

hager

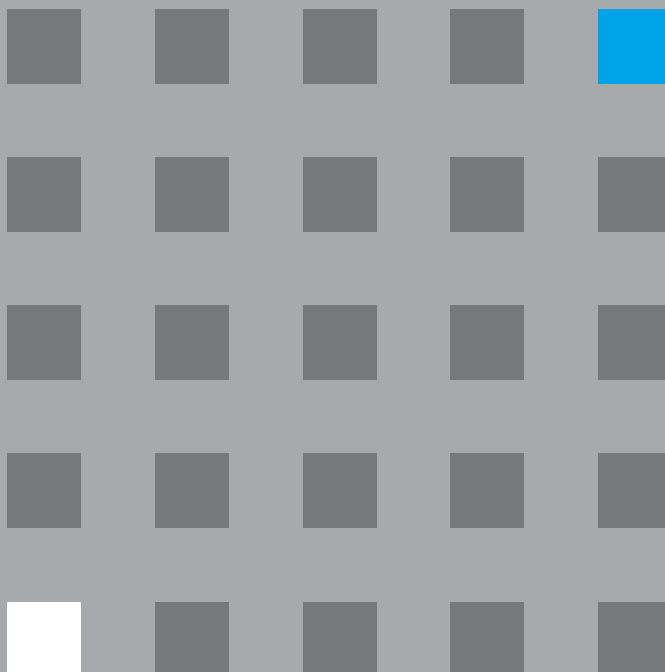
ashley

klik

TEHALIT



# General Catalogue 2007





### **Welcome to the 2007 Hager General Catalogue**

As we continue to expand our product range with new innovations we have taken the step to integrate all the Products and Brands into one catalogue. This should provide you with a convenient reference source for all our products and associated technical information.

This new Catalogue now includes the Hager, Ashley, Klik and Tehalit ranges.

A number of new products have been added including, the Flush Consumer Unit, specifically designed to meet the requirements for Building Regulations Part M installations, a new range of Miniature Circuit Breakers with breaking capacities 10-15kA, and the Tebis TX range of intelligent building controls for commercial & residential applications. Additionally the energy saving Klik Digital connection system has been extended with new occupancy sensors that can be controlled via wall switches, and for the first time the range of easy to fit Tehalit perimeter cable management system has been included in the Hager catalogue.

This new Catalogue should provide you with a wide choice of products for Electrical Distribution for both Commercial and Residential applications in one easy to use document.

Daniel Hager

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# Hager On-Line



## What do you get?

Visiting [www.hager.co.uk](http://www.hager.co.uk) will provide you with the latest news about Hager products, website updates and recent case studies.

The hager website also gives information about the Hager, Ashley, Klik and Tehalit brands. The products and solutions section has been broken down into easy to navigate sections. Each product page provides general information and images to further explain product functionality and benefits.



One of the most useful sections on the website is the 'Downloads' section. You can download all catalogues, brochures and leaflets from Hager, Ashley, Klik and Tehalit ranges in PDF format. This also includes the latest Trade Price List. Also available for downloading are Press Releases and Images.



You can access contact details of various departments, such as telephone, fax and e-mail addresses for; National Sales, Project and Estimating Department and the Technical Support Department.

There is also a contact form for general enquiries, which we will endeavour to reply to within 48 hours.

As well as all the useful information mentioned you can also find details about 'Hager in the UK' and it's 'Quality and Services'.

Registration to the Hager website is free and offers great access to more information.

## Why should you register?

Apart from benefiting from the above when you register you will be able to take advantage of many more services, such as

Technical Support as well as access to the technical downloads, the Applications Guide and you can look at information about Hager Training Courses and enrol for free. Additionally the interactive animations and e-tools section show how products work and show how their features can benefit you. There is also access to wallpapers and screensavers. When registering with [www.hager.co.uk](http://www.hager.co.uk) you can also opt in to receive the monthly Hager Newsletter.



## Especially for Contractors!

If you are an Electrical Contractor in the UK you can benefit from creating your own website with Hager. It only takes 10 minutes to create using multiple-choice options, the website will then be added to Hager's Electrical Contractors directory at [www.your-electrician.com](http://www.your-electrician.com). Hager's Electrical Directory is



advertised to the whole of the UK. This is another tool your business can benefit from.

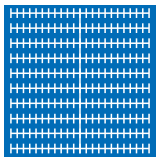
## How to Register.

Simply visit [www.hager.co.uk](http://www.hager.co.uk), under the 'Professional Users' menu selection, click 'Registration' and fill in the form and click 'Send'. Your information will be updated to our system within 48 hours. You can then benefit from being a registered user.

## Website contact details

If you have any questions about the Hager website, contact the web team at [info@hager.co.uk](mailto:info@hager.co.uk), or fill in the 'Contact Us' form under the services section at [www.hager.co.uk](http://www.hager.co.uk) if you are a registered user.





## Faster Fitting for New Consumer Unit With Removable and Resealable Top Wall

The new consumer unit range is faster and simpler to install thanks to a removeable top wall that reseals itself when replaced – a first for the UK. Installation of the new board needs just three tools, since it has features designed to simplify initial fixing, through cabling, to the final fitting of the devices.

The launch of our new range follows 2 years of development. Key to the development was the research conducted among electrical contractors. The practical features incorporated are a direct result of this research.

The new unit can be mounted on uneven walls with minimum visible distortion, thanks to flexible fixing points. These are angled to allow level alignment using the factory fitted spirit level within the consumer unit. A choice of multiple fixing points means the contractor can avoid concealed cables behind the unit.

A removable top wall saves time, since there is no need to thread cables through knockouts. The cable entries are simply snapped off using a pair of pliers, which saves time and also makes the installation safer with less chance of injury from a knife or jagged edges. Replacing the top wall reseals the unit to IP4X, thanks to a foam seal at the top of the unit, thus removing the need for grommets and silicon sealing.

The new range has more space between the devices and terminal bars than any other product. The neutral and earth bars are aligned with the devices at the top of the board



for easy access and there are no restrictions under the DIN rail to obstruct cable runs.

Recognising that the incoming cable is the hardest to dress and fix, we have introduced a clip-in meter tail kit into which the cable is terminated. Flexible links from this then feed into the incoming device.

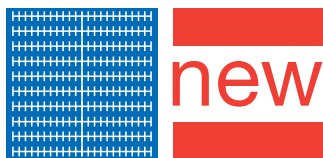
A full metal DIN rail minimises distortion and ensures that devices fit square in the unit and are not dislodged. A clip on the devices makes them easy to remove and replace, without releasing others from the busbar.

A number of consumer unit configurations are possible thanks to a snap-able busbar and the positioning of the terminal bars at the top of the board. A size 6 board with 18 outgoing ways for example, can be configured as a split load board with 1 + 17 outgoing ways to 13 + 5 outgoing ways or as a twin tariff board with 17 + 1 outgoing ways through to 9 + 9.

Finally a label can be mounted on either the cover of the unit or on the devices. There is a recessed section on the board for an RCD label to meet wiring regulations.



Our new range is the most contractor friendly on the market. It is full of practical features to aid installation. We also think that its design makes it the most aesthetic range available, with its modern clean lines and textured finish.



## Flush Consumer Unit

The new range of flush fit consumer units that is up to 25 percent faster to fit in both solid and partition walls.

For partition walls, a flange and frame clamps the unit to the wall. There is no need for separate fixings, the unit simply slots into the prepared hole and the integral fixing screws are tightened.

With solid brick walls, the installer refits the flange to the sides of the back box and uses it as a fixing bracket to secure the base unit to the wall. This allows the base unit to be held well away from the edge of the blocks or bricks and the plastering can be levelled to the edge of the base. The front cover can then be fixed from the front.

There is a choice of 32mm or 25mm knockouts for the incoming cable. You can also fit the back box either way up, so the incomer cable can enter from the top or bottom from either the left or the right. Similarly for the outgoing cables two removable plates at the top and bottom of the box allow the choice of slotted, overlap or 20mm knockouts from either the top or the bottom.

When it comes to cabling, there is plenty of space between the devices and the terminal bars. The neutral and earth bars are aligned with the devices at the top of the board for easy access and there are no restrictions under the DIN rail to obstruct cable runs.

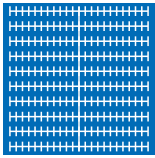
A full metal DIN rail minimises distortion and ensures that devices fit square in the unit and are not dislodged. A clip on the device makes them easy to remove and replace, without releasing others from the busbar.

Finally you can mount a label on either the cover of the unit or on the devices. There is a recessed



section on the board for an RCD label to meet wiring regulations.

The range includes 12 way and 18 way split load boards with a 100A switch and either a 63A or an 80A 30mA RCD. In addition there is a 12-way split load board with 6 + 6 outgoing ways, a 100A switch and two-80A 30mA RCD.



# Protection and Energy Saving Solution for Tesco Homeplus

Contractor Essex Electrical Group Plc has used Hager distribution boards to provide both circuit protection and a simple energy saving control solution for Tesco's new Homeplus stores.

To date Tesco is trialling seven non-food stores under the brand Homeplus. In common with the group's corporate policy, the stores aim to minimise their use of energy. Each store has a sales area of more than 30,000 sq ft.

Hager distribution boards provide all the circuit protection. The company's contactors, time switches and photocells also provide lighting control. Lighting can account for more than 50% of the energy usage in a retail outlet so this was a key energy saving initiative.

Typically each store has a panelboard with a mains incomer of either 400A or 630A. This then feeds up to 12 sub-distribution boards, most of which are TP&N but with some SP&N boards.

The lighting control uses a combination of a master keyswitch, digital time switches and photocells all of which switch the luminaires via contactors. The lighting circuits are split so that 40% can be switched on for cleaning and/or shelf stacking, with the remaining 60% switched on when the store is open to the public.

The master key switch turns on 40% of the lighting at the beginning of the shift and then turns off all the lighting at the end of the day. Digital time switches switch on the remaining lights when the store opens and also turn off 60% of the lighting when the store closes to



the public, for shelf stacking and cleaning, and finally the remaining circuits at the end of the day.

In addition photocells turn the lighting circuits on or off in response to natural daylight levels. Roof lights maximise the amount of natural light available.

Comments Andy Collinge, contracts manager for Essex Electrical Group: "Tesco has opted for simple but effective control of their lighting in their new Homeplus stores. Using time clocks and photocells for automatic switching removes the responsibility from the staff and ensures an energy efficient solution.

"Using Hager's digital timers saved us a lot of installation time. Not only do they have a weekly cycle option to account for different opening times, but they also have an intelligent key that can be pre-programmed with the desired settings.

"For multiple installations with several lighting circuits that are the same, using these timers saved a lot of commissioning time. It also ensures that the different stores have the same lighting control for consistency and if the opening times need altering this can be done quickly and with minimum disruption."







## Bus System Saves Cabling and Time for New Fast Fit Tesco Warehouse

Hulse Electrical has used Hager's Tebis bus system to meet a tight deadline for a complex lighting control solution at Tesco's new 265,000 square foot national distribution centre.

A busbar system supplies power to the 340 lighting circuits. Switching so many circuits using a hardwired solution would involve multiple cabling and several cable runs to switches. This would prove complex, inflexible to change and time consuming. The new distribution centre had to be completed in just 14 weeks.

The switching solution specified by Hulse Electrical used Hager's bus system Tebis. The bus line is a twisted pair cable that runs around the installation in a loop. The lighting circuits and switches are connected to the bus system via output and input devices.

In contrast using a hard-wired solution would involve running twin core cables from each circuit to a switch. Not only is this labour intensive, but it is inflexible if there are any changes or additions.

After installing the bus line, a PC commissioned the system. This involved assigning both switches and lighting circuits addresses and then programming the bus system so that certain circuits only respond to certain switches.

These switching combinations are easily changed or expanded in the future without any new cabling. If a new switch is needed then it is attached to the bus line and programmed into the system.

The bus system saves cabling and time for new fast fit Tesco warehouse. In addition to providing a flexible and fast fit solution for switching multiple lighting circuits, Tebis



can provide additional control options. In this instance if the mains power is lost a generator switches on to provide power. Tebis interfaces with the generator so that the lighting drops down to one-third normal levels to reduce the loading.





## Local Contractor Showcases Smart Home Technology

Carmunnock based contractor Shaun McCarroll, of Electric Works Ltd, has turned to Hager's Tebis bus based system for a simple to understand building services control system to showcase Smart Home technology using his own home.

The Tebis system controls the lighting, underfloor heating and motorised curtains. It also interfaces with the burglar and smoke alarms.

McCarroll argues that while applying building automation technology to the home offers the end user several advantages, such as functionality, convenience and energy efficiency, the public wants a simple to understand system.

"In practice the general public are not used to push button controls or PC control when it comes to switching the lights on or turning the heating down. Using Tebis they can set different lighting scenes or switch multiple services using either a normal wall switch or a remote control," states McCarroll.

"I would not recommend a system that I do not have myself, so it makes sense to use my own home to demonstrate and sell such technology" he continues.

In addition to controlling the building services using a bus system, he has run data cabling throughout his 1920's cottage so that television and audio can be streamed to any room in the house.

Using Tebis he can supply various lighting scenarios for different rooms. In the living room, for instance, the lighting can be dimmed and the curtains drawn for watching the home cinema system. Similarly in the



bathroom a waterproof plasma TV can be watched while the lights are dimmed down or coloured lights can swathe the bathroom in amber.

On a more practical level, a single switch by the front door turns all off all the lights in the house and the heating down to economy level. On entering the house another switch turns the heating back on to comfort levels plus some lights to illuminate an entrance pathway – for example in the hall, kitchen and living room. McCarroll could also have a light switch in a child's bedroom that can turn on the bedroom, landing and toilet lights.

Linking the system to the burglar and smoke alarms, means that

Tebis can also provide additional security for the homeowner. In McCarroll's house if the burglar alarm is activated all the internal and external lights turn on as an additional deterrent. Activating the smoke alarms will turn on the landing, stair and hall lights to illuminate an escape route.

Heating is controlled in each room by a separate thermostat, and can be switched between comfort levels and economy using the thermostat switch or the remote control. Having an efficient and controllable heating system has saved him an estimated £65 per month on heating bills.

Comments McCarroll; "Using a bus system such as Tebis means there are endless control



permutations. It is simple to install and commission. Most importantly for the end user it is simple for them to understand and control. Due to this they tend to use its full functionality and it is not merely technology for technology sake. Also control is easily added to or changed in the future with minimal or no recabling"





# DVLA Klinks into Digital Lighting Control

Contractor Lorne Stewart has specified Hager's Klik DCS to meet the daylight linking lighting control specified by the DVLA for the refurbishment of its Swansea headquarters.

The ongoing refurbishment is due for completion in September 2007. Key to the specification is the improved working conditions for the 4000 staff and the environmental and cost benefits of linking the lights to both occupancy and natural daylight levels.

Consultants WSP detailed the exact lighting control required from the RIDI dimmable ballasts. These are to dim to 400 lux at desk height in office areas and to 300 lux in rest areas. Remote handsets can be used to dim the lighting to 150 lux at the touch of a button and wall switches in meeting rooms can turn the lighting off or manually dim up or down.

Using the Klik DCS system an occupancy sensor detects presence and operates the lights. As daylight levels increase the lights dim down automatically and eventually switch off if natural lighting levels are high enough. If no personnel have been detected for a period of 15 minutes the lights dim down to 10% over 30 seconds, stay at 10% for another 30 seconds and then switch off. On detecting presence the lights dim up to 100% and then dim to match the daylight levels.

Lorne Stewart selected the Klik Digital Connection System because of its ease of installation and commissioning. The contractors do not need to change from standard installation practice and a simple hand held remote control programmer makes commissioning simple.



The Klik DCS system is based on a marshalling box with either 4, 6, 8 or 10 outgoing ways and occupancy sensors that incorporate daylight linking. Each box provides flexibility to control either one lighting circuit, or by two removing a copper link. Both normal and emergency digital light fittings simply plug into the box with the cable supplying both power and data in one connection.

Klik sensors provide the automatic lighting control. Either one or two of these sensors can be hard wired into the Klik DCS box depending on the number of lighting circuits to be controlled. These sensors combine both the occupancy sensing and the daylight linking control required

by the DVLA, whilst still offering the flexibility to override the system when necessary.





## Emirates Stadium Klinks into Light

Electrical Contractor Goodmarriott & Hursthouse has used Hager's Klik LDS as a fast fit lighting installation solution for Arsenal's new Emirates Stadium, which has now reached practical completion.

The Klik LDS marshalling boxes were used for the light fittings in the executive boxes, banqueting areas, restaurants, offices and large open plan rooms.

Goodmarriott & Hursthouse estimates that the system provided a 60% installation time saving since each marshalling box only needs wiring once at first fix. When other trades have left site 4, 6, 8, 10 or 12 luminaires simply plug in. Further time savings were realised at final fix since each luminaire is supplied with the Klik plug already attached.

Each Klik LDS box can supply either one lighting circuit, or, two by removing a copper link. Emergency fittings also plug into the system since each socket will accept four pins, with the fourth contact providing an auxiliary circuit for connecting to a battery.

Project manager for the electrical contractors, Colin Brunton reports two further benefits of using the system. First the electricians could inspect and test the installation before the ceiling went back up. In addition the ceiling void is congested with other services so using a single Klik LDS box to plug in several luminaires is simpler for both installation and for future maintenance.





The new consumer unit range has been designed in partnership with contractors and homeowners, providing benefits to meet today's protection, control and electrical distribution needs.

From the outset, Hager worked closely with contractors and housing developers to provide an aesthetic design that would fit into both new and existing properties, whilst retaining a high level of protection for the equipment, the installer and for the user.

The new consumer unit from Hager is also suitable for small commercial installations such as shops, offices and hotels, where aesthetics are important.

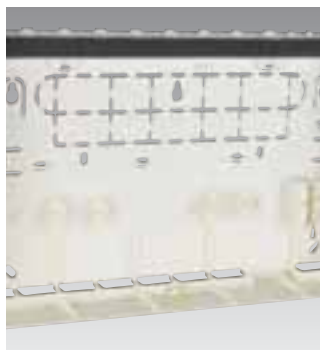
Hager Consumer Units Insulated and metal types feature downward opening doors, with the insulated type available in either plain or transparent door variants on many of the most popular unit sizes. Optionally, a key operated lock can be fitted to secure the lid over the devices to prevent tampering.

All variants are constructed from just six enclosure sizes. The smallest unit will provide a single way consumer unit whilst the largest will house 22 modules to provide a 20-way consumer unit.

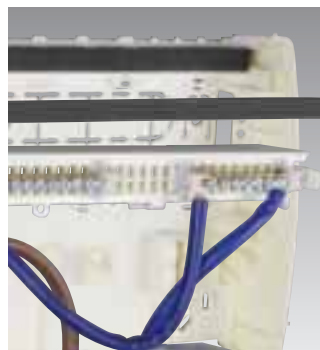


Large choice of fixing points.

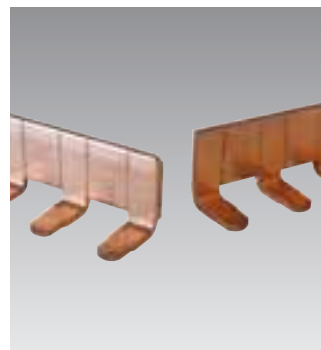
Best in class cable space top side and back



Rear cutouts are optimised for size and position.



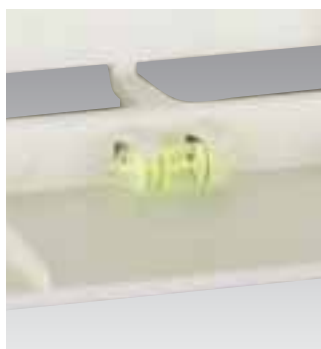
Top wall removes for easy cable access and reseals to IP4X using the two foam strips provided.



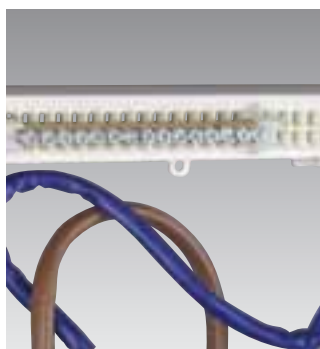
Snap-able busbar allows quick configuration of installation.



Switch disconnector incomer		<b>IP55 Weatherproof consumer units</b>	
- Insulated	1.2	Switch disconnector incomer	1.12
- Metal	1.2		
RCCB		RCCB incomer	1.12
- Insulated	1.3		
- Metal	1.3	Split load 80A RCCB	1.12
Split load (63A RCCB)		Enclosures and switch fuses	1.13
- Insulated	1.4	Skeleton (Mantel)	1.13
- Metal	1.4	Accessories	1.14
Split load (80A & 100A RCCB)		Mini Gamma IP30	1.16
- Insulated	1.4		
- Metal	1.4		
Split load time delayed			
- Insulated	1.5		
- Metal	1.5		
Twin RCCB board with overall 100A switch disconnector		<b>IP55 Weatherproof enclosures</b>	
- Insulated	1.5	Vector II	1.17
Twin and multi tariff		Volta flush mounting enclosures	1.18
- Insulated	1.5	Volta accessories	1.19
- Metal	1.5	Vega surface mounting enclosures	1.20
<b>Flush consumer unit</b>	<b>1.6</b>	Vega accessories	1.21
<b>SP&amp;SN Consumer Unit</b>			
Disconnector incomer			
- Insulated	1.10		
- Metal	1.10		
RCCB incomer			
- Insulated	1.10		
- Metal	1.10		
Insulated enclosures	1.11		
Metal enclosures	1.11		
Garage units	1.12		



Integrated spirit level.



Terminal bars are top mounted for easy cable dressing, fully rated to 100A.



The incoming meter tail kit allows you to save time when installing 25mm<sup>2</sup> & 35mm<sup>2</sup> meter tails by simply connecting to the direct terminal block. This removes the need to bend incoming cables into the consumer unit.

## Switch Disconnecter Incomer - Insulated



VC206

<i>Switch disconnecter (isolator) rating</i>	<i>Total ways</i>	<i>Switch dis. cont. ways</i>	<i>Enclosure size Insulated</i>	<i>Cat ref. Insulated plain door</i>	<i>Cat ref. Insulated glazed door</i>
63A	1	1	1	<b>VC201</b>	<b>VC201G</b>
63A	2	2	1	<b>VC202</b>	<b>VC202G</b>
63A	3	3	2	<b>VC203</b>	<b>VC203G</b>
63A	4	4	3	<b>VC204</b>	<b>VC204G</b>
63A	6	6	3	<b>VC206</b>	<b>VC206G</b>
100A	4	4	3	<b>VC104</b>	<b>VC104G</b>
100A	6	6	3	<b>VC106</b>	<b>VC106G</b>
100A	8	8	4	<b>VC108</b>	<b>VC108G</b>
100A	10	10	4	<b>VC110</b>	<b>VC110G</b>
100A	12	12	5	<b>VC112</b>	<b>VC112G</b>
100A	14	14	5	<b>VC114</b>	<b>VC114G</b>
100A	16	16	6	<b>VC116</b>	<b>VC116G</b>
100A	20	20	6	<b>VC120</b>	<b>VC120G</b>

## Switch Disconnecter Incomer - Metal



VH106G

<i>Switch disconnecter (isolator) rating</i>	<i>Total ways</i>	<i>Switch dis. cont. ways</i>	<i>Enclosure size Metal</i>	<i>Cat ref. Metal plain door</i>	<i>Cat ref. Metal glazed door</i>
63A	1	1	1		<b>VH201</b>
63A	2	2	2		<b>VH202</b>
100A	4	4	3	<b>VH104</b>	<b>VH104G</b>
100A	6	6	3	<b>VH106</b>	<b>VH106G</b>
100A	8	8	4	<b>VH108</b>	<b>VH108G</b>
100A	10	10	4	<b>VH110</b>	<b>VH110G</b>
100A	14	14	5	<b>VH114</b>	<b>VH114G</b>
100A	16	16	6	<b>VH116</b>	<b>VH116G</b>
100A	20	20	6	<b>VH120</b>	<b>VH120G</b>

## RCCB Incomer - Insulated



VC404H

<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB prot. ways</i>	<i>Enclosure size Insulated</i>	<i>Cat ref. Insulated plain door</i>	<i>Cat ref. Insulated glazed door</i>
40A 30mA	1	1	1	VC401H	VC401HG
40A 30mA	2	2	1	VC402H	VC402HG
63A 30mA	3	3	3	VC403H	VC403HG
63A 30mA	4	4	3	VC404H	VC404HG
63A 30mA	6	6	3	VC406H	VC406HG
63A 30mA	8	8	4	VC408H	VC408HG
100A 30mA	4	4	3	VC304H	VC304HG
100A 30mA	6	6	3	VC306H	VC306HG
100A 30mA	8	8	4	VC308H	VC308HG
100A 30mA	14	14	5	VC314H	VC314HG
100A 30mA	18	18	6	VC318H	VC318HG

## RCCB Incomer - Metal



VH404HG

<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB prot. ways</i>	<i>Enclosure size Metal</i>	<i>Cat ref. Metal plain door</i>	<i>Cat ref. Metal glazed door</i>
40A 30mA	1	1	1		VH401H
40A 30mA	2	2	1		VH402H
63A 30mA	4	4	3	VH404H	VH404HG
63A 30mA	6	6	3	VH406H	VH406HG
63A 30mA	8	8	4	VH408H	VH408HG
100A 30mA	4	4	3	VH304H	VH304HG
100A 30mA	6	6	3	VH306H	VH306HG
100A 30mA	8	8	4	VH308H	VH308HG
100A 30mA	14	14	5	VH314H	VH314HG
100A 30mA	18	18	6	VH318H	VH318HG



## Split Load (63A RCCB) - Insulated



VC766HG

<i>Switch disconnecter (isolator) rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Switch dis cont ways</i>	<i>Enclosure size Insulated</i>	<i>Cat ref. Insulated plain door</i>	<i>Cat ref. Insulated glazed door</i>
100A	63A 30mA	6	3	3	4	<b>VC733H</b>	<b>VC733HG</b>
100A	63A 30mA	8	config.		5	<b>VC708C</b>	<b>VC708CG</b>
100A	63A 30mA	10	5	5	5	<b>VC755H</b>	<b>VC755HG</b>
100A	63A 30mA	12	6	6	5	<b>VC766H</b>	<b>VC766HG</b>
100A	63A 30mA	12	config.		5	<b>VC712C</b>	<b>VC712CG</b>
100A	63A 30mA	18	config.		6	<b>VC718C</b>	<b>VC718CG</b>

## Split Load (63A RCCB) - Metal

<i>Switch disconnecter (isolator) rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Switch dis cont ways</i>	<i>Enclosure size Metal</i>	<i>Cat ref. Metal plain door</i>	<i>Cat ref. Metal glazed door</i>
100A	63A 30mA	8	config.		5	<b>VH708C</b>	<b>VH708CG</b>
100A	63A 30mA	12	config.		5	<b>VH712C</b>	<b>VH712CG</b>

## Split Load (80A & 100A RCCB) - Insulated



VC666HG

<i>Switch disconnecter (isolator) rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Switch dis cont ways</i>	<i>Enclosure size Insulated</i>	<i>Cat ref. Insulated plain door</i>	<i>Cat ref. Insulated glazed door</i>
100A	80A 30mA	10	5	5	5	<b>VC655H</b>	<b>VC655HG</b>
100A	80A 30mA	12	6	6	5	<b>VC666H</b>	<b>VC666HG</b>
100A	80A 30mA	12	config.		5	<b>VC612C</b>	<b>VC612CG</b>
100A	80A 30mA	18	config.		6	<b>VC618C</b>	<b>VC618CG</b>
100A	100A 30mA	10	5	5	5	<b>VC555H</b>	<b>VC555HG</b>
100A	100A 30mA	12	config.		5	<b>VC512C</b>	<b>VC512CG</b>
100A	100A 30mA	18	config.		6	<b>VC518C</b>	<b>VC518CG</b>

## Split Load (80A & 100A RCCB) - Metal



VH618CG

<i>Switch disconnecter (isolator) rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Switch dis cont ways</i>	<i>Enclosure size Metal</i>	<i>Cat ref. Metal plain door</i>	<i>Cat ref. Metal glazed door</i>
100A	80A 30mA	12	config.		5	<b>VH612C</b>	<b>VH612CG</b>
100A	80A 30mA	18	config.		6	<b>VH618C</b>	<b>VH618CG</b>
100A	100A 30mA	12	config.		5	<b>VH512C</b>	<b>VH512CG</b>
100A	100A 30mA	18	config.		6	<b>VH518C</b>	<b>VH518CG</b>

## Split Load Time Delayed - Insulated

<i>Time delayed RCCB rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Switch dis cont ways</i>	<i>Enclosure size Insulated</i>	<b><i>Cat ref. Insulated plain door</i></b>	<b><i>Cat ref. Insulated glazed door</i></b>
100A 100mA	63A 30mA	12	config.		5	<b>VC712T</b>	<b>VC712TG</b>

## Split Load Time Delayed - Metal

<i>Time delayed RCCB rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Switch dis cont ways</i>	<i>Enclosure size Metal</i>	<b><i>Cat ref. Metal plain door</i></b>	<b><i>Cat ref. Metal glazed door</i></b>
100A 100mA	63A 30mA	12	config.		5	<b>VH712T</b>	<b>VH712TG</b>

## Twin RCCB Board with overall 100A Switch Disconnecter - Insulated



<i>RCCB rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB Prot ways</i>	<i>Enclosure size Insulated</i>	<b><i>Cat ref. Insulated plain door</i></b>	<b><i>Cat ref. Insulated glazed door</i></b>
80A 30mA	80A 30mA	12	6 + 6	6	<b>VC866H</b>	<b>VC866HG</b>
80A 100mA	80A 30mA	10	config.	5	<b>VC810C</b>	<b>VC810CG</b>
80A 100mA	80A 30mA	16	config.	6	<b>VC816C</b>	<b>VC816CG</b>

VC816C

## Twin and Multi Tariff - Insulated



<i>Switch disc. rating</i>	<i>Total ways</i>	<i>Isolator 1 ways</i>	<i>Isolator 2 ways</i>	<i>Isolator 3 ways</i>	<i>Enclosure size Insulated</i>	<b><i>Cat ref. Insulated plain door</i></b>	<b><i>Cat ref. Insulated glazed door</i></b>
100A 100A	12	config.			5	<b>VC912C</b>	<b>VC912CG</b>
100A 100A	18	config.			6	<b>VC918C</b>	<b>VC918CG</b>
100A 100A 63A	12	6	5	1	6	<b>VC9651</b>	<b>VC9651G</b>
100A 100A 63A	16	8	7	1	6	<b>VC9871</b>	<b>VC9871G</b>

VC918CG

## Twin and Multi Tariff - Metal

<i>Switch disc. rating</i>	<i>Total ways</i>	<i>Isolator 1 ways</i>	<i>Isolator 2 ways</i>	<i>Isolator 3 ways</i>	<i>Enclosure size Metal</i>	<b><i>Cat ref. Metal plain door</i></b>	<b><i>Cat ref. Metal glazed door</i></b>
100A 100A	12	config.			5	<b>VH912C</b>	<b>VH912CG</b>
100A 100A	18	config.			6	<b>VH918C</b>	<b>VH918CG</b>
100A 100A 63A	12	6	5	1	6	<b>VH9651</b>	<b>VH9651CG</b>
100A 100A 63A	16	8	7	1	6	<b>VH9871</b>	<b>VH9871G</b>

Hager has launched a new range of flush fit consumer units that is up to 25 percent faster to fit in both solid and partition walls.

For partition walls, a flange and frame clamps the unit to the wall. There is no need for separate fixings, the unit simply slots into the prepared hole and the integral fixing screws are tightened.

With solid brick walls, the installer refits the flange to the sides of the back box and uses it as a fixing bracket to secure the base unit to the wall. This allows the base unit to be held well away from the edge of the blocks or bricks and the plastering can be levelled to the edge of the base. The front cover can then be fixed from the front.

There is a choice of 32mm or 25mm knockouts for the incoming cable. You can also fit the back box either way up, so the incoming cable can enter from the top or bottom from either the left or the right. Similarly for the outgoing cables two removable plates at the top and bottom of the box allow the choice of slotted, overlap or 20mm knockouts from either the top or the bottom.

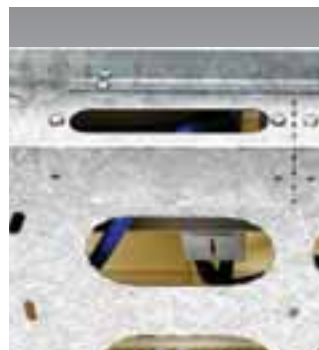
When it comes to cabling, there is plenty of space between the devices and the terminal bars. The neutral and earth bars are aligned with the devices at the top of the board for easy access and there are no restrictions under the DIN rail to obstruct cable runs.

A full metal DIN rail minimises distortion and ensures that devices fit square in the unit and are not dislodged. A clip on the device makes them easy to remove and replace, without releasing others from the busbar.

Finally you can mount a label on either the cover of the unit or on the devices. There is a recessed section on the board for an RCD label to meet wiring regulations.



Large choice of knockouts for cabling.



Large rear cable entries can be rotated, knocked out and removed completely giving a great choice of cable entries.



Back box can be fitted either way to allow choice between 25 or 32mm knockout for incoming.



Flush Consumer Unit

1.8



Innovative flange and clamp design allows for quick fitting to plaster board walls.



Removing flange from the top of the unit and fixing to the side allows easy fixing to brick wall without the worry of bricks breaking.



Fixing points can be easily accessed through the front sides and rear of the base.



## Flush Consumer Unit



VF712C

<i>RCCB rating</i>	<i>Switch disconnecter (isolator) rating</i>	<i>Total ways cont. ways</i>	<i>Switch dis.</i>	<i>Enclosure size Metal</i>	<i>Cat ref. Insulated plain door</i>
63A 30mA	100A	12	Config.	5	<b>VF712C</b>
63A 30mA	100A	18	Config.	6	<b>VF718C</b>
80A 30mA	100A	12	Config.	5	<b>VF612C</b>
80A 30mA	100A	18	Config.	6	<b>VF618C</b>



## Single Pole & Switched Neutral Consumer Units - Switch Disconnecter Incomer - Insulated



VC114N

<i>Switch disconnecter (isolator) rating</i>	<i>Total ways</i>	<i>Switch dis. cont. ways</i>	<i>Enclosure size Insulated</i>	<b><i>Cat ref. Insulated plain door</i></b>	<b><i>Cat ref. Insulated glazed door</i></b>
100A	14	14	5	<b>VC114N</b>	<b>VC114NG</b>

## Switch Disconnecter Incomer - Metal

<i>Switch disconnecter (isolator) rating</i>	<i>Total ways</i>	<i>Switch dis. cont. ways</i>	<i>Enclosure size Metal</i>	<b><i>Cat ref. Metal plain door</i></b>	<b><i>Cat ref. Metal glazed door</i></b>
100A	14	14	5	<b>VH114N</b>	<b>VH114NG</b>

## RCCB Incomer - Insulated



VC308N

<i>RCCB rating</i>	<i>Total ways</i>	<i>Switch dis. cont. ways</i>	<i>Enclosure size Insulated</i>	<b><i>Cat ref. Insulated plain door</i></b>	<b><i>Cat ref. Insulated glazed door</i></b>
100A 30mA	8	8	4	<b>VC308N</b>	<b>VC308NG</b>

## RCCB Incomer - Metal

<i>RCCB rating</i>	<i>Total ways</i>	<i>Switch dis. cont. ways</i>	<i>Enclosure size Metal</i>	<b><i>Cat ref. Metal plain door</i></b>	<b><i>Cat ref. Metal glazed door</i></b>
100A 30mA	8	8	4	<b>VH308N</b>	<b>VH308NG</b>

## Insulated Enclosures



VC008G

<i>Insulated enclosure with doors</i>	<i>Size</i>	<i>Terminal bars</i>		<i>Pack Qty</i>	<i>Cat ref. Insulated plain door</i>	<i>Cat ref. Insulated glazed door</i>
8 module	3	E: 7 x 16mm <sup>2</sup>	N: 9 x 16mm <sup>2</sup>	1	<b>VC008</b>	<b>VC008G</b>
12 module	4	E: 11 x 16mm <sup>2</sup>	N: 13 x 13mm <sup>2</sup>	1	<b>VC012</b>	<b>VC012G</b>
16 module	5	E: 15 x 16mm <sup>2</sup>	N: 17 x 16mm <sup>2</sup>	1	<b>VC016</b>	<b>VC016G</b>
22 module	6	E: 21 x 16mm <sup>2</sup>	N: 23 x 16mm <sup>2</sup>	1	<b>VC022</b>	<b>VC022G</b>

## Metal Enclosures



VH008

<i>Insulated enclosure with doors</i>	<i>Size</i>	<i>Terminal bars</i>		<i>Pack Qty</i>	<i>Cat ref. Metal plain door</i>	<i>Cat ref. Metal glazed door</i>
4 module	2	E: 5 x 16mm <sup>2</sup>	N: 7 x 16mm <sup>2</sup>	1	<b>VH004</b>	
8 module	3	E: 7 x 16mm <sup>2</sup>	N: 9 x 16mm <sup>2</sup>	1	<b>VH008</b>	<b>VH008G</b>
12 module	4	E: 7 x 16mm <sup>2</sup>	N: 9 x 16mm <sup>2</sup>	1	<b>VH012</b>	<b>VH012G</b>
16 module	5	E: 15 x 16mm <sup>2</sup>	N: 17 x 16mm <sup>2</sup>	1	<b>VH016</b>	<b>VH016G</b>
22 module	6	E: 21 x 16mm <sup>2</sup>	N: 23 x 16mm <sup>2</sup>	1	<b>VH022</b>	<b>VH022G</b>



## Garage Units



VE24H

<i>IP rating</i>	<i>RCCB rating</i>	<i>Ways</i>	<i>MCB rating</i>	<i>Cat ref.</i>
IP30	40A 30mA	2	1 x 32A MCB 1 x 6A MCB	<b>GD24H</b>
IP55	40A 30mA	2	1 x 32A MCB 1 x 6A MCB	<b>VE24H</b>

## IP55 Weatherproof Consumer Units - Switch Disconnecter Incomer

### Description

Weatherproof range of consumer units designed to BS EN 60459-3 Annex 2A

### IP Rating

Rated at IP55 - protected against low pressure water splashing from all directions.



VW110G

<i>Switch disconnecter (isolator) rating</i>	<i>Total ways</i>	<i>Switch dis cont ways</i>	<i>Cat ref.</i>
100A	10	10	<b>VW110G</b>

## - RCCB Incomer





VW310G

<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB protected ways</i>	<i>Cat ref.</i>
100A 30mA	10	10	<b>VW310G</b>


## - Split load (80A RCCB)

<i>Switch disconnecter (isolator) rating</i>	<i>RCCB rating</i>	<i>RCCB protected ways</i>	<i>Switch dis cont ways</i>	<i>Cat ref.</i>
100A	80A 30mA	10	10	<b>VW620G</b>

## Enclosures and Switch Fuses

	<i>Metal enclosure without door</i>	<i>Pack qty.</i>	<i>Cat ref.</i>
	1 module RCBO	1	<b>IU41</b>
	2 module	1	<b>IU2</b>
	2 module with extended height	1	<b>IU42</b>
	3 module	1	<b>IU3</b>
	4 module	1	<b>IU4</b>
	4 module with extended height	1	<b>IU44</b>
	5 module with extended height	1	<b>IU45</b>
	4 mod metal unit 1 x 100A Isolator, AC22A Connection capacity: 50mm <sup>2</sup> rigid conductor 35mm <sup>2</sup> flexible conductor 1 x 63A Fuse	1	<b>IU4-16</b>
	4 mod metal unit 1 x 100A Isolator, AC22A Connection capacity: 50mm <sup>2</sup> rigid conductor 35mm <sup>2</sup> flexible conductor 1 x 100A Fuse	1	<b>IU44-11</b>
	□ For dimensional information see 2.66		

## Skeleton (Mantel)

Skeleton consumer units are designed typically for use in installations in areas with pre-determined space available		e.g. metering cupboards in local authority accommodation.				
	<i>Switch disc. isolator rating</i>	<i>RCCB rating</i>	<i>Total ways</i>	<i>RCCB prot. ways</i>	<i>Switch dis. cont. ways</i>	<i>Cat ref.</i>
	100A	-	12	-	12	<b>VS112</b>
	100A	63mA	10	config.		<b>VS710C</b>
	100A	63mA	12	config.		<b>VS712C</b>

## Accessories

The Hager consumer unit has been designed to be the most versatile consumer unit available on the market today. The accessories below can be used to customise standard consumer units and enclosures to almost any configuration.

■ Incoming tail connection kit:  
A fast and easy way to connect incoming tails to the consumer unit incomer without the difficulties of bending the incomer cable and removing stress on the incomer terminals

	Accessories	Pack qty	Cat ref.
	1 module busbar blank	25	VAS01
	2 module dinrail blank piece	5	VAS02
	8 module busbar	1	VAB08
	12 module busbar	1	VAB12
	16 module busbar	1	VAB16
	21 module busbar	1	VAB21
	14 way SP&SN insulated busbar	1	VAB14N
	Neutral link	1	VAN00
	Locking kit	1	VAL00
	Incoming tail connection kit	1	VAM00
	Dual tariff link kit	1	VAK0D
	Split load link kit	1	VAK0S
	Triple tariff link kit	1	VAK0T
	Label pack	1	VAP00
	Terminal bar support clips	5	VAT00
	Terminal bar 2 way	1	VAT02
	Terminal bar 3 way	1	VAT03
	Terminal bar 4 way	1	VAT04
	Terminal bar 5 way	1	VAT05
	Terminal bar 6 way	1	VAT06
	Terminal bar 7 way	1	VAT07
	Terminal bar 8 way	1	VAT08
	Terminal bar 9 way	1	VAT09
	Terminal bar 10 way	1	VAT10
	Terminal bar 11 way	1	VAT11
	Terminal bar 12 way	1	VAT12
	Terminal bar 13 way	1	VAT13
	Terminal bar 14 way	1	VAT14
	Terminal bar 15 way	1	VAT15
	Terminal bar 16 way	1	VAT16
	Terminal bar 17 way	1	VAT17
	Terminal bar 18 way	1	VAT18
	Terminal bar 19 way	1	VAT19
	Terminal bar 20 way	1	VAT20
	Terminal bar 21 way	1	VAT21
	Terminal bar 22 way	1	VAT22
	Terminal bar 23 way	1	VAT23
	Terminal bar 24 way	1	VAT24
	Front cover fixing	2	VAC00
	Front cover and door size 3 plain	1	VAF3S
	Front cover and door size 3 glazed	1	VAF3SG
	Front cover and door size 4 plain	1	VAF4S
	Front cover and door size 4 glazed	1	VAF4SG
	Front cover and door size 5 plain	1	VAF5S
	Front cover and door size 5 glazed	1	VAF5SG
	Front cover and door size 6 plain	1	VAF6S
	Front cover and door size 6 glazed	1	VAF6SG
	Seal strip size 3 - 8 module	2	VAR3S
	Seal strip size 4 - 12 module	2	VAR4S
	Seal strip size 5 - 16 module	2	VAR5S
	Seal strip size 6 - 22 module	2	VAR6S
	<b>100A terminal block (MCB profile)</b>	1	KR50U
	fits directly onto busbar (cable capacity 50mm²)		

	MCBs Type B	BS 1361 HRC Fuse Carriers	BS 1361 Cartridge Fuses	RCBOs - Single Pole (Single Module)			
				Type B Sensitivity 10mA	Type B Sensitivity 30mA	Type C Sensitivity 10mA	Type C Sensitivity 30mA
<b>Single Pole</b>							
5A		<b>L113</b>	<b>L153</b>				
6A	<b>MTN106</b>			<b>AC104</b>	<b>AD104</b>	<b>AC119</b>	<b>AD119</b>
10A	<b>MTN110</b>				<b>AD105</b>		<b>AD120</b>
15A		<b>L115</b>	<b>L155</b>				
16A	<b>MTN116</b>			<b>AC107</b>	<b>AD107</b>	<b>AC122</b>	<b>AD122</b>
20A	<b>MTN120</b>	<b>L116</b>	<b>L156</b>		<b>AD108</b>		<b>AD123</b>
25A	<b>MTN125</b>			<b>AC109</b>	<b>AD109</b>	<b>AC124</b>	<b>AD124</b>
30A		<b>L118</b>	<b>L158</b>				
32A	<b>MTN132</b>			<b>AC110</b>	<b>AD110</b>	<b>AC125</b>	<b>AD125</b>
40A	<b>MTN140</b>				<b>AD111</b>		<b>AD126</b>
45A					<b>AD112</b>		<b>AD127</b>
50A	<b>MTN150</b>				<b>AD113</b>		<b>AD128</b>
63A	<b>MTN163</b>						
<b>Single Pole and Switched Neutral (2 Mod)</b>							
6A					<b>ADA906U</b>		<b>ADA956U</b>
10A					<b>ADA910U</b>		<b>ADA960U</b>
16A					<b>ADA916U</b>		<b>ADA966U</b>
20A					<b>ADA920U</b>		<b>ADA970U</b>
25A					<b>ADA925U</b>		<b>ADA975U</b>
32A					<b>ADA932U</b>		<b>ADA982U</b>
40A					<b>ADA940U</b>		<b>ADA990U</b>

VAS01 for blank busbar ways

**Note:** When other tripping characteristics are required the NCN and NDN single pole MCB range (see pages 3.3-3.4) are suitable for use with Hager consumer unit enclosures.

#### Single Pole and Switched Neutral MCBs

6A	<b>MLN706A</b>
10A	<b>MLN710A</b>
16A	<b>MLN716A</b>
20A	<b>MLN720A</b>
25A	<b>MLN725A</b>
32A	<b>MLN732A</b>
40A	<b>MLN740A</b>



# Mini Gamma IP30

Insulated enclosures 1 row from 2 to 10 ■

Surface mounted enclosures, with a rigid, chassis, housing a DIN rail.

Supplied with Earth terminals (except GD102E), marking labels and sealing grommets to maintain Class II

Options:

- Keylock
- Plain or transparent door
- Terminals and terminal supports



GD102E



GD106E



GP108P



GP110T

## Description

## Pack qty

## Cat ref.

1 row, 2 ■  
l. 55 x h. 160 x d. 82mm

Compatible with WAGO type 273 connector block. (Not supported)

10

**GD102E**

1 row, 4 ■  
l. 110 x h. 180 x d. 82mm

E: 2 x 16 + 2 x 10mm<sup>2</sup> (capacity to fit an additional 4 hole terminal bar on existing support)

5

**GD104E**

1 row, 6 ■  
l. 148 x h. 180 x d. 82mm

E: 2 x 16 + 2 x 10mm<sup>2</sup> (capacity to fit an additional two 4 hole terminal bars or one 7 hole terminal bar on existing support)

4

**GD106E**

1 row, 8 ■

E: 3 x 16 + 4 x 10mm<sup>2</sup> (capacity to fit an additional two 4 hole terminal bars or one 7 hole terminal bar on existing support)

1

**GD108E**

1 row, 10 ■

E: 3 x 16 + 4 x 10mm<sup>2</sup> (capacity to fit an additional three 4 hole terminal bars or two 7 hole terminal bars on existing support)

1

**GD110E**

## Description

## For enclosure ref

## Cat ref.

Plain door with integrated handle  
(Use of door increases IP rating to IP40)

GD102E  
GD104E  
GD106E  
GD108E  
GD110E

**GP102P**  
**GP104P**  
**GP106P**  
**GP108P**  
**GP110P**

Transparent door with integrated handle  
(Use of door increases IP rating to IP40)

GD102E  
GD104E  
GD106E  
GD108E  
GD110E

**GP102T**  
**GP104T**  
**GP106T**  
**GP108T**  
**GP110T**

Terminal support (no terminals)

GD104E  
GD106E  
GD108E  
GD110E

**GZ104S**  
**GZ106S**  
**GZ108S**  
**GZ110S**

Keylock

for plain or transparent door

**VZ313**

## Description

## Characteristics

**Neutral (blue)**  
**Cat ref.**

**Earth (green)**  
**Cat ref.**

Terminals for mini gamma  
(63A rating)

2 x 16 + 2 x 10  
3 x 16 + 4 x 10

**GZ04N**  
**GZ07N**

**GZ04E**  
**GZ07E**

## IP55 Weatherproof enclosures - Vector II

### Enclosure with door

1 row for 3, 6, 10 and 12 ■  
2 row for 24 ■  
3 row for 36 ■  
Adjustable depth DIN rail (except VE103U).

Supplied with sealing plugs to re-instate IP rating after fixing. Front cover sealing.

### Door operation

3-10 ■ - vertical hinging  
retained in open position at 90°  
12-36 ■ - horizontal hinging  
hinging reversible (left or right)

Colour: RAL 7035 (light grey)

**Wiring ducts** 12 - 36 module enclosures/mini wiring channels left and right ensures conductors are neatly dressed

**IP 55** : AC 400V.  
insulation class:  
class II □



VE212U



VZ428

Designation	(100A rating)	Moulded blanks (In front cover)	Pack qty.	Cat ref.
1 row, 3 ■	N: 1 x 25 + 3 x 16 E: 1 x 25 + 5 x 16	□ 2 x 1/2	1	<b>VE103U</b>
1 row, 6 ■	N: 1 x 25 + 5 x 16 E: 1 x 25 + 7 x 16	□ 2 x 1	1	<b>VE106U</b>
1 row, 10 ■	N: 1 x 25 + 9 x 16 E: 1 x 25 + 11 x 16	□ 2 x 1	1	<b>VE110U</b>
1 row, 12 ■	N: 1 x 25 + 10 x 16 E: 1 x 25 + 13 x 16		1	<b>VE112U</b>
2 rows, 24 ■	N: 1 x 25 + 16 x 16 E: 1 x 25 + 16 x 16		1	<b>VE212U</b>
3 rows, 36 ■	N: 1 x 25 + 19 x 16 E: 1 x 25 + 19 x 16		1	<b>VE312U</b>
<b>Earth and Neutral for TP &amp; N connection assembly</b>	3 x (3 x 16 + 2 x 10mm <sup>2</sup> ) 270mm wide N: 1 x (5 x 16 + 6 x 10mm <sup>2</sup> ) In: 63A To fit 12 module wide enclosure only		1	<b>VZ428</b>
<b>Earth and Neutral for single phase connection assembly</b>	2 x (3 x 16 + 4 x 10mm <sup>2</sup> ) 270mm wide In: 63A to fit 12 module wide enclosure only		1	<b>VZ403</b>
<b>Key lock with 2 keys</b>	For all enclosures		1	<b>VZ311</b>
<b>Sliding support for fixing of additional terminal supports in bottom part of enclosure (VE112U and above)</b>	1 set = 2 supports		1 set	<b>VZ744</b>

## Volta Flush Mounting Enclosures

### IP30 Flush mounting enclosures with doors

1-4 rows  
12-48 I  
63A max total load

- Enclosure manufactured from insulated material
- Frame and door manufactured from metal.
- Reversible door

• Delivered with earth block, blanking clips and circuit identification labelling.



VU12D

VU24D

#### Designation

#### Pack qty

#### Cat ref.

1 row, 12 I  
Wall recess  
w. 330 x h. 317 x d. 89mm  
Outside  
w. 348 x h. 336 x d. 9mm

Quick connect earth terminals  
3 x 25mm + 11 x 4mm  
2 + 1/2

1

**VU12D**

2 rows, 24 I  
Wall recess  
w. 330 x h. 442 x d. 89mm  
Outside  
w. 348 x h. 461 x d. 9mm

Quick connect earth terminals  
5 x 25mm + 17 x 4mm  
4 + 2/2

1

**VU24D**



VU36D

VU48D

3 rows, 36 I  
Wall recess  
w. 330 x h. 567 x d. 89mm  
Outside  
w. 348 x h. 586 x d. 9mm

Quick connect earth terminals  
6 x 25mm + 20 x 4mm  
6 + 3/2

1

**VU36D**


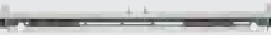

4 rows, 48 I  
Wall recess  
w. 330 x h. 692 x d. 89mm  
Outside  
w. 348 x h. 711 x d. 9mm

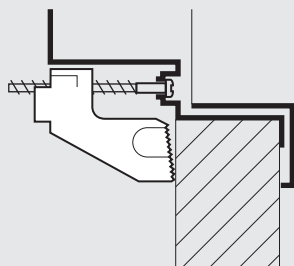
Quick connect earth terminals  
8 x 25mm + 28 x 4mm  
8 + 4/2

1

**VU48D**

## Volta Flush Mounting Enclosures - Accessories

	Designation	Characteristics	Pack qty	Cat ref.
 VZ303	Key lock	Supplied with 2 keys replaces original catch	1	<b>VZ303</b>
	Connection assembly single phase 63A	2 x (3 x 16 + 4 x 10mm <sup>2</sup> ) 270mm wide	1	<b>VZ403</b>
 VZ403	Connection assembly 63A	2 x (3 x 16 + 4 x 10mm <sup>2</sup> ) 1 x (4 x 16 + 7 x 10mm <sup>2</sup> ) 270mm wide	1	<b>VZ428</b>
 VZ428	Counting kit for partition walls Comprising: • 4 support clamps • 4 screws	For mounting flush enclosures in partition walls	1 kit	<b>VZ405</b>





## Vega Surface Mounting Enclosures

### IP40 surface mounting enclosures

with transparent or plain doors;  
1-3 rows 18-54 modules.  
63A max. total load.

Enclosures are of an insulating material coloured white RAL 9016.

The enclosures feature a removable chassis with DIN rails

for ease of installation.

Top and bottom cable entry plates are removable and interchangeable. The door is also reversible with an integral flush handle.

#### Options

- Door lock



VB18R

VB18B

#### Designation

#### Pack qty

#### Cat ref.

1 row, 18 ■  
w. 370 x h. 300 x d. 145mm

Quick connect earth terminals ■ 2+1/2  
4 x 25mm + 14 x 4mm

2 + 1/2

with transparent door

1

**VB18R**

with plain door

1

**VB18B**

2 rows, 36 ■  
w. 370 x h. 450 x d. 145mm

Quick connect earth terminals ■ 4 + 2/2  
7 x 25mm + 25 x 4mm

4 + 2/2

with transparent door

1

**VB36R**

with plain door

1

**VB36B**



VB54R

VB54B

3 rows, 54 ■  
w. 370 x h. 600 x d. 145mm

Quick connect earth terminals ■ 6 + 3/2  
10 x 25mm + 34 x 4mm

6 + 3/2

with transparent door

1

**VB54R**

with plain door

1

**VB54B**

## Vega Surface Mounting Enclosures - Accessories



VZ310

<i>Designation</i>	<i>Pack qty</i>	<i>Cat ref.</i>
<b>Key lock</b> for transparent or opaque doors	1	<b>VZ310</b>

### Connection assemblies

63A	2 x (3 x 16 + 4 x 10mm <sup>2</sup> )	1	<b>VZ708</b>
63A	2 x (3 x 16 + 2 x 10mm <sup>2</sup> )	1	<b>VZ709</b>



VZ708

<b>Coupling pieces</b> for joining two enclosures	1 set	<b>VZ703</b>
--	-------	--------------



VZ709

<b>Replacement cable entry plates</b> top or bottom	With circular cut outs for cables and conduits	10	<b>VZ706</b>
	With rectangular cut outs for cable trunking	10	<b>VZ707</b>



VZ706

<b>Blanking clips</b> to blank out a complete row	1/2 ■ (8.7mm)	50	<b>P031F</b>
	1 ■ (17.5mm)	50	<b>P032F</b>
	18 ■	10	<b>JP015</b>



VZ707

# Ingress Protection Chart


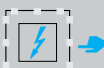
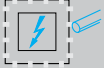
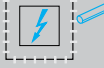
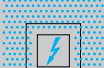
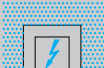
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

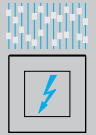
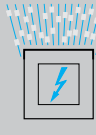

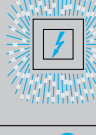

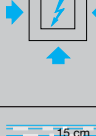

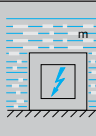
## The first character numeral

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter.
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter.
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

## The second character numeral

Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

## Type Tested Assemblies

### Consumer Units & Distribution Boards

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the British Standard covering the requirements of LV Distribution Boards suitable for this application. The full title is:

#### BS EN 60439-3

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use - Distribution boards

This British standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in the UK as Consumer Units are also included in this British Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's. The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

### Panelboards

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

Generally installed for commercial and light industrial application the panelboard is, however, used in many different types of applications.

Panelboards are covered by the British Standard for Low-voltage Switchgear and Control Gear Assemblies BS EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

### Internal Separation

The internal separation of assemblies is described in the British Standard BS EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

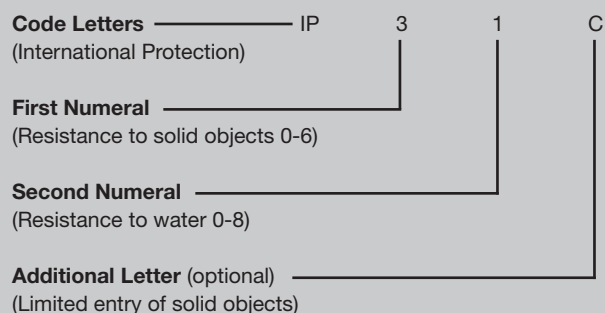
Form numbers are given to some typical forms of separation -

- Form 1 - No separation
- Form 2 - Separation of bus-bars from the functional units
- Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.
- Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.



**Degree of Protection of Enclosures**

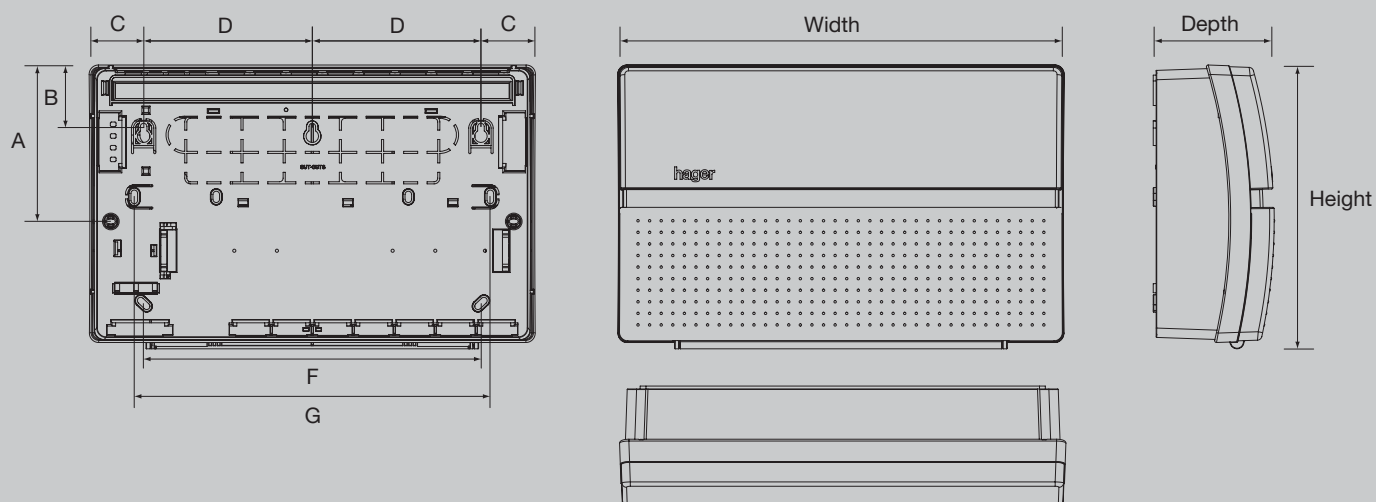
The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water. Refer to page 1.22 for ingress protection chart.

## Consumer Unit - Dimensions



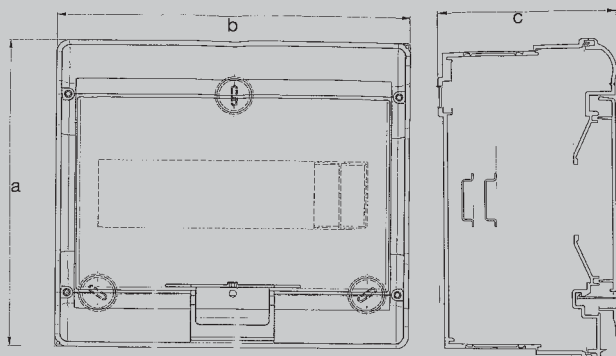
### insulated

enclosure size	Width	Height	Depth	Fixing centres						
				A	B	C	D	E	F	G
3	240	245	105	115	50	45	72	205	145	160
4	310	245	105	115	50	45	107	205	215	230
5	380	245	105	115	50	45	143	205	285	302
6	490	245	105	115	50	45	195	205	395	410

### Non standard enclosure sizes

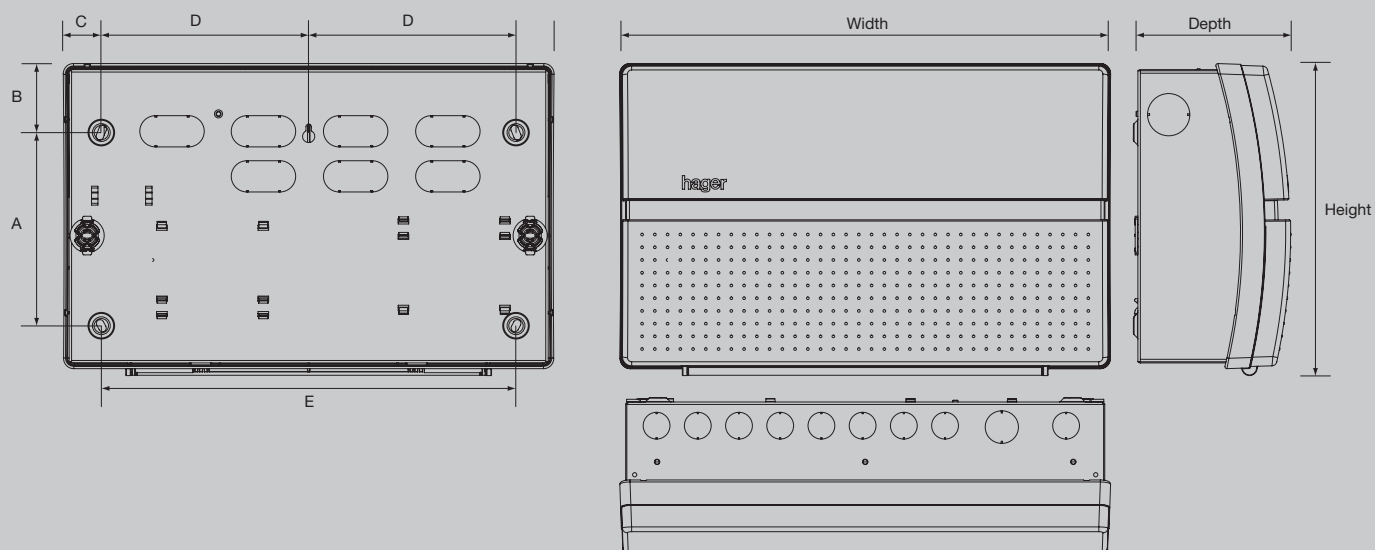
insulated enclosure size	Cat Ref.	Width	Height	Depth
1	VC201	110	180	94
2	VC202	110	180	94
3	VC203	146	180	94

## IP55 Weatherproof Consumer Unit - Dimensions



Cat Ref.	Width	Height	Depth
VW110G	310	302	151
VW310G	310	302	151
VW620G	310	427	151

## Metal Consumer Unit - Dimensions

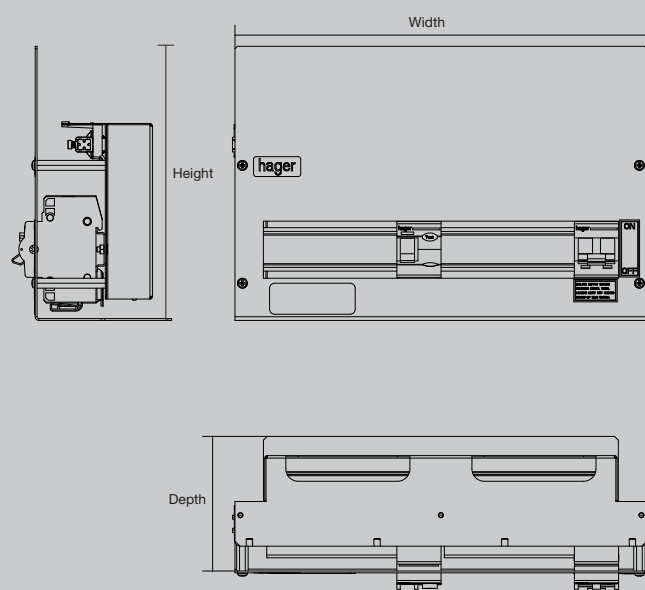


Metal enclosure size	Width	Height	Depth	Fixing centres				
				A	B	C	D	E
2	220	230	110	165	32	55	NA	163
3	240	245	120	150	55	30	89	178
4	310	245	120	150	55	30	125	250
5	380	245	120	150	55	30	160	320
6	490	245	120	150	55	30	214	429

### Non standard enclosure

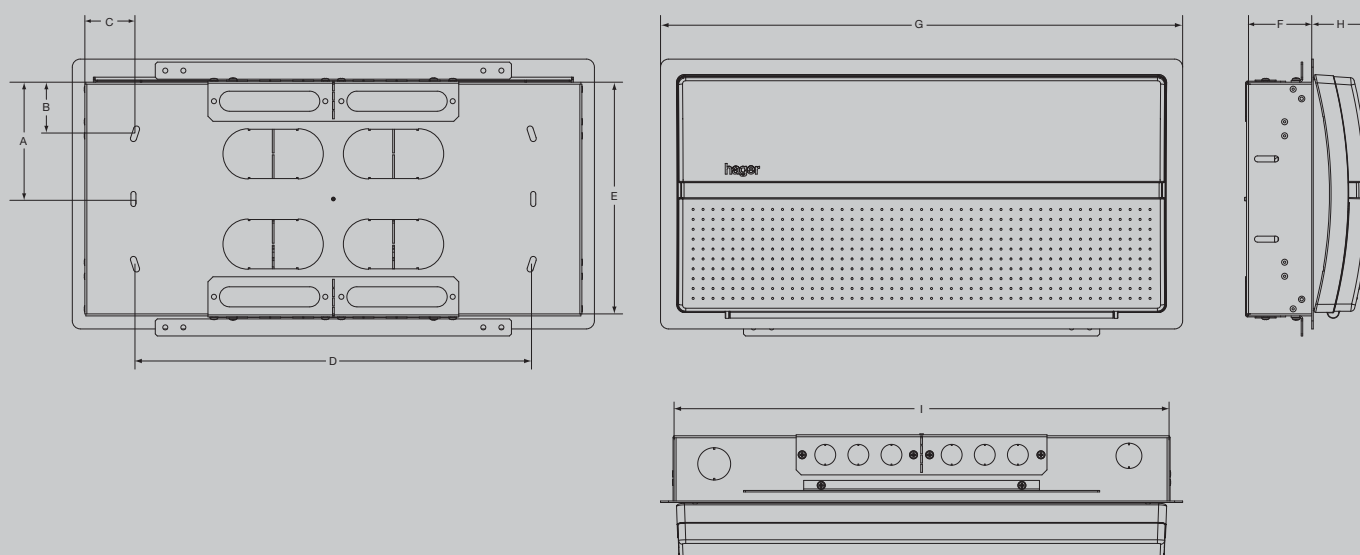
Sizes	Width	Height	Depth
VH201	166	193	124
VH202	166	193	124

## Skeleton (Mantel) Consumer Unit - Dimensions



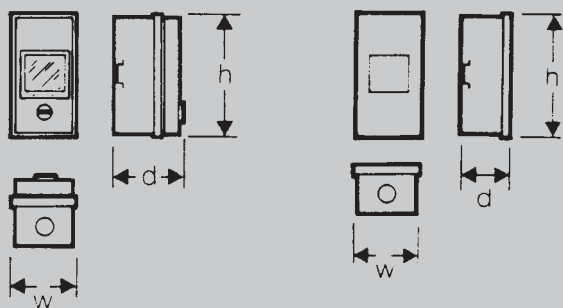
Cat Ref.	Dimensions			Fixing centres
	Width	Height	Depth	
VS112	332	221	74	320
VS710C	332	221	74	320
VS712C	332	221	74	320

## Flush Consumer Unit - Dimensions



	VF612C / VF712C	VF618C / VF718C
A	115	115
B	50	50
C	50	50
D	290	397
E	232	232
F	65	65
G	413	520
H	55	55
I	388	495

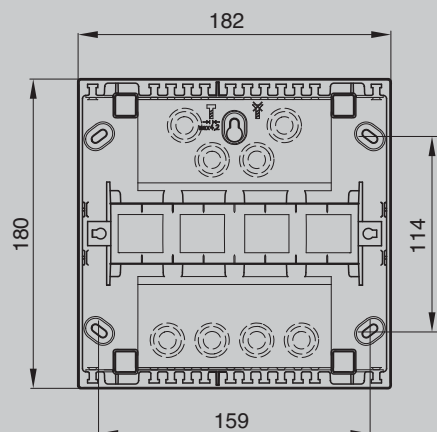
## Enclosures and Switch Fuses - Dimensions



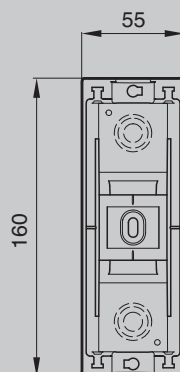
Cat Ref	Height	Width	Depth	Connection	Knockouts
IU41	152mm	50mm	61.5mm	earth only	2 x 20mm
IU2, IU3	152mm	80mm	61.5mm	earth only	2 x 20mm
IU2/D					
IU2/GD	152mm	80mm	87.5mm	earth only	2 x 20mm
IU3/D					
IU4	187mm	115mm	61.5mm	earth only	2 x 25mm
IU4-16					
IU4/D	187mm	115mm	87.5mm	earth only	2 x 25mm
IU44	312mm	125mm	73.5mm	earth only	none
IU45					
IU44-11					
IU44/D	312mm	125mm	99.5mm	earth only	none
IU44/GD					
IU42	312	80	61.5	earth only	2 x 20mm
IU42/D	312	80	100	earth only	2 x 20mm

## Mini Gamma Range - Dimensions

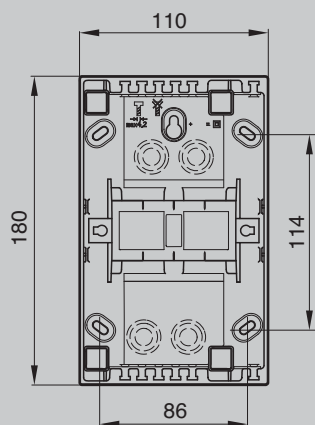
**GD108E**



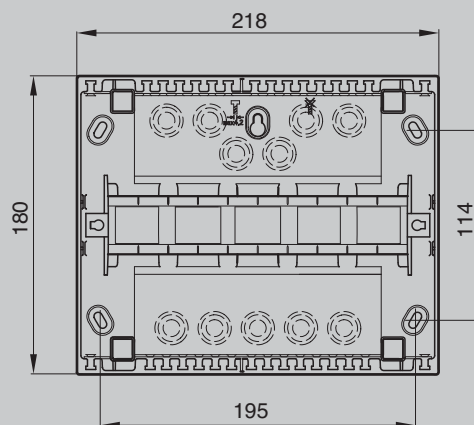
**GD102E**



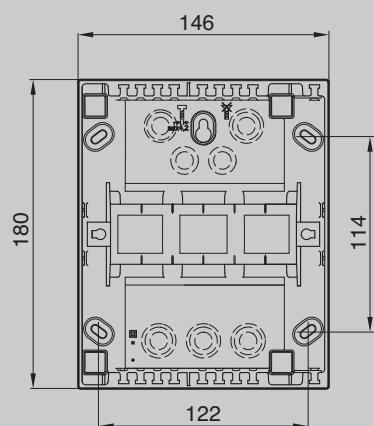
**GD104E**



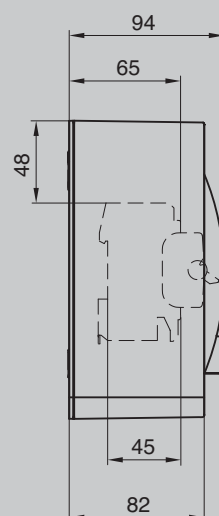
**GD110E**



**GD106E**

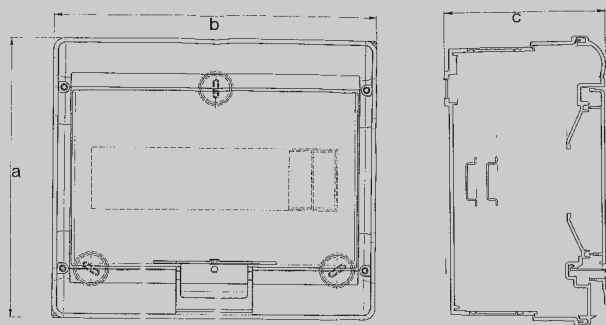


**GD104E to GD110E**



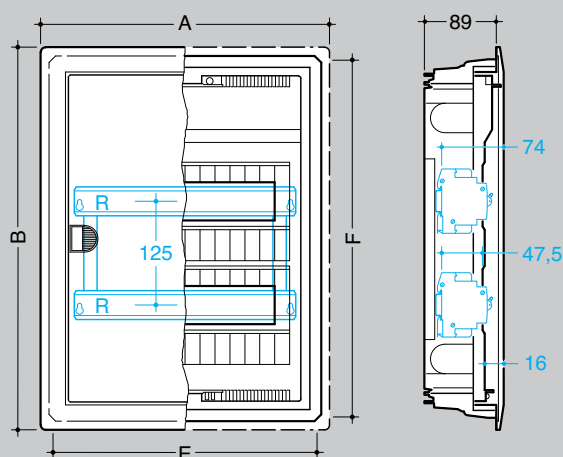


## Vector II IP55 Weatherproof Enclosure - Dimensions



Cat Ref.	Width	Height	Depth
VE103U	110	175	93
VE106U	164	190	113
VE110U	236	210	114
VE112U	310	302	151
VE212U	310	427	151
VE312U	310	552	151

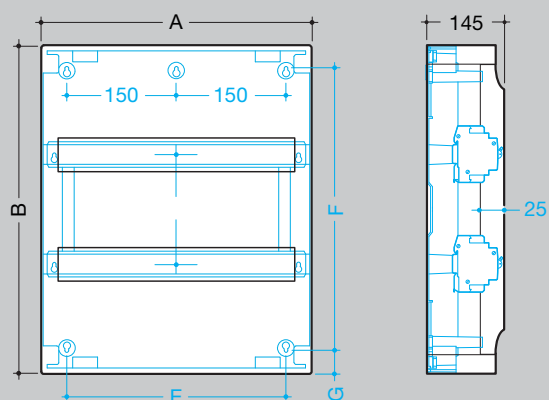
## Volta Flush Mounting Enclosures - Dimensions



### VU24D – 2 rows 24

Volta	Outside	Inside R	A	B	E	F
VU12D	12	1	348	336	330	317
VU24D	24	2	348	461	330	442
VU36D	36	3	348	586	330	567
VU48D	48	4	348	711	330	692

## Vega Surface Mounting Enclosures - Dimensions



### VB36B – 2 rows 36

Vega		A	B	E	F	G
VB18B	18	370	300	300	236	32
VB18R	18	370	300	300	236	32
VB36B	36	370	450	300	386	32
VB36R	36	370	450	300	386	32
VB54B	54	370	600	300	536	32
VB54R	54	370	600	300	536	32

## Distribution Boards - Invicta 63Mk2

Invicta 63Mk2 is a new concept in distribution board technology with many new and innovative features. It is designed with the installer, specifier and architect in mind.

Three phase and neutral distribution boards with 4, 6, 8, 12, 16, 20 or 24 TP&N ways.

### Construction

New rigid box construction. Manufactured from 1.25mm CR steel (end plates 1.5mm). Phosphate pre-treated and powder coated to 00A01 to BS 4800. All unpainted steel components are manufactured from Z2 G275 pre galvanised steel. All fasteners are zinc passivated or plated.

### Installation

New easy removable door provided. Door, end plates, front cover and chassis are removable. Dual earth and neutral bars are provided, earth bars have additional bonding terminals and neutral bars are shrouded.

### Configurations

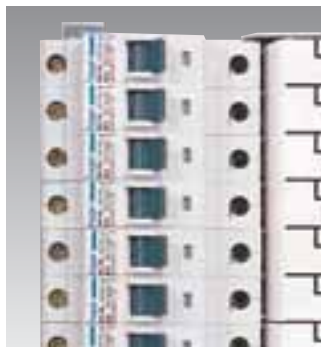
One of the range of incoming devices must be selected to complete the distribution board. The choice of the twenty three incoming devices and fourteen distribution boards give 322 possible configurations.

### Specification

Complies with BS EN 60439-3  
400V AC 3ph 50HZ  
up to 250A In  
Ambient temperature:  
-5°C to +40°C  
24 hour period average: +35°C  
atmospheric conditions 50%  
relative humidity at 40°C  
90% relative humidity at 20°C  
altitude up to 2000 metres  
IP rating: IP3X



### Performance



- Busbar rated up to 250A.
- Insulation tested at 2.5kV.
- Way labels as seen in this photograph are included with all boards.

### Innovation



- Vertical and horizontal stacking facility.
- Fifth keyhole slot for easy wall hanging.
- Site adaptable for clean earthing.
- Standard incomer kits include MCCB, fuse, changeover switch and contactors

### Installation



- Dual earth and neutral bars.
- Up to 40% more space.
- 40mm space behind pan assembly.
- 100A switch disconnector and RCCB incomers fit without connection links.

### Incoming Devices



- Switch disconnectors - up to 250A
- MCCB's - up to 250A
- Direct connection - 250A
- RCCB's - up to 100A
- Fuse switch - up to 200A
- Changeover switch - up to 125A
- Contactor (AC3) - up to 100A
- Others available to order



'A' boards SP&N distribution boards	2.2
Invicta 63Mk2	2.3
IP65 TP&N distribution boards	2.7
Invicta 63Mk2 outgoing devices	2.8
Invicta 125	2.14
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Individually enclosed protection and disconnection	2.30
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Invicta enclosures	2.60
Insulated busbars	
- Prong	2.62
- Fork	2.63
Brass terminals	2.64
Rail mounted terminals	2.65

Outgoing devices



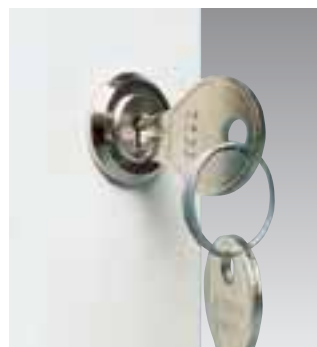
- MCB's 1 and 3 pole  
6-63A type B, 0.5 - 63A type C and D
- RCBO - 1 module 6-50A type B and C
- RCBO - 2 module 6-40A type B and C  
(switched neutral)
- Fuse carriers  
BS 1361 5 - 30A  
BS 88 2 - 32A

Extension boxes



- Standard glazed door
- Full or half chassis or plain cover
- Free standing option
- Composite panel option

Accessories



- Flush mounting kits
- Padlock and door kits
- Brass end plate
- Digital meter pack
- Earth extension kits
- Neutral uprate kits

## A Boards - SP & N Distribution Boards

### SP&N distribution boards

SP&N distribution boards are available from 4-28 outgoing ways. The range comes with a choice of either 100A 2P switch disconnecter, 63A 30mA 2P RCCB or 100A 30mA 2P RCCB, or a range of split load versions.

The range has the following features:

- Ample wiring space, with provision to accept RCBO's
- Full complement of earth and neutral terminal bars to accept up to 25mm<sup>2</sup> incoming and 16mm<sup>2</sup> outgoing cable.
- Optional door lock kit - JK22A
- Accepts most consumer unit accessories
- Suitable for cable entry/exit on all sides and back.

### Construction

Manufactured from 1.25mm CR4 cold reduced mild steel, phosphate pretreated and powder coated to 00A01 BS 4800.

Range complies with BS EN 60-439 part 3

For dimensions see page 2.12



JK104



JK406H

Description	Total ways	RCCB controlled ways	Switch disconnecter controlled ways	Cat ref.
<b>100A Switch disconnecter incomer</b>				
	4		4	<b>JK104</b>
	6		6	<b>JK106</b>
	10		10	<b>JK110</b>
	14		14	<b>JK114</b>
	20		20	<b>JK120</b>
	28		28	<b>JK128</b>
<b>63A 30mA RCCB incomer</b>				
	4	4		<b>JK404H</b>
	6	6		<b>JK406H</b>
	10	10		<b>JK410H</b>
	14	14		<b>JK414H</b>
	20	20		<b>JK420H</b>
<b>100A 30mA RCCB incomer</b>				
	4	4		<b>JK304H</b>
	6	6		<b>JK306H</b>
	10	10		<b>JK310H</b>
	14	14		<b>JK314H</b>
	20	20		<b>JK320H</b>
	28	28		<b>JK328H</b>
<b>Split load with 100A switch disconnecter and 63A 30mA RCCB (100A 30mA JK527H)</b>				
	6	6	Config.	<b>JK706C</b>
	10	10	Config.	<b>JK710C</b>
	14	14	Config.	<b>JK714C</b>
	27	14	13	<b>JK527H</b>

# Invicta 63Mk2 TP & N Distribution Boards - 250A Incoming, 63A Outgoing - JK



JK206P



JK1003S



JK0634RH

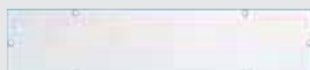
Designation	Number of TP ways	Glazed door cat. ref.	Plain door cat. ref.
<b>Primary boards</b>	4	JK204P	JK204P1
Supplied without incoming and outgoing devices	6	JK206P	JK206P1
	8	JK208P	JK208P1
One of the incoming kits listed below must be fitted.	12	JK212P	JK212P1
	16	JK216P	JK216P1
	20	JK220P	JK220P1
	24	JK224P	JK224P1
<b>Split load boards</b>	12 ways 4 RCCB protected	JK248P	JK248P1
For split load configuration both switch disconnector and RCCB incomer kits are required.	12 ways 6 RCCB protected	JK266P	JK266P1
	12 ways 8 RCCB protected	JK284P	JK284P1
<b>Switch disconnector</b>	100A 3P switch disconnector	JK1003S	
<b>Incoming Kits</b>	125A 3P switch disconnector*	JK1253S	
* Small spreader box recommended if conductors are over 35mm <sup>2</sup>	250A 3P switch disconnector***	JK2503SB	
** Fitted in large extension box for cable spreading 500mm high	100A 4P switch disconnector	JK1004S	
*** Fitted in large extension box for cable spreading 620mm high	250A 4P switch disconnector***	JK2504SB	
	125 3P MCCB**	JK1253M	
	160A 3P MCCB**	JK1603M	
	250A 3P MCCB**	JK2503M	
	125 4P MCCB**	JK1254M	
	160A 4P MCCB**	JK1604M	
	250A 4P MCCB**	JK2504M	
	250A 4P direct connection kit*	JK2504D	
	125A 4P + 4P manual change over switch**	JK1254CO	
	200A 3P fuse combination switch**	JK2003F	
	200A 3P + SwN fuse combination switch**	JK2004F	
	63A 4P (AC3) contactor	JK0634C	
	c/w 63A switch disconnector**		
	100A 4P (AC3) contactor	JK1004C	
	c/w 100A switch disconnector**		
<b>RCCB incomer kits</b>	63A 30mA 4P RCCB	JK0634RH	
	100A 30mA 4P RCCB	JK1004RH	
	100A 100mA 4P RCCB	JK1004RM	
	100A 300mA 4P RCCB	JK1004RL	
	100A 100mA time delayed 4P RCCB	JK1004RMD	
	100A 300mA time delayed 4P RCCB	JK1004RLD	



## Invicta 63Mk2 TP&N distribution boards - 250A incoming, 63A outgoing - JK



JK222A



JK2PLATE

Designation	Characteristics	Cat ref.
<b>Accessories</b>		
	250A single phase conversion kit	<b>JK250SP</b>
	Blanking module (SP MCB way)	<b>VAS01</b>
	Blanking module (Din rail way)	<b>VG01C</b>
	Keylock for door	<b>JK222A</b>
	Spare key for JK222A	<b>JK222KEY</b>
	Door padlock kit (padlock not included)	<b>JK222B</b>
	MCB, RCCB, RCBO padlock kit	<b>MZN175</b>
	Touch up paint	<b>JF95A</b>
	Spare label pack	<b>JK241A</b>
	Painted steel end plate - 1.5mm	<b>JK2PLATE</b>
	Unpainted brass end plate - 2mm	<b>JK2BPLATE</b>
	Brass padlock	<b>JK25A</b>

Designation	Characteristics	Glazed door cat ref.	Plain door cat ref.
<b>Cable spreader boxes</b>			
	Small 250mm height - plain door		<b>JK201E</b>
	Large 400mm height - plain door		<b>JK202E</b>



JK204E

<b>Vertical mounted extension boxes</b>			
For fitting DIN rail mounted modular devices.	Accepts 18 modules (1 row) 250mm	<b>JK204E</b>	<b>JK204E1</b>
	Accepts 36 modules (2 row) 400mm	<b>JK206E</b>	<b>JK206E1</b>

Supplied with earth terminal bar.

Extension boxes can be used  
free standing by adding  
2 x JK2Plate gland plates

<b>Meter pack - Pulse output</b>		
Comprises of:		<b>JK240M</b>
Digital multi function meter, 3 x Control circuit fuse carrier, Wiring harness, Extension boxes, CTs		
<b>Meter pack - RS485 JBUS/MODBUS Communication)</b>		
Comprises of:		<b>JK240MR</b>
Digital multi function meter, 3 x Control circuit fuse carrier, Wiring harness, Extension boxes, CTs		
Comprises of:		<b>JK242A</b>
kWh meter, 3 x control circuit fuse carrier, Wiring harness, Extension boxes, CTs		

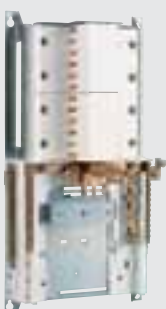
**Note:** Meter pack uses one extension box

Please consult us for BMS compatible devices

## Invicta 63Mk2 TP&N distribution boards - 250A incoming, 63A outgoing - JK



JK202K



JK208PA



JK204EB

Designation	Characteristics	Cat ref.
<b>Mounting plate</b>		
	Suitable for use with non DIN mount device for use with JK201E	<b>JK218A</b>
<b>Flush mounting kits</b>		
	4 way distribution boards	<b>JK204FK</b>
	6 way distribution boards	<b>JK206FK</b>
	8 way distribution boards	<b>JK208FK</b>
	12 way distribution boards	<b>JK212FK</b>
	16 way distribution boards	<b>JK216FK</b>
	20 way distribution boards	<b>JK220FK</b>
	24 way distribution boards	<b>JK224FK</b>
<b>Connecting kits</b>		
Horizontal stacking kit	Allows horizontal stacking of Invicta 63Mk2 distribution boards and extension boxes <b>Note:</b> Enclosures must be same height	<b>JK202K</b>
Vertical stacking kit	Allows vertical stacking of Invicta 63Mk2 distribution boards and extension boxes	<b>JK203K</b>
<b>Pan assemblies</b>		
Suitable as replacement for distribution board pan assembly or for panelbuilding applications.	4 way	<b>JK204PA</b>
	6 way	<b>JK206PA</b>
	8 way	<b>JK208PA</b>
<b>Note:</b> Supplied with terminal bars fitted	12 way	<b>JK212PA</b>
	16 way	<b>JK216PA</b>
	20 way	<b>JK220PA</b>
For dimensions see page 2.13	24 way	<b>JK224PA</b>
<b>Electrical connection</b>	Allows 100A tap off from distribution board or pan assembly outgoing way	<b>KR50U</b>
<b>Earth terminal bars</b>		
Additional terminal bars can be fitted within distribution boards for high integrity earthing.	2 x 6 outgoing connections (4 way)	<b>JK204EB</b>
	2 x 9 outgoing connections (6 way)	<b>JK206EB</b>
	2 x 12 outgoing connections (8 way)	<b>JK208EB</b>
Where only a small quantity of additional terminals are required the spare larger terminal bar can be used to replace the standard one fitted on the pan assembly	2 x 18 outgoing connections (12 way)	<b>JK212EB</b>
	2 x 24 outgoing connections (16 way)	<b>JK216EB</b>
	2 x 30 outgoing connections (20 way)	<b>JK220EB</b>
	2 x 36 outgoing connections (24 way)	<b>JK224EB</b>

## Invicta 63Mk2 TP&N distribution boards - 250A incoming, 63A outgoing - JK

Designation	Characteristics	Cat ref.
<b>Neutral uprating kits</b>		
Neutral kits are provided to uprate the neutral bars for a duty of $1.73 \times I_n$ .	4 way kit	JK204NB
	6 way kit	JK206NB
	8 way kit	JK208NB
These may be suitable where harmonics are present.	12 way kit	JK212NB
	16 way kit	JK216NB
	20 way kit	JK220NB
	24 way kit	JK224NB

<b>Side extension boxes</b> Side extension boxes provide a new concept for distribution boards to allow DIN rail mounted devices or cable ways to be fitted on site.	These are available in either half or full distribution board width. They can be used free standing by using 2 x JK2Plate gland plates*, or they can be horizontally attached to equal width distribution boards using 1 x JK202K per extension box.	For vertical stacking please use 1 x JK203K.  <b>*Note:</b> Half and full width extension boxes supplied with 2 x end plates
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Designation	Characteristics	Cat ref. 1/2 width	Cat ref. full width
<b>Extension boxes for DIN rail mounting devices</b>			
Enclosures have glazed door and DIN rail chassis.	4 way height 2 row	JK204PDH	JK204PDF
	6 way height 2 row	JK206PDH	JK206PDF
Half width enclosure provided with 6 modular ways per row.	8 way height 3 row	JK208PDH	JK208PDF
	12 way height 3 row	JK212PDH	JK212PDF
	16 way height 5 row	JK216PDH	JK216PDF
Full width enclosure provided with 18 modular ways per row.	20 way height 5 row	JK220PDH	JK220PDF
	24 way height 6 row	JK224PDH	JK224PDF
Filler boxes are used to fill gap when vertical and horizontal extension boxes are used.	250mm filler box	JK201PDH	JK201PDF
	400mm filler box	JK202PDH	JK202PDF

For dimensions see page 2.13

<b>Extension boxes with plain door</b>			
Enclosures have plain door and plain cover with no internal DIN rail chassis.	4 way height	JK204PSH	JK204PSF
	6 way height	JK206PSH	JK206PSF
	8 way height	JK208PSH	JK208PSF
Extension boxes can be used as co-ordinated cable ways, or to fit surface mounted equipment. e.g. CT's for metering.	12 way height	JK212PSH	JK212PSF
	16 way height	JK216PSH	JK216PSF
	20 way height	JK220PSH	JK220PSF
	24 way height	JK224PSH	JK224PSF
Please consult us for glazed door option.	250mm filler box	JK201PSH	JK201PSF
	400mm filler box	JK202PSH	JK202PSF
Filler boxes are used to fill gap when vertical and horizontal extension boxes are used.			



JK224PDH

## IP65 TP&N distribution boards 125A incoming, 63A outgoing

IP65 TP&N distribution boards  
Hager IP65 distribution boards  
are suitable for three phase  
applications where a high IP  
rating is required.

The distribution boards are  
available with either a steel or  
GRP enclosure.

Incoming devices are supplied  
separately, and with a choice of  
10 primary distribution boards  
up to 100 possible TP&N  
configurations are possible.  
Available up to 250A direct  
connection with outgoing  
distribution through 4, 6, 8, 12  
or 16 ways, rated for MCBs from  
0.5A to 63A

Complies with  
BS EN 60439-3

*Dimensions (mm)  
(HxWxD)*

*Ways*

*Cat ref.*

### IP65 distribution boards - metal

800 x 600 x 300	4	JK204D
800 x 600 x 300	6	JK206D
800 x 600 x 300	8	JK208D
950 x 600 x 300	12	JK212D
950 x 600 x 300	16	JK216D

### IP65 distribution boards - insulated

800 x 600 x 300	4	JK204F
800 x 600 x 300	6	JK206F
800 x 600 x 300	8	JK208F
1150 x 850 x 300	12	JK212F
1150 x 850 x 300	16	JK216F

### Incoming kits

100A 3P switch disconnect	JK1003S
125A 3P switch disconnect	JK1253S
100A 4P switch disconnect	JK1004S
250A 4P direct connection kit	JK2504D
63A 30mA 4P RCCB	JK0634RH
100A 30mA 4P RCCB	JK1004RH
100A 100mA 4P RCCB	JK1004RM
100A 300mA 4P RCCB	JK1004RL
100A 100mA 4P RCCB - time delayed	JK1004RMD
100A 300mA 4P RCCB - time delayed	JK1004RLD



JK208D



JK208F



JK1003S

## Invicta 63Mk2 - Outgoing devices

	MCBs			RCBOs						Fuse Carriers		
	Type B	Type C	Type D	1 Mod Type B 30mA	1 Mod Type C 30mA	1 Mod Type B 10mA	1 Mod Type C 10mA	2 Mod Type B 30mA	2 Mod Type C 30mA	BS1361 Fuse carrier and fuse	BS88 Fuse carrier only	Direct Tap off
<b>Single pole</b>												
0.5A		NCN100A	NDN100A									
1A		NCN101A	NDN101A									
2A		NCN102A	NDN102A									
4A		NCN104A	NDN104A									
6A	NBN106A	NCN106A	NDN106A	AD104	AD119	AC104	AC119	ADA906U	ADA956U	L113(5A)	L501 45	
10A	NBN110A	NCN110A	NDN110A	AD105	AD120			ADA910U	ADA960U			
16A	NBN116A	NCN116A	NDN116A	AD107	AD122	AC107	AC122	ADA916U	ADA966U	L115(15A)	L501 45	
20A	NBN120A	NCN120A	NDN120A	AD108	AD123			ADA920U	ADA970U	L116(20A)	L501 45	
25A	NBN125A	NCN125A	NDN125A	AD109	AD124	AC109	AC124	ADA925U	ADA975U			
32A	NBN132A	NCN132A	NDN132A	AD110	AD125	AC110	AC125	ADA932U	ADA982U	L118(30A)	L501 45	
40A	NBN140A	NCN140A	NDN140A	AD111	AD126			ADA940U	ADA990U			
45A				AD112	AD127							
50A	NBN150A	NCN150A	NDN150A	AD113	AD128							
63A	NBN163A	NCN163A	NDN163A									
100A												KR50U
<b>Three pole</b>												
0.5A		NCN300A	NDN300A									
1A		NCN301A	NDN301A									
2A		NCN302A	NDN302A									
4A		NCN304A	NDN304A									
6A	NBN306A	NCN306A	NDN306A									
10A	NBN310A	NCN310A	NDN310A									
16A	NBN316A	NCN316A	NDN316A									
20A	NBN320A	NCN320A	NDN320A									
25A	NBN325A	NCN325A	NDN325A									
32A	NBN332A	NCN332A	NDN332A									
40A	NBN340A	NCN340A	NDN340A									
50A	NBN350A	NCN350A	NDN350A									
63A	NBN363A	NCN363A	NDN363A									

1 pole outgoing blank - VAS01

**Note:** Please refer to individual device pages in the catalogue for benefits of 2 module RCBO's  
for other RCBO sensitivities please consult us.

# Ingress Protection Chart



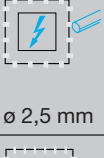
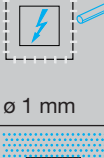
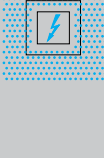
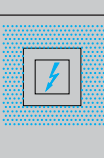
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

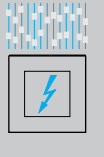
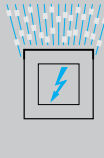
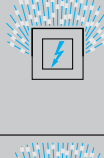
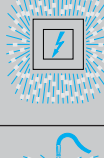
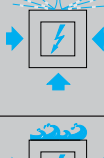


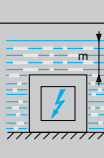
## The first character numeral

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

## The second character numeral

Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer



### Consumer Units & Distribution Boards

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the British Standard covering the requirements of LV Distribution Boards suitable for this application. The full title is:

#### BS EN 60439-3

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use - Distribution boards

This British standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in the UK as Consumer Units are also included in this British Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's. The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

### Panelboards

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

Generally installed for commercial and light industrial application the panelboard is, however, used in many different types of applications.

Panelboards are covered by the British Standard for Low-voltage Switchgear and Control Gear Assemblies BS EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

### Internal Separation

The internal separation of assemblies is described in the British Standard BS EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Form numbers are given to some typical forms of separation -

Form 1 - No separation

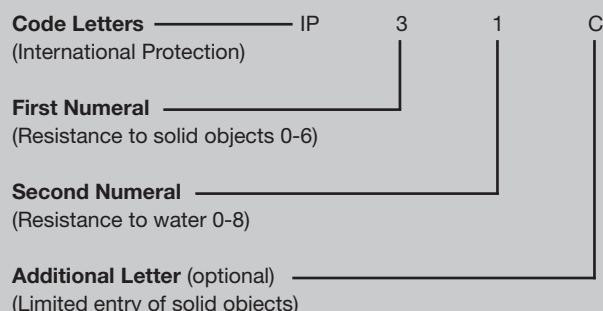
Form 2 - Separation of bus-bars from the functional units

Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.

Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.

**Degree of Protection of Enclosures**

The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water. Refer to page 2.9 for ingress protection chart.

**Invicta 125 Panelboard**

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current		400A
Bus-bar rated short-time withstand current		35kA for 1s direct connected (unconditional)
Incoming -	Main Terminals	400A
	Non-Auto MCCB	400A
	MCCB	400A
Outgoing -	H125 MCCBs	16 to 125A
	4 way	
	6 way	
	8 way	
	12 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - H400 MCCB - outgoing H125		25kA

Table 1

**Short-Circuit Withstand**

The British Standard requires the manufacturer to state the following:

For a panelboard with an incoming MCCB -

- The maximum allowable value of prospective shortcircuit current at the terminals of the incoming MCCB.

For a panelboard where a short-circuit protective device is not incorporated in the incoming unit (Main Terminals) -

- The rated short-time withstand current
- The rated peak withstand current
- The withstand time period if different from one second.

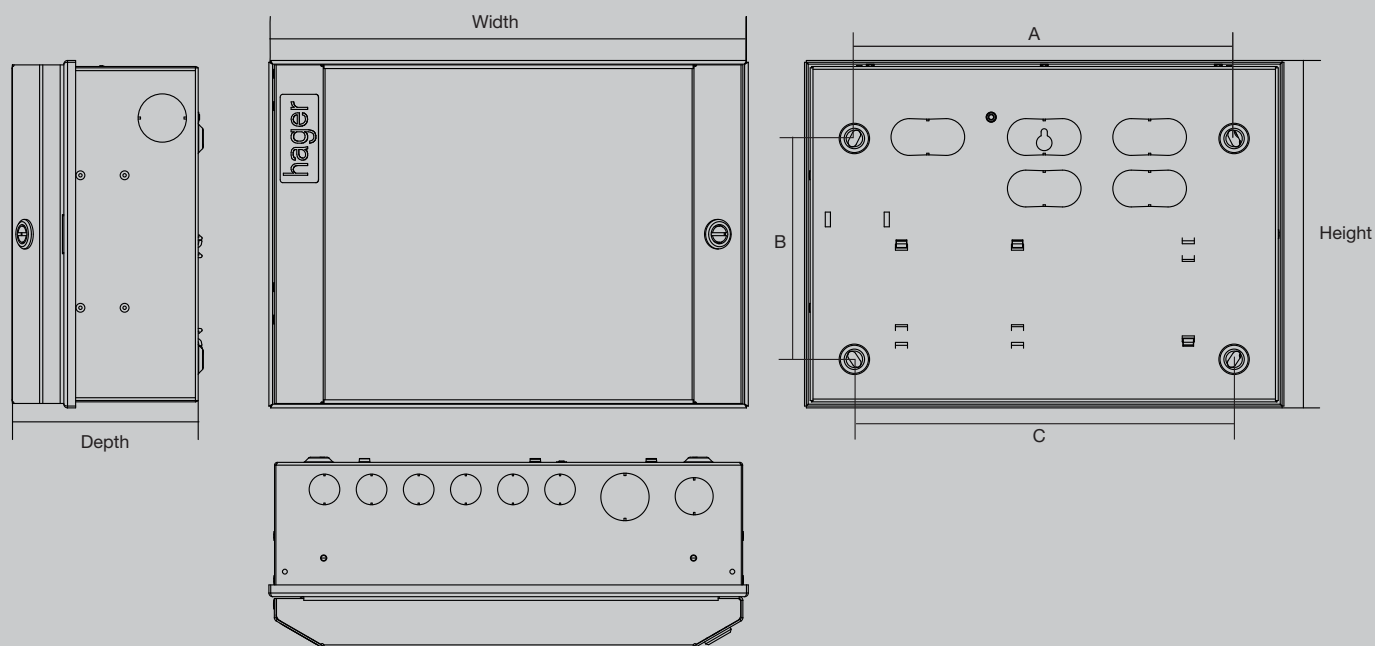
All Invicta panel boards have been independently tested at a UK ASTA approved test laboratory.

To assist in the selection of the correct panelboard, suitable for use on systems having prospective fault levels ranging from 15 to 50kA, Hager have prepared the following simple charts.

**Invicta 250 Panelboard**

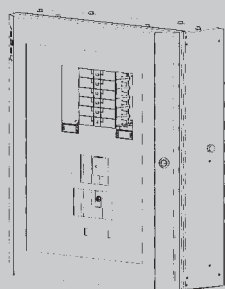
Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current 800A		
Bus-bar rated short-time withstand current		35kA for 1s
Rated conditional short circuit current		40kA - direct connected with 250A MCCB outgoing
Incoming -	Main Terminals	800A
	Non-Auto MCCB	800A
	MCCB	800A
Outgoing -	H125 MCCBs	16 to 125A
	H250 MCCBs	160 to 250A
	6 way	
	8 way	
	12 way	
	18 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - main terminals - outgoing only H250		40kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing only H250		40kA
• Incomer - H400 MCCB - outgoing H125		25kA
• Incomer - H400 MCCB - outgoing only H250		35kA
• Incomer - H800 MCCB - outgoing only H250		50kA

## JK Metal A Boards and Din Rail Enclosures - Dimensions



Encl. size (modules)	Height	Width	Depth	Fixing centers			Knockout size	No of knockouts				
				A	B	C		Top	Bottom	Left side	Right side	Back
8	236	254	130	108	165	163	ø21	3	3	-	-	-
							ø33	1	-	-	1	-
							ø25	1	1	1	1	-
							25 x 50	-	-	-	-	3
12	236	326	130	180	165	235	ø21	6	6	-	-	-
							ø33	1	1	1	1	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	5
16	236	398	130	252	165	307	ø21	8	8	-	-	-
							ø33	1	1	1	1	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	7
22	236	505	130	323	165	378	ø21	11	11	-	-	-
							ø33	1	1	1	1	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	9
2 x 12	472	326	130	235	395	235	ø21	6	6	-	-	-
							ø33	1	1	2	2	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	6
2 x 16	472	398	130	307	395	307	ø21	8	8	-	-	-
							ø33	1	1	2	2	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	8
2 x 22	472	505	130	378	395	378	ø21	11	11	-	-	-
							ø33	1	1	2	2	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	10
3 x 22	708	505	130	378	632	378	ø21	11	11	-	-	-
							ø33	1	1	3	3	-
							ø25	1	1	-	-	-
							25 x 50	-	-	-	-	15

## Invicta 63Mk2 - Dimensions



### Dimensions

Cat Ref.	Height	Width	Depth
JK204P / JK204P1	500	475	160
JK206P / JK206P1	560	475	160
JK208P / JK208P1	620	475	160
JK212P / JK212P1	750	475	160
JK216P / JK216P1	1050	475	160
JK220P / JK220P1	1150	475	160
JK224P / JK224P1	1250	475	160
JK248P / JK248P1	1050	475	160
JK266P / JK266P1	1050	475	160
JK284P / JK284P1	1050	475	160
JK201E	250	475	160
JK202E	400	475	160
JK204E	250	475	160
JK206E	400	475	160

### Pan Assemblies

Cat Ref.	Height	Width	Depth
JK204PA	382	248	115
JK206PA	435	248	115
JK208PA	489	248	115
JK212PA	596	248	115
JK216PA	852	248	115
JK220PA	959	248	115
JK224PA	1066	248	115

### Terminals

No. of TP Ways	Neutral	Earth
4	14 x 25mm <sup>2</sup>	18 x 25mm <sup>2</sup>
6	22 x 25mm <sup>2</sup>	24 x 25mm <sup>2</sup>
8	28 x 25mm <sup>2</sup>	30 x 25mm <sup>2</sup>
12	40 x 25mm <sup>2</sup>	42 x 25mm <sup>2</sup>
16	52 x 25mm <sup>2</sup>	54 x 25mm <sup>2</sup>
20	64 x 25mm <sup>2</sup>	66 x 25mm <sup>2</sup>
24	76 x 25mm <sup>2</sup>	78 x 25mm <sup>2</sup>

### IP65 TP&N Distribution Boards

Cat Ref.	Height	Width	Depth
JK204D / JK204F	800	600	300
JK206D / JK206F	800	600	300
JK208D / JK208F	800	600	300
JK212D / JK216D	1150	600	300
JK212F / JK216F	1150	850	300

### Extension Boxes

Cat Ref.	Height	Width	Depth
For DIN rail mounting devices - 1/2 width			
JK204PDH	500	237.5	160
JK206PDH	560	237.5	160
JK208PDH	620	237.5	160
JK212PDH	750	237.5	160
JK216PDH	1050	237.5	160
JK220PDH	1150	237.5	160
JK224PDH	1250	237.5	160

### Filler boxes

JK201PDH	250	237.5	160
JK202PDH	400	237.5	160

### Full width

JK204PDF	500	475	160
JK206PDF	560	475	160
JK208PDF	620	475	160
JK212PDF	750	475	160
JK216PDF	1050	475	160
JK220PDF	1150	475	160
JK224PDF	1250	475	160

### Filler boxes

JK201PDF	250	475	160
JK202PDF	400	475	160

### Plain door - 1/2 width

JK204PSH	500	237.5	160
JK206PSH	560	237.5	160
JK208PSH	620	237.5	160
JK212PSH	750	237.5	160
JK216PSH	1050	237.5	160
JK220PSH	1150	237.5	160
JK224PSH	1250	237.5	160

### Filler boxes

JK201PSH	250	237.5	160
JK202PSH	400	237.5	160

### Full width

JK204PSF	500	475	160
JK206PSF	560	475	160
JK208PSF	620	475	160
JK212PSF	750	475	160
JK216PSF	1050	475	160
JK220PSF	1150	475	160
JK224PSF	1250	475	160

### Filler boxes

JK201PSF	250	475	160
JK202PSF	400	475	160

## Invicta 125

The Invicta 125 panelboard system has been designed with the contractor in mind. The system is designed to take away the complication and hassle of installing an MCCB panelboard by simply using the same installation principle as with any normal MCB distribution board.

The compact design of the new generation of Hager moulded case circuit breakers has made it possible to provide maximum cable space, within the most compact and aesthetically acceptable panel board on the market.

The combination of 4 primary panelboards and 11 incomer kits means that it becomes easy for the wholesaler to stock. This combination means that from 15 standard products it is possible to supply 44 different distribution configurations.

### Product Features

Glazed door enhances aesthetic design and permits visual inspection of circuit designation and status. The door is reversible for left hand or right hand opening.

Removable gland plates are provided top and bottom for ease of installation and cabling. The removal of the gland plates and cable spreader also allows the mounting of multi-service DIN rail extension boxes and meter packs. A reversible glazed

door is provided for access of the installed equipment. This reversible glazed door also allows visual identification of circuit status.

### Options

Key lock, meter pack, DIN rail, extension box, spreader box.

### Construction

Manufactured from 1.5mm CR4 cold reduced mild steel, phosphate pretreated and powder coated to 00A01 BS4800.

### Specification

Complies with BS EN 60-439 Part 1.

IP3X

4, 6, 8, 12 TP outgoing ways.

### Cable capacity

#### Incomers

3 and 4 pole MCCB

Cable capacity 240mm<sup>2</sup>

3 and 4 pole non auto MCCB

Cable capacity 240mm<sup>2</sup>

Direct connection kit. M12 hexagonal bolt

#### Outgoers

1 and 3 pole MCCB 70mm<sup>2</sup>

### Busbar ratings

400A continuous

outgoing MCCBs:

Single pole 16-125A

(10 ratings)

Fixed thermal, fixed magnetic trips.

Triple pole 20-125A (6 ratings) adjustable thermal fixed magnetic trips.



Overall reversible plain (or glazed) door with optional key locking facility



Totally enclosed busbar system rated at 400A



Removable gland plates (top and bottom)



Wrap-around neutral bar with disconnect facility as standard



Invicta 125 panel  
board system

2.16



Robust powder coated sheet  
steel enclosures



Wrap-around earth bars for ease  
of cabling



SP & TP outgoing MCCBs



Choice of 11 incoming kits



## Invicta 125 Panel Board System - 400A Incoming, 125A Outgoing - JN



JN306P with JN343M incomer  
and JN205E cable spreader box



HD105



HD149U

Designation	Characteristics	Pack qty.	Glazed door Cat ref.	Plain door Cat ref.
<b>Comprises:</b>	4 way	1	<b>JN304P</b>	<b>JN304P1</b>
Enclosures, pan assembly, neutral bar and earth bar	6 way	1	<b>JN306P</b>	<b>JN306P1</b>
	8 way	1	<b>JN308P</b>	<b>JN308P1</b>
<b>Primary Boards</b>	12 way	1	<b>JN312P</b>	<b>JN312P1</b>
Supplied without incoming kit				
One of the incoming kits listed below must be fitted.				
<b>Incoming kits</b>			<b>3P</b>	<b>4P</b>
<b>MCCB</b>	250A (adjustable 200-250)		<b>JN323M</b>	<b>JN324M</b>
	320A (adjustable 240-320)		<b>JN333M*</b>	<b>JN334M*</b>
	400A (adjustable 320-400)		<b>JN343M*</b>	<b>JN344M*</b>
<b>Non Auto MCCB</b>	250A	1	<b>JN323S</b>	<b>JN324S</b>
	400A	1	<b>JN343S*</b>	<b>JN344S*</b>
<b>Direct Connection</b>	400A direct connection kit	1		<b>JN344D</b>
* Spreader box recommended				
<b>MCCB Outgoing - Single Pole</b>			<b>16kA</b>	<b>25kA</b>
$I_{CS} = 100\%$	16A	1	<b>HD101</b>	<b>HH101</b>
Fixed thermal and magnetic trips:	20A	1	<b>HD102</b>	<b>HH102</b>
	25A	1	<b>HD103</b>	<b>HH103</b>
	32A	1	<b>HD104</b>	<b>HH104</b>
	40A	1	<b>HD105</b>	<b>HH105</b>
	50A	1	<b>HD106</b>	<b>HH106</b>
	63A	1	<b>HD107</b>	<b>HH107</b>
	80A	1	<b>HD108</b>	<b>HH108</b>
	100A	1	<b>HD109</b>	<b>HH109</b>
	125A	1	<b>HD110</b>	<b>HH110</b>
<b>MCCB Outgoing - Triple Pole</b>				
$I_{CS} = 100\%$	20A - 25A	1	<b>HD143U</b>	<b>HH143U</b>
Adjustable thermal and fixed magnetic trips	32A - 40A	1	<b>HD145U</b>	<b>HH145U</b>
	50A - 63A	1	<b>HD147U</b>	<b>HH147U</b>
	63A - 80A	1	<b>HD148U</b>	<b>HH148U</b>
	80A - 100A	1	<b>HD149U</b>	<b>HH149U</b>
	100A - 125A	1	<b>HD150U</b>	<b>HH150U</b>
<b>Blanking Plate</b>	SP	1		<b>JN201B</b>
(3 x JN201B needed per triple pole way)				

# Invicta 125 Panel Boards System - 400A Incoming, 125A Outgoing - JN



JN201E



JN205E



JK222A

Designation	Characteristics	Glazed door Cat ref.	Plain door Cat ref.
<b>Extension boxes</b> Supplied with DIN rail for modular devices	1 row 21 mod (250mm height) 2 row 42 mod (400mm height)	<b>JN201E</b> <b>JN203E</b>	<b>JN201E1</b> <b>JN203E1</b>
<b>Cable spreader box</b> To allow additional cabling space	Small 250mm height Large 400mm height		<b>JN205E</b> <b>JN206E</b>
<b>Meter pack</b> Comprises of: Digital multi function meter 3 X control circuit fuse carriers Wiring harness Extension boxes CTs			<b>JN301A</b>
<b>Key lock</b> with one key			<b>JK222A</b>
<b>Locking kits</b>	Incoming device (all ratings) Outgoing device - 125A frame		<b>HX339E</b> <b>HX139</b>
<b>Accessories</b>	Touch up paint Allen key set End plate for JN range		<b>JF95A</b> <b>JF296A</b> <b>JNPLATE125</b>

# Ingress Protection Chart

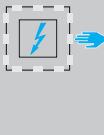
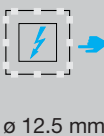

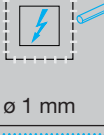
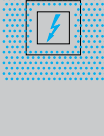
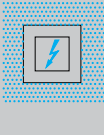
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

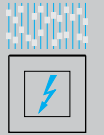
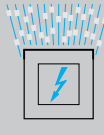
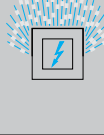

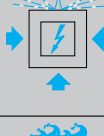

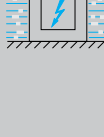
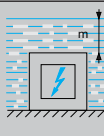
## The first character numeral

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

## The second character numeral

Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

**Consumer Units & Distribution Boards**

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the British Standard covering the requirements of LV Distribution Boards suitable for this application. The full title is:

**BS EN 60439-3**

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use - Distribution boards

This British standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in the UK as Consumer Units are also included in this British Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's. The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

**Panelboards**

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

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Panelboards are covered by the British Standard for Low-voltage Switchgear and Control Gear Assemblies BS EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

**Internal Separation**

The internal separation of assemblies is described in the British Standard BS EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Form numbers are given to some typical forms of separation -

Form 1 - No separation

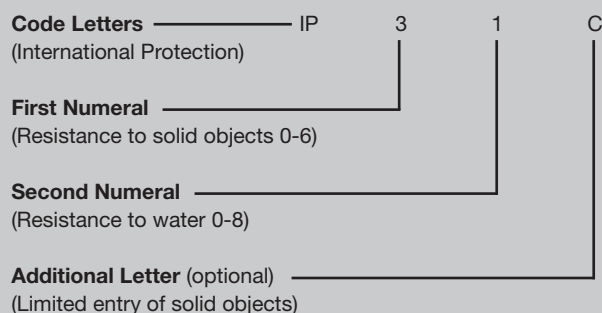
Form 2 - Separation of bus-bars from the functional units

Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.

Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.

### Degree of Protection of Enclosures

The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water. Refer to page 2.18 for ingress protection chart.

### Invicta 125 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current		400A
Bus-bar rated short-time withstand current		35kA for 1s direct connected (unconditional)
Incoming -	Main Terminals	400A
	Non-Auto MCCB	400A
	MCCB	400A
Outgoing -	H125 MCCBs	16 to 125A
	4 way	
	6 way	
	8 way	
	12 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - H400 MCCB - outgoing H125		25kA

Table 1

### Short-Circuit Withstand

The British Standard requires the manufacturer to state the following:

For a panelboard with an incoming MCCB -

- The maximum allowable value of prospective shortcircuit current at the terminals of the incoming MCCB.

For a panelboard where a short-circuit protective device is not incorporated in the incoming unit (Main Terminals) -

- The rated short-time withstand current
- The rated peak withstand current
- The withstand time period if different from one second.

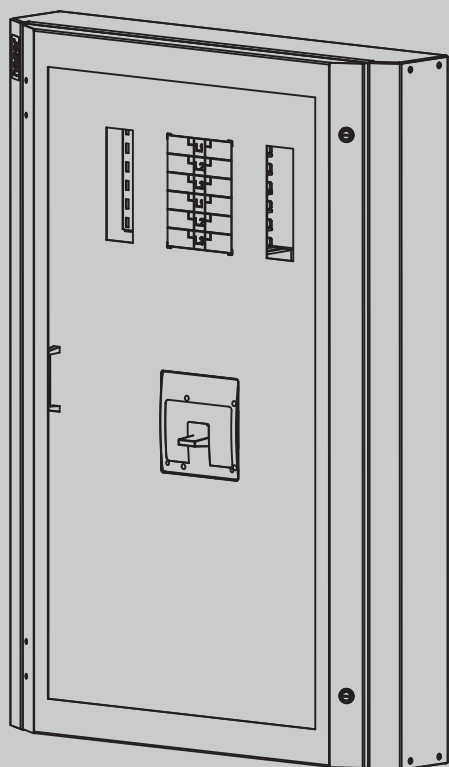
All Invicta panel boards have been independently tested at a UK ASTA approved test laboratory.

To assist in the selection of the correct panelboard, suitable for use on systems having prospective fault levels ranging from 15 to 50kA, Hager have prepared the following simple charts.

### Invicta 250 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current 800A		
Bus-bar rated short-time withstand current		35kA for 1s
Rated conditional short circuit current		40kA - direct connected with 250A MCCB outgoing
Incoming -	Main Terminals	800A
	Non-Auto MCCB	800A
	MCCB	800A
Outgoing -	H125 MCCBs	16 to 125A
	H250 MCCBs	160 to 250A
	6 way	
	8 way	
	12 way	
	18 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - main terminals - outgoing only H250		40kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing only H250		40kA
• Incomer - H400 MCCB - outgoing H125		25kA
• Incomer - H400 MCCB - outgoing only H250		35kA
• Incomer - H800 MCCB - outgoing only H250		50kA

## Invicta 125 - Dimensions



### Dimensions

Cat Ref	Height	Width	Depth
JN304P / JN304P1	976	710	156
JN306P / JN306P1	1053	710	156
JN308P / JN308P1	1130	710	156
JN312P / JN312P1	1284	710	156

### Terminals

	No. of EarthTP ways	Neutral
4	2 x 6 x 50mm	2 x 9 x 25mm
6	2 x 9 x 50mm	2 x 12 x 25mm
8	2 x 12 x 50mm	2 x 15 x 25mm
12	2 x 18 x 50mm	2 x 21 x 25mm
Main connection	M12	M10

### Extension Boxes

Cat Ref.	Height	Width	Depth
JN201E / JN201E1	250	710	156
JN203E / JN203E1	400	710	156
JN205E	250	710	156
JN206E	400	710	156
JN301A	400	710	156
	250	710	156



## Invicta 250

Similar in design concept and appearance to the Invicta 125, this range has been designed to accommodate outgoing MCCBs rated at up to 250A. Incoming circuits can be rated at up to 800A. There are 11 boards 4 of which will only accept the 125A frame size circuit breaker, the other five will accept different combinations of 125 and 250A frame sizes.

### Product features

Glazed door enhances aesthetic design and permits visual inspection of circuit designation and status. Door is reversible for left or right hand opening. Removable gland plates. Meter packs and extension boxes are available. Plain door versions are also available.

### Construction

Manufactured from 1.5mm CR4 cold reduced mild steel, phosphate pretreated and powder coated to 00A01 BS4800.

Removable gland plates are provided top and bottom for ease of installation and cabling. The removal of the gland plates and cable spreader also allows the mounting of multi-service DIN rail extension boxes and meter packs. A reversible glazed door is provided for access of the installed equipment. This also allows visual identification of circuit status.

### Specification

Complies with BS EN 60-439 Pt1.  
IP31X.  
6, 8, 12, 18 TP outgoing ways.

### Incomers

- MCCBs 400A, 630A and 800A
- Non auto MCCBs 400A, 630A and 800A
- Both the MCCB and the non auto MCCB incomers are available in either 3 or 4 pole versions.
- Incoming MCCBs are fully adjustable
- Direct connection. M12 hexagonal bolt.

### Outgoing MCCBs

- Single pole up to 125A - 70mm<sup>2</sup>.
- triple pole up to 250A - 120mm<sup>2</sup>.

### Incomers

#### Cable capacity

- 400A – 2 x 240mm<sup>2</sup>.
- 630A – 2 x 240mm<sup>2</sup>.
- 800A – 2 x 240mm<sup>2</sup>.



Overall reversible door (plain or glazed) with optional key locking facility



Removable gland plates top and bottom



Totally enclosed busbar system rated at 800A



Wrap-around neutral bar with disconnect facility as standard



Invicta 250 Panel  
Board System

2.24



Wrap-around earth bars for ease  
of cabling



Robust powder coated sheet  
steel enclosure



SP and TP MCCBs



Incoming shroud

2.23

# Invicta 250 Panel Board System - 800A Incoming, 250A Outgoing - JF



JF226P

Designation	Characteristics	Glazed door Cat ref.	Plain door Cat ref.
<b>Panelboard</b> Max 125A outgoing devices	6 way	<b>JF206P</b>	<b>JF206P1</b>
	8 way	<b>JF208P</b>	<b>JF208P1</b>
	12 way	<b>JF212P</b>	<b>JF212P1</b>
	18 way	<b>JF218P</b>	<b>JF218P1</b>
<b>Panelboard</b> These panel boards will accept a combination of MCCB frame sizes:  125A frame: 16-125A SP/TP 250A frame: 80-250A TP only	6 way (2 x 250 + 4 x 125A)	<b>JF226P</b>	<b>JF226P1</b>
	8 way (2 x 250 + 6 x 125A)	<b>JF228P</b>	<b>JF228P1</b>
	8 way (4 x 250 + 4 x 125A)	<b>JF248P</b>	<b>JF248P1</b>
	12 way (2 x 250 + 10 x 125A)	<b>JF222P</b>	<b>JF222P1</b>
	12 way (4 x 250 + 8 x 125A)	<b>JF242P</b>	<b>JF242P1</b>
	18 way (4 x 250 + 14 x 125A)	<b>JF244P</b>	<b>JF244P1</b>
	18 way (6 x 250 + 12 x 125A)	<b>JF262P</b>	<b>JF262P1</b>
<b>Incoming kits</b>		<b>3P</b>	<b>4P</b>
<b>MCCB Icu 50kA</b>	400A (adjustable 320-400A)	<b>JF243M</b>	<b>JF244M</b>
	630A (adjustable 505-630A)	<b>JF263M*</b>	<b>JF264M*</b>
	800A (adjustable 640-800A)	<b>JF283M*</b>	<b>JF284M*</b>
<b>Non-Auto MCCB</b>	400A	<b>JF243S</b>	<b>JF244S</b>
	630A	<b>JF263S*</b>	<b>JF264S*</b>
	800A	<b>JF283S*</b>	<b>JF284S*</b>
* The use of a spreader box is recommended with 630A and 800A incoming kits.			
<b>Direct connection</b>	800A		<b>JF284D*</b>
* if used with meter pack please consult us			



HD105

MCCB outgoing		SP 16kA	SP 25kA	TP 16kA	TP 25kA
$I_{CS} = 100\%$	16A	<b>HD101</b>	<b>HH101</b>		
	20A	<b>HD102</b>	<b>HH102</b>		
	25A	<b>HD103</b>	<b>HH103</b>	<b>HD143U</b>	<b>HH143U</b>
	32A	<b>HD104</b>	<b>HH104</b>		
	40A	<b>HD105</b>	<b>HH105</b>	<b>HD145U</b>	<b>HH145U</b>
	50A	<b>HD106</b>	<b>HH106</b>		
	63A	<b>HD107</b>	<b>HH107</b>	<b>HD147U</b>	<b>HH147U</b>
	80A	<b>HD108</b>	<b>HH108</b>	<b>HD148U</b>	<b>HH148U</b>
	100A	<b>HD109</b>	<b>HH109</b>	<b>HD149U</b>	<b>HH149U</b>
	125A	<b>HD110</b>	<b>HH110</b>	<b>HD150U</b>	<b>HH150U</b>
40kA $I_{CS} = 100\%$		160A (adjustable - 128-160)			<b>HN254</b>
40kA $I_{CS} = 100\%$		200A (adjustable - 160-200)			<b>HN203</b>
40kA $I_{CS} = 100\%$		250A (adjustable - 200-250)			<b>HN204</b>



HD149U

# Invicta 250 Panel Board System - 800A Incoming, 250A Outgoing - JF



JF201E

Designation	Characteristics	Pack qty.	Glazed door Cat ref.	Plain door Cat ref.
-------------	-----------------	--------------	-------------------------	------------------------

## Blanking plates

**Note:** 1 x JN201B needed per  
single pole width

(125A frame)

1

**JN201B**

**Note:** 1 x JF202B needed per  
triple pole width

(250A frame)

1

**JF202B**



JF205E

## Extension boxes

Supplied with DIN rail for  
modular devices

1 row 32 mod 250mm

2 row 64 mod 400mm

**JF201E**

**JF203E**

**JF201E1**

**JF203E1**

## Cable spreader boxes

To allow additional cabling space

Small plain door 250mm

Large plain door 400mm

**JF205E**

**JF206E**

## Meter pack

Comprises of:

Digital multi function meter

3 X control circuit fuse carriers

Wiring harness

Extension boxes

CTs

**JF203A**

## Note:

If used with direct connection kit  
please consult us.



JF04A

## Key lock

supplied with one key

**JF04A**

## Locking kits

125A outgoing

160/200/250A outgoing

**HX139**

**HX239**

## Accessories

Touch up paint 30ml

Allen key set

End plate for JF range

**JF95A**

**JF296A**

**JFPLATE250**

# Ingress Protection Chart

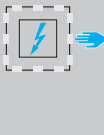
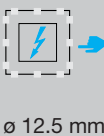

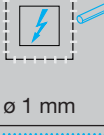
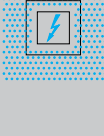
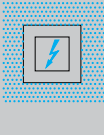
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

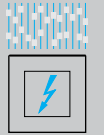
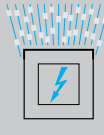
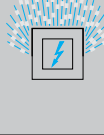

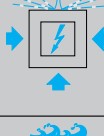

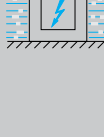
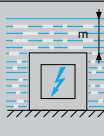
## The first character numeral

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

## The second character numeral

Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

**Consumer Units & Distribution Boards**

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the British Standard covering the requirements of LV Distribution Boards suitable for this application. The full title is:

**BS EN 60439-3**

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use - Distribution boards

This British standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in the UK as Consumer Units are also included in this British Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's. The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

**Panelboards**

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

Generally installed for commercial and light industrial application the panelboard is, however, used in many different types of applications.

Panelboards are covered by the British Standard for Low-voltage Switchgear and Control Gear Assemblies BS EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

**Internal Separation**

The internal separation of assemblies is described in the British Standard BS EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Form numbers are given to some typical forms of separation -

Form 1 - No separation

Form 2 - Separation of bus-bars from the functional units

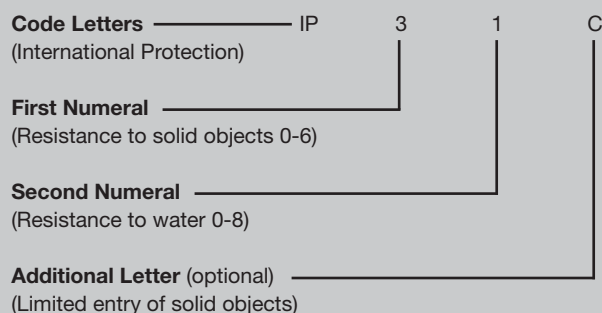
Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.

Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.



### Degree of Protection of Enclosures

The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water. Refer to page 2.26 for ingress protection chart.

### Invicta 125 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current		400A
Bus-bar rated short-time withstand current		35kA for 1s direct connected (unconditional)
Incoming -	Main Terminals	400A
	Non-Auto MCCB	400A
	MCCB	400A
Outgoing -	H125 MCCBs	16 to 125A
	4 way	
	6 way	
	8 way	
	12 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - H400 MCCB - outgoing H125		25kA

Table 1

### Short-Circuit Withstand

The British Standard requires the manufacturer to state the following:

For a panelboard with an incoming MCCB -

- The maximum allowable value of prospective shortcircuit current at the terminals of the incoming MCCB.

For a panelboard where a short-circuit protective device is not incorporated in the incoming unit (Main Terminals) -

- The rated short-time withstand current
- The rated peak withstand current
- The withstand time period if different from one second.

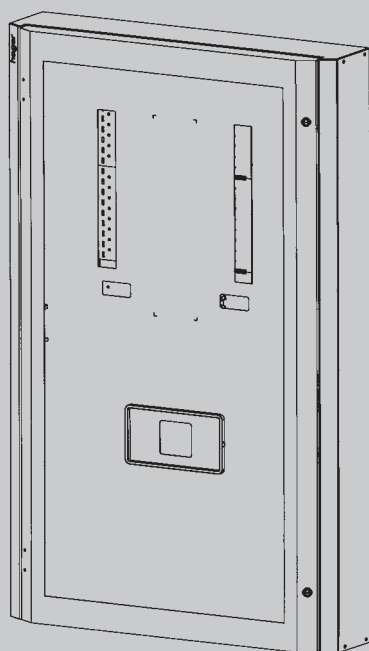
All Invicta panel boards have been independently tested at a UK ASTA approved test laboratory.

To assist in the selection of the correct panelboard, suitable for use on systems having prospective fault levels ranging from 15 to 50kA, Hager have prepared the following simple charts.

### Invicta 250 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current 800A		
Bus-bar rated short-time withstand current		35kA for 1s
Rated conditional short circuit current		40kA - direct connected with 250A MCCB outgoing
Incoming -	Main Terminals	800A
	Non-Auto MCCB	800A
	MCCB	800A
Outgoing -	H125 MCCBs	16 to 125A
	H250 MCCBs	160 to 250A
	6 way	
	8 way	
	12 way	
	18 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - main terminals - outgoing only H250		40kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing only H250		40kA
• Incomer - H400 MCCB - outgoing H125		25kA
• Incomer - H400 MCCB - outgoing only H250		35kA
• Incomer - H800 MCCB - outgoing only H250		50kA

## Invicta 250 - Dimensions



Cat Ref.	Height	Width	Depth
JF206P / JF206P1	1203	900	215
JF208P / JF208P1	1308	900	215
JF212P / JF212P1	1463	900	215
JF226P / JF226P1	1203	900	215
JF228P / JF228P1	1308	900	215
JF248P / JF248P1	1308	900	215
JF222P / JF222P1	1463	900	215
JF242P / JF242P1	1463	900	215
JF218P / JF218P1	1720	900	215
JF244P / JF244P1	1720	900	215
JF262P / JF262P1	1720	900	215

### Terminals

No. of TP ways	Neutral	Earth
JF206P / JF206P1	2 x 9 x 50mm	2 x 12 x 25mm
JF208P / JF208P1	2 x 12 x 50mm	2 x 15 x 25mm
JF212P / JF212P1	2 x 18 x 50mm	2 x 21 x 25mm
JF226P / JF226P1	2 x 6 x 50mm 2 x M10 bolt	2 x 9 x 25mm 2 x 2 x 50mm
JF228P / JF228P1	2 x 9 x 50mm 2 x M10 bolt	2 x 12 x 25mm 2 x 2 x 50mm
JF248P / JF248P1	2 x 6 x 50mm 4 x M10 bolt	2 x 9 x 25mm 2 x 3 x 50mm
JF222P / JF222P1	2 x 15 x 50mm 2 x M10 bolt	2 x 18 x 25mm 2 x 2 x 50mm
JF242P / JF242P1	2 x 12 x 50mm 4 x M10 bolt	2 x 15 x 25mm 2 x 3 x 50mm
JF218P / JF218P1	2 x 27 x 50mm	2 x 30 x 25mm
JF244P / JF244P1	2 x 21 x 50mm 4 x M10 bolt	2 x 24 x 25mm 2 x 3 x 50mm
JF262P / JF262P1	2 x 18 x 50mm 6 x M10 bolt	2 x 21 x 25mm 2 x 4 x 50mm
Main connection	M12	M10

### Extension Boxes

Cat Ref.	Height	Width	Depth
JF201E / JF201E1	250	900	215
JF203E / JF203E1	400	900	215
JF202A	250	900	215
JF203A	250 400	900 900	215 215
JF205E	250	900	215
JF206E	400	900	215

The Hager range of Fuse Combination Switches has been designed to complement both the TP&N and Panelboard ranges by providing individual protection and control of individual circuits.

The Switch Disconnectors have been designed to complement the Fuse Combination Switches, TP&N and Panelboard ranges, also by providing individual protection and control of individual circuits up to 800A.



### Fuse Combination Switches

The enclosures up to 200A have been designed to provide adequate cabling space without the need for additional cable spreader boxes. Operation of the device is through a door

mounted rotary handle which is mechanically interlocked to prevent access to live conductors when the switch is in the ON position. The handle is also padlocked in the OFF position.

### Standards

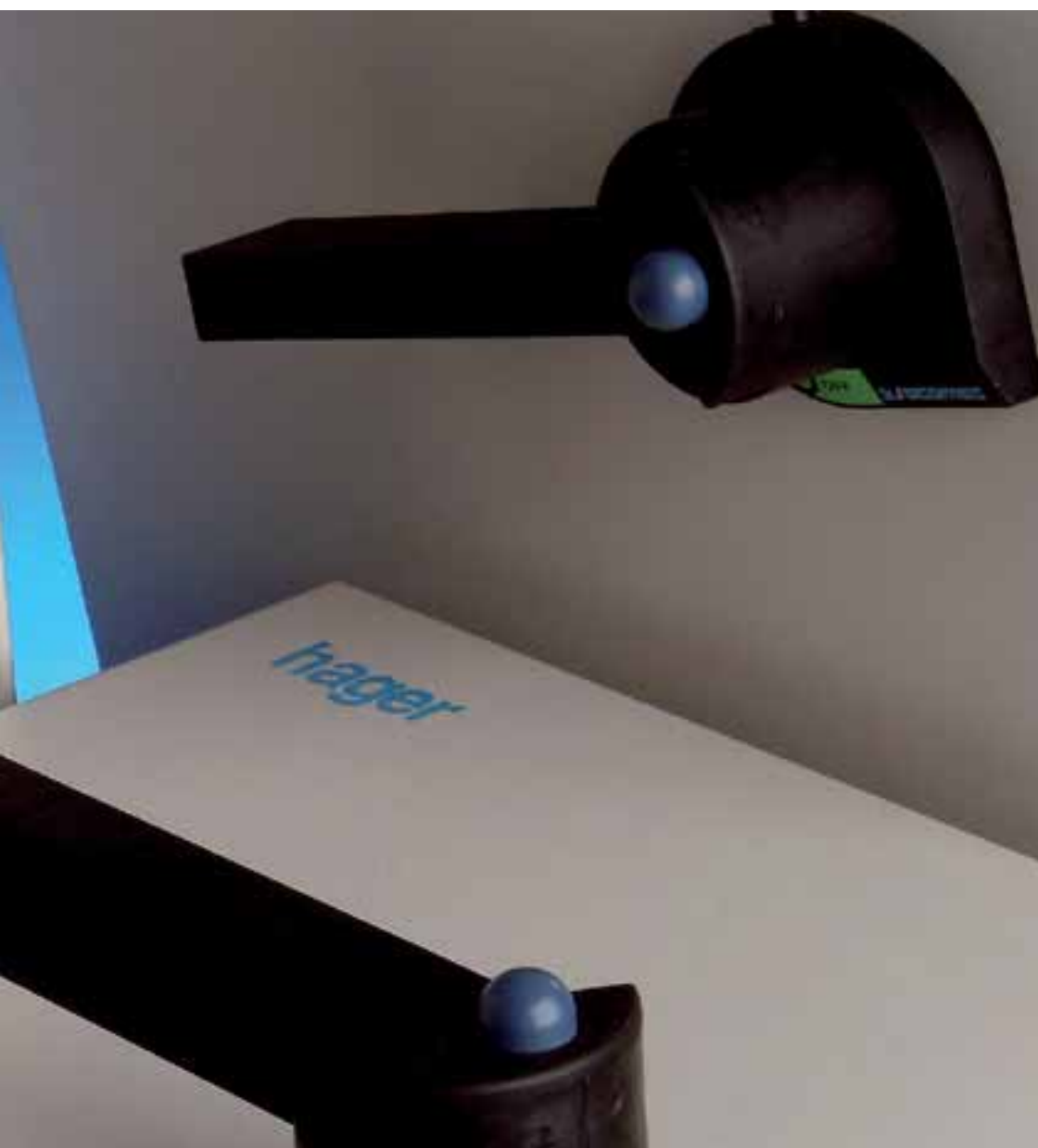
All versions will accept standard BS88 fuse links and can be converted to Switch Disconnector by fitting copper links. This product complies with BS EN 60-439 Part 1 (Enclosure), BS EN 60-947 Part 3 (Device) and IP31. Please note maximum rated fuse links are fitted in all Fuse Combination Switches.



### Switch Disconnectors

The Switch Disconnectors have also been designed to provide adequate cabling space without the need for additional cable spreader boxes.

The operation is the same as the Fuse Combination Switch, the operation of the device is through a door mounted rotary handle, which mechanically interlocks to prevent access to live conductors when the switch is in the ON position, the handle is also padlocked in the OFF position. The standards are also the same as the Fuse Combination Switches.



Fuse combination switches	2.32
Switch disconnectors	2.33
IP65 switch disconnectors	2.34
Enclosed MCCBs	2.35



#### IP65 Switch Disconnectors

The Hager range of switch disconnectors further complements the existing commercial range giving a range of enclosed switch disconnectors

to IP65 for individual isolation. The devices are padlocked in three positions and offer plenty of cabling space. Clip on auxillary contacts can be fitted retrospectively. This product complies with BS EN60 947-3 and IP65 to BS EN 60-529.

## Fuse Combination Switches SPSN, TP&N, TPSN 20 - 800 A - JFB, JFD, JFE, JFG, JFH, JR, JC, JZA

### Description

The Hager range of fuse combination switches has been designed to complement both the TP&N and panelboard ranges by providing individual protection and control of individual circuits.

The enclosures up to 100A have been designed to provide adequate cabling space without the need for additional cable spreader boxes.

Operation of the device is through a door mounted rotary handle which is mechanically interlocked to prevent access to live conductors when the switch is in the on position. The handle is also padlockable in the off position.

All versions will accept standard BS88 fuse links and can be converted to switch disconnecter by fitting copper links.

### Utilisation category

AC22B - 630 - 800A

AC23 - 20 - 400A

### Product features

Complies with:

BS EN 60-439 part 1 (enclosure)

BS EN 60-947 part 3 (device)

IP31.

Range: SPSN 20-100A (4 ratings)

TPN 20-630A (12 ratings)

TPSN 20-630A

(12 ratings)

**Note:** Maximum rated fuse links are fitted in all fuse combination switches.

### Cable capacity

20A = 16mm<sup>2</sup>

32A = 16mm<sup>2</sup>

63A = 25mm<sup>2</sup>

100A = 95mm<sup>2</sup>

125A = 95mm<sup>2</sup>

160A = 95mm<sup>2</sup>

200A = 240mm<sup>2</sup>

250A = 240mm<sup>2</sup>

315A = 240mm<sup>2</sup>

400A = 240mm<sup>2</sup>

630A = 2x300mm<sup>2</sup>

800A = 2x300mm<sup>2</sup>

### Designation

### In A

### Cat ref.

Cable extension  
boxes if required

### Cat ref.

### Fuse combination switch

Single pole switched neutral

20A

32A

63A

100A

JFB202U

JFB203U

JFD206U

JFE210U

JZA701

### Fuse combination switch

Triple pole and neutral

20A

32A

63A

100A

125A

160A

200A

250A

315A

400A

630A

800A

JFB302U

JFB303U

JFD306U

JFE310U

JZA701

JFG312U

JZA701

JFG316U

JZA701

JFG320U

JZA701

JFG325U

JZA701

JFH331U

JZA702

JFH340U

JZA702

JFI363U

JZA703

JFI380U

JZA703

### Fuse combination switch

Triple pole switched neutral

20A

32A

63A

100A

125A

160A

200A

250A

315A

400A

630A

800A

JFB402U

JFB403U

JFD406U

JFE410U

JZA701

JFG412U

JZA701

JFG416U

JZA701

JFG420U

JZA701

JFG425U

JZA701

JFH431U

JZA702

JFH440U

JZA702

JFI463U

JZA703

JFI480U

JZA703

### Copper links

For conversion to isolating  
switches

63A

100A

125/200A

315/400A

630A

800A

JC60L

JC10L

JC20L

JC40L

JC40L

JC63L



JFG416U



JFG425U

## Switch Disconnectors TP&N, TPSN 20 - 800A - JAB, JAC, JAE, JAG, JAH

### Description

The Hager range of switch disconnector has been designed to complement the FCS, TPN and panelboard ranges by providing individual protection and control of individual circuits up to 800A.

The enclosures have been designed to provide adequate cabling space without the need for additional cable spreader boxes.

Operation of the device is through a door mounted rotary handle which is mechanically interlocked to prevent access to live conductors when the switch is in the on position. The handle is also padlockable in the off position.

### Utilisation category


AC-21  
AC-22

### Product features

Complies with:  
BS EN 60-439 part 1 (enclosure)  
BS EN 60-947 part 3 (device).  
IP31.

### Cable capacity

20A = 16mm<sup>2</sup>  
32A = 16mm<sup>2</sup>  
63A = 50mm<sup>2</sup>  
100A = 50mm<sup>2</sup>  
125A = 50mm<sup>2</sup>  
160A = 95mm<sup>2</sup>  
200A = 95mm<sup>2</sup>  
250A = 150mm<sup>2</sup>  
315A = 185mm<sup>2</sup>  
400A = 240mm<sup>2</sup>  
630A = 2x300mm<sup>2</sup>  
800A = 2x300mm<sup>2</sup>

Designation	In A	Cat ref.	Cable extension boxes if required
			Cat ref.
	<b>Switch disconnector</b> Triple pole and neutral	20A	JAB302
		32A	JAB303
		63A	JAB306
		100A	JAB310
		125A	JAC312 JZA700
		160A	JAC316 JZA700
		200A	JAE320 JZA701
		250A	JAE325 JZA701
		315A	JAG331 JZA701
		400A	JAG340 JZA701
		630A	JAH363 JZA702
		800A	JAH380 JZA702
	<b>Switch disconnector</b> Triple pole and switched neutral	20A	JAB402
		32A	JAB403
		63A	JAB406
		100A	JAB410
		125A	JAC412 JZA700
		160A	JAC416 JZA700
		200A	JAE420 JZA701
		250A	JAE425 JZA701
		315A	JAG431 JZA701
		400A	JAG440 JZA701
		630A	JAH463 JZA702
		800A	JAH480 JZA702

JAG402

JAG440



## IP65 Switch Disconnectors - TP&N 10-80A - JG

### Description

The Hager range of switch disconnectors further complements the existing commercial range giving a range of enclosed switch disconnectors to IP65 for individual isolation.

The devices are padlockable in three positions and offer plenty of cabling space. Clip on auxiliary contacts can be fitted retrospectively.

### Product features

Complies with: BS EN60 947-3  
IP65 to BS EN 60-529

### Range:

TPN 10,16,25,40,63 & 80A

### Utilisation category

AC-21

AC-22

### Cable capacity

20 - 40A = 16mm<sup>2</sup>  
63 - 100A = 35mm<sup>2</sup>



JG01S

Designation	In AC21 A	In AC22 A	Cat ref.
<b>TPN switch disconnector</b>	20A	10A	<b>JG00S</b>
	25A	16A	<b>JG01S</b>
	40A	25A	<b>JG02S</b>
	63A	40A	<b>JG03S</b>
	80A	63A	<b>JG04S</b>
	100A	80A	<b>JG05S</b>
<b>Auxiliary changeover contacts</b> Snap on contact outgoing 10A	1NO/1NC		<b>JG10A</b>
	2NO/2NC		<b>JG20A</b>



JG03S

## Enclosed MCCBs SP, TP, 4P 63 - 630A - JG

### Description

The Hager range of enclosed MCCBs has been designed for individual circuit protection in larger installations to complement the panelboard system.

The devices are mounted in IP31 enclosures, with gland plates top and bottom to facilitate cabling.

Both single and triple pole devices are equipped with fully rated neutral links. products rated above 160A are fully adjustable.

4 pole versions with RCCB add-on (adj sens. and time delay) are also available.

### Construction

Range:

#### MCCB

Single pole 63-125A (3 ratings)

Triple pole 63-630A (7 ratings)

Four pole 63-630A (7 ratings)

#### MCCB-RCCB

Four pole + RCCB add-on

63-400A (5 ratings)

### Non-Auto MCCB

Triple pole 125-630A (4 ratings)

Four pole 125-630A (4 ratings)

### Specification

Complies with BS EN 60 947

part 2 (MCCB)

BS EN 60 439 part 1 (enclosure).

### Cable capacity

63A = 70mm<sup>2</sup>

100A = 70mm<sup>2</sup>

125A = 70mm<sup>2</sup>

160A = 120mm<sup>2</sup>

250A = 120mm<sup>2</sup>

400A = 240mm<sup>2</sup>

630A = 2x240mm<sup>2</sup>

### Designation

### In A

### +RCCB add-on

### Cat ref.

#### Enclosed MCCB

Single pole and neutral

Icu 16kA

63A

**JG25M**

Icu 16kA

100A

**JG28M**

Icu 16kA

125A

**JG31M**

#### Enclosed MCCB

Triple pole and neutral

Icu 16kA

50 - 63A

**JG26M**

Icu 16kA

80 - 100A

**JG29M**

Icu 16kA

100 - 125A

**JG32M**

non auto

125A

**JG34S**

Icu 40kA

128 - 160A

**JG36M**

Icu 40kA

200 - 250A

**JG40M**

non auto

250A

**JG42S**

Icu 45kA

320 - 400A

**JG44M**

non auto

400A

**JG46S**

Icu 50kA

505 - 630A

**JG48M**

non auto

630A

**JG50S**

#### Enclosed MCCB

Four pole

Icu 16kA

50 - 63A

**JG27R**

**JG27M**

Icu 16kA

80 - 100A

**JG30M**

Icu 16kA

100 - 125A

**JG33R**

**JG33M**

non auto

125A

**JG35S**

Icu 40kA

128 - 160A

**JG37R**

**JG37M**

Icu 40kA

200 - 250A

**JG41R**

**JG41M**

non auto

250A

**JG43S**

Icu 45kA

320 - 400A

**JG45R**

**JG45M**

non auto

400A

**JG47S**

Icu 50kA

505 - 630A

**JG49M**

non auto

630A

**JG51S**

RCCB add-on adjustable from 0.03A-10A, inst - 1 sec



JG27R



JG40M

# Ingress Protection Chart



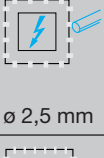
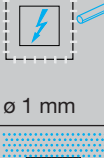
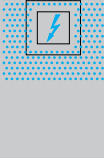
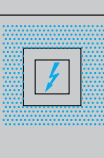
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

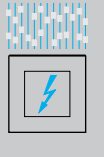
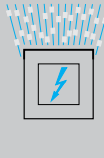
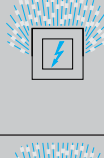
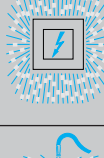
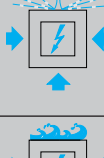


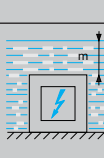
## The first character numeral

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

## The second character numeral

Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

**Consumer Units & Distribution Boards**

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the British Standard covering the requirements of LV Distribution Boards suitable for this application. The full title is:

**BS EN 60439-3**

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use - Distribution boards

This British standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in the UK as Consumer Units are also included in this British Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's. The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

**Panelboards**

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

Generally installed for commercial and light industrial application the panelboard is, however, used in many different types of applications.

Panelboards are covered by the British Standard for Low-voltage Switchgear and Control Gear Assemblies BS EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

**Internal Separation**

The internal separation of assemblies is described in the British Standard BS EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Form numbers are given to some typical forms of separation -

Form 1 - No separation

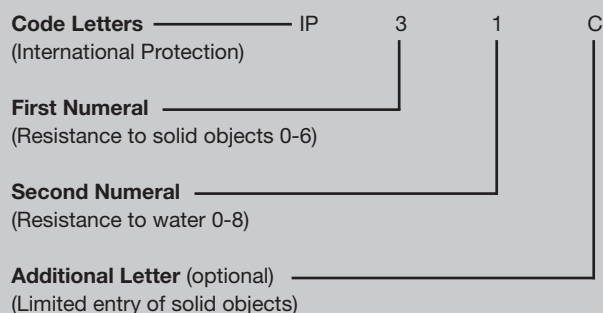
Form 2 - Separation of bus-bars from the functional units

Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.

Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.

### Degree of Protection of Enclosures

The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water. Refer to page 2.36 for ingress protection chart.

### Invicta 125 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current		400A
Bus-bar rated short-time withstand current		35kA for 1s direct connected (unconditional)
Incoming -	Main Terminals	400A
	Non-Auto MCCB	400A
	MCCB	400A
Outgoing -	H125 MCCBs	16 to 125A
	4 way	
	6 way	
	8 way	
	12 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - H400 MCCB - outgoing H125		25kA

Table 1

### Short-Circuit Withstand

The British Standard requires the manufacturer to state the following:

For a panelboard with an incoming MCCB -

- The maximum allowable value of prospective shortcircuit current at the terminals of the incoming MCCB.

For a panelboard where a short-circuit protective device is not incorporated in the incoming unit (Main Terminals) -

- The rated short-time withstand current
- The rated peak withstand current
- The withstand time period if different from one second.

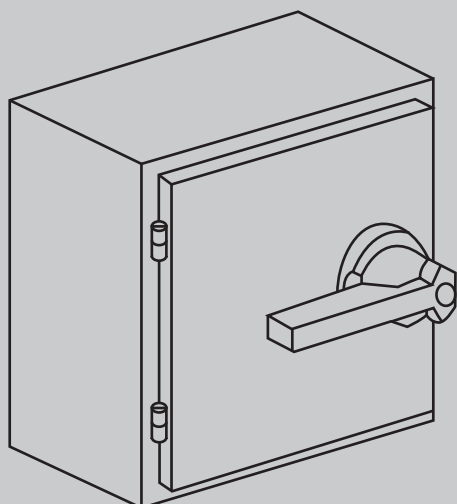
All Invicta panel boards have been independently tested at a UK ASTA approved test laboratory.

To assist in the selection of the correct panelboard, suitable for use on systems having prospective fault levels ranging from 15 to 50kA, Hager have prepared the following simple charts.

### Invicta 250 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current 800A		
Bus-bar rated short-time withstand current		35kA for 1s
Rated conditional short circuit current		40kA - direct connected with 250A MCCB outgoing
Incoming -	Main Terminals	800A
	Non-Auto MCCB	800A
	MCCB	800A
Outgoing -	H125 MCCBs	16 to 125A
	H250 MCCBs	160 to 250A
	6 way	
	8 way	
	12 way	
	18 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - main terminals - outgoing only H250		40kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing only H250		40kA
• Incomer - H400 MCCB - outgoing H125		25kA
• Incomer - H400 MCCB - outgoing only H250		35kA
• Incomer - H800 MCCB - outgoing only H250		50kA

## Fuse Combination Switches



Cat Ref.	Description	Height	Width	Depth
JFB202U	20A SPSN	250	200	150
JFB203U	32A SPSN	250	200	150
JFB302U	20A TPN	250	200	150
JFB303U	32A TPN	250	200	150
JFB402U	20A TPSN	250	200	150
JFB403U	32A TPSN	250	200	150
JFD206U	63A SPSN	325	300	150
JFD306U	63A TPN	325	300	150
JFD406U	63A TPSN	325	300	150
JFE210U	100A SPSN	400	375	200
JFE310U	100A TPN	400	375	200
JFE410U	100A TPSN	400	375	200
JFG312U	125A TPN	500	375	200
JFG412U	125A TPSN	500	375	200
JFG316U	160A TPN	500	375	200
JFG416U	160A TPSN	500	375	200
JFG320U	200A TPN	500	375	200
JFG420U	200A TPSN	500	375	200
JFG325U	250A TPN	500	375	200
JFG425U	250A TPSN	500	375	200
JFH331U	315A TPN	650	500	300
JFH431U	315A TPSN	650	500	300
JFH340U	400A TPN	650	500	300
JFH440U	400A TPSN	650	500	300
JFI363U	630A TPN	800	600	350
JFI463U	630A TPSN	800	600	350
JFI380U	800A TPN	800	600	350
JFI480U	800A TPSN	800	600	350

All dimensions are in mm and exclude the handle.

Add 70mm to the depth to allow for the handle (110mm for 630 / 800A)

Table 4

### Cable Extension Boxes for Fuse Combination Switches

Cat Ref.	Rating	Height	Width	Depth
JZA701	125 / 250A	200	375	200
JZA702	315 / 400A	250	500	300
JZA703	630 / 800A	300	600	350



# Fuse Combination Units

Thermal current I <sub>th</sub> (40°C)	20A	32A	63A	100A	125A	160A	200A	250A	315A	400A	630A*	800A*
Fuse size: BS	A1	A1	A2-A3	A4	B1-B2	B1-B2 B1-B2	B1-B3	B1-B3	B1-B4	C1-C2	C1-C3	
Rated insulated voltage												
Ui (V)	800	800	800	800	800	800	800	800	800	800	1000 1000	
Impulse voltages U <sub>imp</sub>	8000 8000	8000 8000	8000 8000	8000 8000	8000 8000	12000 12000						
Operational current I <sub>e</sub> (A)	A B	A B	A B	A B	A B	A B	A B	A B	A B	A B	A B	A B
415V ac AC-22A/AC-23B	20 20	32 32	63 63	100 100	125 125	160 160	200 200	250 250	315 315	400 400	630 630	800 800
Motor power (kW)												
400V ac	9	15	30	51	63	80	100	**	160 160	220 220	355 355	**
Reactive power 400V ac												
(kVAR)	15	45	25	45	55	60	75	**	125	150	2x125	**
Overload capacity												
Short-circuit with fuses												
(kA Rms)	50	50	50	50	50	50	50	50	50	50	50	50
Fuse rating (A)	20	32	63	100	125	160	200	250	315	400	630	800
BS88												
Making & breaking												
Characteristics												
Breaking capacity	160	256	500	800	1000	1280	1600	2000	2520	3200	**	**
400V AC-23B (A Rms)												
Making capacity	200	320	630	1000	1250	1600	2000	2500	3150	4000	**	**
400V AC-23B (A Rms)												
Withstand												
mechanical	20,000	20,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	8000	8000
(Number of operations)												
Electrical	-	-	-	-	-	-	**	-	-	-	-	**
(Number of operations)												
Tightening torque	2	2	6	9	9	9	20		20	20	40	40
Connection												
Minimum Cu												
Cable section (mm <sup>2</sup> )	2.5	2.5	10	25	35	50	70	70	185	185	2x150	2x150
Maximum Cu												
Cable section (mm <sup>2</sup> )	16	16	25	95	95	95	240	240	240	240	2x300	2x300
Fuse types	NIT20	NIT32	TIS63	TCP100	TF125	TF160	TF200	TKF250	TKF315	TMF400	TTM630	TLM800

\* 630A AC22B making and breaking

\* 800A

\*\* Please call our technical support helpline for these details

Table 5

Switch Disconnectors

Cat Ref.	Description	Height	Width	Depth
JAB302	20A TPN	250	200	150
JAB303	32A TPN	250	200	150
JAB306	63A TPN	250	200	150
JAB310	100A TPN	250	200	150
JAC312	125A TPN	300	250	150
JAC316	160A TPN	300	250	150
JAЕ320	200A TPN	400	375	200
JAЕ325	250A TPN	400	375	200
JAG331	315A TPN	500	375	200
JAG340	400A TPN	500	375	200
JAH363	630A TPN	650	500	300
JAH380	800A TPN	650	500	300
JAB402	20A TPSN	250	200	150
JAB403	32A TPSN	250	200	150
JAB406	63A TPSN	250	200	150
JAB410	100A TPSN	250	200	150
JAC412	125A TPSN	300	250	150
JAC416	160A TPSN	300	250	150
JAЕ420	200A TPSN	400	375	200
JAЕ425	250A TPSN	400	375	200
JAG431	315A TPSN	500	375	200
JAG440	400A TPSN	500	375	200
JAH463	630A TPSN	650	500	300
JAH480	800A TPSN	650	500	300

Table 7

All dimensions are in mm and exclude the handle.  
Add 70mm to the depth to allow for the handle

Cable Extension Boxes for Switch Disconnectors

Cat Ref.	Rating	Height	Width	Depth
JZA700	125 / 160A	200	250	200
JZA701	315 / 400	200	375	300
JZA702	630 / 800	250	500	300

Enlosed thermal current Ithe	20	32	63	100	125	160	200	250	315	400	630	800
Rated insulation voltage Ui (V)	800	800	800	800	800	800	800	800	800	800	1000	1000
Rated Thermal current Ithe (A)	20	32	63	100	125	160	200	250	315	400	630	800
Rated operational Current												
AC21A	20	32	63	100	125	160	160	250	250	250	630	800
AC22A	20	32	63	100	125	125	125	250	250	250	500	800
AC21A	20	32	63	100	125	160	160	200	200	200	500	800
AC22A	20	32	63	100	125	125	125	125	125	125	315	800
Overload capacity												
Icw Rated Short time withstand value (kA/s)	1.26	1.26	1.5	1.5	7	7	7	9	9	9	13	26
R.M.S. value (kA)	0.16	0.256	0.504	0.64	1	1.28	1.28	2	2	2	5.04	6.4
Peak withstand value (kA)	-	-	-	-	20	20	18	30	23	23	45	55
Rated short circuit making capacity (kA)	1.8	1.8	2.1	2.1	11.9	11.9	11.9	15.3	15.3	15.3	26	54.6
Rated impulse withstand voltage Uimp (kV)	8	8	8	8	8	8	8	8	8	8	12	12
Mechanical endurance	100,000	100,000	100,000	100,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000	5,000
Maximum cable size mm <sup>2</sup>	16	16	50	50	50	95	95	150	185	240	2x300	2x300
Tightening torque	2	2	4	4	9	9	9	20	20	20	20	-

Table 9

Cat Ref.	Description	Height	Width	Depth
JG00S	10A TPN	136	100	74
JG01S	16A TPN	136	100	105
JG02S	25A TPN	136	100	105
JG03S	40A TPN	201	136	105
JG04S	63A TPN	201	136	118
JG05S	80A TPN	201	136	118

Table 6

All dimensions are in mm and exclude the handle.

Add 27mm to the depth to allow for the handle on 10-25A products.


Add 32mm to the depth to allow for the handle on 40-80A products.


Enclosed thermal current Ithe			16	25	40	63	80/100
Rated insulation voltage Ui (V)			690	690	690	690	690
Rated thermal current Ithe (A)			25	40	63	80	100
Rated operational current							
AC-21	400V	Ie (A)	25	40	63	80	100
AC-22	230V		16	25	40	63	100
AC-22	400V	cos phi 0.65	16	20	32	63	100
AC-23	230V		16	20	32	63	100
AC-23	400V	cos phi 0.35	16	15	25	40	63
Rated operational power							
AC-23	230V	(kW)	4	5.5	7.5	11	15
AC-23	400V		7.5	11	15	22	30
Rated fused short circuit current							
Back-up fuse	(A)		63	63	63	80	100
R.M.S. value Ik	(kA)		50	50	50	50	50
Peak value	(kA)		5.4	6.6	7.2	8.3	8.7
Rated short circuit making capacity (Icm) (kA)	5.4		6.6	7.2	8.3	8.7	
Rated short-time withstand current (Icm) (kA)	0.9		1	1.1	1.6	1.7	
Rated breaking capacity Icn (A) AC-23							
	400V	cos phi 0.35	250	270	320	480	504
Electrical endurance (number of operations)	3000		3000	3000	3000	3000	
Mechanical endurance (number of operations)	50000		50000	50000	50000	50000	
Terminals mm <sup>2</sup>			1.5-16	1.5-16	1.5-16	2.5-35	2.3-35
Max. thermal torque (Nm)			1.8	1.8	1.8	2.5	2.5

Table 9a

### Fuse - Combination Units - BS EN 60947-3

Many people are attracted to fuse-combination units by their simplicity in application and their reliability in operation. They are particularly useful for use on very high prospective fault level systems where the high energy limiting characteristic of the HRC fuse can be effectively utilised. In the past fuse-combination units came in two forms -

**Switch-Fuse**  A switch in which one or more poles have a fuse in series.

**Fuse-Switch**  A switch in which one or more poles have a fuse carrier/link which forms the moving contact.

The definitions of these two basic types of fuse combination units have now been extended to include units suitable for making, breaking and isolation and units which are only suitable for providing isolation for maintenance work.

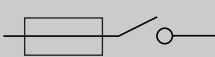
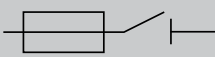
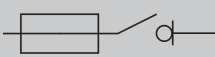



Definition	Symbol	Function
Switch fuse		Making and Breaking current
Disconnecter Fuse		Isolating
Switch Disconnecter Fuse		Making, Breaking and Isolating
Fuse Switch		Making and Breaking Current
Fuse Disconnecter		Isolating
Fuse Switch Disconnecter		Making, Breaking and Isolating

Table 10

However, in order to keep the selection of fuse-combination units as simple as possible, Hager offer a range of high performance double break switch-fuses, which also satisfy the isolating requirement of the British standard. These are correctly shown as and defined as a Fuse Combination Switch.

**Switch disconnectors - BS EN 60947-3.** A range of switch disconnectors (isolators) are available for use on lower current ratings from 20A to 125A, these switches are rated at AC-22 and provide a cost effective alternative to the fuse combination switch especially where the utilisation category AC-23 is not required. ie; mixed resistive and inductive loads. These may be used at AC-23 providing they are derated in accordance with Table 9 page 2.42.

### Utilisation categories

Utilisation categories are not new but they are important because they help the designer or specifier identify the correct unit for a particular application.

The designation of the utilisation category is made up of three parts:

- (1) The prefix ac or dc, which indicates the nature of the current.
- (2) The two digit number, which indicates the type of application the unit is suitable for -
  - 20 Connecting and disconnecting under no-load.
  - 21 Switching of resistive loads.
  - 22 Switching of mixed resistive and inductive loads.
  - 23 Switching of highly inductive loads.
- (3) The suffix A or B, which indicates whether the unit is suitable for frequent or infrequent operation.
  - A - Frequent operation
  - B - infrequent operation.

For example a fuse-combination unit feeding a 400V ac circuit of mixed resistive and inductive loads which would need to be operated frequently would require a minimum utilisation category of AC-22A.

If the load was highly inductive, i.e. motor loads, then the minimum utilisation category would be AC-23A.

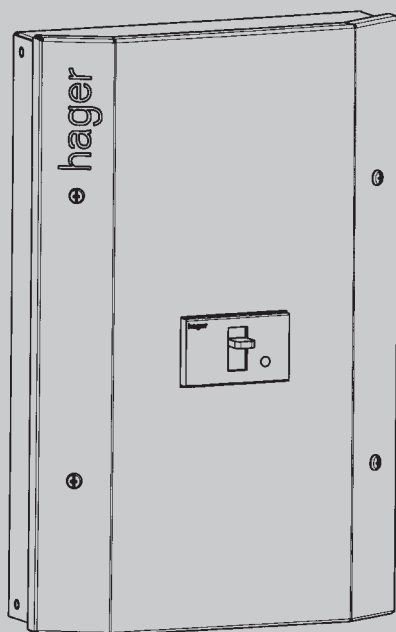
Generally, category AC-23 does not cover the switching of capacitors. Usually this is the subject of agreement between manufacturer and user.

### Motor Power Circuit Protection

Fuse-combination units can be used very effectively for motor power circuit protection, the energy limiting HRC fuse offering very good protection to its associated starter. Category AC-23A should be specified for this duty. Special motor circuit protection fuse links are available which eliminate the need to fit a larger bodied fuse just to take care of the starting current of the motor.

The protection of motor power circuits should not be confused with the direct switching of a single motor. If a fuse-combination unit is required to perform this function then it must comply with the requirements of Appendix A of BS EN 60947-3 which makes provision for different utilisation categories for this application.

## Enclosed MCCBs - Dimensions



Cat Ref.	Description	L	N	Height	Width	Depth
JG25M	63A SPN	70mm	M8	420	267	83
JG26M	63A TPN	70mm	M8	420	267	83
JG27M	63A 4P	70mm	M8	420	267	83
JG27R	63A 4P + RCCB	70mm	M8	420	369	83
JG28M	100A SPN	70mm	M8	420	267	83
JG29M	100A TPN	70mm	M8	420	267	83
JG30M	100A 4P	70mm	M8	420	267	83
JG31M	125A SPN	70mm	M8	420	267	83
JG32M	125A TPN	70mm	M8	420	267	83
JG33M	125A 4P	70mm	M8	420	267	83
JG33R	125A 4P + RCCB	70mm	M8	420	369	83
JG34S	125A TPN non auto MCCB	70mm	M8	420	267	83
JG35S	125A 4P non auto MCCB	70mm	M8	420	267	83
JG36M	160A TPN	120mm	M10	660	334	97
JG37M	160A 4P	120mm	M10	660	334	97
JG37R	160A 4P + RCCB	120mm	M10	768	334	97
JG40M	250A TPN	120mm	M10	660	334	97
JG41M	250A 4P	120mm	M10	660	334	97
JG41R	250A 4P + RCCB	120mm	M10	768	334	97
JG42S	250A TPN non auto MCCB	120mm	M10	660	334	97
JG43S	250A 4P non auto MCCB	120mm	M10	660	334	97
JG44M	400A TPN	240mm	M10	870	384	117
JG45M	400A 4P	240mm	M10	870	384	117
JG45R	400A 4P + RCCB	240mm	M10	1000	384	117
JG46S	400A TPN non auto MCCB	240mm	M10	870	384	117
JG47S	400A 4P non auto MCCB	240mm	M10	870	384	117
JG48M	630A TPN	2x240mm	M10	1130	509	157
JG49M	630A 4P	2x240mm	M10	1130	509	157
JG50S	630A TPN non auto MCCB	2x240mm	M10	1130	509	157
JG51S	630A 4P non auto MCCB	2x240mm	M10	1130	509	157

All sizes are in mm

Table 3



The Orion Plus enclosures are of monobloc construction available in glass fibre reinforced polyester (GRP), or metal.

The enclosures are flexible and can be used for different types of equipment with a choice of:

- Plain mounting plates or
- Din rail modular chassis

These enclosures allow:

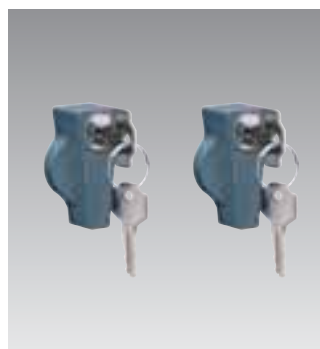
- Installation of automation products for the control of machines or small processes
- With the installation of non modular products such as contactors, transformers etc.
- Cable termination and distribution.



Body made out of one piece up to 800mm



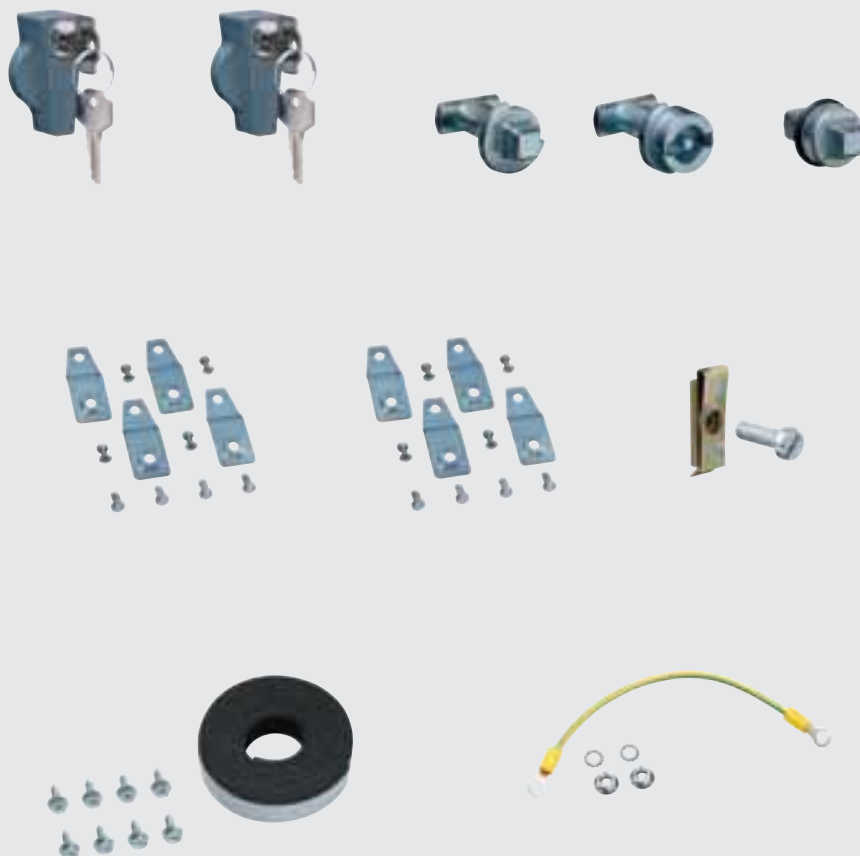
IP65 unit with door closes



Plain door equipped with two locks



Door seal gasket moulded directly onto the door



IP65 Orion Plus metal enclosures	2.48
Orion plus GRP IP65 enclosures	2.50
Accessories	2.51



Range of accessories

## IP65 Orion Plus Metal Enclosures

**Enclosures with plain door**  
steel colour RAL 7035

**IP 65** / door closed  
insulation class : I<sub>II</sub>  
according to BS EN 60529  
1,5mm thick sheet steel for  
body and door

These enclosures feature :

- 2 removable gland plate for cable entry on top and bottom,
- Earth studs on both body and door
- Door easily removable

- Plain door equipped with one or two locks with triangular 8mm bit centres, located out of the sealed area.

**Options:**

- Key lock
- Wall fixing brackets
- Plain or perforated mounting plate
- Equipment kits for modular devices



FL110A

<i>Designation</i>	<i>Dimensions in mm</i>	<i>No. of locks</i>	<i>Cat Ref. plain door</i>	<i>Cat Ref. transparent door</i>
<b>Orion Plus Metal Enclosures</b>	height x width x depth 300 x 250 x 160	1	<b>FL102A</b>	
	350 x 300 x 160	1	<b>FL104A</b>	<b>FL154A</b>
	350 x 300 x 200	1	<b>FL105A</b>	<b>FL155A</b>
	500 x 300 x 200	1	<b>FL110A</b>	<b>FL160A</b>
	500 x 400 x 200	1	<b>FL112A</b>	<b>FL162A</b>
	650 x 400 x 200	2	<b>FL117A</b>	<b>FL167A</b>
	650 x 400 x 250	2	<b>FL118A</b>	<b>FL168A</b>
	650 x 500 x 250	2	<b>FL120A</b>	<b>FL170A</b>
	800 x 600 x 300	2	<b>FL124A</b>	<b>FL174A</b>
	950 x 600 x 300	2	<b>FL126A</b>	<b>FL176A</b>
	950 x 800 x 300	2	<b>FL128A</b>	<b>FL178A</b>

# IP65 Orion Plus Metal Enclosures



FL96Z



FL80Z



FL95Z



FL85Z



FL874A

Designation	Characteristics	Cat Ref.
<b>Key lock</b> Replace the original triangular locks	Key lock to be mounted on the triangular lock	<b>FL96Z</b>
	1 set of 2 key locks with male square 8mm, with 1 key	<b>FL80Z</b>
	Key lock for FL201B	<b>FL94Z</b>
	1 set of 2 locks doublebars 3mm with 1 key	<b>FL95Z</b>
<b>Wall fixing brackets</b> Metal	Metallic wall fixing brackets with screws	<b>FL85Z</b>
	Set of 4	
<b>Kit for connection to earth</b>	For metal enclosures	<b>FL874A</b>
<b>Orion plus spray paint kit</b>	RAL7035	<b>FL672Z</b>

# Orion Plus GRP IP65 Enclosures

## Enclosure with plain door


Made of glass reinforced polyester (GRP)  
Colour : RAL 7035  
FL 201B : RAL 7032  
Body made out of one piece up to height 800mm

These enclosures feature :

- Plain door equipped with one or two locks with triangular 8mm centres, located out of the sealed area, gasket directly moulded on the door.

## Options:

- Key lock,
- Wall fixing brackets
- Plain or perforated mounting plate
- Equipment kits for modular devices.

**IP 65** / door closed BS EN 60529  
insulation class : II   
according to BS EN 61140

- Studs in the back of the enclosure for mounting plate fastening.

Designation	Characteristics	No of locks	Cat Ref. plain door	Cat Ref. transparent door
<b>Orion Plus GRP enclosures</b>	Dimensions in mm: height x width x depth	Heights: top and bottom parts		
	300 x 250 x 160	1	<b>FL201B</b>	
	350 x 300 x 160	1	<b>FL204B</b>	<b>FL254B</b>
	500 x 300 x 200	2	<b>FL209B</b>	<b>FL259B</b>
	500 x 400 x 200	2	<b>FL213B</b>	<b>FL263B</b>
	650 x 400 x 200	2	<b>FL216B</b>	<b>FL266B</b>
	650 x 500 x 250	2	<b>FL221B</b>	<b>FL271B</b>
	800 x 600 x 300	2	<b>FL229B</b>	<b>FL279B</b>
FL201B made of polycarbonate	1200 x 850 x 300	1	<b>FL327B</b>	<b>FL527B</b>
<b>Locks</b>	<b>Key locks</b> To be mounted on the triangular lock, supplied with 2 keys no 427	for enclosures h ≤ 800 for enclosures h ≤ 1150	<b>FL96Z</b>  <b>FL98Z</b>	
Replacement lock	<b>1 set of 2 locks with male square 8mm</b> with 1 key		<b>FL81Z</b>	
	<b>1 set of locks double-bar 3mm</b> with 1 key		<b>FL97Z</b>	
Plastic wall fixing brackets	Delivered with fixing screws M6x12 on enclosure set of 4 pieces		<b>FL863Z</b>	
<b>Depth adjustment slide for enclosures</b>	<b>300mm</b>		<b>FL54Z</b>	



FL216B



FL96Z



FL81Z



FL97Z



FL863Z

## Accessories for Orion Plus Enclosures



FL408A

<i>Designation</i>	<i>Characteristics</i>	<i>Dimensions in mm H x L</i>	<i>Cat Ref.</i>
<b>Plain mounting plates</b> Steel sheet 2mm thickness, aluminium zinc.	for enclosures: FL201B	300 x 250	<b>FL41G</b>
Assembly of the plates: • Fixed directly on the back of the enclosure. • Or on the slides allowing the in-depth setting (fitting with slides FL450A)	FL102A, FL152A,  FL104A, FL105A, FL204B FL154A, FL155A, FL254B  FL110A, FL209B, FL160A FL259B  FL112A, FL213B, FL162A FL263B  FL117A, FL118A, FL216B FL167A, FL168A, FL266B  FL120A, FL221B, FL170A FL271B  FL124A, FL229B, FL174A FL279B  FL126A, FL176A  FL128A, FL178A  FL327B, FL527B	300 x 250  350 x 300  500 x 300  500 x 400  650 x 400  650 x 500  800 x 600  900 x 600  950 x 800  1150 x 850	<b>FL402A</b>  <b>FL404A</b>  <b>FL407A</b>  <b>FL408A</b>  <b>FL412A</b>  <b>FL413A</b>  <b>FL415A</b>  <b>FL416A</b>  <b>FL417A</b>  <b>FL522E</b>
Blank front cover for modular chassis	For chassis	Width	
	FL980A, FL981A	300mm	<b>FL02Z</b>
	FL992A, FL993A	400mm	<b>FL03Z</b>
	FL994A	500mm	<b>FL04Z</b>
	FL996A, FL997A	600mm	<b>FL05Z</b>
	FL998A	800mm	<b>FL06Z</b>



## Accessories for Orion Plus Enclosures

### Designation

### Characteristics

### Cat Ref.



FL981A



FL992A

#### Equipment kits

for modular devices

- **On chassis**  
only FL980A and FL981A

Composed of

- Rails DIN (slide length 44mm) assembled on chassis and adjustable in depth (of front plates with slide)

- **On vertical rail**

composed of

- 2 vertical rail, DIN rail (slide length 44mm)
- Front plates with slit
- A cross-rail authorizing the assembly of bars on base and slides

for enclosures:

FL104A, FL105A, FL204B  
FL154A, FL155A, FL254B

2 rows (24 I)

**FL980A**

FL110A, FL209B, FL160A  
FL259B

3 rows (36 I)

**FL981A**

FL112A, FL213B, FL162A  
FL162A, FL263B

3 rows (48 I)

**FL992A**

FL117A, FL118A, FL216B  
FL167A, FL168A, FL266B

4 rows (64 I)

**FL993A**

FL120A, FL221B, FL170A  
FL271B

4 rows (88 I)

**FL994A**

FL124A, FL229B, FL174A  
FL279B

5 rows (130 I)

**FL996A**

FL126A, FL176A

6 rows (156 I)

**FL997A**

FL128A, FL178A

6 rows (222 I)

**FL998A**

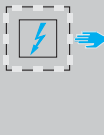
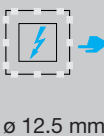
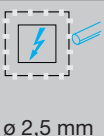
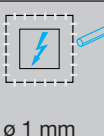
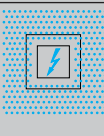
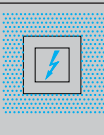
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

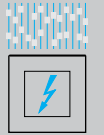
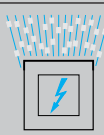
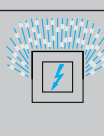
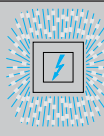
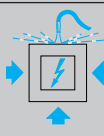
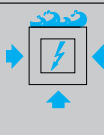
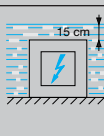
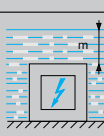
#### The first character numeral

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

#### The second character numeral

Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

### Consumer Units & Distribution Boards

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the British Standard covering the requirements of LV Distribution Boards suitable for this application. The full title is:

#### BS EN 60439-3

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use - Distribution boards

This British standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in the UK as Consumer Units are also included in this British Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's. The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

### Panelboards

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

Generally installed for commercial and light industrial application the panelboard is, however, used in many different types of applications.

Panelboards are covered by the British Standard for Low-voltage Switchgear and Control Gear Assemblies BS EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

### Internal Separation

The internal separation of assemblies is described in the British Standard BS EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Form numbers are given to some typical forms of separation -

Form 1 - No separation

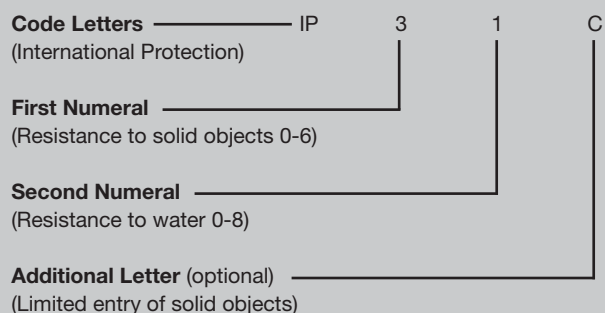
Form 2 - Separation of bus-bars from the functional units

Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.

Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.

**Degree of Protection of Enclosures**

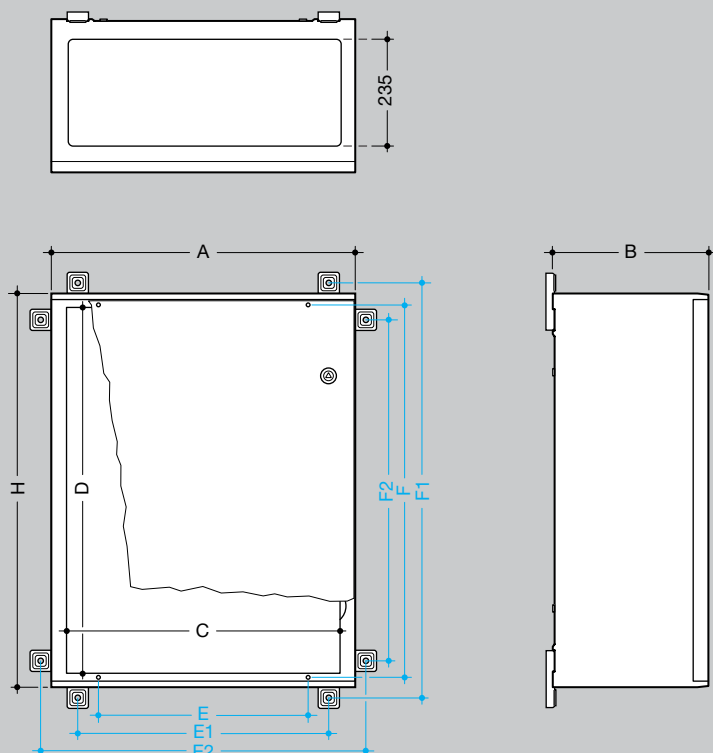
The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

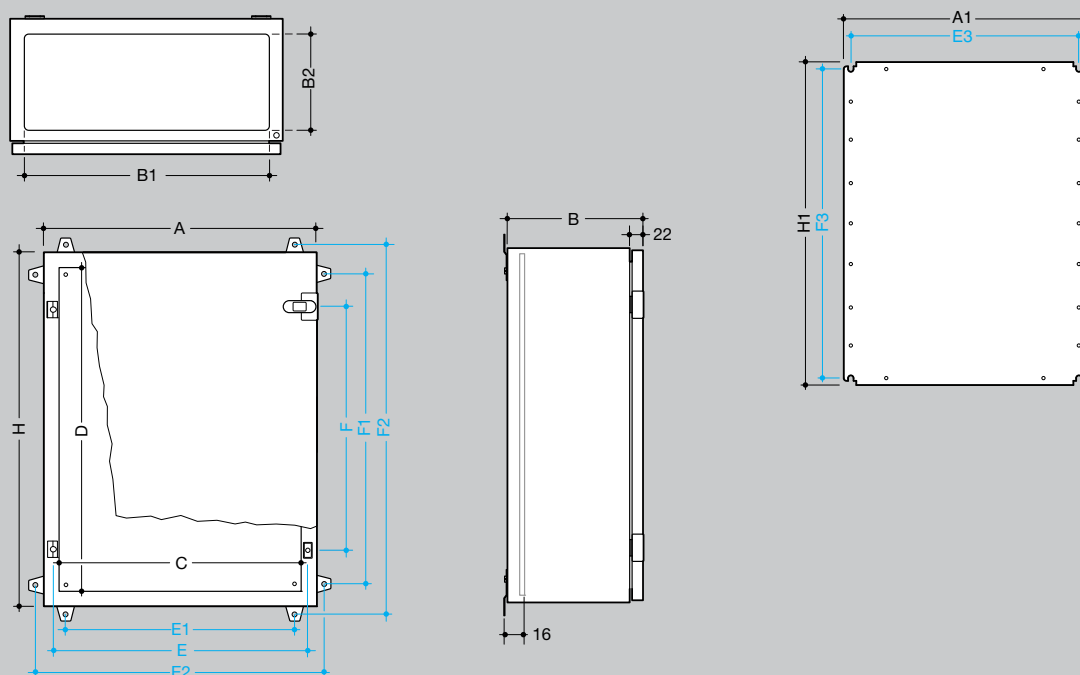
Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water.

## Orion Plus - GRP Enclosures IP65 - Dimensions



References	Rows	Enclosure		B	C	D	E	F	Inside Fixing		Outside Fixing	
		A	H						E1	E2	F1	F2
FL201B	1	250	300	160								
FL204B	2	300	350	160	250	300	219	258	339	339	269	389
FL209B	3	300	500	200	250	450	219	408	339	339	419	539
FL213B	3	400	500	200	350	450	319	408	439	439	419	539
FL216B	4	400	650	200	350	600	319	558	439	439	569	689
FL221B	4	500	650	250	450	600	419	558	539	539	569	689
FL229B	5	600	800	300	550	750	519	708	639	639	719	839
FL327B	-	850	1200	300	750	1050	-	-	-	-	-	-

# Orion Plus - Metal Enclosures IP65 - Dimensions



References	Rows	Enclosure							Outside Fixing				Inside Fixing	
		A	H	B	B1	B2	C	D	E1	E2	F1	F2	E	F
FL102A	-	250	300	160	195	80	200	250	210	320	220	332	169	208
FL104A	2	300	350	160	245	80	250	300	260	370	272	382	219	258
FL105A	2	300	350	200	245	120	250	300	260	370	272	382	219	258
FL110A	3	300	500	200	245	120	250	450	260	370	422	532	219	408
FL112A	3	400	500	200	345	120	350	450	360	470	422	532	319	408
FL117A	4	400	650	200	345	120	350	600	360	470	572	682	319	558
FL118A	4	400	650	250	345	170	350	600	360	470	572	682	319	558
FL120A	4	500	650	250	445	170	450	600	460	570	572	682	419	558
FL124A	5	600	800	300	545	220	550	750	560	670	722	832	519	708
FL126A	6	600	950	300	545	220	550	900	560	670	872	982	519	858
FL128A	6	800	950	300	745	220	750	900	760	870	872	982	719	858

## Orion Plus - Metal Enclosures IP65 - Dimensions

### Dimensions of mounting plates

Full plates	Perforated plates	For enclosures	Dimensions plates		Plates fixing	
			A1	H1	E3	F3
FL402A	FL472A	FL102A	193	280	169	208
FL404A	FL473A	FL104A, FL105A, FL204B	243	330	219	258
FL407A	FL474A	FL110A, FL209B	243	480	219	258
FL408A	FL475A	FL112A, FL213B	343	480	219	408
FL412A	FL476A	FL117A, FL118A, FL216B	343	630	319	408
FL413A	FL477A	FL120A, FL221B	443	630	319	558
FL415A	FL479A	FL123A, FL124A, FL229B	543	780	319	558
FL416A	FL480A	FL125A, FL126A	543	930	419	558
FL417A	FL481A	FL127A, FL128A	743	930	419	558
FL522E		FL327B, FL527B	693	1080	719	858





# Invicta Enclosures

## 1 row boxes 1-5 modules

This range is ideally suited for the installation of individual modular devices. (RCCBs, MCBs, RCBO's switch disconnectors etc).

The range is available without door, with plain door or with glazed door.

Where larger cables need to be accommodated for switch disconnectors etc extra cabling space is provided in the extended height versions.

All boxes from 2-5 modules are fitted with an earth bar as standard and for those with doors the catch can be replaced with the optional key locking facility.

## Enclosures 8-66 modules

One, two or three row enclosures, fitted with DIN rails to accept any combination of Hager modular devices from the simplest switch and MCB arrangements to the more sophisticated control and protection system.

These enclosures feature:

- Ample wiring space
- Full complement of earth and neutral bars fitted as standard
- Significant knockout provision
- Plain or glazed doors
- Optional key lock

☐ For dimensional information see 2.66



IU41



IU44-11



JK016G

Description	Cat Ref. without door	Cat Ref. plain door	Cat Ref. glazed door
1 row 1 suitable for 1 module RCBO	IU41		
1 row 2	IU2	IU2/D	IU2/GD
1 row 2 extended height	IU42*	*IU42/D	
1 row 3	IU3	IU3/D	
1 row 4	IU4	IU4/D	
1 row 4 extended height	IU44*	*IU44/D	*IU44/GD
1 row 5 extended height	IU45*		
4 mod metal unit 1 x 100A Isolator, AC22A Connection capacity: 50mm <sup>2</sup> rigid conductor 35mm <sup>2</sup> flexible conductor 1 x 63A Fuse		IU4-16	
4 mod metal unit 1 x 100A Isolator, AC22A Connection capacity: 50mm <sup>2</sup> rigid conductor 35mm <sup>2</sup> flexible conductor 1 x 100A Fuse		IU44-11	
<i>Note: Recommended maximum cable capacity</i>			
<i>* extended height = 35mm<sup>2</sup></i>			
<i>all other references = 6mm<sup>2</sup></i>			
1 row 8 with knockouts		JK008	JK008G
1 row 12 with knockouts		JK012	JK012G
1 row 16 with knockouts		JK016	JK016G
1 row 22 with knockouts		JK022	JK022G
2 row 24 (2 x 12) with knockouts		JK024	JK024G
2 row 32 (2 x 16) with knockouts		JK032	JK032G
2 row 44 (2 x 22) with knockouts		JK044	JK044G
3 row 66 (3 x 22) with knockouts		JK066	JK066G

## Invicta Enclosures

### Versatile modular design

The modern design of Invicta enclosures, allows great versatility in circuit design.

the distribution board precisely to the installation requirements without compromise.

This coupled with the extensive range of modular circuit protection control and energy management devices available from Hager offers the circuit designer the facility to match

### Description

### Cat. Ref.

#### Accessories

keylock with 2 keys suitable for all enclosures fitted with door - IU enclosure  
JK enclosure

**IKL1**  
**JK222A**

100A 2 pole switch disconnecter

**SB299**

63A 30mA 2 pole RCCB

**CDC263U**

100A 30mA 2 pole RCCB

**CD284U**

100A single module terminal block (MCB profile)

**KR50U**

*Note: For further options please consult Hager*






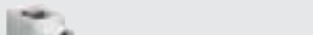





JK222A



CDC263U

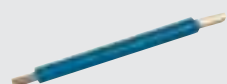
## Insulated Busbars - Prong

	Designation	Characteristics	Current rating In	Bar length	Pack qty.	Cat Ref.
 KB063P	<b>Busbars</b> <b>Length 13</b> Copper section 10mm Suitable for clamp type terminals	<b>1 pole, 1 steps</b> Brown insulation (phase)	63A	13	50	<b>KB063P</b>
		<b>1 pole, 1 steps</b> Blue insulation (neutral)	63A	13	50	<b>KB063N</b>
 KB063N		<b>End caps</b> For KB single pole busbars			10	<b>KZ021</b>
		<b>1 pole</b>	100A	24	10	<b>K171UK</b>
 KZ021	Copper section 10/16mm	<b>2 pole busbars</b> Cables, see below	63A	24	20	<b>KB263C</b>
			80A	56	10	<b>KB280B</b>
 KB263C	Copper section 10/16mm	<b>End cap</b> For 2 pole busbars			10	<b>KZ023A</b>
		<b>3 pole busbars</b>	63A	24	20	<b>KB363C</b>
 KB363C	Copper section 10/16N		80A	57	10	<b>KB380B</b>
		<b>End cap</b> For 3 pole busbars			10	<b>KZ023A</b>
 KB363C		<b>4 pole busbars</b>	63A	24	15	<b>KB463C</b>
			80A	56	10	<b>KB480B</b>
 KF81A	<b>Cable connector</b> Prong type connection from top	For cables: 25mm <sup>2</sup>	63A		10	<b>KF81A</b>
		For cables: 2 x 16mm <sup>2</sup>	63A		10	<b>KF82A</b>
 KF82A	<b>Cable connector</b> Prong type connection from side	For cables: 25mm <sup>2</sup>	63A		10	<b>KF83A</b>
 KF84A	<b>Cable connector</b> Fork type connection from side	For cables: 25mm <sup>2</sup>	63A		10	<b>KF84A</b>
	<b>Neutral assembly</b> DIN rail mounted	5x16mm <sup>2</sup> + 9x10mm <sup>2</sup>	63A		25	<b>KM14N</b>

# Insulated Busbars - Fork



KE01R



KE01B

Designation	Ends of connectors	Characteristics	Current rating In	Length	Pack qty.	Cat Ref.
<b>Flexible links</b>						
Insulated		Brown	100A	122mm	10	<b>KE01R</b>
100A		Blue	100A	122mm	10	<b>KE01B</b>
		Brown	100A	236mm	10	<b>KE02R</b>
		Blue	100A	236mm	10	<b>KE02B</b>
		Brown	100A	330mm	10	<b>KE03R</b>
		Blue	100A	300mm	10	<b>KE03B</b>
		Blue	100A	355mm	10	<b>KE04B</b>
		Brown	100A	500mm	10	<b>KE06R</b>
		Blue	100A	550mm	10	<b>KE07B</b>



= Connection to terminal bar



= Connection to modular device



KD190B

Busbars length 24 ■ 100A	1 pole, 1 ■ steps section: 20mm <sup>2</sup>	100A	57 ■	10	<b>KD190B</b>
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KDN263B

63A	2 pole, 2 ■ steps insulated section: 10mm <sup>2</sup>	63A	24 ■	20	<b>KDN263B</b>
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63A	3 pole, 3 ■ steps insulated	63A	57 ■	20	<b>KDN363B</b>
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KZ059

63A	section: 10mm <sup>2</sup> 4 pole, 4 ■ steps insulated section: 10mm <sup>2</sup>	63A	56 ■	10	<b>KDN463B</b>
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<b>Insulating strip</b> insulation strip for shrouding busbars			5 ■	10	<b>KZ059</b>
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## Brass Terminals in ≤60A

		Description: Brass terminals with/without support for neutral/earth/phase connections.	Technical data: Neutral = Blue support Earth = Green/Yellow support Phase = Beige support			Insulated support can be fitted on DIN rail with KZ060 rail clip or flat bar 12 x 2mm.		
		Connections: number + section	Terminals with support Pack qty.	Neutral Cat ref.	Earth Cat ref.	Phase Cat ref.	Without support Pack qty.	support Cat Ref.
 KM04L	<b>2 x 16 + 2 x 10mm<sup>2</sup></b> 4 connections length 30mm	50	-	-	<b>KM04L</b>	10	<b>K140</b>	
	<b>3 x 16 + 4 x 10mm<sup>2</sup></b> 7 connections length 49mm	50	<b>KM07N</b>	<b>KM07E</b>	<b>KM07L</b>	10	<b>K142</b>	
 KM07N	<b>5 x 16 + 5 x 10mm<sup>2</sup></b> 10 connections length 67mm	20	<b>KM10D</b>	<b>KM10F</b>		10	<b>K143</b>	
	<b>5 x 16 + 6 x 10mm<sup>2</sup></b> 11 connections length 73mm	20	<b>KM11N</b>	<b>KM11E</b>	<b>KM11L</b>	10	<b>K144</b>	
 KM13N	<b>2 x 16 (double drive) + 8 x 10mm<sup>2</sup></b> 10 connections length 69mm	20	<b>KM10N</b>	<b>KM10E</b>		10	<b>K145</b>	
	<b>6 x 16 + 7 x 10mm<sup>2</sup></b> 13 connections length 85mm	20	<b>KM13N</b>	<b>KM13E</b>	-	10	<b>K148</b>	
 KM11B	<b>1 x 25 + 5 x 16 + 5 x 10mm<sup>2</sup></b> 11 connections length 85mm	20	-	<b>KM11B</b>	-	10	<b>K151</b>	
	<b>1 x 25 + 8 x 16 + 8 x 10mm<sup>2</sup></b> 17 connections length 121mm	20	<b>KM17N</b> 2 supports	<b>KM17E</b>	-	10	<b>K156</b>	
 KM13N	<b>1 x 25 + 11 x 16 + 13 x 10mm<sup>2</sup></b> 25 connections length 169mm	20	<b>KM25N</b>	<b>KM25E</b>	-	10	<b>K158</b>	
	<b>1 x 25 + 8 x 16 + 29 x 10mm<sup>2</sup></b>	Long length terminals (without support)			length 242mm	10	<b>K159</b>	
 KZ012	<b>1 x 25 + 16 x 16 + 61 x 10mm<sup>2</sup></b>	Fixing on flat bar 12 x 2 with supports (see below)			length 482mm	10	<b>K160</b>	
	<b>Supports for K140 to K162 terminals insulating material M4 x 8 fixing screws</b>	Blue support for neutral				10	<b>KZ012</b>	
 KZ060		Green/Yellow support for earth				10	<b>KZ013</b>	
		Beige supports (see below)				10	<b>KZ014</b>	
<b>Rail clip for fixing terminals on DIN rails not for: KM04L, KM10D, KM10F, KM10N, KM10E,</b>		Mounting on DIN rail			width 50mm	50	<b>KZ060</b>	

# Rail Mounted Terminals

**Designation:**

To prewire incoming & outgoing circuits in distribution boards.

Colour code:

Beige for phase

Blue for neutral

Yellow/Green for earth



KX04F



KX04H



KW033



K037

Designation	Min / Maximum size in mm <sup>2</sup>	In/A	Width in mm	Pack qty.	Cat Ref.
<b>Phase terminals</b>					
750V~	0.5 - 4mm <sup>2</sup>	24A	5	100	<b>KX04F</b>
Beige Colour	0.5 - 6mm <sup>2</sup>	32A	6	100	<b>KX06F</b>
	1.5 - 16mm <sup>2</sup>	57A	10	50	<b>KX16F</b>
	4 - 25mm <sup>2</sup>	76A	12	50	<b>KX25F</b>
	16 - 50mm <sup>2</sup>	125A	16	20	<b>KX50F</b>

**Note:** KX50F for use in larger depth enclosures. Please consult us.

<b>Neutral terminals</b>	0.5 - 4mm <sup>2</sup>	24A	5	100	<b>KX04N</b>
750V~	0.5 - 6mm <sup>2</sup>	32A	6	100	<b>KX06N</b>
Blue Colour	1.5 - 16mm <sup>2</sup>	57A	10	50	<b>KX16N</b>
	4 - 25mm <sup>2</sup>	76A	12	50	<b>KX25N</b>
	16 - 50mm <sup>2</sup>	125A	16	20	<b>KX50N</b>
<b>Earth terminals</b>	0.5 - 4mm <sup>2</sup>		5	100	<b>KX04H</b>
750V~	0.5 - 6mm <sup>2</sup>		6	50	<b>KX06H</b>
Green/Yellow Colour	1.5 - 16mm <sup>2</sup>		10	50	<b>KX16H</b>
	4 - 25mm <sup>2</sup>		12	50	<b>KX25H</b>
	16 - 50mm <sup>2</sup>		16	20	<b>KX50H</b>

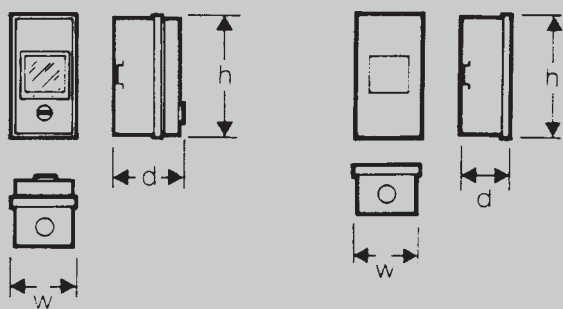
Designation	Characteristics	width in mm	pack qty.	Cat Ref.
<b>End plates - Beige</b>	For: KX04F, N, H, KX06F, N, H	1.5	50	<b>KW025</b>
	For: KX16F, N, H, KX25F, N, H			<b>KW026</b>
	For KR50F, N, H	1.5	20	<b>KW031</b>
<b>End stops</b>	Insulated material	8.5	50	<b>KW033</b>
<b>Marking labels</b>	Numbers:			
Enable individual circuit	1 to 100	set of 25		<b>KW002</b>
identification	101 to 200	set of 25		<b>KW003</b>
	Label L1, L2, L3, N, PE	set of 25		<b>KW004</b>

**Connection blocks In ≤ 125A**

1 pole	Incoming 2 x 25mm	2.5	20	<b>K018</b>
	Outgoing 4 x 16mm			
1 pole	Incoming 2 x 35mm	2.5	10	<b>K037</b>
	Outgoing 4 x 25mm			



## Invicta enclosures - IP30 - Dimensions



Cat Ref	Height	Width	Depth	Connection	Knockouts
IU41	152mm	50mm	61.5mm	earth only	2 x 20mm
IU2, IU3	152mm	80mm	61.5mm	earth only	2 x 20mm
IU2/D					
IU2/GD	152mm	80mm	87.5mm	earth only	2 x 20mm
IU3/D					
IU4	187mm	115mm	61.5mm	earth only	2 x 25mm
IU4/D	187mm	115mm	87.5mm	earth only	2 x 25mm
IU44	312mm	125mm	73.5mm	earth only	none
IU45					
IU44/D	312mm	125mm	99.5mm	earth only	none
IU44/GD					
IU42	312mm	80mm	61.5mm	earth only	2 x 20mm
IU42/D	312mm	80mm	100mm	earth only	2 x 20mm
IU44-11	312mm	125mm	99.5mm	earth only	none
IU4-16	187mm	115mm	61.5mm	earth only	2 x 25mm

## Protection Devices - Miniature Circuit Breakers

The new range of miniature circuit breakers offer increased performance over the previous range. They conform to BS EN 60947-2 standard and can be used to switch on every type of load.

They offer increased safety with an IP2X rating on the screw and terminals.

Other new features include:

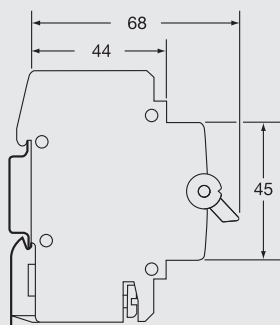
- The new terminal architecture transfers all of the tightening torque directly on to the terminal cage and wire.
- Totally new tripping mechanism with a snap close system.
- Better breaking performance characteristics.
- Circuit labelling window.
- Easily removable from the din rail with top and bottom removable clips.





Miniature circuit breakers 6kA type B SP	3.2
Miniature circuit breakers curve B,C&D 10kA and 15kA	3.3
Auxiliaries and accessories	3.5
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<b>Miniature circuit breakers 80-125A</b>	<b>3.8</b>
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250A frame MCCBs accessories and auxiliaries	3.29
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400A frame MCCBs accessories and auxiliaries	3.30
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630A frame MCCBs accessories and auxiliaries	3.31

## Miniature Circuit Breakers 6kA Type B SP - MTN



### Description

Protection and control of circuits against overloads and short circuits.

- In domestic installations.

### Technical data

Type B tripping characteristics complies with BS EN 60-898. Calibration temperature 30°C. Breaking capacity: 6,000A. Voltage rating: 230-400V. Current rating: 6-63A. Electrical endurance: 20,000

### Operations

Connection capacity  
Rigid conductor 25mm<sup>2</sup>  
Flexible conductor 16mm<sup>2</sup>



MTN106



MTN140

Designation	In/A	Width in 17.5mm	pack qty.	Cat Ref.
Single pole MCB	6	1	12	<b>MTN106</b>
	10	1	12	<b>MTN110</b>
	16	1	12	<b>MTN116</b>
	20	1	12	<b>MTN120</b>
	25	1	12	<b>MTN125</b>
	32	1	12	<b>MTN132</b>
	40	1	12	<b>MTN140</b>
	50	1	12	<b>MTN150</b>
	63	1	12	<b>MTN163</b>

### Miniature Circuit Breakers

Curve B,C & D : BS EN 60898 : 10 kA and BS EN 60947-2 : 15kA

NBNxxxA : "B" Curve  
NCNxxxA : "C" Curve  
NDNxxxA : "D" Curve

In 0.5 to 63A  
Un : 230V-400V

Will accept accessories  
(See page 3.5)

#### Description

- These MCBs allow you to ensure
- Protection of circuits against short circuits
  - Protection of circuits against overload current
  - Control
  - Isolation

Adapted in commercial and industrial electrical distribution.

#### Control

With a fast system of closing, we increase the withstand of contacts on all types of loads.

#### Isolation

The state of isolation is clearly indicated by the "OFF" mechanical position on the toggle with the green colour

#### Connection capacity



- 25mm<sup>2</sup> flexible conductor
  - 35mm<sup>2</sup> rigid conductor
- Fool proof terminal design

Complies with:

- BS EN 60898
- BS EN 60947-2



NCN116A

Designation	In/A	Width in 17.5mm	Pack qty	Cat ref. "B" Curve	"C" Curve	"D" Curve
Single Pole MCB	0.5	1	12		NCN100A	NDN100A
	1	1	12		NCN101A	NDN101A
	2	1	12		NCN102A	NDN102A
	3	1	12		NCN103A	NDN103A
	4	1	12		NCN104A	NDN104A
	6	1	12	NBN106A	NCN106A	NDN106A
	10	1	12	NBN110A	NCN110A	NDN110A
	13	1	12	NBN113A	NCN113A	NDN113A
	16	1	12	NBN116A	NCN116A	NDN116A
	20	1	12	NBN120A	NCN120A	NDN120A
	25	1	12	NBN125A	NCN125A	NDN125A
	32	1	12	NBN132A	NCN132A	NDN132A
	40	1	12	NBN140A	NCN140A	NDN140A
	50	1	12	NBN150A	NCN150A	NDN150A
	63	1	12	NBN163A	NCN163A	NDN163A
Double Pole MCB	0.5	2	6		NCN200A	NDN200A
	1	2	6		NCN201A	NDN201A
	2	2	6		NCN202A	NDN202A
	3	2	6		NCN203A	NDN203A
	4	2	6		NCN204A	NDN204A
	6	2	6	NBN206A	NCN206A	NDN206A
	10	2	6	NBN210A	NCN210A	NDN210A
	13	2	6	NBN213A	NCN213A	NDN213A
	16	2	6	NBN216A	NCN216A	NDN216A
	20	2	6	NBN220A	NCN220A	NDN220A
	25	2	6	NBN225A	NCN225A	NDN225A
	32	2	6	NBN232A	NCN232A	NDN232A
	40	2	6	NBN240A	NCN240A	NDN240A
	50	2	6	NBN250A	NCN250A	NDN250A
	63	2	6	NBN263A	NCN263A	NDN263A



NCN216A

### Miniature Circuit Breakers

Curve B,C & D : BS EN 60898 : 10 kA and BS EN 60947-2 : 15kA

NBNxxxA : "B" Curve  
NCNxxxA : "C" Curve  
NDNxxxA : "D" Curve

In 0.5 to 63A  
Un : 230V-400V

Will accept accessories  
(See page 3.5)

#### Description

These MCBs allow you to ensure

- Protection of circuits against short circuits
- Protection of circuits against overload current
- Control
- Isolation

Adapted in commercial and industrial electrical distribution.

#### Control

With a fast system of closing, we increase the withstand of contacts on all types of loads.

#### Isolation

The state of isolation is clearly indicated by the "OFF" mechanical position on the toggle with the green colour

#### Connection capacity

- 25mm<sup>2</sup> flexible conductor
  - 35mm<sup>2</sup> rigid conductor
- Fool proof terminal design

Complies with:

- BS EN 60898
- BS EN 60947-2



NCN316A

Designation	In/A	Width in 17.5mm	Pack qty	Cat ref. "B" Curve	"C" Curve	"D" Curve
Triple Pole MCB 	0.5	3	4		NCN300A	NDN300A
	1	3	4		NCN301A	NDN301A
	2	3	4		NCN302A	NDN302A
	3	3	4		NCN303A	NDN303A
	4	3	4		NCN304A	NDN304A
	6	3	4	NBN306A	NCN306A	NDN306A
	10	3	4	NBN310A	NCN310A	NDN310A
	13	3	4	NBN313A	NCN313A	NDN313A
	16	3	4	NBN316A	NCN316A	NDN316A
	20	3	4	NBN320A	NCN320A	NDN320A
	25	3	4	NBN325A	NCN325A	NDN325A
	32	3	4	NBN332A	NCN332A	NDN332A
	40	3	4	NBN340A	NCN340A	NDN340A
	50	3	4	NBN350A	NCN350A	NDN350A
	63	3	4	NBN363A	NCN363A	NDN363A
Four Pole MCB 	0.5	4	3		NCN400A	NDN400A
	1	4	3		NCN401A	NDN401A
	2	4	3		NCN402A	NDN402A
	3	4	3		NCN403A	NDN403A
	4	4	3		NCN406A	NDN404A
	6	4	3	NBN406A	NCN406A	NDN406A
	10	4	3	NBN410A	NCN410A	NDN410A
	13	4	3	NBN413A	NCN413A	NDN413A
	16	4	3	NBN416A	NCN416A	NDN416A
	20	4	3	NBN420A	NCN420A	NDN420A
	25	4	3	NBN425A	NCN425A	NDN425A
	32	4	3	NBN432A	NCN432A	NDN432A
	40	4	3	NBN440A	NCN440A	NDN440A
	50	4	3	NBN450A	NCN450A	NDN450A
	63	4	3	NBN463A	NCN463A	NDN463A

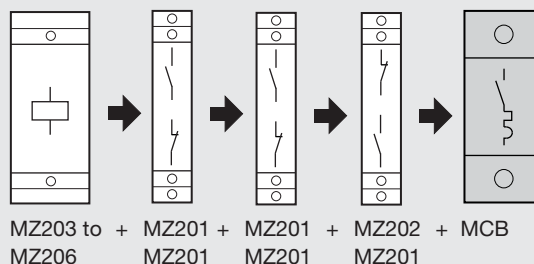



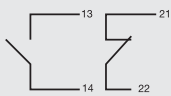

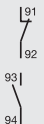





NCN416A

## Auxiliaries and Accessories for Devices - NBN, NCN, NDN, 10kA MCBs

All auxiliaries are common to both single and multi-pole 10kA circuit breakers and RCCBs

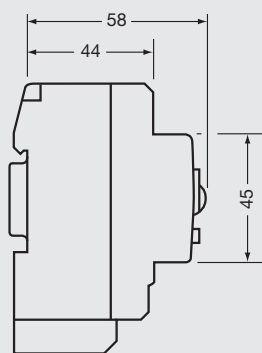
**Connection capacity**  
4mm<sup>2</sup> flexible  
6mm<sup>2</sup> rigid



	Designation	Description	Width in 17.5mm	Pack qty.	Cat Ref.
 MZ201	Auxiliary contacts 5A - 230V~.	1NO + 1NC allows remote indication of main contact status	1/2	1	<b>MZ201</b>
					
 MZ202	Auxiliary contacts and alarm indication	Allows indication of whether MCB has been turned off or tripped	1/2	1	<b>MZ202</b>
					
 MZ204	Shunt trip	Allows remote tripping of the associated device. Operation of the coil is indicated by a flag on the product fascia	1	1	<b>MZ203</b>
		230V - 415Vac 110V - 130Vdc			
 MZ205	Under voltage release	Allows MCB to be closed only when voltage is above 85% of Un. MCB will automatically trip when voltage falls to between 70-35% of Un. Operation of the coil is indicated by a flag on the product fascia	1	1	<b>MZ204</b>
		24 - 48Vac 12 - 48Vdc			
 MZN175	Locking kit for the toggle of the device. supplied without padlock.	This allows locking of the device toggle in the on/off position. will accept two padlocks with hasps of 4.75mm diameter max.	2	1	<b>MZ206</b> <b>MZ205</b>



## RCCB add-on blocks for MCB devices - NBN, NCN, NDN



### Description

These products provide earth fault protection when associated with the 10kA (types NB,NC,ND) range of MCBs. They are designed to be fitted to the right hand side of 2 and 4 pole MCBs and the completed unit provides protection against:-

- overload
- short circuit
- earth faults

### Technical data

3 non adjustable sensitivities  
30, 100 & 300mA  
nominal voltage 230 - 400V  
protection against nuisance tripping.

2 pole = 2

4 pole = 3

BS EN 61009 appendix G

**S** Selective (time delay)  
versions are available in 100  
& 300mA

### Connection capacity

16mm<sup>2</sup> flexible  
25mm<sup>2</sup> rigid

All devices have a test facility.



### Designation

Sensitivity  
*I<sub>Δn</sub>*

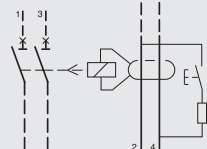
*I<sub>n</sub>/A*

Width in 17.5mm

Pack  
qty.

Cat Ref.  
standard

### 2 pole RCCB add-on blocks



30mA	63A	2	1	<b>BD264</b>
100mA	63A	2	1	<b>BE264</b>
300mA	63A	2	1	<b>BF264</b>

time delayed **S** 100mA

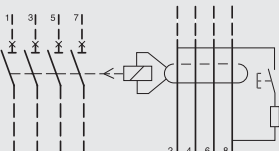
63A 2 1 **BN264**

time delayed **S** 300mA

63A 2 1 **BP264**



### 4 pole RCCB add-on blocks



30mA	63A	3	1	<b>BD464</b>
100mA	63A	3	1	<b>BE464</b>
300mA	63A	3	1	<b>BF464</b>

time delayed **S** 100mA

63A 3 1 **BN464**

time delayed **S** 300mA

63A 3 1 **BP464**



2 pole MCB and add on block showing unique sliding  
connection feature



The new range of modular protection devices ranging from 80 to 125A re-inforces Hagers commitment to new product development in protection solutions for OEMs and commercial buildings.

Especially designed to provide :

- Protection as main incomer for sub distribution
- Protection of loads directly supplied by a distribution board.

Offering benefits focussed on safety, ease of installation and use friendliness, this is another example by Hager of continuous investment to develop products for the future.



The HM range of MCBs and add-on blocks benefit from the new exclusive "cage connection".



The connection of auxiliaries becomes easy, thanks to the new "Fast on" connection terminals provided on the top and bottom of the MCBs. This provides a quick and easy solution to feed auxiliaries such as shunt trip coil, UV release etc.

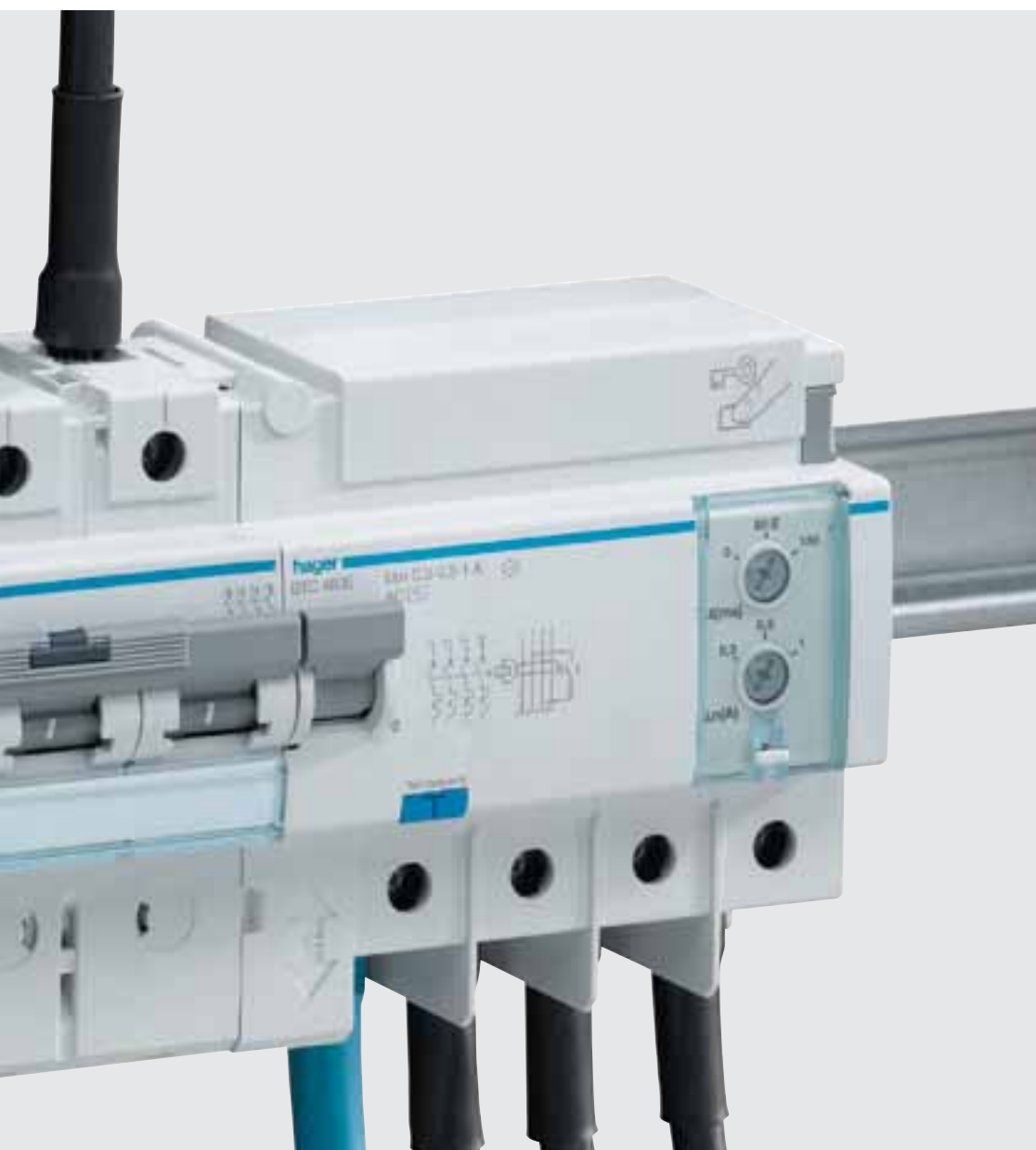
Capacity:

- 1.5 to 6mm<sup>2</sup>
- Maximum current 6A



Across the range, the assembly of the add-on block is carried out in three simple steps.

1. Assembly
2. Connection
3. Locking



Miniature Circuit Breakers 80-125A	3.10
HMF "C" Curve	3.11
HMF "C" Curve 15kA	3.12
HMD "D" Curve 15kA	3.13
RCD Add-on Blocks type AC	3.14



The add-on blocks are available in fixed and adjustable versions. In adjustable version, the sensitivity and the time delay can be adjusted, even when connected.



The RCD Add on block is equipped with locating pins which helps to secure the tightening of the bottom terminals to the circuit breaker. The cover cannot be closed if the terminals are not tightened correctly



The MCBs can lock in "OFF" position by the integrated locking facility on the toggle.

This lock allows inserting a 2,5 to 3,5mm plastic cable tie where you can fit a warning card if necessary (delivered with each product).



The DIN rail clips of the circuit breaker unit and add-on-block facilitate its mounting. They are easily accessible with a screwdriver.

## Miniature Circuit Breakers 80-125A

### Thermal magnetic circuit breakers

#### Curves "C" - "D"

#### In 80 to 125 A

These circuit breakers are intended for the protection of the circuits against overloads and short circuits.

#### ☐ HMC curve "C"

##### 15 kA

(BS EN 60898-1)

15 kA for 80 - 100 - 125 A :

BS EN 60947-2

Width 1.5 mod/pole

#### ☐ HMD curve "D"

##### 15 kA

(BS EN 60898-1)

15 kA for 80 - 100 - 125 A :

BS EN 60947-2

Width 1.5 mod/pole

#### ☐ HMF curve "C"

##### 10 kA

(BS EN 60898-1)

10 kA for 80 - 100 - 125 A :

BS EN 60947-2

width 1.5 mod/pole

### Series HMC, HMD, HMF :

These circuit breakers are equipped with reinforced screw cages.

A label holder is integrated under the toggle to ensure the location of the product.

The "OFF" position is clearly shown by a green indicator below the toggle.

Suitable for isolation (according to BS EN 60947-2) : the isolation of the circuit breakers is indicated by a green indicator on the toggle.

These circuit breakers have quick closing : fast and simultaneous closing of the contacts, independent of the handling speed.

This increases the life of the circuit breaker whatever the type of load.

**Nominal voltage :** 230/415 V ~  
calibration setting :30 °C  
(BS EN 60898-1)  
**insulation voltage:** 500 V

#### Options :

☐ auxiliary :  
- to visualise the state ON or OFF of the circuit breaker,  
- to ON/OFF remotely the circuit breaker

☐ locking mechanism

☐ terminal covers and phase separators

☐ RCD add-on blocks

### Series HMC, HMD,

☐ Mounting capability :  
bistable DIN-rail latches (2 positions) upstream and downstream facilitate the mounting of the circuit breakers on the DIN-rail.

☐ Terminals with tightening compensation.  
These circuit breakers are equipped with screw cages with tightening compensation, (reinforcement cage cable holding jaws). These elements contribute to an effective cable tightening over time.

☐ These circuit breakers are equipped with cable terminals of type "fast on" upstream and downstream to feed an auxiliary low voltage circuit (indicating lights, auxiliary control...) Max. current 6A  
max. cable csa - 6 mm<sup>2</sup>

☐ Lockable toggle  
MCB can be locked in "Off" position by the integrated locking facility on the toggle. This lock allows to insert a 2.5-3.5mm plastic cable tie where you can fit a warning card if necessary and allows a safer working environment for all personnel.

☐ RCD Add-on blocks, simple, quick, adjustable and fixed  
1. Assembly  
2. Connection  
3. Locking  
the assembly of the add-on block is carried out very quickly and easily. Simple and fast : it is a Hager innovation. add-on blocks 125A are available in fixed version and adjustable version.

Model	Icc/Curve	Accessories	Fast-on connection	Tightening comp. system	Lockable handle	Front product labelling
HMF	10kA / C	YES	NO	NO	NO	YES
HMC / HMD	15kA / C, D	YES	YES	YES	YES	YES

# Miniature Circuit Breakers 80-125A HMF : "C" - 10 kA

<b>Curves "C"</b>	<b>10 kA</b> (BS EN 60898-1)	<b>Tripping curves</b> "C" magnetic setting between 5 and 10 In.	<b>Connection capacity</b> • 35mm <sup>2</sup> flexible wire (50mm <sup>2</sup> possible with some cable end-caps), • 70mm <sup>2</sup> rigid wire	<b>KEMA</b> approved according to BS EN 60898-1, BS EN 947-2 standards.
<b>In 80 to 125 A</b>	<b>10 kA</b> (BS EN 60947-2)	<b>Use :</b> Commercial and industrial applications		



HMF199T



HMF299T



HMF399T



HMF499T

<i>Designation</i>	<i>In/A</i>	<i>Width in ■ 17.5 mm</i>	<i>Cat Ref. "C" Curve</i>
<b>Circuit breakers 1 pole</b>	80	1.5	<b>HMF180T</b>
	100	1.5	<b>HMF190T</b>
	125	1.5	<b>HMF199T</b>
<b>Circuit breakers 2 poles</b>	80	3	<b>HMF280T</b>
	100	3	<b>HMF290T</b>
	125	3	<b>HMF299T</b>
<b>Circuit breakers 3 poles</b>	80	4.5	<b>HMF380T</b>
	100	4.5	<b>HMF390T</b>
	125	4.5	<b>HMF399T</b>
<b>Circuit breakers 4 poles</b>	80	6	<b>HMF480T</b>
	100	6	<b>HMF490T</b>
	125	6	<b>HMF499T</b>

# Miniature Circuit Breakers 80-125A HMC : "C" - 15 kA

<b>Curves "C"</b>	<b>15 kA</b> (BS EN 60898-1)	<b>Tripping curves</b> "C" magnetic setting between 5 and 10 In.	<b>Connection capacity</b> • 35mm <sup>2</sup> flexible wire (50mm <sup>2</sup> possible with some cable end-caps), • 70mm <sup>2</sup> rigid wire	<b>KEMA</b> approved according to BS EN 60898-1, BS EN 947-2 standards.
<b>In 80 to 125 A</b>	<b>15 kA</b> (BS EN 60947-2)	<b>Use :</b> Commercial and industrial applications		



HMC199T



HMC299T



HMC399T



HMC499T

<i>Designation</i>	<i>In/A</i>	<i>Width in ■ 17.5 mm</i>	<i>Cat Ref. "C" Curve</i>
<b>Circuit breakers 1 pole</b>	80	1.5	<b>HMC180T</b>
	100	1.5	<b>HMC190T</b>
	125	1.5	<b>HMC199T</b>
<b>Circuit breakers 2 poles</b>	80	3	<b>HMC280T</b>
	100	3	<b>HMC290T</b>
	125	3	<b>HMC299T</b>
<b>Circuit breakers 3 poles</b>	80	4.5	<b>HMC380T</b>
	100	4.5	<b>HMC390T</b>
	125	4.5	<b>HMC399T</b>
<b>Circuit breakers 4 poles</b>	80	6	<b>HMC480T</b>
	100	6	<b>HMC490T</b>
	125	6	<b>HMC499T</b>



### Miniature Circuit Breakers 80-125A HMD : "D" - 15 kA

**Curves "D"** **15 kA**  
(BS EN 60898-1)  
**15 kA**  
(BS EN 60947-2)

**In 80 to 125 A**

**Tripping curves**  
"D" magnetic setting between  
10 and 20 I<sub>n</sub>.

**Use :**  
Commercial and  
industrial applications

**Connection capacity**  
• 35mm<sup>2</sup> flexible wire (50mm<sup>2</sup>  
possible with some cable  
end-caps),  
• 70mm<sup>2</sup> rigid wire

**KEMA** approved according to  
BS EN 60898-1, BS EN 947-2  
standards.




HMD299T



HMD399T



HMD499T

Designation	In/A	Width in  17.5 mm	Cat Ref. "C" Curve
<b>Circuit breakers 1 pole</b>	80	1.5	HMD180T
	100	1.5	HMD190T
	125	1.5	HMD199T
<b>Circuit breakers 2 poles</b>	80	3	HMD280T
	100	3	HMD290T
	125	3	HMD299T
<b>Circuit breakers 3 poles</b>	80	4.5	HMD380T
	100	4.5	HMD390T
	125	4.5	HMD399T
<b>Circuit breakers 4 poles</b>	80	6	HMD480T
	100	6	HMD490T
	125	6	HMD499T

### Accessories for Circuit Breakers



MZN 130



MZN 131

Designation	Characteristics	Cat Ref.
<b>Terminal covers / Screw cap</b>	Allows to cover connection terminals, screws of circuit breakers. The screw covers can be sealed.	<b>MZN130</b>
<b>Phase separator</b>	1 set of 3 phase separators	<b>MZN131</b>


## RCD add-on blocks type AC for circuit breakers HMC, HMD, HMF

**RCD add-on blocks for** circuit breakers HMC, HMD, HMF.

### Fixed :

- **high sensitivity 30 mA** instantaneous
- **low sensitivity 300 mA** - instantaneous.

### Settings :

- sensitivity  $\Delta n$  0,3 - 0,5 - 1 A ...
- delay   $\Delta t$  0 - 60 - 150 ms.

These devices are intended to be fixed on the right side of the circuit breakers to form differential circuit breakers from 80 to 125A, two, three or four-pole.

This "circuit breaker + block" ensures, in addition to the overload and short circuit protection, the protection of the installations against the insulation defects (300mA and 1A) and the protection of the people against the direct contacts (30mA) and indirect (300mA).

### Adjustable blocks :

the setting is done by actuating the thumbwheel in front face. The setting thumbwheels are protected by a transparent sealable cover.

### Disassembly :

the bistable latch (2 positions) facilitate the assembly or disassembly by the bottom of the "circuit breaker + block."

These RCD add-on blocks exist in version AC and in version A-HI.

### Version AC :

the add-on blocks are protected against unexpected tripping caused by the transitory leakage currents : lightning, capacitive loading.

### High Immunity :

The products with "reinforced immunity" reduce the unexpected tripping when they protect equipment generating disturbances (micro-processing, electronic ballast,...)

The earth fault is indicated when the handle is in lower position (yellow colour).

Test button for earth fault check.

### Tightening compensation cages

These circuit breaker blocks are equipped with screw cages with tightening compensation, reinforcement arch and cable holding jaws. These elements contribute to an effective tightening over time.

### Connection capacity :

- 35mm<sup>2</sup> flexible connection (50° possible with some terminals),
- 70mm<sup>2</sup> rigid connection.

Assembly and disassembly facilitated by the drawer assembly system. The terminal cover is dependent of the add-on block. It is provided with keying systems avoiding the omission of terminal tightening downstream of the circuit breaker. .

Nominal voltage : -15 +10 %

2 poles : 230 V

three and four-pole : 230/400 V

test button : 230/400 V.

In conformity with the requirements of the appendix G of the BS EN 61009-1.


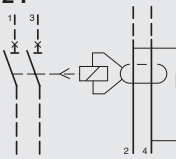

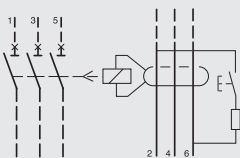

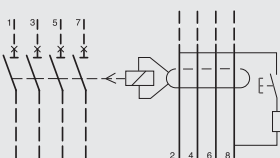

In conformity with the requirements of standard BS EN 60947-2.



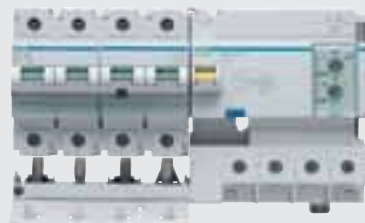
BTC 280E



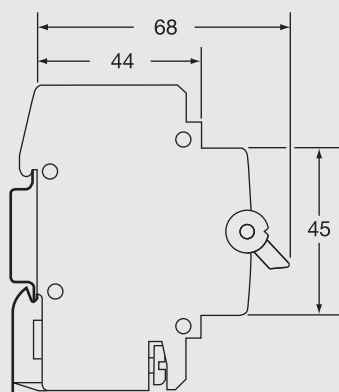
BDC 480E

Designation	Sensitivity fixed / adjustable $\Delta n$	$I_n$ / A	Width in  mm 17,5 mm	Cat Ref. add-on blocks AC
<b>Add-on blocks 2 poles 2 P</b> 	fixed 30 mA	125	6	<b>BDC280E</b>
	adjustable 0,3 - 0,5 - 1 A  0 - 60 - 150 ms	125	6	<b>BTC280E</b>
<b>Add-on blocks 3 poles 3 P</b> 	fixed 30 mA	125	6	<b>BDC380E</b>
	adjustable 0,3 - 0,5 - 1 A  0 - 60 - 150 ms	125	6	<b>BTC380E</b>
<b>Add-on blocks 4 poles 4 P</b> 	fixed 30 mA	125	6	<b>BDC480E</b>
	fixed 300 mA	125	6	<b>BFC480E</b>
	adjustable 0,3 - 0,5 - 1 A  0 - 60 - 150 ms	125	6	<b>BTC480E</b>

### association circuit breaker + add-on block 4 poles adjustable



## Single Pole and Switched Neutral (SPSN) Devices - MCB and Fuse Carrier



### Description

#### MCBs

Protection and control of circuits against overloads and short circuits.

### Technical data

Type C tripping characteristics  
Complies with BS EN 60-898  
Calibration temperature 30°C  
Breaking capacity - 6000A  
Voltage rating - 230VAC

### Connection capacity

Rigid 16mm<sup>2</sup>  
Flexible 10mm<sup>2</sup>

### Description

#### Fuse carriers

Protection and control of circuits against overloads and short circuits

### Technical data

Characteristics type (fuse) gF  
Interruption capacity -  
10-20A 4000A  
25 & 32A - 6000A  
Voltage rating - 250VAC  
Connection capacity  
Rigid 16mm<sup>2</sup>  
Flexible 10mm<sup>2</sup>



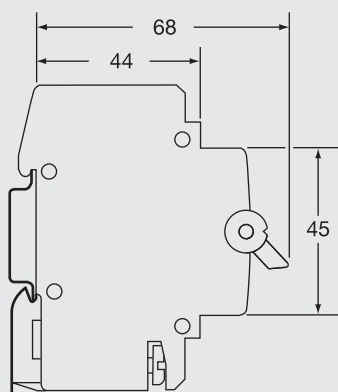
MLN710A



MLN740A

Designation	Current (A)	Width in ■	Pack qty	Cat Ref.
<b>MCB</b>				
Single Pole & Switched Neutral	6	1	12	<b>MLN706A</b>
	10	1	12	<b>MLN710A</b>
	16	1	12	<b>MLN716A</b>
	20	1	12	<b>MLN720A</b>
	32	1	12	<b>MLN732A</b>
	40	1	12	<b>MLN740A</b>
<b>Fuse Carrier</b>				
Single Pole & Switched Neutral without fuse fitted.	10	1	12	<b>L12401</b>
	16	1	12	<b>L12501</b>
	20	1	12	<b>L12601</b>
	25	1	12	<b>L12701</b>
	32	1	12	<b>L12801</b>
<b>Spare fuse type gF</b>				
10A - 8.5 x 23mm	10		10	<b>LF138</b>
16A - 10.3 x 25.8mm	16		10	<b>LF139</b>
20A - 8.5 x 31.5	20		10	<b>LF140</b>
25A - 10.3 x 31.5mm	25		10	<b>LF141</b>
32A - 10.3 x 38mm	32		10	<b>LF142</b>
<b>Single module blank</b>			25	<b>VAS01</b>
Shrouds busbar & blanks spare ways				
<b>Locking kit</b>			2	<b>MZN175</b>
For the toggle of the device. Supplied without padlock. For use with MCCB's.				
This allows locking of the device toggle in the on/off position. Will accept two padlocks with hasps of 4.75mm diameter max.				

## 2 & 4 Pole RCCBs



### Description

To open a circuit automatically in the event an earth fault between phase and earth, and/or neutral and earth. A wide range of current ratings and sensitivities are available. Suitable for domestic, commercial and industrial applications.

### Technical data

Complies with BS EN 61008, IEC1008

### Sensitivities (Fixed)

10, 30, 100, 300mA & 100 and 300mA time delayed.

### Terminal capacities

16-63A Rigid 25mm<sup>2</sup>  
Flexible 16mm<sup>2</sup>  
80&100A Rigid 50mm<sup>2</sup>  
Flexible 35mm<sup>2</sup>

### Features

Positive contact indication is provided by the rectangular flag indicator  
Red = Closed  
Green = Open  
Indication of trip is provided by the oval flag indicator

Yellow = Tripped.

All RCCBs have trip free mechanisms and can be padlocked either on or off.

Operating temperature range  
- 5 to 40°C type AC  
- 25 to 40°C type A

Operating voltage  
2P: 110-230Vac  
4P: 230 - 400Vac

Width in 17.5mm modules ■

2P - 2 ■

4P - 4 ■



CDC225U



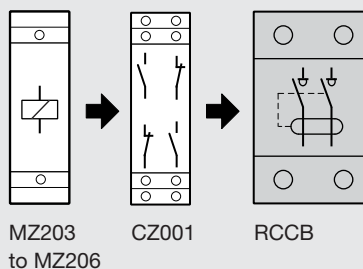
CDC263U

<i>Sensitivity type AC</i>	<i>Current rating</i>	<i>Pack qty.</i>	<i>Cat Ref. 2 Pole</i>	<i>Cat Ref. 4 Pole</i>
10mA	16A	1	CCC216U	
30mA	25A	1	CDC225U	CDC425U
30mA	40A	1	CDC240U	CDC440U
30mA	63A	1	CDC263U	CDC463U
30mA	80A	1	CD280U	CD480U
30mA	100A	1	CD284U	CD484U
100mA	25A	1	CEC225U	CEC425U
100mA	40A	1	CEC240U	CEC440U
100mA	63A	1	CEC263U	CEC463U
100mA	80A	1	CE280U	CE480U
100mA	100A	1	CE284U	CE484U
300mA	25A	1	CFC225U	CFC425U
300mA	40A	1	CFC240U	CFC440U
300mA	63A	1	CFC263U	CFC463U
300mA	80A	1	CF280U	CF480U
300mA	100A	1	CF284U	CF484U
<b>Time delayed</b>				
100mA	100A	1	CN284U	CN484U
300mA	100A	1	CP284U	CP484U
<b>Type A DC sensitive</b>				
10mA	16A	1	CCA216U	
30mA	25A	1	CDA225U	CDA425U
30mA	40A	1	CDA240U	CDA440U
30mA	63A	1	CDA263U	CDA463U
<b>Accessories</b>				
<b>Terminal covers</b>				
	16A-63A	1	CZN005	CZN006
	80A-100A	1	CZ007	CZ008

## RCCB - Auxiliaries

### Configurations

□ For technical details  
see page 3.38.



CZ201



MZ204



MZ205



MZN175

Designation	Description	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Interface auxiliary</b> Indicates the position of the associated RCCB On, Off, Tripped. Also acts as RCCB interface with standard MCB auxiliaries MZ203-MZ206	2NO 2NC 6A AC1 230V	1	1	<b>CZ001</b>
<b>Shunt trip</b>	Allows remote tripping of the associated device. Operation of the coil is indicated by a flag on the product fascia			
	230Vac - 400Vac	1	1	<b>MZ203</b>
	110V - 130Vdc			
	24 - 48Vac	1	1	<b>MZ204</b>
	12-48Vdc			
<b>Under voltage release</b>	Allows RCCB to be closed, only when voltage is above 85% of Un. RCCB will automatically trip when voltage falls to between 70-35% of Un (230V). Operation of the release is indicated by a flag on the product fascia.			
	230Vac	1	1	<b>MZ206</b>
	48Vdc	1	1	<b>MZ205</b>
<b>Locking kit</b> For the dolly of the device. Supplied without padlock.	This allows locking of the device dolly in the on/off position. Will accept two padlocks with hasps of 4.75mm diameter max.		2	<b>MZN175</b>

## RCBO - Single Pole

### Description

Compact protection devices which combine the overcurrent functions of an MCB with the earth fault functions of an RCCB in a single unit. A range of sensitivity and current ratings are available for use in domestic commercial and industrial applications

New insulated DIN clip on 10kA MCBs and 1 module RCBO

### Technical data

Specification  
Complies with BS EN61009, IEC1009  
Sensitivities (fixed)  
10mA and 30mA  
Breaking capacity: 6kA

### Terminal capacities

16mm<sup>2</sup> rigid,  
10mm<sup>2</sup> flexible

### Application

1 module devices provide a compact solution for installation in consumer units, Invicta 63Mk2 distribution boards.  
These devices are 1 pole & solid neutral.

### Operating voltage

127-230V AC

Flying neutral lead length:  
700mm



AD110

Sensitivity mA	In/A	Width in ■ 17.5mm	Pack qty.	Cat Ref. Type B	Cat Ref. Type C
10mA	6A	1	1	AC104	AC119
10mA	16A	1	1	AC107	AC122
10mA	25A	1	1	AC109	AC124
10mA	32A	1	1	AC110	AC125
30mA	6A	1	1	AD104	AD119
30mA	10A	1	1	AD105	AD120
30mA	16A	1	1	AD107	AD122
30mA	20A	1	1	AD108	AD123
30mA	25A	1	1	AD109	AD124
30mA	32A	1	1	AD110	AD125
30mA	40A	1	1	AD111	AD126
30mA	45A	1	1	AD112	AD127
30mA	50A	1	1	AD113	AD128
100mA	16A	1	1	-	AE116Z
100mA	32A	1	1	-	AE132Z
10kA 30mA	6A	1	1	-	AD184
10kA 30mA	10A	1	1	-	AD185
10kA 30mA	16A	1	1	-	AD187
10kA 30mA	20A	1	1	-	AD188
10kA 30mA	25A	1	1	-	AD189
10kA 30mA	32A	1	1	-	AD190
10kA 30mA	40A	1	1	-	AD191

### Locking kit

For the dolly of the device.  
Supplied without padlock.

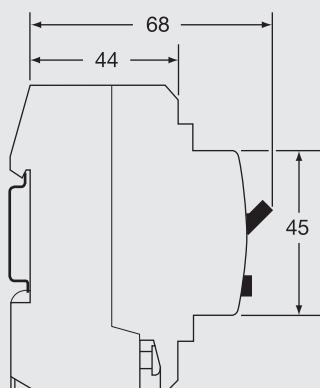
This allows locking of the device dolly in the on/off position.  
Will accept two padlocks with hasps of 4.75mm diameter max.

**MZN175**



MZN175

## RCBO - Single Pole and Switched Neutral



### Description

Compact protection devices which provide MCB overcurrent protection and RCCB earth fault protection in a single unit. Complies with BS EN 61 009

### Technical data

The units are available with current ratings of 6A, 10A, 16A, 20A, 25A, 32A and 40A. The device switches both the phase and neutral conductors. All ratings have 30mA earth fault protection. The units feature indicators which show whether tripping is due to an overcurrent or earth fault.

Breaking capacity: 6kA  
Voltage rating: 110-230V.  
Current rating: 6-40A.

### Operations

Mechanical life:  
20,000 operations

### Connection capacity

Rigid conductor 25mm<sup>2</sup>  
Flexible conductor 16mm<sup>2</sup>



ADA932U

Designation	In/A	Width in 17.5mm	Pack qty.	Cat Ref. Type "B"	Cat Ref. Type "C"
RCBO tripping current (30mA) with flying 700mm lead for neutral connection.	6	2	1	ADA906U	ADA956U
	10	2	1	ADA910U	ADA960U
<b>For use in consumer units and distribution boards only.</b>	16	2	1	ADA916U	ADA966U
	20	2	1	ADA920U	ADA970U
	25	2	1	ADA925U	ADA975U
	32	2	1	ADA932U	ADA982U
	40	2	1	ADA940U	ADA990U

## RCBO - Single Pole and Switched Neutral Type C 4.5kA

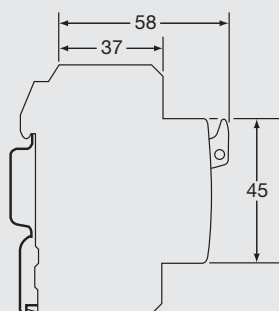


ADC806F

Designation	In/A	Width in 17.5mm	Pack qty.	Cat Ref. Type "C"
RCBO	6	2	1	ADC806F
All terminal version for cable in cable out applications e.g. local protection, caravan pitches, festive illuminations, street lighting.	10	2	1	ADC810F
	16	2	1	ADC816F
	20	2	1	ADC820F
	25	2	1	ADC825F
<b>Note: Not for use in fixed busbar consumer units or distribution boards.</b>	32	2	1	ADC832F



## HRC fuse carriers - BS 1361 and BS 88



### Description

Protection and control of circuits against overloads and short-circuits:

### Technical data

- Fuse carriers suitable for fuses which fully comply with the dimensional, power loss, fusing factor, discrimination and time-current characteristic of BS 1361

Complies with BS 1361:1971

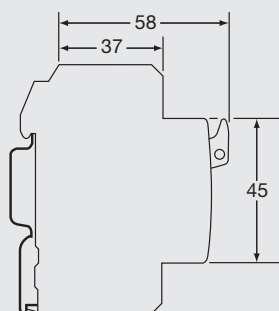
- Short-circuit rating: 16.5kA (i.e. no further consideration of fault levels is necessary)
- Colour coded ratings
- Connection capacities: Top: 16 mm<sup>2</sup> flexible cable + busbar



L113 L115 L116 L118

Designation	Current rating (Amps)	Colour	Width in 17.5mm	Pack qty.	Cat Ref.
<b>BS 1361 Fuse Carriers</b> (Complete with cartridge fuse) for single phase applications	5 A – 230 V	White	1	12	<b>L113</b>
	15 A – 230 V	Blue	1	12	<b>L115</b>
	20 A – 230V	Yellow	1	12	<b>L116</b>
	30 A – 230 V	Red	1	12	<b>L118</b>
<b>BS 1361 HRC Spare Cartridge Fuses</b>	5 A (23 x 6.35 x 4.8mm)	White	-	50	<b>L153</b>
	15 A (26 x 10.32 x 6.4mm)	Blue	-	50	<b>L155</b>
	20 A (26 x 10.32 x 6.4mm)	Yellow	-	50	<b>L156</b>
	30 A (29 x 12.7 x 8mm)	Red	-	50	<b>L158</b>
	Spare fuse holder up to 20A	-	-	10	<b>L147</b>

## BS 88 HRC fuse carriers and fuses



### Fuse carrier 32 Amps max.

Protection and control of circuits against overloads and short-circuits:

- In three phase circuits

- Suitable for fuses which comply with BS 88:Part 1:1975 and with the standardised performance requirements for industrial fuse links specified in BS 88:Part 2

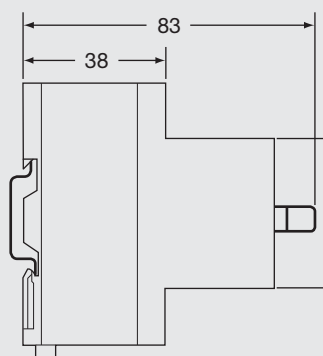
- Rating voltage: 415 V a.c. 250 V d.c.
- Fusing factor: class Q 1
- Rated breaking capacities: 80 kA at 415 V a.c. 40 kA at 250 V d.c.



L50145 and L176

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Fuse Carriers</b> For BS 88 fuses (Supplied without fuse).	32 Amps max.	1	12	<b>L50145</b>
BS 88 cartridge fuses	2 A	-	20	<b>L171</b>
	4 A	-	20	<b>L172</b>
	6 A	-	20	<b>L173</b>
	8 A	-	20	<b>L174</b>
29 x 12.7 x 8mm	10 A	-	20	<b>L175</b>
	16 A	-	20	<b>L176</b>
	20 A	-	20	<b>L177</b>
	25 A	-	20	<b>L178</b>
	32 A	-	20	<b>L179</b>

## Motor Starters



### Description

To ensure localised control and protection of single and three phase motors.

### Technical data

- Adjustable thermal relay
- AC3 utilisation category
- Connection capacity  
2 conductors  
max size: Flexible 1 to 4mm<sup>2</sup>  
Rigid 1.5 to 6mm<sup>2</sup>

### Options

Undervoltage release: MZ528N, MZ529N  
Auxiliary contacts: MZ520N, MZ527N  
Alarm contact: MZ527N

### Complies with

IEC 947-1, IEC 947-2  
(appropriate parts of)

**Note:** Please consult us for enclosure selection



MM501N



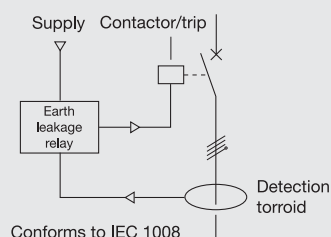
MZ520N



MZ521N

Designation	Current setting	standard power ratings of 3 phase motors 50/60Hz (AC3 category)		Width in 17.5mm	Pack qty.	Cat Ref.
		230V (kW)	400V (kW)			
motor starters	0.1 - 0.16A				1	MM501N
	0.16 - 0.25A	-	0.06	2 1/2	1	MM502N
	0.25 - 0.4A	0.06	0.09	2 1/2	1	MM503N
	0.4 - 0.6A	0.09	0.12	2 1/2	1	MM504N
	0.6 - 1.0A	0.09	0.12	2 1/2	1	MM505N
	1.0 - 1.6A	0.25	0.55	2 1/2	1	MM506N
	1.6 - 2.5A	0.55	0.8	2 1/2	1	MM507N
	2.5 - 4A	0.8	1.5	2 1/2	1	MM508N
	4 - 6A	1.5	2.5	2 1/2	1	MM509N
	6 - 10A	2.5	4	2 1/2	1	MM510N
	10 - 16A	4	7.5	2 1/2	1	MM511N
	16 - 20A	5.5	9	2 1/2	1	MM512N
	20 - 25A	7.5	12.5	2 1/2	1	MM513N
Auxiliary contacts (Act as an indicating device to monitor the ON or OFF position)	1C + 1O	2A AC1 - 400V~ 3.5A AC1 - 230V~		1/2	1	MZ520N
Alarm contact (Mounted inside the motor starter)	1C	1A AC1 - 400V~ 2A AC1 - 230V~			1	MZ527N
Under voltage release (To prevent automatic restarting of the controlled device)		230V~ 50Hz			1	MZ528N
		400V~ 50Hz			1	MZ529N
Surface mounting enclosure  w. 78mm x h. 150mm x d. 95mm		Weatherproof IP55 Removable window			1	MZ521N
Emergency stop button IP65		Mounted on surface mounting enclosure MZ521N			1	MZ530N

## Earth Fault Relays



### Earth fault relays with separate detection torroids

These units ensure the protection of electrical installations. 30mA versions can provide supplementary protection against direct connection.

This range of electronic earth fault relays provide monitoring of earth fault currents. When the fault current rises above the selected level, the output contacts of the product operate. Depending on the relay selected, it can have either fixed or adjustable sensitivity, a time delay is also available for selectivity purposes. The relays are linked with detection torroids, 14 separate types are available, circular and rectangular in section (see page 110).

### Common characteristics

- Positive safety: the relay trips in the event of a break in the relay/torroid link.
- Positive reset required after a fault is detected.
- Test button for simulation of a fault.
- Protected against nuisance tripping from transients.
- DC sensitive.
- Output: 1 C/O contact 250V~ 6A AC1.
- Visual display of fault by red LED

### Features according to the selected devices

- Adjustment of sensitivity and delay (sealable).
- Extra positive safety contact (1C/O 250V~ 6A AC1).
- Display of fault current before it triggers the relay (5% to 75%).

- Extra output contact (250V 0.1A max.) to enable remote indication of fault currents over 50% of  $I_{\Delta n}$ .
- Remote test and reset by 3 wire link.

### Torroids

Circular dia. 35, 70, 105, 140, 210mm  
Rectangular 70 x 175, 115 x 305, 150 x 350mm  
Connection capacity  
Relay - 1.5 to 6mm<sup>2</sup>  
Relay - torroid link  
2 wires, 25m max.  
Test and remote reset link  
3 wires, 20m max.  
For enclosure selection, please consult us.



HR400



HR420

Designation	Characteristics	Width in ■ 17.5mm	Pack qty.	Cat Ref.
<b>Earth fault relay</b> C/O contact 6A~ AC1	Instant trip, fixed sensitivity $I_{\Delta n} = 30\text{mA}$	2	1	<b>HR400</b>
	300mA	2	1	<b>HR402</b>
<b>Earth fault relay</b> C/O contact 6A~ AC1 Adjustable sensitivity $I_{\Delta n} = 30, 100, 300\text{mA}$ 1 & 3A	Instant trip or time delay 0.13 - 0.3 - 1 & 3 sec	3	1	<b>HR410</b>
<b>Earth fault relay</b> C/O contact 6A~ AC1 Positive safety C/O contact 6A~ AC1 Adjustable sensitivity $I_{\Delta n} = 30, 100, 300\text{mA}$ 1 & 3A Instant or time delayed 0.13 - 0.3 - 1 & 3 sec	Standard version	3	1	<b>HR411</b>
	Version with LED optical scale	3	1	<b>HR420</b>
	Version with LED optical scale and remote test	5	1	<b>HR425</b>
<b>Earth leakage relay with integral torroid adjustable sensitivity as above instant or time delayed as above.</b>		4	1	<b>HR440</b>
		6	1	<b>HR441</b>

## Earth Fault Relay - Torroids



HR802



HR830



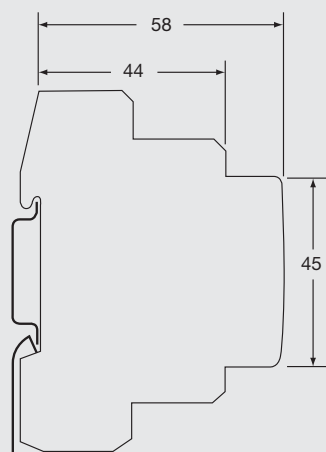
HR820



HR822

<i>Designation</i>	<i>Characteristics</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>Circular section torroid</b>	ø 30mm	1	<b>HR800</b>
	ø 35mm	1	<b>HR801</b>
	ø 70mm	1	<b>HR802</b>
	ø 105mm	1	<b>HR803</b>
	ø 140mm	1	<b>HR804</b>
	ø 210 mm	1	<b>HR805</b>
<b>Rectangular section torroid</b>	70 x 175mm	1	<b>HR830</b>
	115 x 305mm	1	<b>HR831</b>
	150 x 350mm	1	<b>HR832</b>
<b>Rectangular split torroid</b>	20 x 30mm	1	<b>HR820</b>
	50 x 80mm	1	<b>HR821</b>
	80 x 80mm	1	<b>HR822</b>
	80 x 121mm	1	<b>HR823</b>
	80 x 161mm	1	<b>HR824</b>

## Surge Protection Devices (SPD)



SPD's protect electric and electronic equipment against transients, originating from lightning, switching of transformers, lighting and motors

These transients can cause premature ageing of equipment, down time, or complete destruction of electronic components and material

SPDs are strongly recommended on installations that are exposed to transients, to protect sensitive and expensive electrical equipment such as TV, video, washing machines, Hi-fi, PC, alarm etc.

The choice of SPD depends on a number of criteria such as:

- The exposure of the building to transients.
- The sensitivity and value of the electrical equipment that requires protection.
- Earthing system
- Level of protection

The range of SPDs is separated into 2 types of protection:

1. Main protection - class 2 SPDs with higher discharge current ( $I_{max} 8/20$ ), to evacuate as much of the transient to earth as possible
2. Fine protection - class 2 + 3 SPDs with low voltage protection level ( $U_p \leq 1000V$ ), to cut-down the transient surge as low as possible to protect very sensitive equipment.

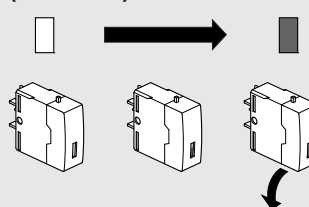
### Technical data

Complies with IEC61643-1

### Reserve status indicator (R versions)



### End of life indicator (D versions)



OK



auxiliary contact for remote signalling (R versions only)



230V~ 1A  
12V ... 10mA

### Installation and connection

The main protection SPDs are installed directly after the main incoming switch or RCCB (type S).

SPDs can be used in any supply system e.g. TNCS, TNS, TT.

Options: Replacement cartridges.

Connected in parallel to the equipment to be protected.

Protection is assured in both common and differential modes.

☐ For technical details see page 3.65 - 3.66



SPN215D

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
Un: 230/400 V 50/60 Hz	Single pole Up: 1.2kV at In	1	1	<b>SPN140D</b>
Un: 230/400 V 50/60 Hz	2 poles, 1ø + N with reserve indicator and auxiliary contacts Up: 1.0kV at In	2	1	<b>SPN215R</b>
Un: 230/400 V 50/60 Hz	2 poles 1ø + N Up: 1.0kV at In	2	1	<b>SPN215D</b>
Un: 230/400 V 50/60 Hz	4 pole 3ø + N with reserve indicator and auxiliary contacts Up: 1.2kV at In	4	1	<b>SPN415R</b>
Un: 230/400 V 50/60 Hz	4 poles 3ø + N Up: 1.0kV at In	4	1	<b>SPN415D</b>

## Surge Protection Devices (SPD)

### SPDs with low let through voltage levels

To protect very sensitive electronic equipment. This fine protection complements the main protection and can protect 1 or many electronic devices.

Optimal coordination is obtained when cascaded with a main protection device (lower Up- see the table below).

Discharge current:  
I<sub>max</sub>. 8kA (8/20 wave)  
a green LED on the front face indicates the status of the SPD  
SPN208S, connected in series with the equipment that needs to be protected (with a maximum line current of 25A). Protection is assured in both common and differential modes

### Connection capacity

Terminal blocks L, N & E

- Rigid conductor: 10mm<sup>2</sup>
- Flexible conductor: 6mm<sup>2</sup>

### Replacement cartridges

These cartridges replace the cartridge in the main SPD (page 3.24).

They allow simple replacement without the need to cut-off the power supply.

Cartridges are available for all discharge currents (40kA and 15kA) with and without condition indication.

A keying system exists to prevent a line cartridge being interchanged by mistake with a neutral one and visa versa neutral cartridges have a

discharge current of 65kA

### Replacement cartridges for phase:

SPN140D = SPN040D  
SPN215D = SPN015D  
SPN415D = SPN015D  
SPN215R = SPN015R  
SPN415R = SPN015R


### For neutral / earth

SPN215D = SPN040N  
SPN415D = SPN040N  
SPN215R = SPN040N  
SPN415R = SPN040N

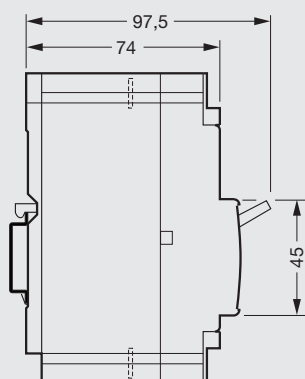
□ For technical details see page 3.65 - 3.66



SPN208S

Designation	Characteristics	Width in  17.5mm	Pack qty.	Cat Ref.												
SPD With low voltage protection level (Class 2) Uc: 230/400V 50/60 Hz	rated at 25 A 2 pole 1ø + N  cascading table (main protection + fine protection) voltage protection level: Up	1	1	SPN208S												
Up (L,N/E): 1.2kV at In Up (L/N): 1kV at In	<table><tr><th>I<sub>p</sub></th><th>Up L, N/E</th><th>Up L/N</th></tr><tr><td>15kA</td><td>900V</td><td>800V</td></tr><tr><td>40kA</td><td>900V</td><td>800V</td></tr><tr><td>65kA</td><td>850V</td><td>750V</td></tr></table>	I <sub>p</sub>	Up L, N/E	Up L/N	15kA	900V	800V	40kA	900V	800V	65kA	850V	750V			
I <sub>p</sub>	Up L, N/E	Up L/N														
15kA	900V	800V														
40kA	900V	800V														
65kA	850V	750V														

## 125A Frame MCCBs



### Description

The Hager range of MCCBs offer panelbuilders and OEM's, a wide choice of options. The 125A frame is available in 1,3 and 4 poles, with a breaking capacity of 16kA, or 25kA.

### Technical data

Complies with - BS EN 60947-2  
Current rating - 16, 20, 25,32,40,50,63,80,100 and 125A  
Voltage - 1P-230VAC 3 & 4P 230/400VAC  
Short circuit capacity -  $I_{cs} = 100\%$

Thermal adjustment: 4P and 3P 0.8-1, SP fixed.  
Magnetic adjustment: fixed  
Cable capacity - 70mm<sup>2</sup>, max  
Bar width = 12mm<sup>2</sup>

☐ For technical details see page 3.40 - 3.44



HD105



HD149U

Designation	Current rating (A)	Poles	Icu kA	Ics % Icu	Pack qty	Cat Ref. 16KA	Cat Ref. 25KA
MCCB	16	1	16	100	1	HD101	HH101
MCCB	20	1	16	100	1	HD102	HH102
MCCB	25	1	16	100	1	HD103	HH103
MCCB	32	1	16	100	1	HD104	HH104
MCCB	40	1	16	100	1	HD105	HH105
MCCB	50	1	16	100	1	HD106	HH106
MCCB	63	1	16	100	1	HD107	HH107
MCCB	80	1	16	100	1	HD108	HH108
MCCB	100	1	16	100	1	HD109	HH109
MCCB	125	1	16	100	1	HD110	HH110
MCCB	20-25	3	16	100	1	HD143U	HH143U
MCCB	32-40	3	16	100	1	HD145U	HH145U
MCCB	50-63	3	16	100	1	HD147U	HH147U
MCCB	63-80	3	16	100	1	HD148U	HH148U
MCCB	80-100	3	16	100	1	HD149U	HH149U
MCCB	100-125	3	16	100	1	HD150U	HH150U
MCCB	50-63	4	16	100	1	HD167U	
MCCB	80-100	4	16	100	1	HD169U	
MCCB	100-125	4	16	100	1	HD170U	
Non automatic	125	3			1	HC101	
Non automatic	125	4			1	HC102	



## 125A frame MCCBs - Accessories and Auxiliaries

### Earth fault blocks (4P only)

Mounting - right side  
Rated current - 125A (40 °C)

### Internal auxiliaries

Shunt trip - for remote tripping of the MCCB, operates when coil is energised.  
Under voltage release - for remote tripping of the MCCB, operates when the coil is de-energised.

Auxiliary contact - allows remote indication of the MCCB contacts.

Alarm contact - remotely indicates the tripped status of the MCCB



HB112

Designation	Pack qty	Cat Ref.
<b>Add-on earth fault block</b> Sensitivity - adjustable 0.03, 0.1, 0.3, 1, 3, 10A  Time delay settings instantaneous 0.06, 0.15, 0.3, 0.5, 1s	1	<b>HB112</b>



HX122

Designation	Coil rating (V)	Power consumption (VA)	Operating voltage (Un)	Pack qty	Cat Ref.
<b>Shunt trip</b>	12-60V ac/dc				<b>HX101E</b>
	110-240V ac/dc	300	>75%	1	<b>HX104E</b>
	380-415V ac	300	>75%	1	<b>HX105E</b>
<b>Under voltage release</b>	208-240V ac		≤70%	1	<b>HX114E</b>
	380-500V ac		≤70%	1	<b>HX115E</b>



HX131

Designation	Contact rat. 400VAC	Contact rat. 230VAC	Contact rat. 110VAC	Pack qty	Cat Ref.
<b>Auxiliary contacts</b>					
Auxiliary 2 N/O	1.5A	3A	4A	1	<b>HX122</b>
Auxiliary and alarm C/O	1.5A	3A	4A	1	<b>HX123</b>



HX122

Designation	Type	Shaft length mm	Padlockable off	Pack qty	Cat Ref.
<b>Rotary handles</b>					
	Direct	-	Yes	1	<b>HX130</b>
	Indirect	200mm	Yes	1	<b>HX131A</b>

### Accessories

Terminal shield 3P	2	<b>HY121</b>
Terminal shield 4P	2	<b>HY122</b>
Padlock kit for 125A MCCB	1	<b>HX139</b>

## 250A Frame MCCBs

### Description

The Hager range of MCCBs offer panelbuilders and OEM's, a wide choice of options. The 250A frame is available with a breaking capacity up to 40kA

### Technical data

Standards - BS EN 60947-2  
Current rating - 160, 250A  
Voltage - 230/400VAC  
Short circuit capacity -  
3 & 4P  $I_{cu} = I_{cs} = 40KA$

### Thermal adjustment

3 & 4P - 0.8 -1 x  $I_n$   
magnetic adjustment - 3 & 4P  
5 - 10 x  $I_n$   
Cable capacity - 120mm<sup>2</sup>, max  
bar width = 20mm<sup>2</sup>

☐ For technical details  
see page 3.40 - 3.44



HH253

<i>Designation</i>	<i>Current rating (A)</i>	<i>Poles</i>	<i>I<sub>cu</sub> kA</i>	<i>I<sub>cs</sub> %I<sub>cu</sub></i>	<i>Pack qty</i>	<i>Cat Ref.</i>
MCCB	80	3	40	100	1	<b>HN251</b>
MCCB	100	3	40	100	1	<b>HN252</b>
MCCB	125	3	40	100	1	<b>HN253</b>
MCCB	160	3	40	100	1	<b>HN254</b>
MCCB	200	3	40	100	1	<b>HN203</b>
MCCB	250	3	40	100	1	<b>HN204</b>
MCCB	160	4	40	100	1	<b>HN264</b>
MCCB	200	4	40	100	1	<b>HN213</b>
MCCB	250	4	40	100	1	<b>HN214</b>
Non automatic	250	3			1	<b>HC203</b>
Non automatic	250	4			1	<b>HC204</b>

## 250A Frame MCCBs - Accessories and Auxiliaries

### Earth fault blocks (4P only)

Mounting - underneath  
rated current - 250A.

### Internal Auxiliaries

Shunt trip - for remote tripping of  
the MCCB, operates when coil is  
energised.

Under voltage release - for  
remote tripping of the MCCB,  
operates when the coil is  
de-energised

Auxiliary contact - allows remote  
indication of the MCCB contacts  
Alarm contact - remotely  
indicates the tripped status of  
the MCCB.

### Designation

Pack  
qty

### Cat Ref.

### Add-on Earth Fault Block

Sensitivity - adjustable  
0.03, 0.1, 0.3, 1, 3, 10A

Time delay settings  
instantaneous  
0.06, 0.15, 0.3, 0.5, 1s

1

HB211



HX104E

### Designation

Coil rating  
(V)

Power  
consumption (VA)

Operating  
voltage (Un)

Pack  
qty

### Cat Ref.

### Shunt trip

12-60V  
AC/DC

300

>75%

1

HX101E

110-240V  
AC/DC

300

>75%

1

HX104E

380-415V AC

300

>75%

1

HX105E

### Under voltage release

230

5

≤70%

1

HX114E

400

5

≤70%

1

HX115E

HX122



### Designation

Contact  
rat. 400VAC

Contact  
rat. 230VAC

Contact  
110VAC

Pack  
qty

### Cat Ref.

### Auxiliary contacts

Auxiliary 2 N/O

1.5A

3A

4A

1

HX122

Auxiliary and alarm C/O

1.5A

3A

4A

1

HX223E

HX230



### Designation

Type

Shaft  
length mm

Padlockable  
off

Pack  
qty

### Cat Ref.

### Rotary handles

direct

-

yes

1

HX230

indirect

200mm

yes

1

HX231

HX239



### Accessories

Terminal shield 3P

2

HY221

Terminal shield 4P

2

HY222

Padlock attachment - for standard toggle

1

HX239

## 400A Frame MCCBs

### Description

The Hager range of MCCBs offer panelbuilders and OEM's, a wide choice of options. The 400A frame is available with a range of auxiliaries or accessories.

### Technical data

Complies with - BS EN 60947-2  
Current rating - 250-400  
Voltage - 230/400VAC  
Short circuit capacity -  
Icu = Ics = 45KA

### Thermal adjustment

3 & 4P - 0.8 - 1x In  
magnetic adjustment - 3 & 4P  
5 - 10 x In  
cable capacity - 240mm<sup>2</sup>, max  
bar width = 32mm<sup>2</sup>

□ For technical details  
see page 3.40 - 3.44



HN303E

Designation	Current rating (A)	Poles	Icu kA	Ics % Icu	Pack qty	Cat Ref.
MCCB	250	3	50	100	1	HN301E
MCCB	320	3	50	100	1	HN302E
MCCB	400	3	50	100	1	HN303E
MCCB	250	4	50	100	1	HN321E
MCCB	320	4	50	100	1	HN322E
MCCB	400	4	50	100	1	HN323E
non auto	400	3			1	HC301E
non auto	400	4			1	HC302E

## 400A frame MCCBs - Accessories and Auxiliaries



HX104E

Designation	Coil rating (V)	Power consumption (VA)	Operating voltage (Un)	Pack qty	Cat Ref.
<b>Shunt trip</b>					
	12-60V AC/DC	300	>75%	1	HX101E
	110-240V AC/DC	300	>75%	1	HX104E
	380-415 AC	300	>75%	1	HX105E
<b>Under voltage release</b>					
	208-240V	5	≤70%	1	HX114E
	380-500V	5	≤70%	1	HX115E



HX722

Designation	Contact rat. 400VAC	Contact rat. 230VAC	Contact 110VAC	Pack qty	Cat Ref.
<b>Auxiliary contacts</b>					
Auxiliary 2 N/O	1.5A	6A	4A	1	HX122
Auxiliary and alarm C/O	1.5A	3A	4A	1	HX223E

Designation	Type	Shaft length mm	Padlockable off	Pack qty	Cat Ref.
<b>Rotary handles</b>					
	Direct	-	yes	1	HX330E
	Indirect	200mm	yes	1	HX331E

### Accessories

3 pole shroud	2	HY321E
4 pole shroud	2	HY322E
Toggle locking kit	1	HX339E

## 630A Frame MCCBs

### Description

The Hager range of MCCBs offer panelbuilders and OEM's, a wide choice of options. The 630A frame is available with a range of auxiliaries or accessories

### Technical data

Standards - BS EN 60947-2 and IEC947-2  
Current rating - 500-800  
Voltage - 3 & 4P 400/415VAC  
Short circuit capacity - 3 & 4P Icu = Ics = 50KA

### Thermal adjustment

3 & 4P - 0.8 - 1 x In  
magnetic adjustment - 3 & 4P  
5 - 10 x In  
cable capacity - 2 x 240mm<sup>2</sup>,  
max bar width = 50mm<sup>2</sup>

☐ For technical details see page 3.40 - 3.44



HN802

Designation	Current rating (A)	Poles	Icu kA	Ics % Icu	Pack qty	Cat Ref.
MCCB	500	3	50	100	1	HN802
MCCB	630	3	50	100	1	HN803
MCCB	800	3	50	100	1	HN806
MCCB	500	4	50	100	1	HN812
MCCB	630	4	50	100	1	HN813
MCCB	800	4	50	100	1	HN816
non auto	630	3			1	HC801
non auto	630	4			1	HC802
non auto	800	3			1	HC803
non auto	800	4			1	HC804

## 630A frame MCCBs - Accessories and Auxiliaries



HX830

Designation	Coil rating (V AC)	Power consumption (VA)	Operating voltage (Un)	Pack qty	Cat Ref.
<b>Shunt trip</b>					
	12-60V AC/DC	300	>75%	1	HX801
	110-240VAC/DC	300	>75%	1	HX804
	400V AC		>75%	1	HX805
<b>Under voltage release</b>					
	230	5	≤70%	1	HX814
	400	5	≤70%	1	HX815



HX831

Designation	Contact rat. 400VAC	Contact rat. 230VAC	Contact 110VAC	Pack qty	Cat Ref.
<b>Auxiliary contacts</b>					
Auxiliary 2 N/O	1.5A	3A	4A	1	HX822
Auxiliary and alarm C/O*	1.5A	3A	4A	1	HX823
Designation	Type	Shaft length mm	Padlockable off	Pack qty	Cat Ref.
<b>Rotary handles</b>					
	Direct	-	Yes	1	HX830
	Indirect	200mm	Yes	1	HX831

### Basic Principles

The proper selection of the correct circuit protective device requires an understanding of the potential hazards against which protection for safety is required. The Wiring Regulations identify several hazards:

- Electric shock
- Thermal effects
- Overcurrent
- Undervoltage
- Isolation

**Electric shock** - is divided into two parts:

- Direct contact: contact with parts which result in an electric shock in normal service
- Indirect contact: contact with exposed conductive parts which result in an electric shock in case of a fault.

To protect against direct contact the Wiring Regulations suggest the following basic measures should be taken:

- (1) by insulation of live parts
- (2) by enclosures or barriers
- (3) by obstacles
- (4) by placing out of reach

To protect against indirect contact the Wiring Regulations suggest the following basic measures should be taken:

- (1) Earthed equipotential bonding and automatic disconnection of supply
- (2) Use of class II equipment or equivalent insulation
- (3) Non-conducting location
- (4) Earth-free local equipotential bonding
- (5) Electrical separation

Of these five measures, the first is by far the most commonly used - (1) Earthed equipotential bonding and automatic disconnection of supply:

In each installation circuit protective conductors connect all exposed conductive parts of the installation to the main earthing terminal. Main equipotential bonding conductors are used to connect extraneous conductive parts of other incoming services and structural metalwork to the main earthing terminal. These extraneous conductive parts include the following:

- Main water pipes
- Gas installation pipes
- Other service pipes and ducting
- Risers of central heating and air conditioning systems
- Exposed metal parts of the building structure

This bonding creates a zone within which any voltages appearing between exposed conductive parts and extraneous conductive parts, are minimised; the earth fault loop impedance must have a value low enough to allow sufficient current to flow for the circuit protective device to operate rapidly to disconnect the supply; disconnection must be sufficiently fast so that voltages appearing on the bonded metalwork cannot persist long enough to cause danger; depending on the operating characteristics of the protective device and the earth impedance, such disconnection may be achieved either by overcurrent devices, Fuses, Miniature Circuit Breakers, (i.e. MCBs) or by Residual Current Devices, (i.e. RCCBs).

**Thermal Effect** - refers to heat generated by the electrical equipment in normal use and under fault conditions. The proper selection of equipment complying with the latest product standards is essential in providing protection against thermal effects.

**Overcurrent** - is defined as a current exceeding the rated value of the circuit components. It may be caused by the overloading of a healthy circuit or it may take the form of a short-circuit current, defined as an "overcurrent resulting from a fault of negligible impedance between live conductors having a difference in potential under normal operating conditions". Overcurrent protection may be provided by using fuses or circuit breakers singly or in combination.

**Undervoltage** - refers to the dangers that could be caused by the reduction or loss in voltage and the subsequent restoration, such as the unexpected re-starting of motors or the automatic closing of protective devices. The proper selection of control and protective devices must take the protection against undervoltage into consideration.

**Isolation** - every circuit shall be provided with means of isolation (except in certain cases) to prevent or remove hazards associated with the installation, equipment and machines. The new standards for circuit breakers and switch-fuses now take this into account.

### Protection against shock by indirect contact

Indirect contact - is the contact of persons or livestock with exposed conductive parts made live by a fault and which may result in electric shock. An example would be where the insulation of an electric heater has broken down resulting in a live conductor internally touching the casing. This could result in the heater casing being raised to a hazardous voltage level, causing electric shock to a person touching it.

Two important measures must be taken to prevent this hazard:

- The impedance of circuit conductors is kept to a minimum. The earth fault loop impedance ( $Z_s$ ) is used as a measure of the circuit impedance under fault conditions.
- The overcurrent device protecting the circuit is selected to rapidly disconnect an earth fault.

The effect of these two measures is inter-related.

1. By ensuring that the circuit protective conductor is of a low impedance, the voltage to which the live casing is raised, under fault conditions, is kept to a minimum.
2. The low impedance path provided by the circuit conductors and the circuit protective conductor will result in a high level of current in the event of an earth fault. This high fault current ensures that the overcurrent protective device will disconnect the fault in a short time, reducing the interval during which the casing of the faulty equipment is live.

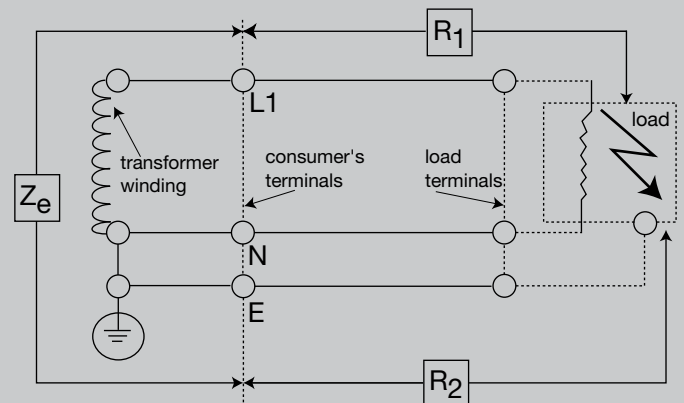


Fig 2

Components of earth fault loop impedance ( $Z_s$ ) in a system. (Earth fault at load between conductor and casing).  
 $Z_s = Z_e + (R_1 + R_2)$

### Earth fault loop impedance ( $Z_s$ )

To ensure the impedance of conductors in a circuit is sufficiently low the system designer has to establish the value of the earth fault loop impedance.

$Z_s$  is a measure of the earth fault current loop, comprising the phase conductor and the protective conductor. It comprises the complete loop including the winding of the transformer from which the circuit is supplied as defined by the following:

$Z_e$  is the part of the earth fault loop impedance external to the installation, its value can be measured or a nominal value can be obtained from the supply authority.

**( $R_1 + R_2$ )** - Where  $R_1$  is the resistance of the phase conductor within the installation and  $R_2$  is the resistance of the circuit protective conductor. These two components constitute the loop impedance within the installation.

Therefore:  $Z_s = Z_e + (R_1 + R_2)$

Once the value of  $Z_s$  has been established a suitable overcurrent protective device has to be selected to ensure disconnection of an earth fault within the specified time. The times are:

- 5 seconds for fixed equipment.
- For portable equipment and for fixed equipment installed outside the equipotential bonding zone, the disconnection times are dependent on the nominal voltage to earth, i.e. 220 to 277 volts = 0.4 seconds.

### $Z_s$ by Calculation

To establish whether the relevant disconnection time can be achieved a simple calculation must be made, based on Ohm's law:

$$\text{If (fault current)} = \frac{U_{oc} \text{ (open circuit voltage)*}}{Z_s \text{ (earth fault loop)}}$$

\* voltage between phase and earth (240V)

The fault current ( $I_f$ ) must be high enough to cause the circuit protective device to trip in the specified time. This can be established by consulting the time/current characteristic for the protective device. If the maximum trip time for the fault current calculated is less than or equal to the relevant value (5s for fixed equipment; 0.4s for portable equipment) then compliance is achieved. It is important that when consulting the characteristic curve the worst case is used, i.e. the maximum tripping time including any tolerance. An example is shown in Figs 1 and 2.

### $Z_s$ by tables

The above procedure can be used for any type of protective device providing a time/current characteristic curve is available. Frequently, however, a much simpler method is available using tables listing maximum  $Z_s$  values which have been interpreted from the characteristic curves for the relevant devices. Providing the system  $Z_s$  is equal to or less than the value given in the table, compliance is achieved. Tables for a number of 'standard' devices (certain fuses and MCBs) are given in the Wiring Regulations.

### $Z_s$ too high

If the system  $Z_s$  value is too high to achieve rapid enough disconnection with the overcurrent protective devices available then it is necessary to use one of the two following methods:

- Fit a cable with a larger cross-section and consequently a lower impedance. This may be a very expensive solution especially when the installation is complete before the problem is discovered.
- Use a Hager residual current device (RCCB). Subject to certain conditions being met this provides a simple and economical solution.

Example

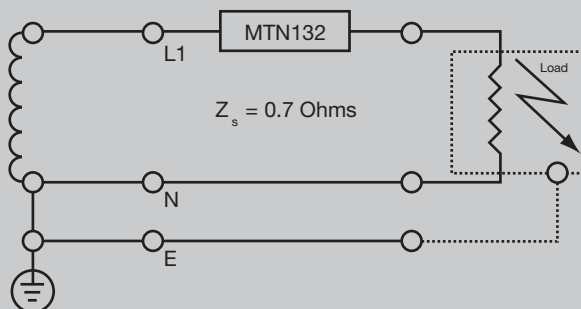


Fig 2

Fig 2 shows a fixed circuit with an earth loop impedance  $Z_s$  of 0.7 ohms protected with an MTN132. The fault current ( $I_f$ ) will therefore be  $U_o/Z_s = 240/0.7 = 343A$

By referring to the characteristic for MTN132 (see Fig 3) it can be seen that the breaker will disconnect in 0.02 seconds for this current. The breaker therefore easily satisfies the requirement for disconnection in 5 seconds.

If the circuit  $Z_s$  was 2.0 ohms then the fault current would be:  $240/2 = 120A$  and the disconnection time would be 10 seconds, in which case compliance would not be achieved.

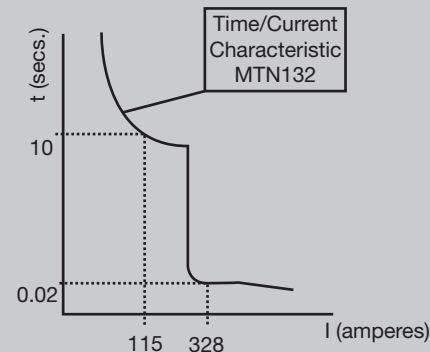


Fig 3

### Protection against overcurrent

**Overcurrent** - "A current exceeding the rated value. For conductors the rated value is the current-carrying capacity"

**Overload Current** - "An overcurrent occurring in a circuit which is electrically sound"

**Short-Circuit Current** - "An overcurrent resulting from a fault of negligible impedance between live conductors having a difference in potential under normal operating conditions."

### Protection against Overload Current

For the protection against overload current, protective devices must be provided in the circuit to break any overload current flowing in the circuit conductors before it can cause a temperature rise which would be detrimental to insulation, joints, terminations or the surroundings of the conductors.

In order to achieve this protection the nominal current of the protective device  $I_n$  should be not less than the design current of the circuit  $I_b$  and that  $I_n$  should not exceed the current-carrying capacity of the conductors  $I_z$ , and that the current causing effective operation of the protective device  $I_2$  does not exceed 1.45 times the current-carrying capacity of the conductor  $I_z$ , expressed as

$$I_b \leq I_n \leq I_z$$

$$I_2 \leq 1.45 I_z$$

### Protection against Short-Circuit Current

Protective devices must be provided to break any short-circuit current before it can cause danger due to thermal and mechanical (electro-dynamic) effects produced in the conductors and connections. The breaking capacity of the protective device shall not be less than the prospective short-circuit current at the point at which the device is installed. However a lower breaking capacity is permitted provided that a properly co-ordinated back-up device having the necessary breaking capacity is installed on the supply side (see page 3.43).

### Positioning of Overcurrent Devices

Devices for the protection against overload and short-circuit must be placed at the point where a reduction occurs in the current-carrying capacity of the conductors. This reduction could be caused by a change in the environmental conditions as well as the more obvious change in the cross-sectional area of the cable.

There are of course exceptions to this general rule which relate to a very few special applications. These are set out in detail in the Wiring Regulations.



Both of the new British Standards covering Low Voltage Circuit Breakers provide the user with a better assurance of quality and performance by taking into account the actual operating conditions of the breaker. New definitions and symbols have been introduced which should be committed to memory. Some of those most frequently used are:

- $U_e$  : Rated service voltage
- $U_i$  : Rated insulation voltage ( $> U_{max}$ )
- $U_{imp}$  : Rated impulse withstand
- $I_{cm}$  : Rated short circuit making capacity
- $I_{cn}$  : Rated short circuit capacity
- $I_{cs}$  : Rated service short circuit breaking capacity
- $I_{cu}$  : Rated ultimate short circuit breaking capacity
- $I_{\Delta n}$  : Rated residual operating current (often called residual sensitivity)
- $I_n$  : Rated current = maximum value of current used for the temperature rise test
- $\Delta_t$  : trip delay of residual current devices

In addition BS EN 60898 sets out to provide a greater degree of safety to the uninstructed users of circuit breakers. It is interesting to note that the description "miniature circuit breaker" or MCB is not used at all in this standard, but no doubt both manufacturers and users will continue to call circuit breakers complying with BS EN 60898 miniature circuit breakers or MCBs for some time to come.

The scope of this standard is limited to ac air break circuit breakers for operation at 50Hz or 60Hz, having a rated current not exceeding 125A and a rated short-circuit capacity not exceeding 25kA.

A rated service short-circuit breaking capacity  $I_{cs}$  is also included which is equal to the rated short-circuit capacity  $I_{cn}$  for short-circuit capacity values up to and including 6kA, and 50% of  $I_{cn}$  above 6kA with a minimum value of 7.5kA. As the circuit-breakers covered by this standard are intended for household and similar uses,  $I_{cs}$  is of academic interest only. The rated short-circuit capacity of a MCB ( $I_{cn}$ ) is the alternating component of the prospective current expressed by its r.m.s. value, which the MCB is designed to make, carry for its opening time and to break under specified conditions.  $I_{cn}$  is shown on the MCB label in a rectangular box without the suffix 'A' and is the value which is used for application purposes.  $I_{cn}$  (of the MCB) should be equal to or greater than the prospective short-circuit current at the point of application.

You will see from the curves that the inverse time / current characteristic which provides overload protection is the same on all three. This is because the British Standard requires the breaker to carry 1.13 times the rated current without tripping for at least one hour and when the test current is increased to 1.45 times the rated current, it must trip within one hour, and again from cold if the current is increased to 2.55 times the rated current the breaker must trip between 1 and 120 seconds. The inverse time delay characteristic of all MCBs claiming compliance with BS EN 60898 must operate within these limits.

The difference between the three types of characteristic curves designated 'B', 'C' and 'D' concerns only the magnetic instantaneous trip which provides short-circuit protection.

- For type 'B' the breaker must trip between the limits of 3 to 5 times rated current
- For type 'C' the breaker must trip between the limits of 5 to 10 times rated current, and
- For type 'D' the breaker must trip between the limits of 10 to 20 times rated current.

Often manufacturers publish their MCB tripping characteristics showing the limits set by the standard and guarantee that any breaker that you purchase will operate within these limits. So great care should be taken when working with characteristic curves showing lower and higher limits - on no account should you take a mean point for application design purposes.

For cable protection applications you should take the maximum tripping time and some manufacturers publish single line characteristic curves which show the maximum tripping time. If the design problem is nuisance tripping then the minimum tripping time should be used and for desk top co-ordination studies, both lower and upper limits have to be taken into account.

#### Energy limiting

Energy is measured in Joules. \*James Prescott Joule proved that thermal energy was produced when an electric current flowed through a resistance for a certain time, giving us the formula :-

Joules =  $I^2 \times R \times t$  or because we know that watts =  $I^2 R$

Joules = watts x seconds

Therefore we can say that :-

One Joule = one watt second

or energy = watts x seconds =  $I^2 R t$

If the resistance (R) remains constant or is very small compared with the current (I) as in the case of short-circuit current, then energy becomes proportional to  $I^2 t$ . Which is why the energy let-through of a protective device is expressed in ampere squared seconds and referred to as  $I^2 t$

$I^2 t$  (Joule Integral) is the integral of the square of the current over a given time interval ( $t_0, t_1$ )

The  $I^2 t$  characteristic of a circuit breaker is shown as a curve giving the maximum values of  $I^2 t$  as a function of the prospective current.

Manufacturers are required by the British Standard to produce the  $I^2 t$  characteristic of their circuit breakers.

See page 3.39.

The energy limiting characteristics of modern MCBs greatly reduce the damage that might otherwise be caused by short-circuits. They protect the cable insulation and reduce the risk of fire and other damage. Knowledge of the energy limiting characteristic of a circuit breaker also helps the circuit designer calculate discrimination with other protective devices in the same circuit.

Because of the importance of the energy limiting characteristic the British Standard for circuit breakers for household and similar installations suggests three energy limiting classes based on the permissible  $I^2 t$  (let-through) values for circuit breakers up to 32A; class 3 having the best energy limiting performance.

All Hager MCBs exceed the requirements for energy let-through set by the British Standard for energy limiting class 3.

Electrical characteristics	References							
	MLN	MTN	NBN	NCN	NDN	HMF*	HMC	HMD
<b>Poles</b>	SP+N	SP	SP DP TP 4P	SP DP TP 4P	SP DP TP 4P	SP DP TP 4P		
<b>Rated operational voltage</b> $U_e$ (V)	230	230	230/400	230/400	230/400	400		
<b>Nominal current</b>	6-40A	6-63A	6-63A	0.5-63A	6-63A	80-125A		
<b>Breaking capacity</b> to BS EN 60 898	6kA	6KA	10kA	10kA	10kA			
<b>Breaking capacity</b> to BS EN 60947-2	N/A	N/A	15kA	15kA	15kA	10kA	15kA	
<b>Rated insulation voltage</b> $U_i$ (V)	500V	500V	500V	500V	500V	500V		
<b>Rated impulse voltage</b> $U_{imp}$ (kV)	2500V	2500V	2500V	2500V	2500V	2500V		
<b>Electrical endurance</b> 0.5 to 32A  40 to 63A	10,000 cycles	20,000 cycles 10,000 cycles						

Table 11

\* Din rail mount only, not for use in fixed busbar distribution boards.

### Power loss

The power loss of MCB's is closely controlled by the standards and is calculated on the basis of the voltage drop across the main terminals measured at rated current. The power loss of Hager circuit breakers is very much lower than that required by the British Standard, so in consequences run cooler and are less affected when mounted together.

The table below gives the watts loss per pole at rated current.

MCB rated current (A)	0.5	1	2	3	4	6	10	16	20	25	32	40	50	63	80	100
<b>Watts loss per pole (W)</b>	1.3	1.5	1.7	2.1	2.4	2.7	1.8	2.6	2.8	3.3	3.9	4.3	4.8	5.2	8	10

Table 12

### For use with DC

Because of their quick make and break design and excellent arc quenching capabilities Hager circuit breakers are suitable for DC applications.

The following parameters must be considered.

1 System voltage:

Determined by the number of poles connected in series (See table 13)

2 Short circuit current:

(See table 14)

3 Tripping characteristics:

- The thermal trip remains unchanged
- The magnetic trip will become less sensitive requiring derating by  $\sqrt{2}$  the ac value. (See table 14)

No. of poles	1 pole		2 poles in series	
Range	max voltage	breaking capacity L/R=15ms	max voltage	breaking capacity L/R=15ms
<b>MTN</b>	60V	6kA	125V	6kA
<b>NBN NCN NDN</b>	60V	10kA	125V	10kA

Table 13

Characteristic curve	B		C		D	
Magnetic trip	50Hz	dc	50Hz	dc	50Hz	dc
I <sub>rm1</sub>	3I <sub>n</sub>	4.5 I <sub>n</sub>	5I <sub>n</sub>	7.5 I <sub>n</sub>	10I <sub>n</sub>	15I <sub>n</sub>
I <sub>rm2</sub>	5I <sub>n</sub>	7.5 I <sub>n</sub>	10I <sub>n</sub>	15I <sub>n</sub>	20I <sub>n</sub>	30I <sub>n</sub>

Table 14

**Note:** The circuit breaker can have the line/load connected to either the top or bottom terminals

### Temperature Derating

MCBs are designed and calibrated to carry their rated current and to operate within their designated thermal time/current zone at 30°C. Testing is carried out with the breaker mounted singly in a vertical plane in a controlled environment. Therefore if the circuit breaker is required to operate in conditions which differ from the reference conditions, certain factors have to be applied to the standard data. For instance if the circuit breaker is required to operate in a higher ambient temperature than 30°C it will require progressively less current to trip within the designated time/current zone.

### Correction Factor

The breaker is calibrated at a temperature of 30°C.

### Temperature Correction

In (A)	30°C	35°C	40°C	45°C	50°C	55°C	60°C
0.5	0.5	0.47	0.45	0.4	0.38	-	-
1	1	0.95	0.9	0.8	0.7	0.6	0.5
2	2	1.9	1.7	1.6	1.5	1.4	1.3
3	3	2.8	2.5	2.4	2.3	2.1	1.9
4	4	3.7	3.5	3.3	3	2.8	2.5
6	6	5.6	5.3	5	4.6	4.2	3.8
10	10	9.4	8.8	8	7.5	7	6.4
16	16	15	14	13	12	11	10
20	20	18.5	17.5	16.5	15	14	13
25	25	23.5	22	20.5	19	17.5	16
32	32	30	28	26	24	22	20
40	40	37.5	35	33	30	28	25
50	50	47	44	41	38	35	32
63	63	59	55	51	48	44	40
80	80	76	72	68	64	60	56
100	100	95	90	85	80	75	70

Table 15

### Grouping factors

Consideration should also be given to the proximity heating effect of the breakers themselves when fully loaded and mounted together in groups. There is a certain amount of watts loss from each breaker depending on the trip rating which may well elevate the ambient air temperature of the breaker above the ambient air temperature of the enclosure.

Grouping factor (rated current reduce by factor K)

no. of units n	K
n = 1	1
2 ≤ n < 4	0.95
4 ≤ n < 6	0.9
6 ≤ n	0.85

Table 16

### Example

Five circuit breakers are to be installed inside an enclosure in a switchroom which has an average ambient air temperature of 35°C. Each circuit breaker will be required to supply a continuous current of 20A.

From Table 15 we would select a circuit breaker which has a rated current of 25A at 30°C and 23.5A at 35°C. This takes care of the switchroom ambient air temperature of 35°C, but we also have to take into account the grouping factor of five continuously loaded breakers mounted together in one enclosure. Table 16 gives us a grouping factor K of 0.9. We then apply this grouping factor to the rated current at 35°C which gives us a circuit breaker rated current of  $23.5 \times 0.9 = 21.15A$  in the specified conditions.

### Frequency

Thermal – unchanged

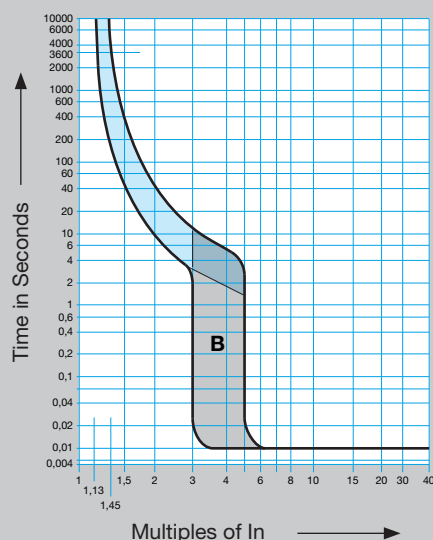
Magnetic – value multiplied by coefficient K

F (Hz)	17Hz – 60Hz	100Hz	200Hz	400Hz
K	1	1.1	1.2	1.5

Table 17

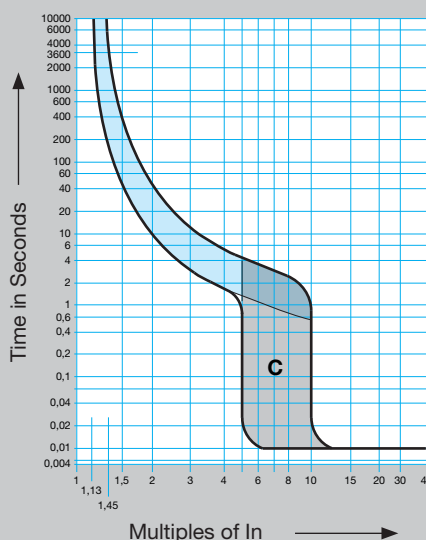
### 'B' curve (BS EN 60 – 898)

MCBs: MTN rated 6 – 63A  
NBN rated 6 – 63A



### 'C' curve (BS EN 60 – 898)

MCBs: NCN rated 0.5 – 63A  
MLN rated 2 – 32A  
NMF rated 80 – 100A



### 'D' curve (BS EN 60 – 898)

MCBs: NDN rated 6 – 63A  
HMD rated 80-125A

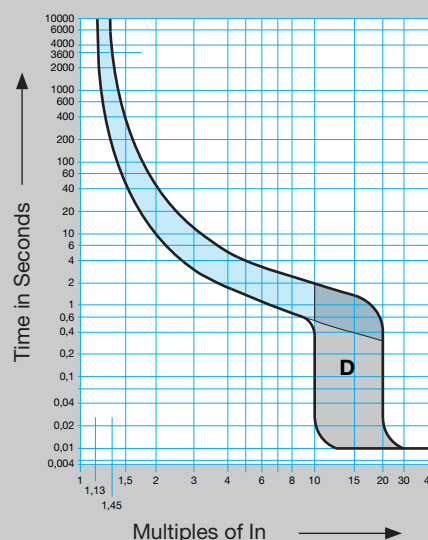


Fig 6

### Current limiting at 400V

MTN NBN NCN NDN

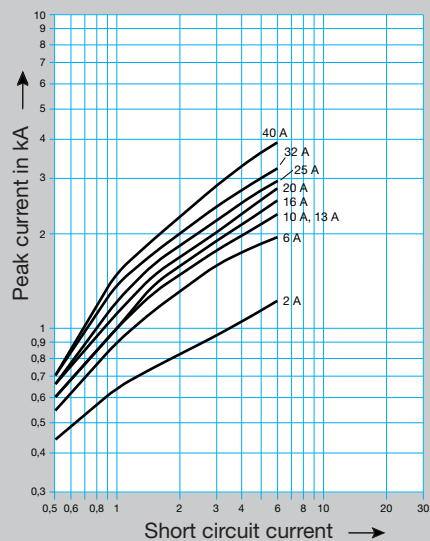
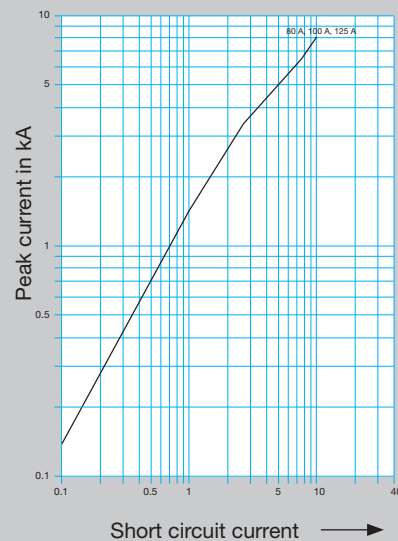
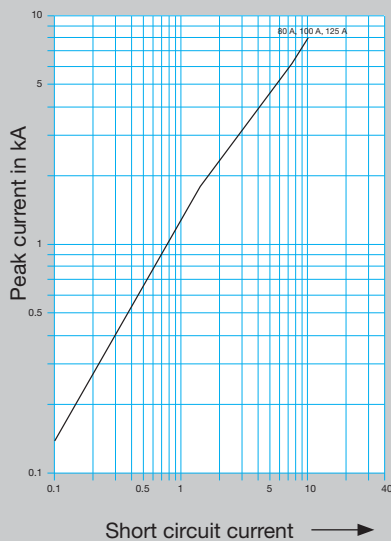


Fig 7

HMF, HMC, HMD 80 - 125A



### Functions

Tripping and indication auxiliary contacts are common to the range of multi-pole 10kA MCBs, and RCCBs. They should be mounted on the left hand side of the device.

### Auxiliary contact MZ201 (fig 9)

Allows remote indication of the status of the device contacts to which it is associated.

### Auxiliary contact and alarm contact MZ202

This accessory has two separate functions.

Like the MZ201 auxiliary contact, however the alarm contact will provide indication if the breaker trips under fault conditions.

### MZ203 shunt trip\*

Allows tripping of the device by feeding the coil. The contacts also allow for remote indication of operation.

### MZ206 under voltage release\* (fig 10)

Allows the MCB to trip when the voltage drops or by pressing a remote off switch (ie emergency stop).

\* Indication that the product has tripped due to the voltage release is provided by a flag on the product.

### Wiring diagram

MZ201 auxiliary contact and alarm contact

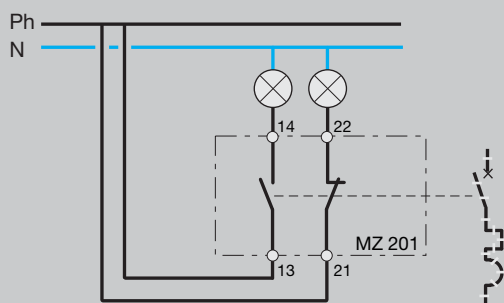


Fig 9

### MZ206 under voltage release

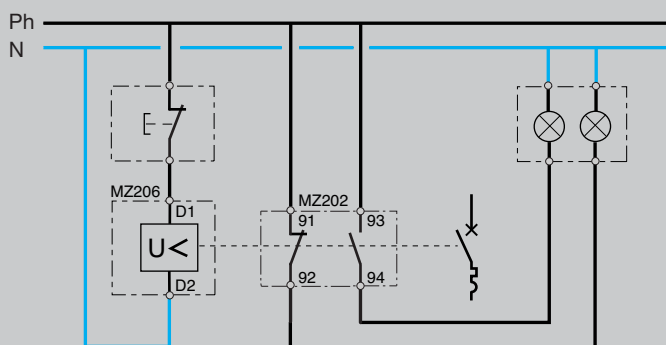


Fig 10

### Electrical characteristics

	MZ201/MZ202	MZ203	MZ206
	1 x O 1 x C contact 230V~6A AC-1		
		230 - 415~ 110 - 130 ...	230V~ 50Hz

Table 18

### Electrical connection

By terminal fitted with fixed clamp screws wiring capacity.

Flexible : 2 x 1.5mm<sup>2</sup>

Rigid : 2 x 1.5mm<sup>2</sup>

### MZ203

Power - 8VA

tolerance : -15% of Un

### MZ206

Latching voltage is between 35 and 70% of Un 230V~.

Coil consumption 3VA

### Grouping / Combination of Several Auxiliaries

On 2, 3 and 4 pole MCBs it is possible to associate 3 auxiliaries – 2 indication auxiliaries and 1 release auxiliary. In this case, it is important to first fix the indication auxiliary (MZ201 and MZ202) and then the release auxiliary (MZ203 and MZ206)

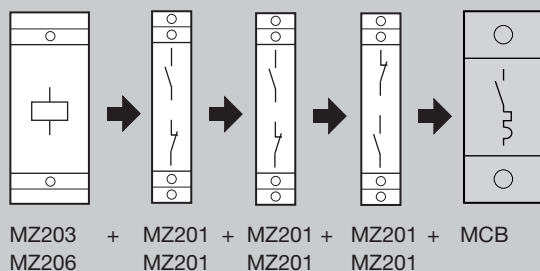


Fig 11

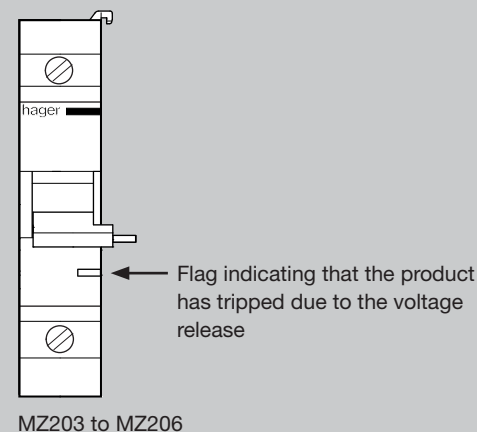


Fig 12

### Transformer Protection

When a transformer is switched on, a high inrush current occurs in the primary circuit of the transformer irrespective of the load on the secondary side. Correct selection of the primary circuit protective device will avoid the risk of nuisance tripping due to this inrush current. Tables 19 & 20 show the recommended MCB's for the protection of single phase (230V) and three phase (400V) transformers.

#### Single Phase 230V

Transformer Rating (VA)	Primary Current (A)	Recommended MCB		
		NBN	NCN	NDN
50	0.22	-	1	6
100	0.43	-	2	6
200	0.87	-	3	6
250	1.09	6	4	6
300	1.30	10	4	6
400	1.74	10	6	6
500	2.17	16	10	6
750	3.26	16	10	6
1000	4.35	25	16	10
2500	10.87	63	40	20
5000	21.74	-	63	32
7500	32.60	-	-	50
10000	43.48	-	-	63

Table 19

#### Three Phase 400V

Transformer Rating (VA)	Primary Current (A)	Recommended MCB		
		NBN	NCN	NDN
500	0.72	-	3	6
750	1.08	6	4	6
1000	1.44	10	6	6
2000	2.88	16	10	6
3000	4.33	25	16	10
4000	5.77	32	20	10
5000	7.21	40	25	16
7500	10.82	63	32	20
10000	14.43	-	50	25
15000	21.64	-	63	32
20000	28.86	-	-	50
25000	36.07	-	-	63

Table 20

### Lighting circuit

Although the MCBs prime function is the protection of lighting circuits, they are often used as local control switches as well, conveniently switching on and off large groups of luminaires in shops and factories. The MCB is well able to perform this additional task safely and effectively. Hager MCBs have an electrical endurance of 20,000 on/off operations for rated trips up to and including 32A and 10,000 on/off operations for 40, 50 and 63A rated trips. Account must be taken of the effects of switching inductive loads.

For the protection of lighting circuits the designer must select the circuit breaker with the lowest instantaneous trip current compatible with the inrush currents likely to develop in the circuit.

High Frequency (HF) ballasts are often singled out for their high inrush currents but they do not differ widely from the conventional 50Hz. The highest value is reached when the ballast is switched on at the moment the mains sine wave passes through zero. However, because the HF system is a "rapid start" system whereby all lamps start at the same time, the total inrush current of an HF system exceeds the usual values of a conventional 50Hz system. Therefore where multiple ballasts are used in lighting schemes, the peak current increases proportionally.

Mains circuit impedance will reduce the peak current but will not affect the pulse time.

The problem facing the installation designer in selecting the correct circuit breaker is that the surge characteristic of HF ballasts vary from manufacturer to manufacturer. Some may be as low as 12A with a pulse time of 3mS and some as high as 35A with a pulse time of 1mS. Therefore it is important to obtain the expected inrush current of the equipment from the manufacturer in order to find out how many HF ballasts can safely be supplied from one circuit breaker without the risk of nuisance tripping.

This information can then be divided into the minimum peak tripping current of the circuit breaker, shown in Table below

Circuit Breaker	Circuit breaker rated current								
	6A	10A	16A	20A	25A	32A	40A	50A	63A
B	26	43	68	85	106	136	170	212	268
C	43	71	113	142	177	223	283	354	446
D	85	142	226	283	354	453	566	707	891

Table 21

### Minimum peak tripping current

Example:

How many HF ballasts, each having an expected inrush of 20A can be supplied by a 16A type C circuit breaker? From Table 21, 16A type C we have a minimum peak tripping current of 113A.

$$\text{Therefore } \frac{113}{20} = 5$$

i.e. 5 ballasts can be supplied by a 16A type C circuit breaker.

### Moulded case circuit breakers

Moulded case circuit breakers have been developed for use in commercial and industrial installations and, as the name implies, the air-break circuit breaker mechanism is housed in a moulded case of non-conducting material which not only provides a frontal protection of at least IP30 but also provides full segregation of all live parts.

The main features of a modern Moulded Case Circuit Breaker (MCCB) are:

1. High breaking capacity and low specific let-through energy, ensuring full operating safety under heavy fault conditions.
2. Simultaneous opening and closing of all main poles.
3. Trip free mechanism.
4. Positive contact indication whereby the toggle always indicates the exact position of the main contacts.
5. Test button which allows periodic testing of the mechanical trips.

MCCBs are intended to be selected, installed and used by skilled or instructed people and as such should comply with and be tested to BS EN 60947-2.

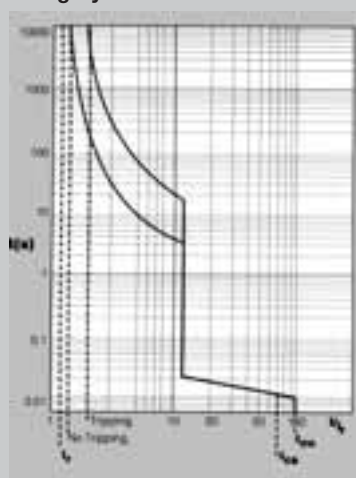
This British Standard, unlike BS EN 60898 which covers circuit breakers for household and similar installations does not set out to standardise the circuit breakers time/current characteristics. It does however give two points at which the time/current characteristics should be verified. The circuit breaker should be able to carry 1.05 times the thermal trip setting current without tripping and when loaded to 1.3 times that current to trip in one hour or less and in two hours or less for rated current above 63A.

$I_r$  = Thermal trip setting.

$I_{cs}$  = Rated service short circuit capacity.

$I_{cu}$  = Rated ultimate short circuit capacity.

### Category A MCCB Characteristic Curve



### Short-time withstand current $I_{cw}$

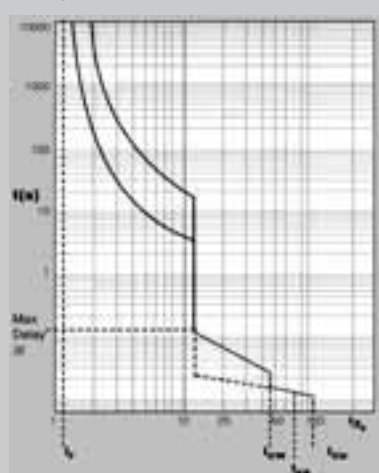
BS EN 60947-2 defines two categories of circuit breakers:

Category 'A' for which no short-circuit trip delay is provided. These are generally the smaller moulded case circuit breakers below 630A with time current characteristics as shown in Fig 12. Category 'A' breakers will trip instantaneously when the short-circuit current is greater than the magnetic trip setting of the circuit breaker.

Category 'A' circuit breakers are suitable for current discrimination but not for time discrimination.

Category 'B' for which, in order to achieve time discrimination, it is possible to delay tripping during short-circuit conditions with values lower than  $I_{cw}$  (As shown in Fig 13). These are generally the larger moulded case circuit breakers and air circuit breakers with time current characteristics as shown in Table 23. For moulded case circuit breakers  $I_{cw}$  is always lower than the ultimate breaking capacity  $I_{cu}$ .

### Category B MCCB characteristic curve



The British Standard gives minimum values of  $I_{cw}$  and of the associated time delay. See Table 22

Short time withstand required for $I_{cw}$		Associated delay
$I_n \leq 2500A$	$I_n > 2500A$	$\Delta t(s)$
$I_{cw} \geq 12I_n$ (min 5kA)	$I_{cw} \geq 30kA$	0.05 minimum value
		0.1 )
		0.25 ) preferred
		0.5 ) values
		1 )

Table 22

Frame (A)	thermal rating $I_{th}$	rated voltage $U_e(V)$	rated short time withstand $I_{cw} (A)$	impulse voltage $U_{imp} (kV)$	insulation voltage $U_i (V)$	no mechanical operations	no electrical operations
125	125	230/415	1.7*	6	500	6000	6000
250	250	415	3.0*	8	690	6000	6000
400	400	415	4.8*	8	750	16000	16000
630	630	415	7.5*	8	750	16000	16000
800	800	415	9.6*	8	750	16000	16000

\* half second rating

Table 23



## MCCB Breaking Capacity & Temperature Derating

### Breaking Capacity

An attempt has been made to try and make the assigned short-circuit breaking capacities of a circuit breaker more understandable to the specifier and of more practical use to the designer than the old P1 and P2 ratings. The British Standard still specifies two ratings

- $I_{cu}$ : Rated ultimate short-circuit breaking capacity
- $I_{cs}$ : Rated service short-circuit breaking capacity.

#### Ultimate Short Circuit Breaking Capacity

$I_{cu}$  corresponds in practice to P1 in the former standard and is defined in the same way. This is now covered under test sequence 3, which is:

- Verify the overcurrent releases at 2.I<sub>r</sub>;
- Two successive breaks at  $I_{cu}$ , cycle 0 - 3 min - CO;
- Dielectric withstand at 2U<sub>e</sub> (50Hz, 1 min);
- Verify the calibration of the over-current releases.

$I_{cu}$  Represents the maximum short-circuit current which the breaker can break and is to be compared with the prospective fault current at the point of installation:

$I_{cu}$  (Of the device) Must be equal to or greater than the prospective short-circuit at the point of installation.

#### Service Short-circuit Breaking Capacity

Generally, when a short-circuit occurs (in itself a very rare occurrence) its value is much lower than its calculated value. Nonetheless, it is essential that these lower values of short-circuit are cleared effectively and safely, and that the supply is re-established as quickly as possible. It is for this reason that BS EN 60947-2 has introduced a new characteristic,  $I_{cs}$ , known as Service Breaking Capacity and generally expressed as a percentage of  $I_{cu}$ . The value can be chosen by the manufacturer from 25, 50, 75 or 100%.

$I_{cu}$  must be verified as described under test sequence 2 which is:

- Three successive breaks at  $I_{cs}$  with cycle 0 - 3 min - CO - 3 min - CO;
- Dielectric withstand at 2U<sub>i</sub> (50 Hz, 1 min);
- Temperature rise at  $I_n$ ;
- Verify the calibration of the over-current releases.

This establishes  $I_{cs}$  as a performance characteristic which can be considered not simply as a breaking capacity (as was the case of P2) but as the ability of the circuit breaker to ensure normal service, even after having disconnected several short-circuits.

The percentage ratio of  $I_{cs}$  to  $I_{cu}$  is another important aspect for the designer to understand. Our wiring regulations, which are based on IEC 364, give no guidance at the moment on the use of performance characteristic  $I_{cs}$ . To comply with these regulations it is only necessary for the ultimate breaking capacity of the protective device to be equal to or greater than prospective fault level:  $I_{cu} \geq I_{cs}$ .

The selection of the percentage ratio of  $I_{cs}$  to  $I_{cu}$  to achieve optimum continuity of service depends on the "probable short circuit level". Therefore  $I_{cs}$  should be equal to or greater than the probable short circuit level. However for large air circuit breakers it is usual for  $I_{cs} = I_{cu}$ , i.e. 100% because these devices are usually installed as main incomers to large switchboards where their field of protection is often limited to the switchboard itself. In these conditions the probable  $I_{cs}$  will be only slightly less in comparison with the  $I_{cu}$ .

It is important for this application to select a device where  $I_{cs}$  performance is close to  $I_{cu}$ .

While this holds true for large switchboards, designed for high prospective fault levels, it is possible to use lower rated circuit breakers as incomers on panelboards designed for a relatively low prospective fault level. This provided that the service performance level is equal to or greater than the prospective fault level. For example, it is possible to install an H630 moulded case circuit breaker as a main in-circuit on a switchboard supplied from a 400kVA transformer because the H630  $I_{cs}$  is greater than the PSCC.

However, for those circuit breakers which are usually installed as outgoers, protecting cables to sub-boards or other loads, a 50% ratio is adequate because studies have shown that when a short-circuit does occur it is nearly always single or two phase and located at the extremity of the protected cable, and is usually less than 25% of the prospective fault level at the origin of the system and, in almost all cases, not greater than 50%. It is therefore a wise precaution, to prolong the working life of the installation, to choose a device having a service performance  $I_{cs}$  equal to 50%  $I_{cu}$ . It is advisable to base the  $I_{cs}$  rating of a MCCB on the psc at the extremity of the circuit that it is protecting.

### Temperature Derating

Hager MCCBs are designed and calibrated to carry their rated current and to operate within this designated thermal time/current zone at 40°C. If the ambient temperature around the circuit breaker differs from 40°C then it requires more or less current to operate the thermal trip depending on the ambient temperature variation.

Table 24 shows the variation of the range of the thermal trip as a function of the ambient temperature. The instantaneous magnetic trip is not affected by variations in ambient temperature.

#### Variation of Thermal Trip Range with Ambient Temperature

		30°C		40°C		50°C		60°C	
Type	In	min	max	min	max	min	max	min	max
125A	16	-	16.0	-	16.0	-	15.4	-	14.0
	20	-	20.0	-	20.0	-	19.2	-	18.0
	25	-	25.0	-	25.0	-	24.0	-	25.5
	32	-	32.0	-	32.0	-	30.7	-	28.8
	40	-	40.0	-	40.0	-	38.4	-	36.0
	50	-	50.0	-	50.0	-	48.0	-	45.0
	63	-	63.0	-	63.0	-	60.5	-	56.7
	80	-	80.0	-	80.0	-	76.8	-	72.0
250A	100	-	100.0	-	100.0	-	96.0	-	90.0
	125	-	125.0	-	125.0	-	120.0	-	112.5
	160	128.0	160.0	128.0	160.0	122.9	153.6	115.2	144.0
	200	160.0	200.0	160.0	200.0	153.6	192.0	144.0	180.0
400A	250	200.0	250.0	200.0	250.0	192.0	240.0	180.0	225.0
	320	256.0	320.0	256.0	320.0	245.8	307.2	230.4	288.0
	400	320.0	400.0	320.0	400.0	307.2	384.0	288.0	360.0
630A	500	400.0	500.0	400.0	500.0	384.0	480.0	360.0	450.0
	630	504.0	630.0	504.0	630.0	483.8	604.8	453.6	567.0
800A	800	640.0	800.0	640.0	800.0	614.4	768.0	576.0	720.0

Table 24

## MCCB Technical Tables

Frame type		125	125	250	400	630	800
Rated current at 40°C	Amps	125	125	250	400	630	800
No. of poles		1	3-4	3-4	3-4	3-4	3-4
	height mm	140	140	176	257	273	273*
	width mm	25	75/101	105/140	140/183	210/273	210/273*
	depth mm	74	74	91	103	103	103
Rated voltage Ue	V a.c. (50-60Hz)	500	500	690	690	750	750
	230-240V a.c.	16	25	85	85	85	65
	400-415V a.c.		16	40	45	50	50
	690V a.c.				20	20	20
	250V d.c.	20	20	20	20	20	20
	400V a.c.	100%	100%	100%	100%	100%	50%
Releases							
Rated current (product range)		16-125A	16-125A	160-250A	320-400A	500-630A	800A
Adjustable thermal releases	In	Fixed	0.8-1.0	0.8-1.0	0.8-1.0	0.8-1.0	0.8-1.0
Adjustable magnetic releases	In	Fixed	Fixed	5.0-10.0	5.0-10.0	5.0-10.0	2.0-8.0
Selective category B type					available	available	available
MCCBs BS EN 60947-2					on request	on request	on request
Moulded case switches			✓	✓	✓	✓	✓
Internal accessories							
Shunt trip			✓	✓	✓	✓	✓
Under voltage releases			✓	✓	✓	✓	✓
Auxiliary contacts			✓	✓	✓	✓	✓
Alarm contacts			✓	✓	✓	✓	✓

Table 25

\* excludes terminal extension pads

For other control voltages please consult us.

Frame type	Designation	125 Cat Ref.	250 Cat Ref.	400 Cat Ref.	630/800 Cat Ref.
Control voltage		230V 400V	230V 400V	230V 400V	230V 400V
	Shunt trip operating voltage UF = 0.7 to 1.1 Un	HX104E HX105E	HX104E HX105E	HX104E HX105E	HX804 HX805
	<b>Under voltage release</b> <b>Release voltage</b> UF = 0.35 to 0.7 Un <b>Maintaining voltage</b> UF ≥ 0.85 Un	HX114E HX115E	HX114E HX115E	HX114E HX115E	HX814 HX815
	Auxiliary contacts (2 off)	HX122 -	HX122 -	HX122 -	HX822 -
	Auxiliary and alarm	HX123 -	HX223 -	HX223E -	HX823 -

Table 26

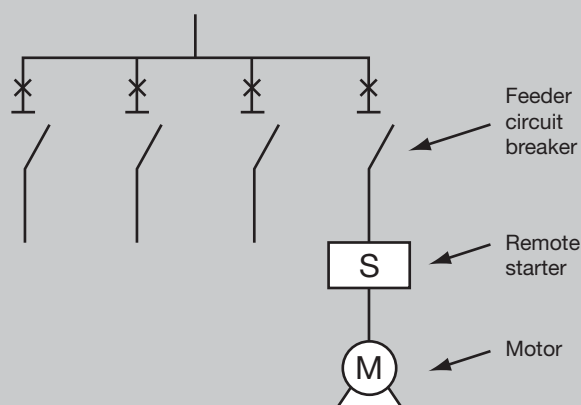


Fig 14

kW	hp	Full load speed rev/min	Full load current A	Direct start	
				Starting current x FLC	Starting torque x FLC
		2800	3.2	6.75	3
		1400	3.5	5.5	2.5
1.5	2	900	3.8	4.5	2.2
		700	4.3	4.0	2.0

Table 27

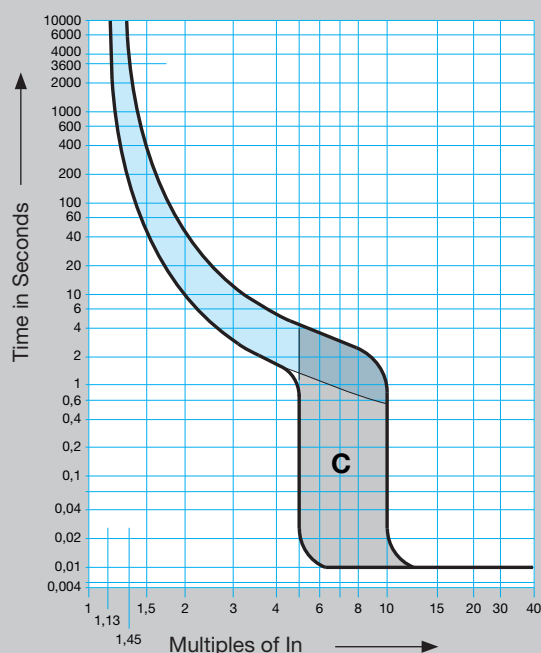


Fig 15

### Motor Power Circuit Protection

The selection of the circuit protective device for motor power supply circuits depends in the first instance on the relative physical position of the various circuit elements. The feeder circuit breaker in the switchboard, panelboard or distribution board, the starter with its contactor and thermal overload relay, with perhaps its own isolator or short-circuit protective device (SCPD) and of course the motor.

The feeder circuit breaker, which can be a perfectly standard thermal magnetic breaker, must protect the cable feeding the starter so the normal selection criteria apply. In addition, however, it must be able to withstand the inrush and starting currents of the motor without nuisance tripping. The inrush current, which should not be confused with the starting current, appears at the instant of switch on and could be as great as 10 times the full load current (FLC) of the motor, but with a relatively short pulse time of 20 to 30 milliseconds.

The starting current of a direct on line (DOL) start squirrel cage motor does vary with the designed speed of the motor - the higher the speed the higher the starting torque and the starting current as a ratio of the FLC. However the FLC is inversely proportional to the design speed of the motor. Table 27 shows typical performance data for average 1.5kw/2hp three phase squirrel cage motors.

The run-up time can vary between one and fifteen seconds depending on the surge of the motor and the type of load the motor is driving.

Clearly then, to accurately select the correct circuit breaker for a motor power supply circuit it is essential to know the correct FLC, the starting current and the run-up time. This information is then plotted against the time/current characteristic curve of the type of circuit breaker (or fuse) selected.

#### Example

Select an appropriate feeder circuit breaker to supply a 1.5kw 3 phase motor DOL start. FLC 3.5A, starting current 5.5 x FLC, run-up time 6 secs. The circuit breaker must be suitable for fitting into a 3 phase MCB Distribution Board.

Starting current:  $3.5 \times 5.5 = 19.25A$  for 6 secs

Inrush current :  $3.5 \times 10 = 35A$

Comparing the data against the time/current characteristics of a type C MCB, Fig 15, we see that at 6 secs the breaker will carry  $2 \times I_n$  without tripping. Therefore a 10A MCB would carry 20A for 6 secs. The minimum instantaneous trip for this type C MCB would be 50A.

Therefore the closest protection for this motor feeder circuit would be a 3 Pole 10A type C MCB. A 10A type D could be used providing the 100A maximum instantaneous trip was not a problem. The inrush current would preclude the use of a 10A type B because the minimum instantaneous trip is only 30A. In this case use the next size up, i.e. 16A.

Motor rating	DOL starting conditions	Assisted start conditions
Up to 0.75kW	5 x FLC for 6 secs	2.5 x FLC for 15 secs
1.1 to 7.5 kW	6 x FLC for 10 secs	2.5 x FLC for 15 secs
11 to 75kW	7 x FLC for 10 secs	2.5 x FLC for 15 secs
90 to 160kW	6 x FLC for 15 secs	2.5 x FLC for 20 secs

Table 28

### 1 Phase 230V DOL Starting

kW	hp	FLC A	Recommended circuit breaker			
			(A) NBN	HN NCN	NDN	Fuse(A)
0.18	0.25	2.8	16	10	10	10
0.25	0.33	3.2	16	10	10	16
0.37	0.5	3.5	16	10	10	16
0.55	0.75	4.8	20	16	16	16
0.75	1.0	6.2	25	20	20	20
1.1	1.5	8.7	40	25	25	25
1.5	2.0	11.8	50	32	32	32
2.2	3.0	17.5	-	50	50	40
3.0	4.0	20	-	63	63	50
3.75	5.0	24	-	-	-	63
5.5	7.5	36	-	-	-	80
7.5	10	47	-	-	-	100

Table 29

### 3 Phase 400V Assisted Starting Star-Delta

kW	hp	FLC A	Recommended circuit breaker		
			(A) NCN	(A) NDN	HRC fuse (A)
3	4	6.3	16	10	16
4	5.5	8.2	20	10	16
5.5	7.5	11.2	32	16	20
7.5	10	14.4	40	25	25
11	15	21	50	32	32
15	20	27		40	35
18.5	25	32		50	40
22	30	38		63	50
30	40	51			63
37	50	63			80
45	60	76			80
55	75	91			100
75	100	124			160
90	125	154			200
110	150	183			200
132	175	219			250
150	200	240			315
160	220	257			315

Table 30

Tables 28,29,30 and 31 give general recommendations for the selection of circuit breakers and HRC fuses for the protection of motor power circuits and are based on the assumptions shown in Table 28 for a cage motor running at approximately 1400 Rev/Min.

### Assisted Start

The selection of a feeder circuit breaker for a motor with an assisted start facility is much the same as for DOL start. The full load running current is the same for both, but the starting current for the assisted start can be less than half, with a subsequent reduction in starting torque. Typical starting current for star-delta start would be 2 to 2 1/2 times FLC, with a run-up time of 15 to 20 seconds depending on the size of the motor and the load driven by the motor. However the transient during changeover still has to be taken into account so selection is often dictated by the instantaneous trip setting of the circuit breaker.

### 3 Phase 400V DOL Starting

kW	hp	FLC A	Recommended circuit breaker			
			(A) NBN	(A) NCN	(A) NDN	HRC fuse (A)
0.18	0.25	0.87		2		4
0.25	0.33	1.17		3		4
0.37	0.5	1.2		3		4
0.55	0.75	1.8		4		6
0.75	1.0	2.0	10	6	6	6
1.1	1.5	2.6	16	10	6	10
1.5	2.0	3.5	16	10	10	16
2.2	3.0	4.4	20	16	16	16
3.0	4.0	6.3	25	20	20	20
4.0	5.5	8.2	32	25	25	25
5.5	7.5	11.2	50	40	40	32
7.5	10	14.4	63	50	50	40
11	15	21				63
15	20	27				80
18.5	25	32				80
22	30	38				80
30	40	51				100
37	50	63				125
45	60	76				125
55	75	91				160
75	100	124				200
90	125	154				250
110	150	183				315
132	175	219				355
150	200	240				355
160	220	257				355

Table 31

### Prospective Short Circuit Current (PSCC)

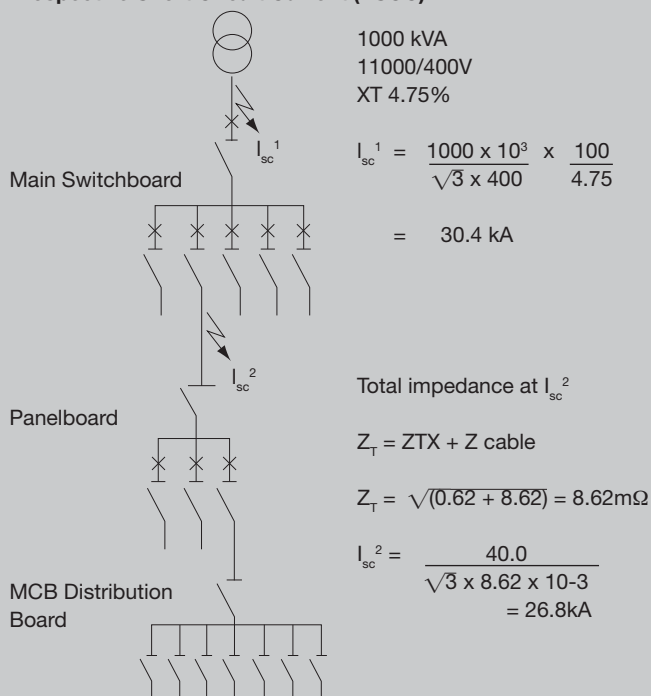


Fig 16

In order to select the correct device for the proper protection against short-circuit current the Wiring Regulations suggest that the prospective short-circuit current at every relevant point of the complete installation shall be determined by calculation or by measurement of the relevant impedances.

Of course this is only necessary if the prospective short-circuit current at the origin of the installation is greater than the breaking capacity of the smallest protective device.

All short-circuit current protective devices must have a breaking capacity equal to or greater than the prospective fault current at the point where they are to be installed

$$I_{cn} \geq \text{Prospective fault current}$$

The relationship between prospective fault current and probable fault current is discussed later.

### Prospective Fault Current

The theoretical maximum fault condition at any point in a distribution system is termed the "prospective fault current". This is the rms value of the current that would flow on the occurrence of a solidly bolted direct fault at that point and pre-supposes that the voltage will remain constant and the ultimate supply source has limitless capacity. Therefore, the prospective fault current is limited by

- The impedance of the high voltage network feeding the supply transformer.
- The impedance of the supply transformer.
- The impedance of the distribution Network from the supply transformer to the point of fault.

In practice the voltage does drop and the fault does have impedance and moreover the protective devices have impedance. Therefore the prospective current is theoretical and cannot be exceeded.

The severity of the short-circuit fault is also controlled by the "Power Factor" which like the fault current is determined by the circuit conditions up to the point of fault. However, the short-circuit power factor is not to be confused with the load power factor which is determined by the characteristics of the load itself.

Power Factor is effectively a measure of stored energy in the system. Hence if the power factor is low, there is a considerable amount of stored energy to be dissipated during the fault clearance. Also there will be a degree of asymmetry of the current wave due to the presence of a dc component.

### Asymmetrical Short Circuit Current

When a short-circuit occurs in a circuit the resistance of which is negligible compared with the inductive reactance, the resulting short-circuit current has a dc component. This dc component has a maximum value when the short-circuit occurs at the instant at which the circuit voltage is zero. (see Fig 17). Since in a three phase system there are six voltage zeros per cycle, it is certain that there will be considerable asymmetry in the current flowing in at least one of the phases. If the fault occurs at any other point of the voltage wave, the resultant short-circuit is partially offset, that is to say, it contains a dc component of reduced magnitude.

The asymmetrical current consists of the symmetrical short-circuit current superimposed on or offset by a dc component which decreases exponentially to practically zero within a few cycles. The asymmetrical short-circuit current peak determines the maximum mechanical stress to which the equipment may be subjected.

The maximum peak current is about 1.75 times the peak symmetrical current, or putting it another way 1.75 x  $\sqrt{2}$ , i.e. 2.5 times the rms value of the symmetrical short-circuit current.

Circuit breakers are selected so that the breaking capacity is always equal to or greater than the rms value calculated at the relevant point of installation. The making capacity is generally ignored, the assumption being that it will be in line with the level of peak current normally associated with the calculated rms current.

For example a circuit breaker with a breaking capacity of 15kA rms will have a making capacity of 15 x 2 = 30kA peak (see Table 32)

This assumes a short-circuit power factor of 0.3.

### Ratio n between making and breaking capacity

Breaking capacity $I_{cn}$ (A)	Standard power factor	Minimum making capacity ( $n \times I_{cn}$ )
$\leq 1500$	0.95	$1.41 \times I_{cn}$
$> 1500 \leq 3000$	0.9	1.42
$> 3000 \leq 4500$	0.8	1.47
$> 4500 \leq 6000$	0.7	1.53
$> 6000 \leq 10000$	0.5	1.7
$> 10000 \leq 20000$	0.3	2.0
$> 20000 \leq 50000$	0.25	2.1
$> 50000$	0.2	2.2

Table 32

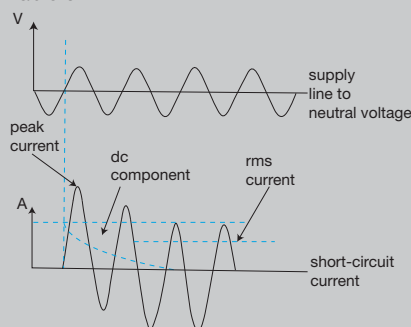


Fig 17

## Prospective Fault Current

### Calculation of Prospective Short Circuit Current

Several excellent proprietary computer programs are now available for calculating the prospective fault level at any point in the installation. They are also able to select the correct size and type of cable and match this with the correct circuit protective device.

### Estimation of Prospective Fault Current

Actually calculating prospective short-circuit current is not in itself difficult but it does require basic data which is not always available to the electrical installation designer.

It is therefore usual to use a simple chart as shown in Fig 18 to estimate the prospective short circuit current. This type of chart always gives a prospective fault level greater than that which would have been arrived at by calculation using accurate basic data. Therefore it is safe to use but sometimes may result in an over engineered system.

### Conductor Cross Sectional Area (mm<sup>2</sup>) (Cu)

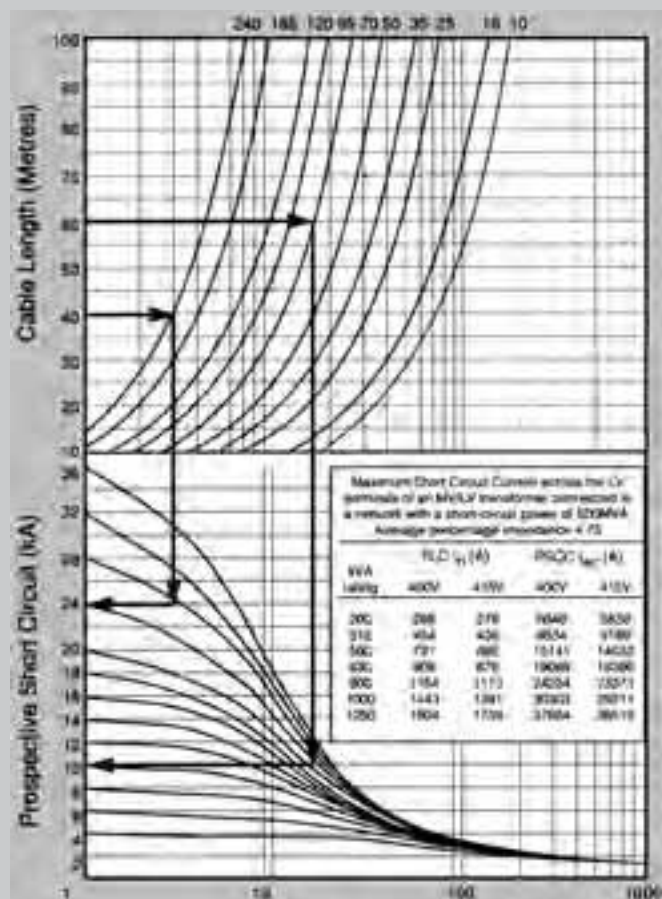


Fig 18

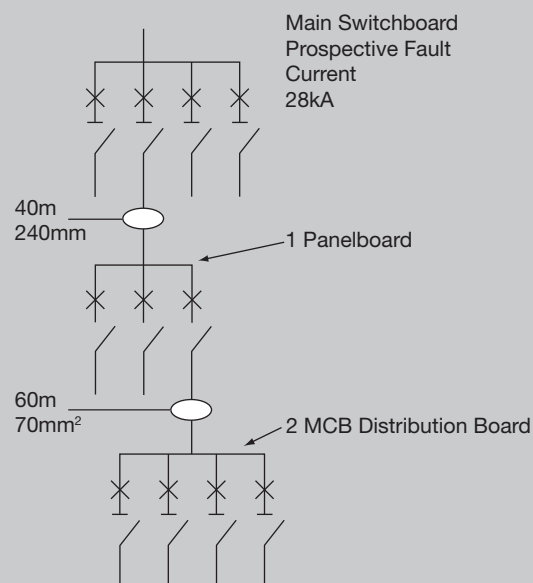


Fig 19

### Example

- 1 Project 40m of cable length across on to the 240mm<sup>2</sup> cable curve. From this point project down onto the 28kA curve. From this point projecting across we note that the prospective fault level at the panelboard is 24kA.
- 2 Project 60m of cable length across onto the 70mm<sup>2</sup> cable curve. From this point project down on to the 24kA curve. From this point projecting across we see that the prospective fault level at the MCB distribution board is 10kA.



Prospective Short Circuit Current in Domestic Installations

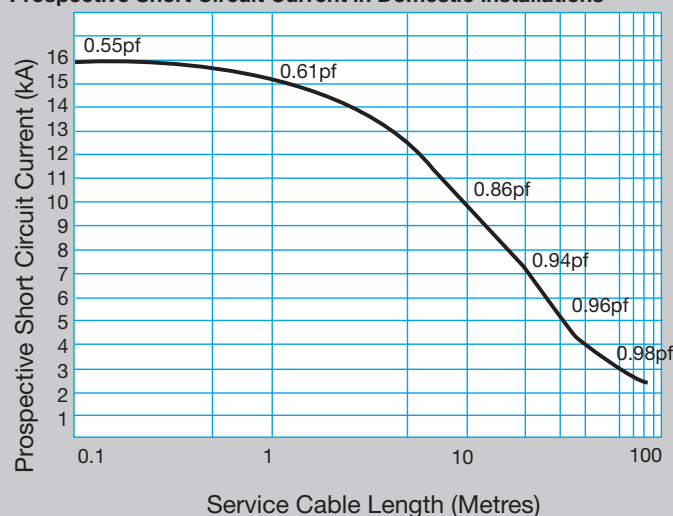


Fig 20

On single phase supplies up to 100A the electricity supply companies generally recommend that any installation is designed to cope with the maximum system fault level of the distributing main.

The declared fault level of the LV distributing main is 16kA (0.55 pf). Some supply companies do, however, accept that the impedance of the service cable may be taken into account as this is unlikely to change during the lifetime of the installation. The graph in Fig 20 shows for a standard service arrangement using a 25mm<sup>2</sup> service cable, the maximum prospective fault current at the consumer units incoming terminals, depending on the length of service cable from the point of connection to the LV distributing main.

The service cable length for domestic and similar installations may be taken as the distance from the service position in the consumer's premises to the boundary of the plot, assuming that the distributing mains cable is in the adjacent footpath.

Note: Hager consumer units with the following main incoming devices are tested to BS EN 60439-3 annex ZA - 16kA conditional short circuit.

Incoming device	Cat Ref
63A 2P switch disconnector	SB263U
100A 2P switch disconnector	SB299U
63A 2P RCCB	CDC263U
80 + 100A 2P RCCB	CD, CN
	280U + 284U
40A 2P RCCB / Garage Boards	CDC240U

Probable Short-Circuit Current

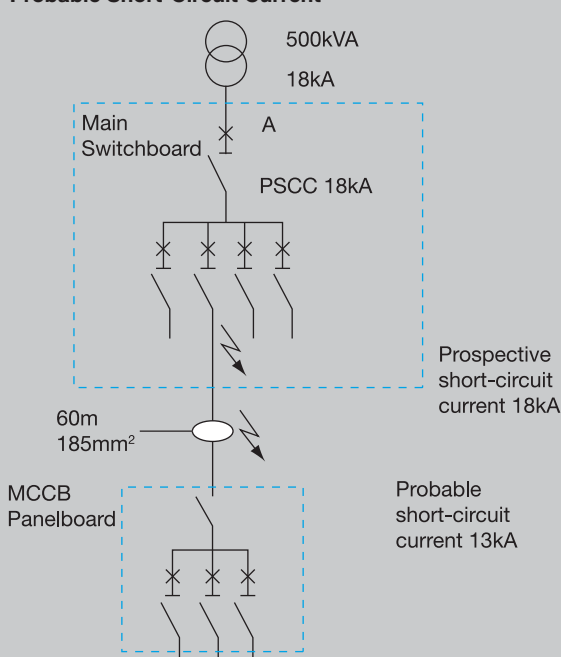


Fig 21

On page 3.43 the relationship between probable short-circuit current and service short-circuit breaking capacity is explained. The probable short circuit is the type of short circuit which is most likely to occur; this is nearly always at the extremity of the protected cable and more often than not a single phase or earth fault. Fig 21 shows a typical 3 phase 4 wire 400V system fed by a 500 kVA transformer. The transformer is adjacent to the main switchboard so the prospective short-circuit current (PSCC) on the main switchboard busbars is estimated as 18kA. The probable short-circuit current on the panelboard feeder circuit is estimated as 13kA, if it were a 3 phase symmetrical fault, or 6.5kA for a phase to neutral fault, which in fact would be the most likely type of fault. (Note: when estimating a phase to neutral prospective short-circuit current the length of conductor is doubled.)

Therefore for this application the main switchboard incoming circuit breaker

(A) Should have an  $I_{cs} \geq 18kA$  and an  $I_{cu} \geq 18kA$ .

The panelboard feeder circuit breaker

(B) Should have an  $I_{cu} \geq 18kA$  and an  $I_{cs} \geq 13kA$ .

Prospective Short Circuit Current (PSCC)



### Co-ordination between circuit protective devices

The proper co-ordination of two circuit protective devices is essential in all installations in order to fulfil the requirements of the Wiring Regulations which set out to ensure the safe continuity of supply of electrical current under all conditions of service. If a fault does occur, the circuit protective device nearest the fault should operate, allowing the device immediately upstream to continue to supply healthy circuits. This is called discrimination.

Sometimes the upstream device is selected to protect the downstream device(s) against high prospective short circuit currents and will operate to provide this protection should the actual short circuit current rise to a level which cannot be handled by the device nearest the fault. This is called back-up protection and devices should be so chosen as to allow discrimination up to the point the back-up device takes over.

### Discrimination

Discrimination, which is sometimes called selectivity, is the co-ordination of two automatic circuit protective devices in such a way that a fault appearing at any given point in an installation is cleared by the protective device installed immediately upstream of the fault and by that device alone.

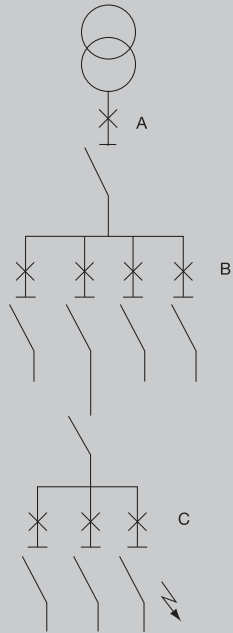


Fig 22

#### Example

A fault occurs downstream of final sub-circuit device "C". All other protective devices remain closed ensuring continuity of supply to the rest of the installation.

When this ideal situation is achieved under all conditions it is called "total discrimination".

Discrimination between two protective devices can be based on either the magnitude of the fault which is called "current discrimination" or the duration of the time the upstream device can withstand the fault current; this is called "time discrimination".

### Current discrimination

In order to achieve "current discrimination" in a distribution system it is necessary for the downstream device to have a lower continuous current rating and a lower instantaneous tripping value than the upstream device. Current discrimination increases as the difference between the continuous current ratings of the upstream and downstream devices increases.

A simple way of checking current discrimination at both overload and short-circuit conditions is to compare the time/current characteristic curves of both devices plotted to the same scale. Transparency overlays, if available, make this task much easier (see Fig 23). For this example the time/current characteristics of a 32A type 'B' circuit breaker complying with BS EN 60898, with a 100A category 'A' circuit breaker to BS EN 60947-2 are checked for current discrimination.

Because the thermal characteristic curve of the upstream circuit breaker clears the knee of the characteristic curve of the smaller downstream breaker, it can be said that overload discrimination is achieved under all conditions. However because the instantaneous characteristic curves cross at 0.01 sec, short-circuit discrimination is limited up to the point they cross, which in this case is approximately 2.7kA. The point at which the two time/current characteristics cross is called the limit of discrimination or selectivity. In this example the level of discrimination  $I_s$  is 2.7kA, so we only have partial discrimination between these two devices.

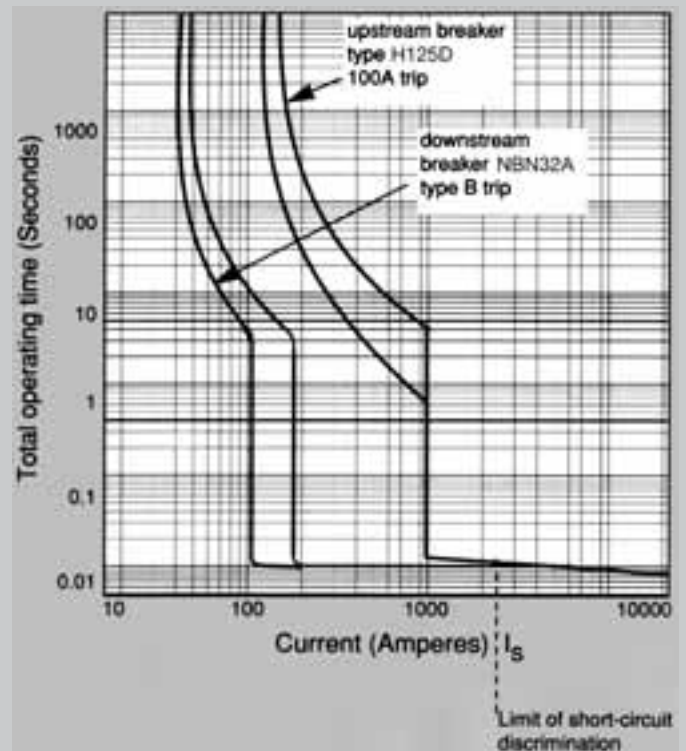


Fig 23

**Time discrimination**

Time discrimination is achieved by delaying the opening of the upstream circuit breaker until the downstream circuit breaker has opened and cleared the fault. The total clearing time of the downstream circuit breaker must be less than the time setting of the upstream circuit breaker and the upstream circuit breaker must be able to withstand the fault current for the time setting period. Therefore the upstream circuit breaker must be a category 'B' breaker which has been designed and tested for this purpose.

To determine time discrimination it is only necessary to compare the time/current characteristic curves of the two devices to ensure that no overlap occurs.

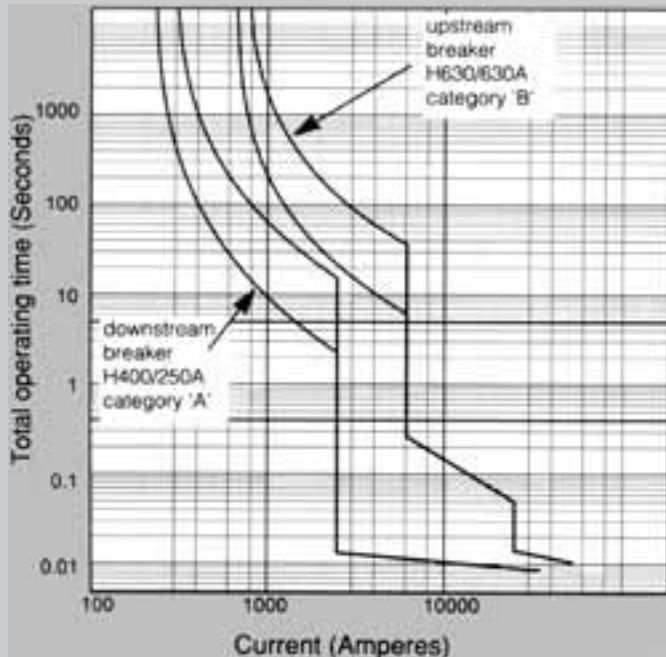


Fig 24

**Short circuit discrimination**

A more accurate way of checking the discrimination between two circuit protective devices at short circuit levels is to compare the energy let-through of the downstream device with the no-tripping or pre-arcing energy levels of the upstream device.

In order to check current discrimination at short circuit levels between:

Fuse upstream - fuse downstream

It is only necessary to compare the  $I^2t$  values of each fuse. This information is usually available in very simple tabular form (see Table 33). If the total let-through energy ( $I^2t$ ) of the downstream fuse is less than the pre-arcing energy ( $I^2t$ ) of the upstream fuse, then total discrimination is achieved at short-circuit levels.

### Fuse I<sup>2</sup>t characteristics

Rated current Amperes	Pre-arcing I <sup>2</sup> t kA <sup>2</sup> s	Total I <sup>2</sup> t kA <sup>2</sup> s
6	0.01	0.025
10	0.07	0.25
16	0.17	0.45
20	0.31	0.90
25	0.62	1.90
32	1.00	3.0
40	2.1	8.0
50	7.0	17
63	11	30
80	22	70
100	39	100
125	62	170
160	101	300
200	190	500
315	480	1100
400	800	2100
500	1100	3100
630	1800	5000

Table 33

### MCB Total let-through energy

MCB In	Total let-through energy kA <sup>2</sup> S at PSCC		
	3kA	6kA	10kA
6	5.9	10.5	15
10	6.5	12.2	21.5
16	8.0	17.5	30
20	8.8	19.5	34
25	10	21	38
32	11	24	42
40	12.5	29	50
50	15	34	61
63	16	38	72

Table 34

Fuse upstream - Circuit breaker downstream. The same procedure applies to fuse/circuit breaker as it does to fuse/fuse association to check current discrimination.

While for all practical purposes, a desk top study of time/current and let-through energy (I<sup>2</sup>t) characteristics are perfectly adequate, the British Standards for circuit breakers do recommend testing to confirm the results. With this in mind Hager have prepared a complete list of discrimination levels for all its circuit protective devices.

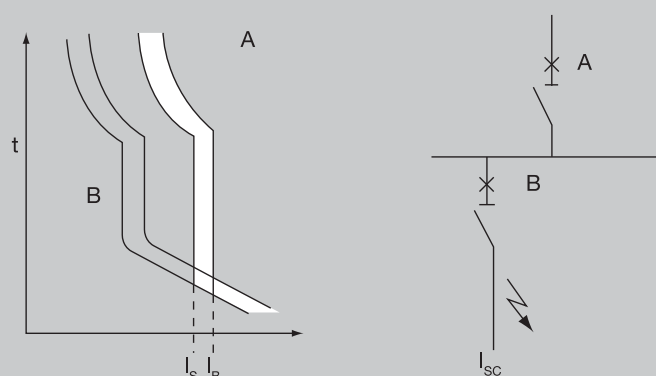


Fig 25 Back-up protection co-ordination

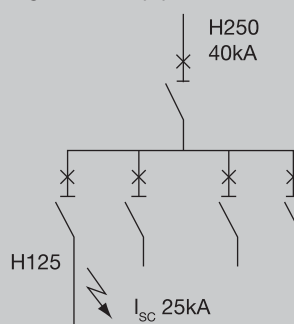


Fig 26

### Back-up protection

Sometimes known as cascading, when the energy limiting capacity of an upstream breaker is used to allow the use of a downstream circuit breaker having a short circuit breaking capacity ( $I_{cu}$ ) lower than the prospective fault level at the point at which it is installed. Table 35 shows the prospective fault level achieved with cascading.

It should be noted that when two circuit protective devices are used in association to improve the short-circuit capacity of the downstream device, total selectivity can never be achieved up to the assigned breaking capacity of the association.

The upstream device must at some point operate to provide the necessary protection to the downstream circuit breaker. This point, which is known as the take-over current, must not be greater than the rated short-circuit capacity of the downstream circuit breaker alone. It therefore follows that the limit of selectivity  $I_s$  will be less than the take-over current  $I_b$ . See Fig 25.

### Example

A panelboard is to be installed at a point where the prospective fault level is 25kA. 250A incoming and 16A TP outgoing circuits. Select the lowest cost circuit breakers which may be used. See Fig 26.

Incoming - Hager H250 MCCB having an  $I_{cu}$  of 40kA.

From Table 35 we see we can select a Hager H125 MCCB having an  $I_{cu}$  of 16kA to BS EN60947-2 but enhanced to 30kA with cascading.

## Co-ordination

### Definition

This allows circuit breakers of lower breaking capacity than the PSCC to be installed. The principle is that two breakers operating in series will clear a larger fault and that energy let through by the upstream breaker will not damage the down stream device.

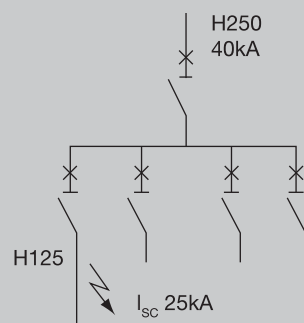


Fig 27

## Circuit breaker to circuit breaker back-up protection

Upstream device	125A Frame MCCB	250A Frame MCCB	400A Frame MCCB	630A Frame MCCB	800A Frame MCCB
Downstream Device					
6kA MCBs MTN	16	20			
10kA MCBs NBN, NCN, NDN	16	20			
125A frame MCCB		30	30	30	30
250A frame device			45	50	50
400A frame device				50	50
630A frame device					

Please consult us

Table 35

## Fuse to MCCB back-up protection

### Upstream

Downstream	Device type	BS88 Gg 250A	BS88 Gg 315A	BS88 Gg 400A	BS88 Gg 630A	BS88 Gg 800A	BS88 Gg 1000A
	125A frame	80kA					
	160A frame		80kA	80kA			
	250A frame			80kA	80kA		
	400A frame				80kA	80kA	
	630A frame						80kA

Table 36

# Circuit Breaker Discrimination Charts

Prospective fault levels to which selectivity is achieved.

	NCN									NDN								
BS EN 947-2	10kA 15kA									10kA								
Curve	C									D								
In	6A	10A	16A	20A	25A	32A	40A	50A	63A	6A	10A	16A	20A	25A	32A	40A	50A	63A
MTN/NB																		
6A			0.12	0.15	0.19	0.24	0.3	0.38	0.47		0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
10A				0.15	0.19	0.24	0.3	0.38	0.47			0.24	0.3	0.38	0.48	0.6	0.75	0.95
16A					0.19	0.24	0.3	0.38	0.47					0.38	0.48	0.6	0.75	0.95
20A						0.24	0.3	0.38	0.47						0.48	0.6	0.75	0.95
25A							0.3	0.38	0.47							0.6	0.75	0.95
32A								0.38	0.47								0.75	0.95
40A									0.47									0.95
NC/MLN																		
0.5A	0.05	0.08	0.12	0.15	0.19	0.24	0.3	0.38	0.47	0.09	0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
1A	0.05	0.08	0.12	0.15	0.19	0.24	0.3	0.38	0.47	0.09	0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
2A	0.05	0.08	0.12	0.15	0.19	0.24	0.3	0.38	0.47	0.09	0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
3A	0.05	0.08	0.12	0.15	0.19	0.24	0.3	0.38	0.47	0.09	0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
4A		0.08	0.12	0.15	0.19	0.24	0.3	0.38	0.47	0.09	0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
6A			0.12	0.15	0.19	0.24	0.3	0.38	0.47		0.15	0.24	0.3	0.38	0.48	0.6	0.75	0.95
10A				0.15	0.19	0.24	0.3	0.38	0.47			0.24	0.3	0.38	0.48	0.6	0.75	0.95
16A					0.19	0.24	0.3	0.38	0.47					0.38	0.48	0.6	0.75	0.95
20A						0.24	0.3	0.38	0.47						0.48	0.6	0.75	0.95
25A							0.3	0.38	0.47							0.6	0.75	0.95
32A								0.38	0.47								0.75	0.95
40A									0.47									0.95
ND																		
6A				0.15	0.19	0.24	0.3	0.38	0.47			0.24	0.3	0.38	0.48	0.6	0.75	0.95
10A						0.24	0.3	0.38	0.47					0.38	0.48	0.6	0.75	0.95
16A								0.38	0.47						0.48	0.6	0.75	0.95
20A									0.47							0.6	0.75	0.95
25A																	0.75	0.95
32A																		0.95

Table 37

Circuit breaker discrimination chart - fuse/MCCB to MCB																									
BS 88				HM		H125D		H250								H400				H630 to H800					
80kA				10kA		16kA		35kA								45/50kA									
IEC 947-2				C																					
curve				Gg1																					
	40	50	63	80	100	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800		
MTN/BNB																									
	3.4	3.8	T	T	T	0.6	1.3	1.6	1.9	2.3	2.9	4	5.5	6.7	8.6	T	T	T	T	T	T	T	T		
	2	2.5	4	6	T	0.6	1.1	1.4	1.7	2	2.4	2.8	3.4	4	4.9	T	T	T	T	T	T	T	T		
	1.2	2	3	5	8	0.6		1.3	1.5	1.8	2.1	2.4	2.8	3.2	3.7	9.5	T	T	T	T	T	T	T		
	1	1.5	3	4.5	7	0.6			1.5	1.8	2.1	2.4	2.8	3.2	3.7	9.5	T	T	T	T	T	T	T		
	1	1.3	2.6	3.5	6	0.6				1.7	1.9	2.1	2.3	2.5	2.9	6.2	T	T	T	T	T	T	T		
	1.2	2.1	2.8	4.2	6.2	0.6					1.9	2.1	2.3	2.5	2.9	6.2	T	T	T	T	T	T	T		
			2	2.6	3.5	0.6						1.6	1.7	1.9	2.2	5	8.1	T	T	T	T	T	T		
				3	3	0.6							1.4	1.5	1.8	4.1	6.8	T	T	T	T	T	T		
	63A				2.5									1.2	1.4	3.3	5.9	9.4	T	T	T	T	T		
NCN																									
0.5A	T	T	T	T	T	0.6	1.3	1.4	1.6	1.9	2.4	3.7	5.6	8.8	T	T	T	T	T	T	T	T	T		
1A	T	T	T	T	T	0.6	1.3	1.4	1.6	1.9	2.4	3.7	5.6	8.8	T	T	T	T	T	T	T	T	T		
2A	T	T	T	T	T	0.6	1.3	1.4	1.6	1.9	2.4	3.7	5.6	8.8	T	T	T	T	T	T	T	T	T		
3A	6	6	T	T	T	0.6	1.1	1.2	1.4	1.7	2	2.5	3.4	4.8	5.8	6.7	T	T	T	T	T	T	T		
4A	4.5	4.5	T	T	T	0.6	1.1	1.2	1.4	1.7	2	2.5	3.4	4.8	5.8	6.7	T	T	T	T	T	T	T		
6A	3.4	3.8	T	T	T	0.6	1.1	1.2	1.4	1.7	2	2.5	3.4	4.8	5.8	6.7	T	T	T	T	T	T	T		
10A	2	2.5	4	6	T	0.6		1.1	1.2	1.4	1.7	2.1	2.5	3	3.5	4.3	T	T	T	T	T	T	T		
16A	1.2	2	3	5	8	0.6			1.3	1.6	1.9	2.1	2.4	2.7	3.2	8.3	T	T	T	T	T	T	T		
20A	1	1.5	3	4.5	7	0.6				1.6	1.9	2.1	2.4	2.7	3.2	8.3	T	T	T	T	T	T	T		
25A	1	1.3	2.6	3.5	6	0.6					1.7	1.8	2	2.2	2.5	5.4	8.7	T	T	T	T	T	T		
32A		1.2	2.1	2.6	4.2	0.6						1.8	2	2.2	2.5	5.4	8.7	T	T	T	T	T	T		
40A			2	2.6	3.5	0.6							1.5	1.7	2	4.3	7	T	T	T	T	T	T		
50A				3	3	0.6								1.3	1.5	3.6	5.9	9	T	T	T	T	T		
63A					2.5										1.1	2.8	5.2	8.2	T	T	T	T	T		
NDN																									
6A	3.4	3.8	T	T	T	0.6	0.9	1	1.1	1.3	1.6	2	2.7	3.8	4.7	5.3	T	T	T	T	T	T	T		
10A	2	2.5	4	6	T	0.6		0.95	1.1	1.4	1.7	2	2.4	2.8	3.4	8.3	T	T	T	T	T	T	T		
16A	1.2	2	3	5	8	0.6				1.3	1.5	1.7	1.9	2.2	2.6	6.7	T	T	T	T	T	T	T		
20A	1	1.5	3	4.5	7	0.6					1.5	1.7	1.9	2.2	2.6	6.7	T	T	T	T	T	T	T		
25A	1	1.3	2.6	3.5	6	0.6						1.4	1.6	1.7	2	4.3	6.9	T	T	T	T	T	T		
32A		1.2	2.1	2.8	4.2	0.6							1.6	1.7	2	4.3	6.9	T	T	T	T	T	T		
40A			2	2.6	3.5	0.6								1.3	1.5	3.4	5.6	8.4	T	T	T	T	T		
50A				3	3	0.6									1.2	2.9	4.7	7.1	T	T	T	T	T		
63A					2.5											2.2	4.2	6.6	T	T	T	T	T		
HM																									
80A																1.7	3.9	6.6	T	T	T	T	T		
100A																	1.7	3.9	6.6	T	T	T	T		

Table 38

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# Circuit Breaker Discrimination Charts

## MCCB to MCCB

In	A	H125								H250				H400				H630 / H800			
		16	20	25	32	40	50	63	80	100	125	160	200	250	250	320	400	400	500	630	800
H125	16			0.9	1	1	1	0.95	1	1.1	1.3	1.6	2	2.5	2.3	3	3.4	5.6	6.4	8.3	8.3
	20				1	1	1	0.95	1	1.1	1.3	1.6	2	2.5	2.3	3	3.4	5.6	6.4	8.3	8.3
	25					1	1	0.95	1	1.1	1.3	1.6	2	2.5	2.3	3	3.4	5.6	6.4	8.3	8.3
	32						1	0.95	1	1.1	1.3	1.6	2	2.5	2.3	3	3.4	5.6	6.4	8.3	8.3
	40							0.95	1	1.1	1.3	1.6	2	2.5	2.3	3	3.4	5.6	6.4	8.3	8.3
	50								1	1.1	1.3	1.6	2	2.5	2.3	3	3.4	5.6	6.4	8.3	8.3
	63									1.1	1.3	1.6	2	2.5	2.1	2.5	3.4	5.6	6.4	8	8
	80										1.3	1.6	2	2.5	2	2.5	3.4	5.6	6.4	8	8
	100											1.6	2	2.5	2	2.5	3.4	5.6	6	8	8
	125												2	2.5	2	2.5	3.4	5.6	6	8	8
H250	160													2.5	2	2.5	3.4	4	4	4.5	4.5
	200															2.4	3.4	4	4	4.5	4.5
	250															2.4	3.4	4	4	4.5	4.5
H400	250															2.4	3.4	4	4	4	4
	320																3.4	4	4	4	4
	400																			4	4
H630	400																			4.4	4.4
	500																				
	630																				
	800																				

Table 39



## Circuit Breaker $Z_s$ Values & Energy Let Through

### Earth loop impedance ( $Z_s$ ) values for MCBs & MCCBs

Below are the maximum permissible values of  $Z_s$  to obtain disconnection in 0.4 & 5 seconds

Type	Rated trip In	Max let-through energy (kA <sup>2</sup> s) at PSCC			Max $Z_s$ (ohms)	
		3kA	6kA	10kA	0.4 Secs	5 Secs
MTN/	6	5.9	10.5	15	8	8.8
NBN	10	6.5	12.2	21.5	4.8	5.33
B curve	16	8.0	17.5	30	3	3.33
	20	8.8	19.5	34	2.4	2.66
	25	10	21	38	1.92	2.14
	32	11	24	42	1.5	1.66
	40	12.5	29	50	1.2	1.33
	50	15	34	61	0.96	1.06
	63	16	38	72	0.76	0.84
NCN/HM	0.5	0.01	0.01	0.01	48	120
C curve	1	4.0	7.0	10	24	53
	2	4.0	7.0	10	12	26
	3	5.0	10.0	15	8	18.78
	4	5.9	10.5	15	6	13.56
	6	5.9	10.5	15	4	8.8
	10	6.5	12.2	21.5	2.4	5.33
	16	8.0	17.5	30	1.5	3.33
	20	8.8	19.5	34	1.2	2.66
	25	10	21	38	0.96	2.14
	32	11	24	42	0.75	1.66
	40	12.5	29	50	0.6	1.33
	50	15	34	61	0.48	1.06
	63	16	38	72	0.38	0.84
	80				0.30	0.66
	100				0.24	0.53
NDN	6	5.9	10.5	15	2	8.8
D curve	10	6.5	12.2	21.5	1.2	5.33
	16	8.0	17.5	30	0.75	3.33
	20	8.8	19.5	34	0.6	2.66
	25	10	21	38	0.48	2.14
	32	11	24	42	0.37	1.66
	40	12.5	29	50	0.3	1.33
	50	15	34	61	0.24	1.06
	63	16	38	72	0.19	0.84

Table 40

Type	Rated trip In	Max $Z_s$ (ohms)	
		0.4 secs	5 secs
H125 fixed mag. trip	16	0.2	1.9
	20	0.2	1.5
	25	0.2	1.2
	32	0.2	0.94
	40	0.2	0.75
	50	0.2	0.6
	63	0.2	0.48
	80	0.2	0.38
	100	0.2	0.3
	125	0.2	0.24
H 250 mag. trip set to max	160	0.125	0.125
	200	0.10	0.10
	250	0.08	0.08
H 250 mag. trip set to min	160	0.25	0.25
	200	0.20	0.20
	250	0.16	0.16
H 400 mag. trip set to max	320	0.06	0.06
	400	0.05	0.05
H 400 mag. trip set to min	320	0.13	0.13
	400	0.10	0.10
H 800 mag. set to max	500	0.05	0.05
	630	0.03	0.03
	800	0.03	0.03
H 800 mag. trip set to min	500	0.10	0.10
	630	0.06	0.06
	800	0.05	0.05

Table 41

These values have been calculated using the formula  $Z_s = U_{oc}/I_a$  taken from appendix 3 of BS EN7671: 1992, taking into account the 20% tolerance stated in section 8.3.3.1.2 of BS EN 60947-2.  $U_{oc}$  is the open circuit voltage of the REC transformer taken at 240V.  $I_a$  is the current causing operation of the protective device within the specified time. Calculate from  $I_m \times 1.2$ .

Full table as Apps guide (Table 27)

### Single module RCBO characteristics

- Single pole overcurrent protection
- Single pole switching (solid neutral)
- Positive contact indication
- Neutral lead - 700mm long

Current rating	Ambient temperature (°C)						
	30°C	35°C	40°C	45°C	50°C	55°C	60°C
6A	6	5.9	5.8	5.7	5.6	5.5	5.4
10A	10	9.8	9.7	9.5	9.3	9.2	9.0
16A	16	15.7	15.5	15.2	14.9	14.7	14.4
20A	20	19.7	19.3	19.0	18.7	18.3	18.0
25A	25	24.6	24.2	23.8	23.3	22.9	22.5
32A	32	31.5	30.9	30.4	29.9	29.3	28.8
40A	40	39.3	38.6	38.0	37.3	36.6	36.0
45A	45	44.2	43.5	42.8	42.0	41.2	40.5
50A	50	49.2	48.3	47.5	46.7	45.8	45.0

### Technical specification

Standard / approvals:	BS EN61009 Type tested KEMA up to 50A ASTA up to 40A
Nominal voltage:	127/230VAC (-6% +10%)
Frequency:	50/60Hz
Sensitivity:	10mA / 30mA - AC
Breaking capacity:	6kA or 10kA (on request)
Temperature:	Working -50°C to + 40°C Storage -50°C to + 80°C
Mechanism:	Trip free
Endurance:	Electrical - 4000 Mechanical - 20000

### Fuse carriers – characteristics

Designation	Characteristics	Width in 17.5mm	Colour code	Cat Ref.	HRC Cartridge Fuses
Fuse carriers for BS 1361 fuses	5A-230V	1	White	L113	<p>time/current characteristics for HRC fuse links BS 1361 : 1971 : 5, 15, 20, 30 A</p>
	15A-230V	1	Blue	L115	
	20A-230V	1	Yellow	L116	
	30A-230V	1	Red	L118	
for BS 88 fuses	32A-maxi-400V	1	-	L50145	
Accessories (HRC cartridge fuses)	A x B x C (mm)				
	5A : 23 x 6.35 x 4.8		White	L153	
	15A : 26 x 10.32 x 6.4		Blue	L155	
	20A : 26 x 10.32 x 6.4		Yellow	L156	
	30A : 29 x 12.70 x 8.0		Red	L158	
Fuse links to BS 88	2A : 29 x 12.70 x 8.0			L171	
	4A : 29 x 12.70 x 8.0			L172	
	6A : 29 x 12.70 x 8.0			L173	
	8A : 29 x 12.70 x 8.0			L174	
	10A : 29 x 12.70 x 8.0			L175	
	16A : 29 x 12.70 x 8.0			L176	
	20A : 29 x 12.70 x 8.0			L177	
	25A : 29 x 12.70 x 8.0			L178	
	32A : 29 x 12.70 x 8.0			L179	

### Connection capacity:

- Top: 16□ Rigid conductor
- Bottom: 10□ Flexible conductor or busbar

Table 42

### Residual current devices

A residual current device (RCCB) is the generic term for a device which simultaneously performs the functions of detection of the residual current, comparison of this value with the rated residual operating value and opening the protected circuit when the residual current exceeds this value.

For fixed domestic installations and similar applications we have two types:

- Residual current operated circuit-breaker without integral over-current protection (RCCB's) which should comply with the requirements of BS EN 61008
- Residual current operated circuit-breaker with integral over-current protection (RCBO's) which should comply with the requirements of BS EN 61009

Both RCCB's and RCBO's are further divided into types depending on their operating function :-

Type AC For which tripping is ensured for residual sinusoidal alternating currents, whether suddenly applied or slowly rising. Marked with the symbol.



Type A For which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether suddenly applied or slowly rising. Marked with the symbol.



Type S For selectivity, with time-delay. Marked with the symbol.



RCCB's must be protected against short-circuits by means of circuit-breakers or fuses. RCBO's have their own in built short-circuit protection, up to it's rated value.

The drawing opposite shows how a toroid is located around the line and neutral conductors to measure the magnetic fields created by the current flowing in these conductors. The sum of the magnetic fields set up by these currents (which takes into consideration both the magnitude and phase relationship of the currents) is detected by the toroid.

In a normal healthy circuit the vector sum of the current values added together will be zero. Current flowing to earth, due to a line earth fault, will return via the earth conductor, and regardless of load conditions will register as a fault. This current flow will give rise to a residual current ( $I_{res}$ ) which will be detected by the device.

It is most important that the line and neutral conductors are passed through the toroid. A common cause of nuisance operation is the failure to connect the neutral through the device.

RCCBs work just as well on three phase or three phase and neutral circuits, but when the neutral is distributed it must pass through the toroid.

RCCBs are not suitable for use on dc systems and unearthed networks.

### RCCBs – domestic installation

RCCBs can be installed in two ways:

1. Whole house protection.
2. Selective protection.

Whole house protection is provided typically by a consumer unit where the RCCB device serves as the main switch. Although very popular this suffers from a disadvantage: all circuits are disconnected in the event of fault. Selective protection can be provided by associating the RCCB with identified high risk circuits by adopting one or more of the following:

### Principle

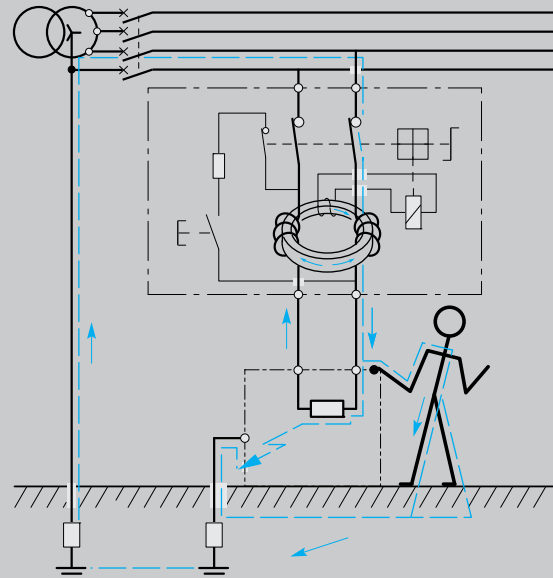


Fig 28

Current flowing through toroid in healthy circuit

$$I_{res} = I_1 - I_2 = 0$$

Current flowing through toroid in circuit with earth fault  $I_3$

$$I_{res} = I_1 - I_2 + I_3 = I_3$$

- Split busbar consumer unit:

All circuits are fed via an overall isolator and selected circuits fed additionally via the RCCB. Typical circuits fed direct are lighting, freezer, storage heating; and circuits fed via the RCCB are socket outlets, garage circuits. This concept minimises inconvenience in the event of fault.

### Individual RCBO

each separate final circuit requiring protection by a RCD can be supplied through an RCBO. This method provides the best solution for minimising inconvenience.

### Nuisance Tripping

All Hager RCCBs incorporate a filtering device preventing the risk of nuisance tripping due to transient voltages (lightning, line disturbances on other equipment...) and transient currents (from high capacitive circuit).

### Pulsating DC Fault Current Sensitive

Increasingly, semi-conductors are also extensively used in computers, VDUs, printers, plotters... all of which may be fed from the mains electrical supply. The presence of semi-conductors may result in the normal sinusoidal ac waveform being modified. For example, the waveform may be rectified or, as in asymmetric phase control devices, the waveform may be chopped. The resulting waveforms are said to have a pulsating dc component.

In the event of an earth fault occurring in equipment containing semi-conductor devices, there is a probability that the earth fault current will contain a pulsating dc component.

Standard type AC may not respond to this type of earth fault current and the intended degree of protection will not be provided.

### Use of RCCBs

**RCCBs** offer excellent protection against earth fault currents; the main areas of application being as follows:

- **$Z_s$  value too high to allow disconnection in the required time**

Where the overcurrent protection or a circuit breaker cannot provide disconnection within the specified time because the earth fault loop impedance is too high the addition of RCCB protection may well solve the problem without any other change in the system. Because of its high sensitivity to earth fault current and its rapid operating time, in most cases the RCCB will ensure disconnection within the specified time. This is achieved without any detriment to overcurrent discrimination because, unlike the situation in a fuse based system, the increased sensitivity is obtained without increasing sensitivity to overcurrent faults. Use of RCCBs in this way can be particularly useful for construction sites and bathrooms where disconnection times are more stringent than for standard installations. (Construction sites - 0.2s at 220-277V, bathrooms - 0.4s).

The limitation to this technique is the requirement that the rated residual operating current multiplied by  $Z_s$  should not exceed 50V. This is to avoid the danger of exposed conductive parts reaching an unacceptably high voltage level.

Residual current protection can even be added to a completed distribution system where the value of  $Z_s$  is excessive, either because of a design oversight or subsequent wiring modification.

- **Protection against shock by direct contact**

So far we have considered shock by indirect contact only. Direct contact is defined thus:

**Direct contact** - contact of persons or livestock with live parts which may result in electric shock. The consideration here is not the hazard of parts becoming live as a result of a fault but the possibility of touching circuit conductors which are intentionally live.

RCCBs, although affording good protection against the potentially lethal effects of electric shock, must not be used as the sole means of protection against shock by direct contact. The Electricity at Work Act recommends the use of RCCBs, "...danger may be reduced by the use of a residual current device but states that this should be "...considered as a second line of defence". The Wiring Regulations defines the other measures that should be taken i.e.

- Insulation of live parts.
- Barriers or enclosures.
- Obstacles.
- Placing live parts out of reach.

Additionally an RCCB used for this purpose should have:

- A sensitivity of 30mA
- An operating time not exceeding 40mS at a residual current of 150mA.

The specified sensitivity is based on research that has been carried out to estimate the effect various levels and duration of current can have on the human body. This experience is summarised in a graph shown in 'IEC 479-1: Effects of current passing through the human body'. A simplified version of this graph is shown opposite. It shows that very small currents can be tolerated for reasonably long periods and moderate currents for very short periods. It can be seen, for instance, that 100mA for 100mS or 20mA for 500mS will not normally cause any harmful effect. 200mA for 200mS or 50mA for 500mS which are in Zone 3, would be more dangerous; and shock levels in Zone 4 carry a risk of lethal consequences.

The tripping characteristic for a 30mA RCCB is also shown in the graph. It shows the level of current required to cause the RCCB to trip, for example; 50mA will cause a trip but not 10mA. Comparing its characteristic with the various zones on the graph it can be seen that the 30mA RCCB gives a very good measure of protection against the hazards associated with electric shock. Where a higher level of protection is required, for example in laboratories, 10mA devices are available.

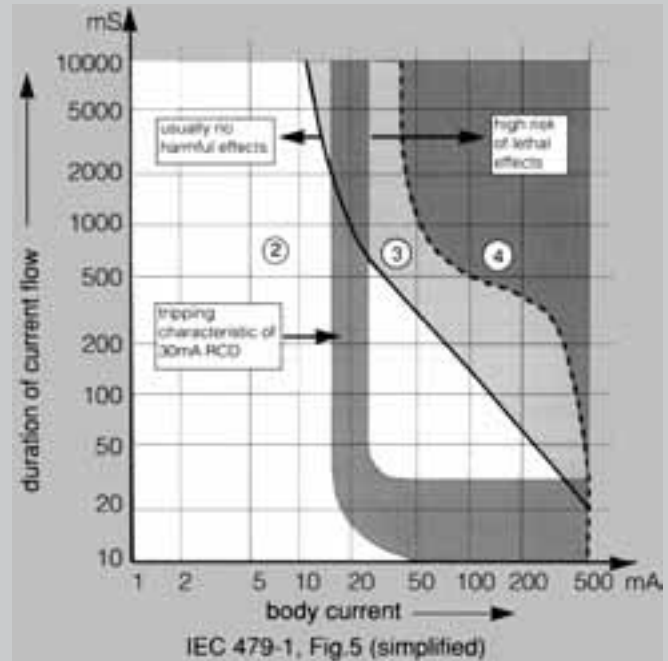


Fig 29

**Note:**

Although RCCBs are extremely effective devices they must never be used as the only method of protection against electric shock. With or without RCCB protection all electrical equipment should be kept in good condition and should never be worked on live.

### • Protection against shock outside the equipotential bonding zone

Bonding conductors are used in an installation to maintain metallic parts, as near as possible, to the same potential as earth. Working with portable equipment outside this equipotential bonding zone, e.g. in the car park of a factory, introduces additional shock hazards. Socket outlets rated 32A or less 'which may be reasonably expected to supply portable equipment for use outdoors' be equipped with 30mA RCCB protection unless fed from an isolating transformer or similar device, or fed from a reduced voltage.

### • Protection in special locations

The use of RCCBs is obligatory or recommended in the following situations:

- Caravans: 30mA RCCBs should be used.
- TT systems.
- Swimming pools: 30mA RCCB for socket outlets in Zone B obligatory; recommended in Zone C.
- Agricultural and horticultural: 30mA RCCB for socket outlets and for the purpose of protection against fire,  $RCCB \leq 0.5A$  sensitivity.
- Construction sites: 30mA RCCB recommended.

### • Portable equipment

With the exception mentioned above, where a socket is specifically designated for work outside the equipotential bonding zone, the Wiring Regulations demand the use of RCCBs to protect the users of portable equipment. It is widely recognised that their use has made a significant contribution to safety in the workplace and the home.

### • Protection against fire hazards

The provisions in the Wiring Regulations for protection against shock by indirect contact ensure rapid disconnection under earth fault assuming the fault has negligible impedance. Under such conditions the fault current, as we have seen, is sufficiently great to cause the overcurrent protection device to quickly disconnect the fault. However high impedance faults can arise where the fault current is sufficient to cause considerable local heat without being high enough to cause tripping of the overcurrent protective device. The heat generated at the point of the fault may initiate a fire long before the fault has deteriorated into a low impedance connection to earth.

The provision of residual current protection throughout a system or in vulnerable parts of a system will greatly reduce the hazard of fire caused by such faults.

### • PEN conductors

The use of RCCBs with PEN conductors is prohibited. A PEN conductor is a single conductor combining the functions of neutral conductor and protective conductor. This being so, when the PEN conductor is taken through the torroid of an RCCB, earth faults will go undetected because the return path for the earth fault current is included in the residual sum.

### • Auxiliary contacts

A range of auxiliaries, alarm and shunt contacts are available for Hager RCCBs.

### • Supply entry

Top or bottom feed.

### CB/RCCB co-ordination

RCCB	Short circuit current capacity of the RCCB only	MTN 6-63A B	With MCB's		
			NBN 6-63A B	NCN 6-63A C	NDN 6-63A D
2 poles					
16A	1500A	6kA	10kA	10kA	6kA
25A	1500A	6kA	10kA	10kA	6kA
40A	1500A	6kA	10kA	10kA	6kA
63A	1500A	6kA	10kA	10kA	6kA
80A	1500A	6kA	10kA	10kA	6kA
100A	1500A	6kA	10kA	10kA	6kA
4 poles					
16A	1500A	6kA	6kA	6kA	4.5kA
25A	1500A	6kA	6kA	6kA	4.5kA
40A	1500A	6kA	6kA	6kA	4.5kA
63A	1500A	6kA	6kA	6kA	4.5kA
80A	1500A	6kA	6kA	6kA	4.5kA
100A	1500A	6kA	6kA	6kA	4.5kA

Table 43

RCCB	Short circuit current capacity of the RCCB only	With BS 1361 fuses			With BS 88 fuse		
		60A	80A	100A	60A	80A	100A
2P							
16A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
25A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
40A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
63A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
80A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
100A	1500kA	13kA	6kA	3.5kA	11kA	5kA	5kA
4P							
16A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
25A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
40A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
63A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
80A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA
100A	1500A	13kA	6kA	3.5kA	11kA	5kA	3kA

Table 44

### RCCB Add-Ons

3 sensitivities 30mA, 100mA & 300mA instantaneous.  
2 sensitivities 100mA & 300mA time delayed.  
RCCB add-ons can be associated with devices rated from 0.5 to 63A in 2 and 4 poles.

### Wiring Diagram

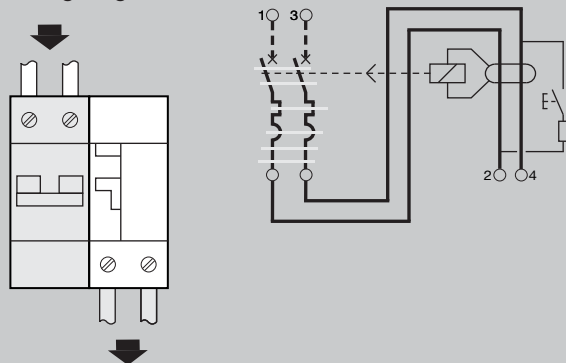


Fig 30

### Connection capacity


63A = 16mm<sup>2</sup>

63A = 25mm<sup>2</sup>

### Characteristics

Easy coupling (drawer system)  
Easy disassembly (without damage)  
Conforms to EN61009 Appendix G

### MCB & RCCB add-on association chart

	In	2 Pole			4 Pole		
		≤63A			≤63A		
<b>Sensitivity</b>		30mA	100mA	300mA	30mA	100mA	300mA
<b>Cat Ref. (standard)</b>		<b>BD264</b>	<b>BE264</b>	<b>BF264</b>	<b>BD464</b>	<b>BE464</b>	<b>BF464</b>
<b>Cat Ref. (time delayed)</b>			<b>BN264</b>	<b>BP264</b>		<b>BN464</b>	<b>BP464</b>
<b>MCB suitability</b>							
<b>NBN</b>		6-63A	6-63A	6-63A	6-63A	6-63A	6-63A
<b>NCN</b>		0.5-63A	0.5-63A	0.5-63A	0.5-63A	0.5-63A	0.5-63A
<b>NDN</b>		0.5-63A	0.5-63A	0.5-63A	0.5-63A	0.5-63A	0.5-63A
<b>Width when combined with MCB</b>			4 module 70mm				7 module 122.5mm

Table 45

### Mounting

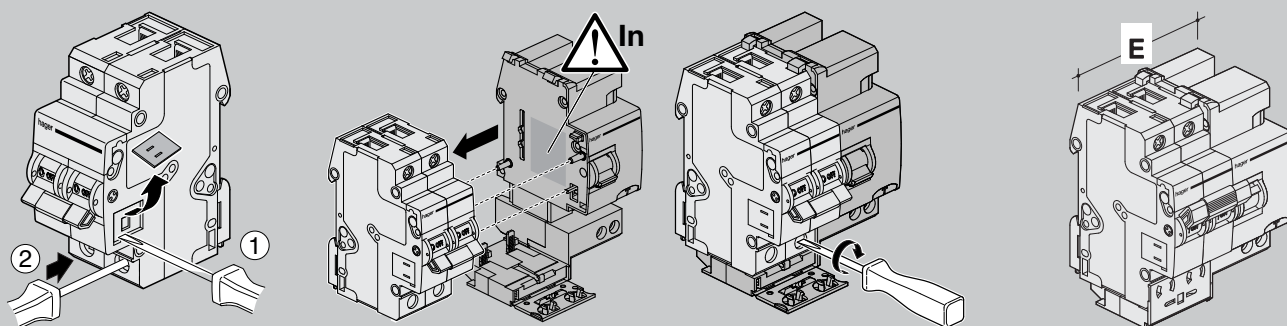


Fig 31



### Technical specifications

		Non-Adjustable		Adjustable						
		HR400	HR402	HR403	HR410	HR411	HR420	HR425	HR440	HR441
Supply voltage ~50/60HZ		220-240V								
Residual voltage ~50/60Hz		500V Maximum								
Power Absorbed		3VA		5VA						
Output		Volt free contacts								
Contact Rating		6A / 250V AC-1								
Sensitivity IΔn		0.03A / 0.1A / 0.3A / 1A / 3A / 10A								0.03A / 0.1A / 0.3A / 0.5A / 1A / 3A / 10A
Instantaneous / Time Delay		Instantaneous			Instantaneous or time delay 0.13s / 0.3s / 1s / 3s			Instantaneous or time delay 0s / 0.1s / 0.3s / 0.45s / 0.5s		Instantaneous or time dealy 0s / 0.1s / 0.3s / 0.5s / 0.75s / 1s
Torroid Withstand Capacity		50kA / 0.2s								
Distance between torroid and relay		50 Meter Maximum								
Relay cable connection										
- Rigid		1.5□ to 10□								
- Flexible		1□ to 6□								
Torroid cable connection										
- Rigid		1.5□ to 4□								
- Flexible		1□ to 2.5□								
Relay	Working temperature	-10°C to +55°C		-5°C to +55°C						
	Storage temperature	-25°C to +40°C		-25°C to +40°C						
Torroid	Working temperature	-10°C to +70°C		-10°C to +70°C						
	Storage temperature	-40°C to +70°C		-40°C to +70°C						

Table 46

### Main Characteristics

#### "Reset" Button

When pressed, the output remains switched and return to normal is obtained by either: by pressing the "reset" clear pushbutton or cutting off the power supply. If the "reset" button is not pressed the device remains in the fault position.

#### Test Button

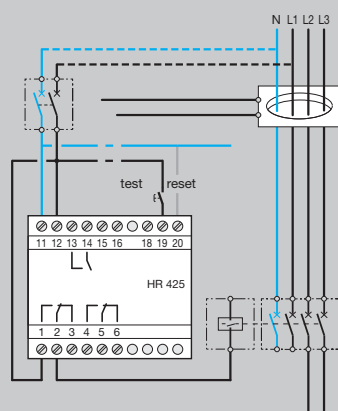
Pressing the test button allows a fault simulation which operates the relay and the output contacts. The fault level display is shown by an LED on the front of the product.

#### I $\Delta$ n selector

Sensitivity setting: 0.03A instantaneous  
0.1A/0.3A/1A and 3A time delay

#### Time delay selector

Adjustable time setting - instantaneous / 0.13s / 0.3s / 1s and 3s



### Sealable settings

A sealable cover prevents interference once the settings have been made.

#### Standard output (1 C/O contact)

Switching to state 1 on:

- Failure of the core/relay connection
- Fault current in the monitored installation

#### Positive safety outlet (1 C/O contact)

Switching to state 1: Switching on the power

Switching to state 0: Failure of the core/relay connection  
fault current in the monitored installation  
failure of relay supply  
internal failure of relay

Optical scale display by 5 LEDs of the fault in % of I $\Delta$ n

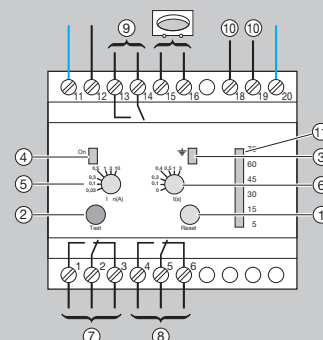
Optical scale display by (5 LEDs) of the fault in % of I $\Delta$ n

Common pin 6:

State 1 : output terminal 8

State 0 : output terminal 4

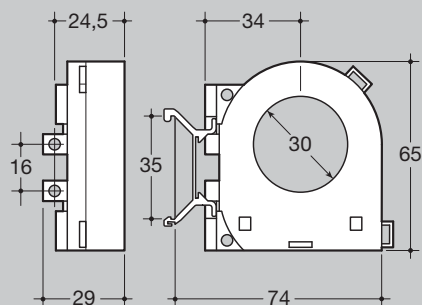
1. Reset push button
2. Test push button
3. Fault signal LED
4. Device on indicator
5. Sensitivity setting
6. Time delay setting
7. Standard output
8. Safety output
9. Prealarm output
10. Remote reset
11. Optical scale





## Torroids for Earth Fault Relays

### Circular Torroids HR800



### Circular Torroids

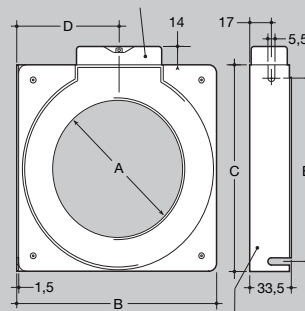


Fig 33

Reference	Type	Dimensions (mm)				
		A	B	C	D	E
HR801	Ø 35	35	92	86	43.5	74
HR802	Ø 70	70	115	118	60.5	97
HR803	Ø 105	105	158	162.5	84.5	140
HR804	Ø 140	140	218	200	103.5	183
HR805	Ø 210	210	290	295	150	265

Table 47

### Rectangular Torroids

Reference	Type	Dimensions (mm)								
		A1	A2	B	C	D	E	F	G	H
HR830	70x175	70	175	176	260	85	225	22	40	7.5
HR831	115x305	115	305	239	400	116	360	25	50	8.5
HR832	150x350	150	350	284	460	140	415	28	50	8.5

Table 48

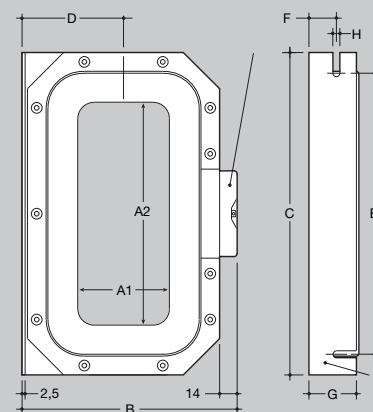
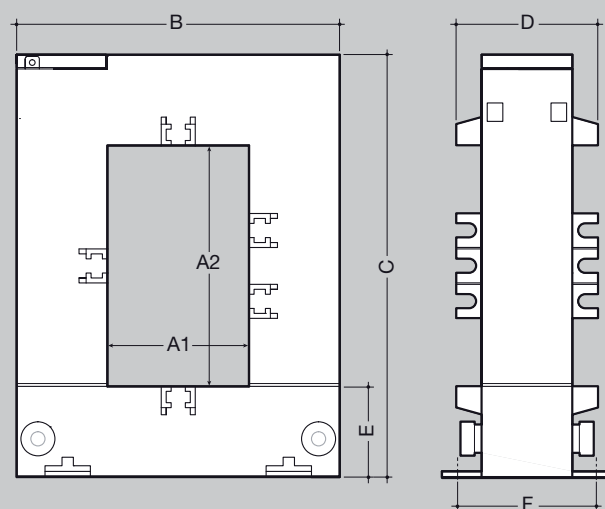


Fig 34

### Rectangular Torroids

Reference	A1	A2	B	C	D	E	F
HR820	20	30	89	110	41	32	46
HR821	50	80	114	145	50	32	46
HR822	80	80	145	145	50	32	46
HR823	80	121	145	185	50	32	46
HR824	80	161	184	244	70	37	46



# Torroids for Earth Fault Relays

## Mounting of Circular Torroids

With Cables ►

U 1000 R2V  
Single pole



U 1000 R2V  
Single pole



U 1000 R2V  
Multi pole



U 1000 R2V  
multi pole



U 1000 R2V  
multi pole



H07 V - U  
single pole



H07 V - U  
single pole



Type of Torroid ▼  
Ø

30	HR800	4 x 16□	2 x 50□	35□	35□	50□	4 x 35□	2 x 70□
35	HR801	4 x 25□	2 x 70□	50□	35□	70□	4 x 50□	2 x 95□
70	HR802	4 x 185□	2 x 400□ or 4 x 150□	240□	35□	300□	4 x 240□	2 x 400□ or 4 x 185□
105	HR803	4 x 500□	2 x 630□ or 4 x 185□	300□	35□	300□	4 x 400□	2 x 400□ or 4 x 240□
140	HR804	4 x 630□	2 x 630□ or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400□ or 4 x 240□
210	HR805	4 x 630□	2 x 630□ or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400□ or 4 x 240□
70 x 175	HR830	4 x 630□	2 x 630□ or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400□ or 4 x 240□
115 x 305	HR831	4 x 630□	2 x 630□ or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400□ or 4 x 240□
150 x 350	HR832	4 x 630□	2 x 630□ or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400□ or 4 x 240□
20 x 30	HR820	4 x 16□	2 x 70□	10□	35□	16□	4 x 10□	2 x 35□
50 x 80	HR821	4 x 240□	2 x 630 or 4 x 185□	120□	35□	150□	4 x 185□	2 x 240□
80 x 80	HR822	4 x 500□	2 x 630 or 4 x 185□	300□	35□	300□	4 x 400□	2 x 400 or 4 x 240□
80 x 120	HR823	4 x 630□	2 x 630 or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400 or 4 x 240□
80 x 160	HR824	4 x 630□	2 x 630 or 4 x 240□	300□	35□	300□	4 x 400□	2 x 400 or 4 x 240□

Typical RCCB Time/Current Characteristics

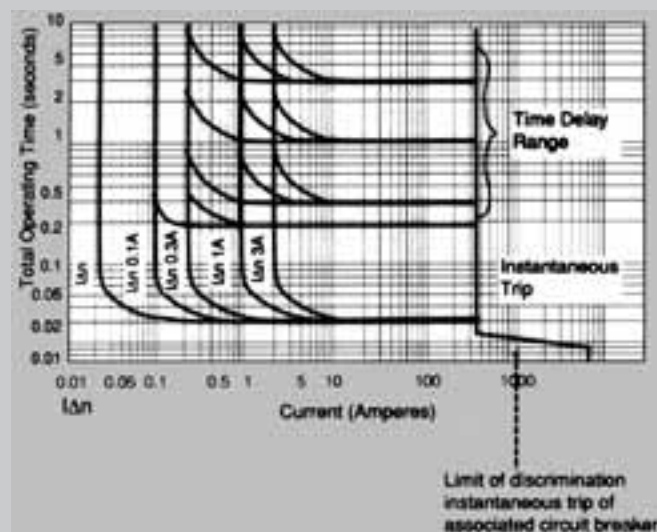


Fig 36

### Discrimination between Circuit Breakers with add on RCCBs

Having decided on the type and the limit of discrimination of the circuit breakers in the system, it is very important to consider the discrimination between any add on RCCBs. In theory it is possible to achieve current discrimination between RCCBs but the limit of discrimination is too low for practical purposes. Time discrimination is by far the best method and is achieved by delaying the tripping of the upstream RCCB, See Fig 36, which shows the RCCB characteristics for both instantaneous and time delayed.

Note that the limit of discrimination is the instantaneous setting of the associated circuit breaker. In other words if the earth fault current is greater than the instantaneous trip setting of the associated circuit breaker, the circuit breaker will trip regardless of the time delay on the RCCB. Table 49 indicates how time discrimination may be achieved between RCCBs.

Discrimination between Residual Current Devices

		Up-stream residual current device																	
		Up-stream RCCB sensitivity IΔn	0.01A	0.03A	0.1A	0.3A					1.0A				3.0A				
Down-stream Residual Current Device	Downstream RCCB Sensitivity IΔn	Time Delay Secs	0	0	0	0.2	0	0.2	0.3	1.0	3.0	0	0.3	1.0	3.0	0	0.3	1.0	3.0
	0.01A	0																	
	0.03A	0																	
	0.1A	0																	
		0.2																	
	0.3A	0																	
		0.2																	
		0.3																	
		1.0																	
		3.0																	
	1.0A	0																	
		0.3																	
		2.0																	
		3.0																	
	3.0A	0																	
		0.3																	
		1.0																	
		3.0																	

Table 49

Discrimination achieved

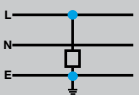
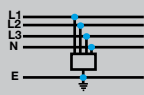
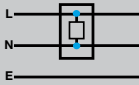
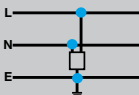
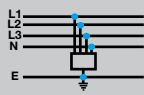
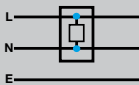
	Class II - overvoltage protection					
	High	Medium				Fine
Reference	SPN140D	SPN215D	SPN215R	SPN415D	SPN415R	SPN208S
Installation exposure level (risk)	High	Medium	Medium	Medium	Medium	Low
Installation of SPD	Parallel	Parallel	Parallel	Parallel	Parallel	Series
Number of poles	1P	1P+N	1P+N	3P&N	3P&N	1P+N
Number of Modules	1	2	2	4	4	2
Nominal current	-	-	-	-	-	-
Nominal Voltage Un (V)	230	230	230	400	400	230/400
Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60
Max. continuous operating Voltage Uc (V)						
common mode -	275	275	275	275	275	440
differential mode -						255
Voltage protection level Up (kV)						
common mode -	1.2	1.0	1.0	1.0	1.0	1.2
differential mode -						1.0
Discharge current wave 8/20us (kA)						
Nominal current In	15	5	5	5	5	2
Maximum current I <sub>max</sub>	40	15	15	15	15	8
Operating temperature range	-40/+60	-40/+60	-40/+60	-40/+60	-40/+60	-40/+60
Storage temperature range	-40/+70	-40/+70	-40/+70	-40/+70	-40/+70	-40/+70
Short circuit withstand with max. backup fuse or MCB	20kA	10kA	10kA	10kA	10kA	6kA
Max. backup fuse	25A	10A	10A	10A	10A	25A
Backup MCB (C curve)	25A	25A	25A	25A	25A	25A
End of life indication (fault indication)						
1. three stage indication-green, green/red, red (R versions)	Yes	N/A	Yes	N/A	Yes	N/A
2. Basic indication - green/red (D versions)	N/A	Yes	N/A	Yes	N/A	N/A
3. Green LED is on when SPD is working	N/A	N/A	N/A	N/A	N/A	Yes
Applications						
industrial & commercial buildings	Yes	Yes	Yes	Yes	Yes	Yes
domestic buildings	Yes	Yes	Yes	Yes	Yes	Yes
Connection capacity	2.5/35 mm <sup>2</sup>	2.5/25 mm <sup>2</sup>	2.5/25 mm <sup>2</sup>	2.5/25 mm <sup>2</sup>	2.5/25 mm <sup>2</sup>	2.5/10 mm <sup>2</sup>
Connection capacity for the auxiliary contact	N/A	N/A	0.5/1.5 mm <sup>2</sup>	N/A	0.5/1.5 mm <sup>2</sup>	N/A
Auxiliary contact	N/A	N/A	230V/0.5A	N/A	230V/0.5A	N/A
Voltage/nominal current			12Vdc 10mA		12Vdc 10mA	

Table 50

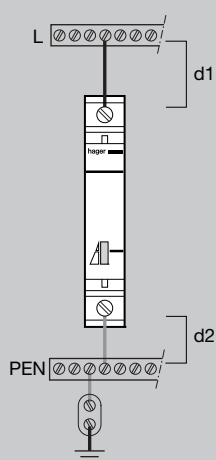
I <sub>max</sub>	The maximum value of current that the SPD can withstand and remain operational.
I <sub>n</sub>	The nominal value of current that the SPD can withstand at least 20 times and still be serviceable.
U <sub>p</sub>	The residual voltage that is measured across the terminal of the SPD when I <sub>n</sub> is applied.
U <sub>c</sub>	The maximum voltage which may be continuously applied to the SPD without conducting.
U <sub>oc</sub>	Open circuit voltage under test conditions.
I <sub>sc</sub>	Short circuit current under test conditions.
U <sub>n</sub>	The nominal rated voltage of the installation
MOV	Metal Oxide Varistor
SPD	Surge Protective Device.

How to choose your surge protection device

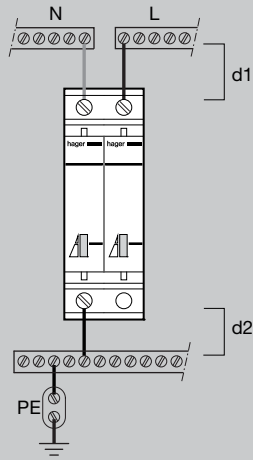
The choice of surge protection device depends on your supply arrangements and level of protection required

Earthing system	Type of protection	Connection	Products to be used in a Single phase installation	Three phase installation
TN-C TN-C-S (P-M-E)	Transient voltage surges (8/20ms)	Class II main protection $I_{max} = 40kA$ or $15kA$ (depending on selection)	SPN140D 	1 x SPN415D / SPN415R 
		Class II fine protection $U_p < 1kV$	SPN208S 	
TN-S TT	Transient voltage surges (8/20ms)	Class II main protection $I_{max} = 15kA$ $I_{max} = 15kA$	SPN215D/SP215R 	1 x SPN415D/SPN415R 
		Class II fine protection $U_p < 1kV$	SPN208S 	

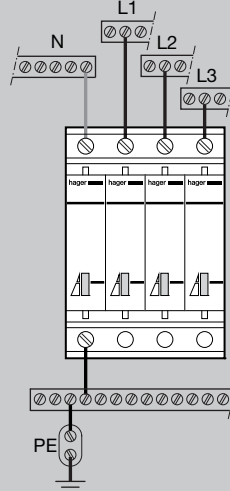
### Connections



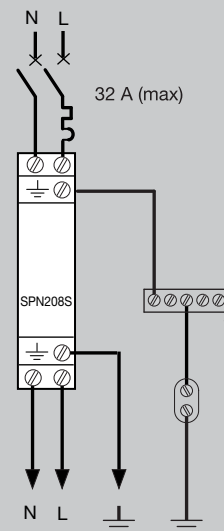
SPN140D



SPN215D/R



SPN415D/R



SPN208S

Fig 43

### Technical Specifications

#### Electrical Characteristics

- Electrical supply: 230V/400V~
- Ambient temperature range:  
-25°C to +55°C
- Working life: 100,000 operations AC-3
- Maximum of 40 operations/hour
- Tropicalized for all climates
- Connection with clamp type, terminals connection capacity:  
Flexible : 1 to 4N  
Rigid : 1.5 to 6N

### Electrical Connection Single Phase

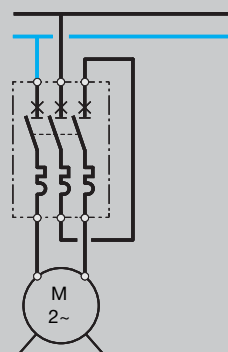


Fig 41

### Time / Current Characteristics

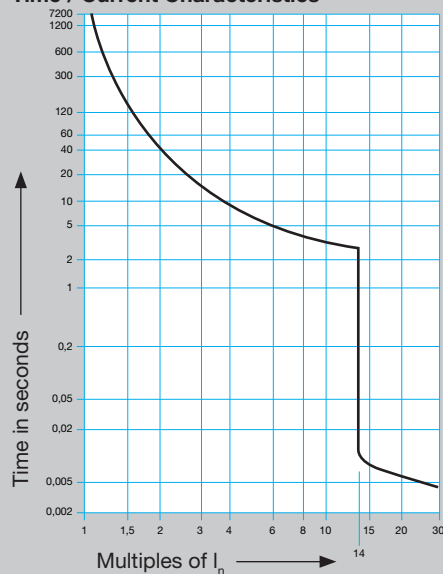


Fig 42

	230V	400V	230V / 400V a Mgl
MM 501N	100kA	100kA	100kA
MM 502N			
MM 503N			
MM 504N			
MM 505N			
MM 506N			
MM 507N			
MM 508N			
MM 509N			
MM 510N			
MM 511N	16kA	16kA	50kA
MM 512N			
MM 513N			

Table 52

Nominal breaking capacity  $\geq$  short circuit current: fuses are not necessary, if nominal breaking capacity  $<$  short circuit current: fuses must be used, breaking capacity of association is 80kA (with BS 88 fuses).

### Under voltage release (no volt coil)

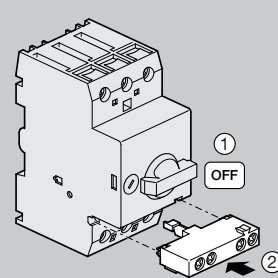
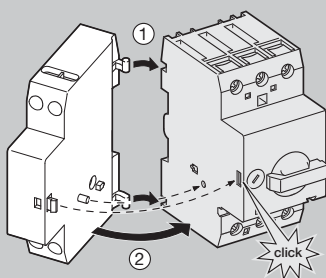
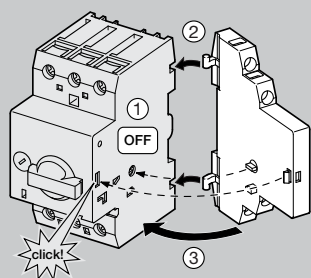
**MZ528**      **MZ529**  
230V~      400V~

### Auxiliary contacts (Mounted inside starter)

**MZ520**  
2A – 400V~  
3.5A – 230V~

### Alarm contact (Mounted under starter)

**MZ527**  
2A – 400V~  
1A – 230V~



## Modular Devices - Indicators and Push Buttons

The new range of indicator lights and push buttons replaces and expands upon the whole SV range and is composed of the following three families

- Indicator Lights in various colours such as red, green, orange, blue and clear.
- Push Buttons in various contact types (NO, NC, NO+NC in 1 or 2 poles) and buttons (latching or impulse).
- Indicator Lights and Push Buttons, an association of the above two solutions.



New LED technology provides longer life.



Updated and modernised appearance.



Integrated label holder.





Switch disconnecter	4.2
2 way / centre-off changeover modular switches	4.3
Latching relays	4.4
Relays	4.5
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Thermostats	4.20
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kiloWatt hour meters	4.25
Hours counter	4.27

# Switch Disconnecter

## Description

For use as a switch disconnector in all types of circuit. Complies with: BS EN 60 947-3 all ratings

## Technical Data

Utilisation Category  
AC22B

## In : 25, 32A

Shrouded cable clamps  
Connection capacity:  
10mm<sup>2</sup> - Rigid conductor  
6mm<sup>2</sup> - Flexible conductor

## In : 40, 63, 80A

Cable clamps  
Connection capacity:  
25mm<sup>2</sup> - Rigid conductor  
16mm<sup>2</sup> - Flexible conductor

## In : 100A

Cable clamps  
Connection capacity:  
50mm<sup>2</sup> - Rigid conductor  
35mm<sup>2</sup> - Flexible conductor

All switches have a green / red indication on the handle giving positive contact indication.



SB140



SB232



SB140

Designation	Characteristics	Width in 17.5mm	Pack qty	Cat Ref.
Single Pole	1 x 25A 250V~	1	12	<b>SB125</b>
	1 x 25A 250V~ with pilot light	1	1	<b>SB125V</b>
	1 x 32A 250V~	1	12	<b>SB132</b>
	1 x 32A 250V~ with pilot light	1	1	<b>SB132V</b>
	1 x 40A 250V~	1	12	<b>SB140</b>
	1 x 63A 250V~	1	12	<b>SB163</b>
	1 x 80A 250V~	1	12	<b>SB180</b>
	1 x 100A 250V~	1	6	<b>SB199</b>
Double Pole	2 x 25A 250V~	1	1	<b>SB225</b>
	2 x 25A 250V~ with pilot light	1	1	<b>SB225V</b>
	2 x 32A 250V~	1	1	<b>SB232</b>
	2 x 32A 250V~ with pilot light	1	1	<b>SB232V</b>
	2 x 40A 250V~	2	1	<b>SB240</b>
	2 x 63A 250V~	2	1	<b>SB263</b>
	2 x 80A 250V~	2	1	<b>SB280</b>
	2 x 100A 250V~	2	1	<b>SB299</b>
Triple Pole	3 x 25A 400V~	2	1	<b>SB325</b>
	3 x 32A 400V~	2	1	<b>SB332</b>
	3 x 40A 400V~	3	1	<b>SB340</b>
	3 x 63A 400V~	3	1	<b>SB363</b>
	3 x 80A 400V~	3	1	<b>SB380</b>
	3 x 100A 400V~	3	1	<b>SB399</b>
Four Pole with Indicator	4 x 25A 400V~	2	1	<b>SB425F</b>
	4 x 32A 400V~	2	1	<b>SB432F</b>
	4 x 40A 400V~	4	1	<b>SB440F</b>
	4 x 63A 400V~	4	1	<b>SB463F</b>
	4 x 80A 400V~	4	1	<b>SB480F</b>
	4 x 100A 400V~	4	1	<b>SB499F</b>
Locking device			1	<b>MZN175</b>

## 2 way / Centre-off Changeover Modular Switches



SF118F

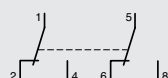
Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Switches, 2 ways Single pole</b>	1 x 25A 250V~	1	12	<b>SF118F</b>



<b>1 x N/O 1 x N/C Double pole</b>	2 x 25A 250V~	1	12	<b>SF115</b>
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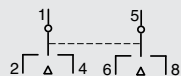
<b>Changeover Double pole</b>	2 x 25A 250V~	2	6	<b>SF218F</b>
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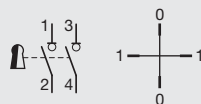
<b>Switches, Centre-off changeover Single pole</b>	1 x 25A 250V~	1	12	<b>SF119F</b>
--	---------------	---	----	---------------



<b>Double pole</b>	2 x 25A 250V~	2	6	<b>SF219F</b>
--------------------	---------------	---	---	---------------



<b>Lockable rotary switch on off (4 positions)</b>	10A 400Vac	3	1	<b>SK606</b>
--	------------	---	---	--------------



SK606

## Latching Relays

### Description

Latching relays - operate when impulsed by a signal voltage. The impulse can be provided via a pushbutton or pushswitch. The first pulse operates the relay and latches it into its set (opposite) state, the next operation of the pushbutton returns the relay into its reset (original) state.

### Auxiliary contacts (EPN050, EPN051)

Are available for remote signalling and centralised control applications and can be easily combined with the latching relays.  
connection: 10mm<sup>2</sup> flexible  
6mm<sup>2</sup> rigid



EPN510



EPN540

Designation	Type	Coil	Power circuit AC1	Width in 17.5mm	Pack qty.	Cat Ref.
Latching relays	1 NO	230V 50 Hz	16A - 250V~	1	12	<b>EPN510</b>
		24V 50 Hz	16A - 250V~	1	1	<b>EPN513</b>
	2 NO	230V 50 Hz	16A - 250V~	1	1	<b>EPN520</b>
		24V 50 Hz	16A - 250V~	1	1	<b>EPN524</b>
		12V 50Hz	16A - 250V	1	1	<b>EPN521</b>
	1 NC + 1 NO	230V 50 Hz	16A - 250V~	1	1	<b>EPN515</b>
		24V 50 Hz	16A - 250V~	1	1	<b>EPN518</b>
		12V 50 Hz	16A - 250V~	1	1	<b>EPN519</b>
	2 NC + 2 NO	230V 50 Hz	16A - 250V~	2	1	<b>EPN525</b>
		24V 50 Hz	16A - 250V~	2	1	<b>EPN528</b>
		12V 50 Hz	16A - 250V~	2	1	<b>EPN529</b>
	4 NO	230V 50 Hz	16A - 400V~	2	1	<b>EPN540</b>
		24V 50 Hz	16A - 400V~	2	1	<b>EPN541</b>

Designation	Power circuit	Width in 17.5mm	Pack qty.	Cat Ref.
Auxiliary contact	2A - 250V~	1/2	1	<b>EPN051</b>
Auxiliary contact for centralised control	24V - 230V~	1/2	1	<b>EPN050</b>

## Relays

### Description

To provide command of low power circuits max 16A; associated with push buttons, switches, time switches etc to provide for remote control applications.


The relays will accept an auxiliary contact for remote signalling applications. (EP071)

For the command of ELV circuits use interface relays EN145 and EN 146.

For the command of high power circuits (20, 40 63 amps) use contactors as shown on page 4.6.



ER120

Designation	Type	Coil AC voltage	Power circuit AC1	Width in  17.5mm	Pack qty.	Cat Ref.
Relays	1 NC + 1 NO	230V 50 Hz	16A - 250V~	1	12	ER120
		24V 50 Hz	16A - 250V~	1	12	ER123
		12V 50 Hz	16A - 250V~	1	12	ER124
	2 NC + 2 NO	230V 50 Hz	16A - 250V~	2	1	ER135
		24V 50 Hz	16A - 250V~	2	1	ER138
		12V 50 Hz	16A - 250V~	1	2	ER139
Auxiliary contacts			2A - 250V~	1/2	1	EP071

## Interface Relays

### Description

To interface between low voltage and extra low voltage circuits to ensure galvanic isolation to 4kV.

### Application

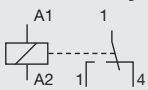
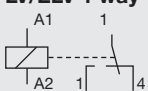
Interface between fire alarm, burglar alarm and other ELV systems and main distribution circuits.

### Connection:

flexible 4mm<sup>2</sup>  
rigid 6mm<sup>2</sup>



EN145

Designation	Characteristics	Width in ■ 17.5mm	Pack qty.	Cat Ref.
<b>Interface relays</b> <b>ELV/LV 1 way</b>	Coil voltage: 10 to 26V ac/dc output: 1 changeover contact max. 5A 230V~ min. 10mA - 12V dc	1	6	<b>EN145</b>
				
<b>LV/ELV 1 way</b>	Coil voltage: 230V~ 50Hz output: 1 changeover contact max. 5A 230V~ min. 10mA - 12V dc	1	6	<b>EN146</b>
				

## Contactors

### Description

For the remote switching and control of power circuits (20A-63A AC1)

### Technical data

The choice of contactor depends upon a number of parameters, e.g.

- The nature of the supply.
- The power it is switching.
- The characteristics of the load.
- The control voltage required.
- Number of operations

All contactors ratings are for AC1 loads only – if the load differs from AC1 the contactor may need de-rating.

**The use of LZ060 (heat dissipation inserts) between all contactors installed or between contactors and adjacent devices is recommended.**

### Options

Contact choice

- Normally open (NO)
- Normally closed (NC)

**ES237 and ES238 are low noise versions**

### Auxiliary

20A contactors will accept auxiliary, EP071 contact.



ESN463



LZ060

Designation	Type	Coil AC voltage	Power circuit AC1	Width in ■ 17.5mm	Pack qty.	Cat Ref.
	<b>2 NO</b>	230V 50 Hz	20A - 250V~	1	12	<b>ES220</b>
		<b>*Low noise devices</b>	20A - 250V~	1	1	<b>ES237*</b>
			40A - 400V~	3	1	<b>ES240</b>
			63A - 400V~	3	1	<b>ES263</b>
		24V 50 Hz	20A - 250V~	1	1	<b>ES224</b>
	<b>2 NC</b>	230V 50 Hz	20A - 250V~	1	12	<b>ES230</b>
	<b>3 NO</b>	230V 50 Hz	20A - 400V~	2	6	<b>ES320</b>
			40A - 400V~	3	1	<b>ES340</b>
	<b>3 NO + 1 NC</b>	230V 50 Hz	40A - 400V~	3	1	<b>ES345</b>
		Auxiliary contact	1 NC (10A)			
			63A - 400V~	3	1	<b>ES365</b>
		Auxiliary contact	1 NC (10A)			
	<b>4 NO</b>	230V 50 Hz	20A - 400V~	2	6	<b>ES420</b>
		<b>*Low noise devices</b>	20A - 400V~	2	1	<b>ES238*</b>
		24V 50 Hz	20A - 400V~	2	1	<b>ES424</b>
		230V 50Hz	40A - 400V~	3	1	<b>ES440</b>
		230V 50Hz	63A - 400V~	3	1	<b>ES463</b>
	<b>4 NC</b>	230V 50 Hz	20A - 400V~	2	6	<b>ES430</b>
			40A - 400V~	3	1	<b>ES480</b>
			63A - 400V~	3	1	<b>ES490</b>
	<b>2 NC + 2 NO</b>	230V 50 Hz	63A - 250V~	3	1	<b>ES470</b>
<b>Auxiliary for 20A contactors</b>			2A - 250V~	1/2	1	<b>EP071</b>
<b>Heat dissipation insert</b>				1/2	10	<b>LZ060</b>

## Override Contactors

### Override contactors

Manual override facility allows temporary override, with automatic return at next coil energisation. Permanent off can also be selected.  
ET201 low noise version.

### Technical data

The choice of contactor depends upon a number of parameters, e.g.

- The nature of the supply.
- The power it is switching.
- The characteristics of the load.
- The control voltage required.
- Number of operations

All contactors ratings are for AC1 loads only – if the load differs from AC1 the contactor may need de-rating.

**The use of LZ060 (heat dissipation inserts) between all contactors installed or between contactors and adjacent devices is recommended.**

### Options

Contact choice

- Normally open (NO)
- Normally closed (NC)

LZ060 heat dissipation inserts.

### Auxiliary

20A contactors will accept auxiliary, EP071 contact.



ET341



EP071



LZ060

Designation	Type	Coil AC voltage	Power circuit AC1	Width in 17.5mm	Pack qty.	Cat Ref.
Override contactor low noise recommended for domestic use	<b>2 NO</b>	230V 50 Hz	16A - 250V~	1	1	<b>ET201</b>
	<b>2 NO</b>	230V 50 Hz	20A - 250V~	1	12	<b>ET221</b>
	<b>3 NO</b>	230V 50 Hz	20A - 400V~	2	6	<b>ET321</b>
			40A - 400V~	3	1	<b>ET341</b>
	<b>4 NO</b>	230V 50 Hz	20A - 400V~	2	6	<b>ET421</b>
			40A - 400V~	3	1	<b>ET441</b>
<b>Auxiliary for 20A contactors</b>			2A - 250V~	1/2	1	<b>EP071</b>
<b>Heat dissipation insert</b>				1/2	10	<b>LZ060</b>



## Electromechanical Time Switches

### Description

Electromechanical time switches  
1 and 2 channel.  
For hourly, daily or weekly  
programming.  
To control lighting, heating,  
ventilation, household  
appliances etc.  
To save energy and to improve  
comfort.

### Technical data

- Programming by captive segments.
  - Manual override:
- For 1 module products:
- Automatic
  - Permanent ON
- For 3 module products:
- Automatic
  - Permanent ON
  - Permanent OFF

### Minimum switching time:

- 15 min for daily dial
- 2h for weekly dial

### Connection:

Protected tunnel terminals.  
1-4mm<sup>2</sup>



EH010

### Designation

### Characteristics

Width in ■  
17.5mm

Pack  
qty.

### Cat Ref.

### 1 Channel time switches

#### Quartz

Without supply failure reserve

Voltage supply:  
230V~ 50Hz  
Output:  
For 3 module products  
1 changeover contact  
16A 250V~ AC1  
For 1 module products  
1 N.O. contact  
16A 250V~ AC1

Daily dial

1

1

**EH010**

3

1

**EH110**



EH171

#### Quartz

With supply failure reserve  
200 hours after being  
connected for 120 hours

Voltage supply:  
230V~ 50/60Hz  
Output:  
For 3 modules products  
1 changeover contact  
16A 250V~ AC1  
For 1 module products  
1 N.O. contact  
16A 250V~ AC1

Daily dial

1

1

**EH011**

3

1

**EH111**

Weekly dial

3

1

**EH171**

## Electromechanical and Digital Timers - Selection Guide

Range: Electromechanical Time Clocks 1 Channel:			Digital Time Clocks			
			1 Channel:		2 Channels	4 Channels
						
1 mod: EH010, EH011			3 mod: EH110 EH111 EH171	1 mod: EG071 EG010	2 mod: EG103 EG103V EG103E	2 mod: EG203 EG203E
						4 mod: EG400
Programming Cycle	Electromechanical		Digital			
	1 Channel 1 mod	3 mod	1 Channel 1 mod	2 mod	2 Channels 2 mod	4 Channels 4 mod
24 hours	EH010 EH011	EH110 EH111	EG010			
24 hours + 7 days						
7 days		EH171	EG071	EG103 EG103V EG103E	EG203 EG203E	
Annual						EG400

### Applications:



Heating



Lighting



Immersion Heater



Power Outlets



Ventilation



Air-Conditioning



Refrigerator



Alarm

## Digital Time Switches

Use : domestic and commercial buildings.

For the control of lighting, heating, household appliances, shop windows, signage etc., to improve comfort and to save energy.

### EG103 and EG203 (basic version)

Product set at current time and date when delivered.  
Automatic change of Summer / Winter time.

### Programming key:

- To allow easy back up and re-installation of the program to

allow permanent program overrides.

- Programming per day or group of days
- 56 ON / OFF programme steps
- Permanent ON/OFF overrides
- Temporary ON/OFF overrides bar graph indication showing the daily profile
- Possibility of locking the keyboard with EG004
- Programming without the need to be energised

### EG103E/V and EG203E (evolution versions)

Same characteristics as EG103 and EG203 plus more:

- Holidays mode: forcing ON or

OFF between two dates

- Presence simulation - random switching
- Backlit screen
- Impulse programming capability (1s to 30 min)

### Connection:

EG010 / EG 071 : 0.5 to 4mm<sup>2</sup>,  
EG 103 and EG 203/E :  
1 to 6mm<sup>2</sup> flexible,  
1.5 to 10mm<sup>2</sup> rigid,

### Operating voltage:

230~ 50/60 Hz  
(except EG103V  
- 12/24V AC/DC)



EG103



EG203E



EG005

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>1 Channel digital time switch</b> (daily cycle) (not compatible with program key)	5 adjustable pre-recorded Programs 6 switchings per day (3 on and 3 off) Output: 1 changeover contact 16A - 250V~ AC1 3 year reserve	1	1	<b>EG010</b>
<b>1 Channel digital time switch</b> (weekly cycle) (not compatible with program key)	Output : 1 changeover contact μ 16 A - 250V~ AC 1 Capacity 20 program steps 3 year reserve	1	1	<b>EG071</b>
<b>1 Channel digital time switch</b> (weekly cycle - basic version)	Output : 1 changeover contact μ 16 A - 250V~ AC 1 Delivered with key EG005	2	1	<b>EG103</b>
<b>2 Channel digital time switch</b> (weekly cycle - basic version)	Output : 2 changeover contact μ 16 A - 250V~ AC 1 Delivered with key EG005	2	1	<b>EG203</b>
<b>1 Channel digital time switch</b> (weekly cycle) evolution version	Output : 1 changeover contact μ 16 A - 250V~ AC 1 Delivered with key EG005	2	1	<b>EG103E</b>
<b>1 channel digital time switch</b> (weekly cycle) evolution version	Output : 1 changeover contact μ 16 A - 250V~ AC 1 Operating voltage 12/24V AC/DC Delivered with key EG005	2	1	<b>EG103V</b>
<b>2 Channel digital time switch</b> (weekly cycle) evolution version	Output : 2 changeover contacts μ 16 A - 250V~ AC 1 Delivered with key EG005	2	1	<b>EG203E</b>
<b>PC Interface and software tool</b>	RS232 interface between PC and key interface module with software on CD  USB Connection		1	<b>EG003</b>  <b>EG003U</b>
<b>Locking key</b> (yellow colour)	To prevent unauthorised re-programming of all EG time clocks (except EG010/EG071 and EG400)		1	<b>EG004</b>
<b>Spare programming key</b> (grey colour)	for timers EG103, EG103V EG 203, EG103E, EG203E		1	<b>EG005</b>
<b>DIN rail storage module for keys</b>	For 3 keys EG005 or EG004		1	<b>EG006</b>

## 4 Channel Digital Time Switches

### 4 channel digital time switch weekly and annual cycle

In commercial premises timed programming often requires the use of multi-circuit equipment with large programming capacities for a weekly or annual cycle, the EG400 digital time switch is a compact modular unit (4 mod.) which replaces electromechanical clocks efficiently.

### Applications:

- Command of lighting circuits.
- Control of heating.
- Ventilation control.
- Bell.
- Alarm.

### Functions:

- Summer/winter time pre-programmed.
- Permanent on/off override.
- Override with automatic return to auto-mode.

- On/off override programmable from date to date.
- Groups of days and channels to save program steps.
- Work on impulse, maximum duration 59 seconds.
- 15 special weekly cycles

### Connection:

1mm<sup>2</sup> to 4mm<sup>2</sup> - flexible  
1.5mm<sup>2</sup> to 6mm<sup>2</sup> - rigid



EG400

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>4 channel digital time switch Weekly/annual cycle</b> Program setting: 1 minute increments  capacity: 408 program steps	Voltage rating: 230V~ 50/60 Hz Outputs: 3 changeover contacts 10A - 250V~ AC1 1 NO contact: 10A - 250V~ AC1 Supply failure reserve: 100hrs Lithium battery total of 100 hrs	4	1	<b>EG400</b>
Programming key			1	<b>EG002</b>
PC interface and software tool	RS232 interface between PC and key interface module with software on CD, serial port connection  USB connection		1	<b>EG003</b>  <b>EG003U</b>



EG002

## Light Sensitive Switch

### Description

A photo-electric cell measures the light level and in conjunction with the relay provides on/off control of a circuit.

This device controls lighting circuits in relation to ambient light, based on user settings.

Front cover sealability

### Applications

Street lighting, display lighting, illuminated signs etc.

### Connection:

Protected cable clamps

Capacity:

Rigid: 1.5 to 10mm<sup>2</sup>

Flexible: 1 to 6mm<sup>2</sup>

On board LED shows status of changeover contact.

### Technical data

4 position override switch allowing:

- Auto: normal operating mode
- On: permanently switched on
- Off: permanently switched off
- Test: setting mode for easy adjustment.



EE100 complete with surface photo electric cell

Designation	Characteristics	Width in ■ 17.5mm	Pack qty.	Cat Ref.
Light sensitive switch Sensitivity: 2 ranges 5 to 50 lux	<b>Voltage rating:</b> 230V~ - 50/60 Hz Output: 1 changeover AC1 contact	3	1	<b>EE100</b>
50 to 2000 lux	16A AC1 - 230V~			
Delivered with: A separate surface <b>Photo-electric cell (EE003)</b>	Maximum distance: 50m between photocell and controller  Must be used in conjunction with a suitably rated contactor (see page 4.29) where load conditions demand			

## Light Sensitive Programmer

### Description

To control the lighting installation in relation to time and ambient light.

It is a weekly programmer associated with a light sensitive switch.

### Working principle

The user programmes both on/off periods and a desired light level. The cell measures the light level within the on period. Depending on the light level (below or above the programmed threshold, the output will be switched on/off.

20 program steps  
1 minute switching increments

### Programming function

Programming by keys and display on LCD screen. On/off override facility, permanent working. Display and control of the programme. Test setting for easy adjustment



EE171 complete with surface photo electric cell

### Designation

**Light sensitive programmer**

Sensitivity: 2 ranges  
5 to 50 lux  
50 to 2000 lux

Delivered with:  
A separate surface  
**Photo-electric cell (EE003)**

### Characteristics

Voltage rating:  
230V~ 50/60 Hz

Output: c/o contact  
16A AC1 - 250V~  
maximum distance:  
50m between photocell and controller

Must be used in conjunction with a suitably rated contactor (see page 4.29) where load conditions demand

Width in ■  
17.5mm

Pack  
qty.

**Cat Ref.**

3 1 **EE171**

**Replacement photo electric cell (flush)**  
for EE100 and EE171

1 **EE002**

**Replacement photo electric cell (surface)**  
for EE100 and EE171

1 **EE003**

## Emergency Lighting Module

### Application:

For both residential and commercial applications

Installed in a consumer unit or distribution board, the lamp can be configured to light automatically in the event of power failure.

It can also be withdrawn from its base, thereby acting as a mini torch with an operating duration of 1 hour 30 mins

### Designation

Emergency lighting module

Width in ■  
17.5mm

Pack  
qty.

**Cat Ref.**

3 1 **EE960**



EE960

## Timers - Selection Guide

### Range: Timers

### Delay timers



**EM001N**



**EM002**  
Pre-warning  
switch off  
notice



**EZ001**  
Delay on



**EZ002**  
Delay off



**EZ003**  
Adjustable  
time on



**EZ004**  
Timer



**EZ005**  
Symmetrical  
flasher



**EZ006**  
Multi-function

Typical area of application

Areas of use	Residential	Communal / Landlords Areas	Commercial	Industrial
Applications				
Communal Stairwells and landlord areas		EM001N + EM002		
External Lighting	EM001N EM001N + EM002			
Landlords areas Bathrooms	EZ002 EZ006			
Heating overrides			EZ001 EZ006	
Shop windows Signage			EZ005 EZ006	
Timer function	EZ004 EZ006			
Door closing mechanisms	EZ004 EZ006			
Alarm bell			EZ004 + EZ006 EZ006	
Variation of alarm frequency			EZ005 EZ006	



## Delay Timers

### Description

To provide all types of automatic control i.e. lighting, ventilation, watering, machine pre-heating, automatic door and visual audible indication, cycle control etc.

### Applications

For timing and automation in domestic and commercial premises. The input signal can be via various switching devices (pushbutton, latching switch, timeclock etc.) and the timed output used to control the application.

### Technical data

Voltage range:  
12 V AC/DC  
24 to 48V DC  
24 to 230V AC  
Adjustable: Time delay from 0.1s to 10hrs.  
Led indicator  
Complies with EN 60669-2-1  
Terminal capacity:  
6mm<sup>2</sup> max flexible  
1.5 - 10mm<sup>2</sup> rigid

### Designation

### Characteristics

Width in   
17.5mm

Pack  
qty.

### Cat Ref.

#### Delay on



1 c/o contact  
10A / 230V~ AC1  
Time delay T: 0.1s to 10hr

1

1

**EZ001**

#### Delay off



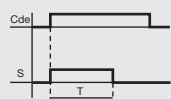
1 c/o contact  
10A / 230V~ AC1  
Time delay T: 0.1s to 10hr

1

1

**EZ002**

#### Adjustable time on



1 c/o contact  
10A / 230V~ AC1  
Time delay T: 0.1s to 10hr

1

1

**EZ003**

#### Timer



1 c/o contact  
10A / 230V~ AC1  
Time delay T: 0.1s to 10hr

1

1

**EZ004**

#### Symmetrical flasher



1 c/o contact  
10A / 230V~ AC1  
Time delay T: 0.1s to 10hr

1

1

**EZ005**

#### Multifunction

6 individual functions  
including:  
D - Delay on  
C - Delay off  
E - Adjustable time on  
B - Adjustable time off  
A - Timer  
F - Symmetrical flasher

1 c/o contact  
10A - 230V~ AC1  
Time delay T: 0.1s. to 10hr

1

1

**EZ006**



EZ001



EZ003



EZ005



EZ006

## Time Lag Switches

### Description

To provide control of lighting circuits with automatic switch-off after a pre-set time (e.g.: staircase, corridors). Command signal via impulse.

### Technical data

- Time delay setting by rotating dial on front of device.
- 30s to 10min

### EM001N time lag switch

For lighting circuits (medium or high daily use)  
Characteristic: compact design equipped with a 2 position switch permanent/timed lighting implementation facility.

**Note:** This range is only suitable for use with momentary pushbuttons, non latching switches.

### EM002 switch off notice add-on block

Incorporating pre-warning of switch-off improves the safety for users / pre-warning of switch-off at the end of the time delay, light intensity reduction by 50% for a period of 24 sec. prior to final switch off.

**Use only on incandescent lighting circuits.**



EM001N

Designation	Characteristics	Width in 17.5 mm	Pack qty.	Cat Ref.
Time lag switch	Voltage rating: 230V; - 50/60 Hz Restart facility 2 function switch: • Permanent • Timed Output: 1 changeover contact 16 A - 230V; AC 1 10A - 2300W - incandescent 10A - 2300W - halogen 230V	1	6	<b>EM001N</b>

**Note:** Heat dissipation insert (LZ060) recommended between EM001N and EM002 (if fitted)



EM002

Add-on block pre-warning switch off notice	Voltage rating: 230V; - 50/60 Hz Restart facility Pre-warning of switch-off by decrease of output Voltage (50% for 24 sec.) Switch off notice: 24 secs Output power: 1000W - incandescent 1000W - halogen Not suitable for use with discharge lamp	2	1	<b>EM002</b>
--	---	---	---	--------------

## Pushbuttons - Impulse

### Description

Pushbuttons to actuate loads either directly or via contactors etc.

### Technical data

Modular pushbuttons

- Without light  
With grey button, red/green optional

- With light  
With red, green button

### Light technology

LED

### Connection

Cage terminals

### Capacity

10mm<sup>2</sup> rigid conductor.  
6mm<sup>2</sup> flexible conductor.

Standard : BS EN 60947-5-1

### Designation

### Characteristics

Width in  17.5mm

Pack  
qty.

### Cat Ref.

### Pushbuttons (Impulse)

16A – 250V~

### Without indicator light



Contacts: 1 NO

1

12

**SVN311**



Contacts: 2 NO

1

12

**SVN331**



Contacts: 2 NO  
Double Pushbutton

1

12

**SVN371**



Contacts: 1 NC

1

12

**SVN321**



Contacts: 2 NC

1

12

**SVN341**



Contacts: 1 NO + 1 NC

1

12

**SVN351**



Contacts: 1 NO + 1 NC  
Double Pushbutton

1

12

**SVN391**

### Pushbuttons (Impulse)

### With indicator light



Contacts: 1 NO : Green

1

12

**SVN411**



Contacts: 2 NO : Red

1

12

**SVN432**



Contacts: 1 NC : Red

1

12

**SVN422**



Contacts: 2 NC : Green

1

12

**SVN441**



Contacts: 1 NO + 1 NC

1

12

**SVN452**



SVN311



SVN391










SVN411



SVN422

## Pushbuttons - Latching

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Pushbuttons (latching)</b>				
<b>16A – 250V~ Without indicator light</b>				
	Contacts: 1 NO	1	12	<b>SVN312</b>
	Contacts: 2 NO	1	12	<b>SVN332</b>
	Contacts: 1 NC	1	12	<b>SVN322</b>
	Contacts: 2 NC	1	12	<b>SVN342</b>
	Contacts: 1 NO + 1 NC	1	12	<b>SVN352</b>
<b>With indicator light</b>				
	Contacts: 1 NO : Green	1	12	<b>SVN413</b>
	Contacts: 2 NO : Green	1	12	<b>SVN433</b>

## Indicator Lights

<b>Modular indicator lights</b> Available with red, green, amber, blue, colourless lens	<b>Options</b> DIN rail mountable	<b>Capacity</b> 10mm <sup>2</sup> rigid conductor. 6mm <sup>2</sup> flexible conductor.
<b>Light technology</b> LED	<b>Connection</b> Cage terminals	Standard : BS EN 62094-1

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Indicator lights</b>				
<b>230V~</b>				
<b>With light : Green</b>				
	Red	1	12	<b>SVN121</b>
	Orange	1	12	<b>SVN122</b>
	Blue	1	12	<b>SVN123</b>
	Clear	1	12	<b>SVN124</b>
	Red & Green Double Indicator	1	12	<b>SVN125</b>
	Red Triple Indicator	1	12	<b>SVN126</b>
<b>12/48V</b>				
	Green	1	12	<b>SVN127</b>
	Red	1	12	<b>SVN128</b>



SVN122

## Transformers, Bells and Buzzers

**Description**  
Provide separated extra low voltage 8, 12, 24V~.

**Technical data**  
Secondary voltages:  
8V, 12V, 24V~  
Bell transformers are short-circuit protected.  
Bells/buzzers:  
Max. continuous duty  
≤ 30 minutes.  
**Connection capacities:** 6mm<sup>2</sup>  
Cable clamp type

**Output:**  
Bells: 85 dBA  
Buzzers: 78 dBA

When a bell transformer is installed in an enclosure with mains voltage equipment, 230V cable should be used on the secondary side of the transformer or extra low voltage cable should be sheathed within the enclosure.

**Note:** The transformers have a higher no load voltage. The stated voltages correspond to the voltages on nominal load.



ST313



ST301



SU212

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Safety transformers</b>	<b>230V/12-24V~</b> 50Hz <b>25VA</b> 50/60 Hz	4	1	<b>ST312</b>
	<b>230V/12-24V~</b> 50Hz <b>16VA</b> 50/60 Hz	4	1	<b>ST313</b>
	<b>230V/12-24V~</b> 50Hz <b>40VA</b> 50/60 HZ	4	1	<b>ST314</b>
	<b>230V/12-24V~</b> 50Hz <b>60VA</b> 50/60 Hz	6	2	<b>ST315</b>
<b>Bell transformers</b>	<b>230V/8V~</b> 50/60 Hz <b>4VA</b> - 8-12V : 0.33A	2	6	<b>ST301</b>
	<b>230V/8-12V~</b> 50/60 Hz <b>8VA</b> - 12V : 0.67A	2	6	<b>ST303</b>
	<b>230V/8-12V~</b> 50/60 Hz <b>16VA</b> - 12V : 1.33A	3	1	<b>ST305</b>
<b>Bells</b>	<b>8/12V~</b> 5VA - 0.33A	1	12	<b>SU212</b>
	<b>230V~</b> 6.5VA - 0.03A	1	12	<b>SU213</b>
<b>Buzzers</b>	<b>8/12V~</b> 4VA - 0.33A	1	12	<b>SU214</b>
	<b>230V~</b> 6.5VA - 0.03A	1	12	<b>SU215</b>

## Thermostats

### Description

Electronic thermostats for any application requiring temperature control (from cold room to steam room).

### Applications

EK081 fixed ambient probe for night temperature regulation.  
EK083 used as floor probe to limit floor temperature.  
EK083 used to control hot water temperature (with its collar) in case of probe disconnection.

3 working modes are possible (selected by wiring):

1. Permanent off
2. Permanent on
3. Cyclic operation 1 minute in every 4.

Output status is displayed by an LED.

### EK187

#### Electronic thermostat suitable for heating control

Two adjustable temperature levels are selected by external signals (operation by time switch or digital programmer). Additionally there is an adjustable low level temperature for frost protection etc. In the event of probe disconnection the heating system is switched on one minute in every four.



EK187



EK081



EK082



EK083

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>Multi-range thermostats</b> Delivered without probe associate with EK081 or EK083 probes	Voltage rating: 230V~ - 50/60 Hz Output: 1 changeover contact 2A AC1 - 230V~ 4 ranges: -30 to 0°C 0 to +30°C +30 to +60°C +60 to +90°C To associate with contactors (page 4.29)	3	1	<b>EK186</b>
<b>Multi-order thermostat</b> Delivered without probe associate with EK081 or EK082 probes  Accuracy $\pm 0.2^{\circ}\text{C}$	Voltage rating: 230V~ - 50/60 Hz Output: 1 changeover contact 2A AC1 - 230V~ Temperature level 1 (comfort) Adjustable 5 - 30°C Temperature level 2 (night setting) Adjustable 2 - 8°C less than Level 1 setting Temperature level 3 (frost setting) Adjustable 5 - 30°C To associate with contactors (page 4.29)	3	1	<b>EK187</b>
<b>Fixed ambient probe</b>	Can be associated with: EK186, EK187 thermostats EG502 programmable thermostat		1	<b>EK081</b>
<b>Adjustable ambient probe</b> The probe is equipped with a potentiometer for the correction of the set temperature ( $\pm 3^{\circ}\text{C}$ )	Can be associated with: EK187 thermostat EG502 programmable thermostat		1	<b>EK082</b>
<b>Universal probe</b> Removable collar	Can be associated with: EK186 thermostat EG502 programmable thermostat		1	<b>EK083</b>

## Programmable Thermostat

### Programmable thermostat description

To save energy by managing the heating system according to the periods of occupation.

It is a weekly programmer associated with a 3 setting thermostat:

- "Comfort",
- "Reduced",
- "Anti-frost"

**Connection:** protected cable clamps

Capacity: 1.5 to 10 mm<sup>2</sup> rigid

Capacity: 1 to 6 mm<sup>2</sup> flexible

### Thermostatic function

- Adjustable comfort and reduced temperature
- Fixed anti-frost temperature
- Display of state of output,
- Display of selected mode,
- Push button selection of working mode:
- Automatic cycle comfort T° / reduced T°
- Permanent comfort temperature
- Permanent reduced temperature
- Permanent anti-frost temperature.


### Probes

EG502 can be associated with:

- EK081 fixed ambient probe,
- EK082 adjustable ambient probe
- EK083 universal probe (see page 4.20)



EG502

Description	Characteristics	Width in  mm	Pack qty.	Cat Ref.
<b>Programmable thermostat</b> Delivered without probe	Voltage rating: 230V; 50 Hz	4	1	<b>EG502</b>
Associate with EK081, EK082, EK083 probes	Output: 1 changeover contact 2A – 250V; AC1 2 temperature settings "comfort" and "reduced" adjustable from + 8°C to + 28°C, Anti-frost temperature setting + 8°C (constant)			



## Analogue Voltmeters, Ammeters

### Analogue voltmeters

For domestic and commercial installations

- Single phase: direct connection
- Three phase: use of a voltmeter selector switch SK602 see page 4.24.

Frequency: 50 Hz

### Connection capacity:

Rigid conductor 10mm<sup>2</sup>

Flexible conductor 6mm<sup>2</sup>

### Analogue ammeters


For domestic and commercial installations  
indirect reading via current transformers: 50-100-150-250-400A



SM500



SM050

Designation	Characteristics	Width in  17.5 mm	Pack qty.	Cat Ref.
<b>Voltmeter</b>	Accuracy: 2% Consumption: 2.5VA	4	1	<b>SM500</b>
<b>Ammeter</b>	Accuracy: 2% connection via a Current transformer (CT) (page 4.23)			
	0 - 50A	4	1	<b>SM050</b>
	0 - 100A	4	1	<b>SM100</b>
	0 - 150A	4	1	<b>SM150</b>
	0 - 250A	4	1	<b>SM250</b>
	0 - 400A	4	1	<b>SM400</b>

## Digital Voltmeters, Ammeters

### Digital voltmeters

SM501

For domestic and commercial installations

- Three phase: use of a voltmeter selector switch SK602

### Digital ammeters

SM151, SM401, SM601: reading via a current transformer (see below)



SM501



SM401

Designation	Characteristics	Width in 17.5 mm	Pack qty.	Cat Ref.
<b>Digital voltmeters</b>				
220/230V ; 50/60 Hz	Voltage rating:			
accuracy: $\pm 1\%$				
consumption: 4 VA				
scale: 0 - 500V		4	1	<b>SM501</b>
<b>Digital ammeters</b>				
	Voltage rating:			
	220/230V ; 50/60 Hz			
	Accuracy: $\pm 1\%$			
	Consumption: 4 VA			
- Reading via CT 150/5A (SR150)	Scale: 0 - 150A	4	1	<b>SM151</b>
- Reading via CT 400/5A (SR400)	Scale: 0 - 400A	4	1	<b>SM401</b>
- Reading via CT 600/5A (SR600)	Scale: 0 - 600A	4	1	<b>SM601</b>

## Current Transformers (C.T)

Current transformers are used to feed analogue and digital ammeters and kilowatt hour meters.

The current on the secondary circuit (0 - 5A) is proportional to the current on primary circuit class: 1

Can be mounted on copper bar or on cable  
Can be mounted on DIN rail



SR300

Designation	Characteristics	Pack qty.	Cat Ref.
<b>Current transformers (CT)</b>			
	Ratio:		
	50/5	1	<b>SR051</b>
	100/5	1	<b>SR101</b>
	150/5	1	<b>SR150</b>
	200/5	1	<b>SR200</b>
	250/5	1	<b>SR250</b>
	300/5	1	<b>SR300</b>
	400/5	1	<b>SR400</b>
	600/5	1	<b>SR600</b>

## Selector Switches for Voltmeters and Ammeters

### Description

For use with Voltmeters and Ammeters.

### Applications

Complies with  
IEC 947-3  
BS EN 60947-3.  
Terminal capacity:  
1- 6mm<sup>2</sup> - Flexible  
1.5 - 10mm<sup>2</sup> - Rigid

Isolating voltage 500Vac  
Nominal current 10-20A

### Designation

### Characteristics

Width in ■  
17.5mm

Pack  
qty.

### Cat Ref.

#### Voltmeter selector

20A 400Vac

3

1

**SK602**

3Ph&N

3 readings between phases

3 readings between phase & neutral

null position (no reading)



SK602

#### Ammeter selector

20A 400Vac

3

1

**SK603**

4 positions

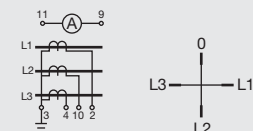
use in 3Ph&N

reading by phase

null position (no reading)

should be used with current transformer (CT)

(see page 4.23)



SK603

#### Lockable rotary switch

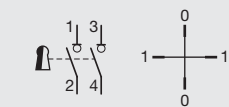
10A 400Vac

3

1

**SK606**

on off (4 positions)



SK606

## kiloWatt Hour Meters

**Description**

kiloWatt hour meters measure the active energy used in an electrical installation. The range provides meters with pulsed outputs (except EC110) for remote indication or linking into an energy management system as standard. kWh meters can be used for local metering of installations or monitoring individual machines.  
2 options on resettable meters:

- Total counter (non resettable)
- Resettable counter (shows energy used since last reset)

**Technical data**

3 types

- 32A (direct connection) single phase
- 80A (direct connection) three phase
- For other single / dual tariff products (via a CT)

**Displays**

7 digit LCD type  
pulsed output - 1 pulse = 100 Wh

Pulse duration = 60ms ± 10ms  
three phase

Pulse duration = 15ms single phase

Complies with IEC 1036 (class 2)



EC050

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>kiloWatt hour meter single phase</b> Voltage 230V - 50Hz Direct connection In = 320mA - 32A	Total counter Non - resettable counter	1	1	<b>EC050</b>

Use of heat dissipation inserts (cat. ref. LZ060) are recommended on each side of direct connection meters



EC111

<b>kiloWatt hour meter single phase</b> Voltage 230V - 50Hz Direct connection In = 320mA - 32A	Non - resettable Total counter with pulsed output 1 pulse = 100Wh	1	1	<b>EC051</b>
---	--	---	---	--------------

Use of heat dissipation inserts (cat. ref. LZ060) are recommended on each side of direct connection meters



EC120

<b>kiloWatt hour meter single phase</b> Voltage 230V - 50Hz Direct connection In = 320mA - 32A	Total counter Resettable counter With pulsed output 1 pulse = 100 Wh	3	1	<b>EC111</b>
---	---	---	---	--------------

Use of heat dissipation inserts (cat. ref. LZ060) are recommended on each side of direct connection meters

<b>kiloWatt hour meter single phase</b> Voltage 230V - 50Hz Connection via a current Transformer (In/5A) Ratio of 100/5 See page 4.23 for C.T.	Total counter Resettable counter With pulsed output 1 pulse = 100 Wh	3	1	<b>EC120</b>
--	---	---	---	--------------

Auto correction in the case of reversed CT polarity

<b>kiloWatt hour meter single phase - dual tariff</b> Voltage 230V - 50Hz Connection via a current Transformer (In/5A) Ratio of 100/5 See page 4.23 for C.T.	Total counter Resettable counter With pulsed output 1 pulse = 100 Wh	3	1	<b>EC121</b>
--	---	---	---	--------------

Auto correction in the case of reversed CT polarity

## kiloWatt Hour Meters



EC320



EC321

Designation	Characteristics	Width in 17.5mm	Pack qty.	Cat Ref.
<b>kiloWatt hour meter three phase</b> Voltage 3 x 230/400V - 50-60Hz Direct connection In = 800mA - 80A	Total counter Resettable counter With pulsed output 1 pulse = 100 Wh	7	1	<b>EC310</b>

Use of heat dissipation inserts (cat. ref. LZ060) are recommended on each side of direct connection meters

<b>kiloWatt hour meter three phase</b> Voltage 3 x 230/400V - 50-60Hz Connection via a current Transformer (In/5A) From 50A to 1500A See page 4.23 for CT's	Total counter Resettable counter With pulsed output 1 pulse = 100 Wh	4	1	<b>EC320</b>
---	---	---	---	--------------

Balanced or unbalanced network selection also possible (i.e. 3 wire or 4 wire application) auto correction in the case of reversed CT polarity

<b>kiloWatt hour meter three phase - dual tariff</b> Voltage 3 x 230/400V - 50-60Hz Connection via a current Transformer (In/5A) From 50A to 1500A See page 4.23 for CT's	Total counter Resettable counter With pulsed output 1 pulse = 100 Wh	4	1	<b>EC321</b>
---	---	---	---	--------------

Balanced or unbalanced network selection also possible (i.e. 3 wire or 4 wire application) auto correction in the case of reversed CT polarity

## Hours Counter

### Description

To measure the total operating time of any circuit/load non resettable

### Application Example

- Total time of plant running
- Connection in parallel with contactor coil
- Recording of lighting hours for relamping purposes



EC100

<i>Designation</i>	<i>Characteristics</i>	<i>Width in 17.5mm</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Hours counter	Voltage ratings: 230V - 50 Hz	2	1	<b>EC100</b>

## Latching Relays

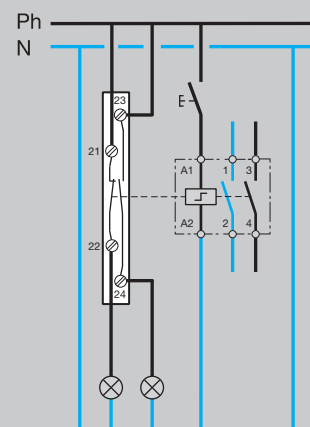
### Technical Characteristics

	EPN510 EPN515 EPN520	EPN513 EPN518 EPN524	EPN519	EPN525 EPN540	EPN528 EPN541	EPN529
<b>Voltage</b>	230V	24V	12V	230V	24V	12V
<b>Start consumption</b>	24VA	24VA	24VA	48VA	47VA	TBC
<b>Contact rating</b>				16A 250V~*		
<b>AC1</b>						
<b>Electrical endurance</b>	150,000 operations					
<b>AC1 - 16A</b>						
<b>Mechanical endurance</b>	500,000 operations					
<b>Current in open position</b>	8 mA					
<b>Max duration of voltage supply to coil</b>	1 h					
<b>Min duration of current supply to coil</b>	0.1 s					
<b>Working temperature</b>	-5 to +40°C					
<b>Storage temperature</b>	-40 to +80°C					
<b>Connections</b>						
Coil						
Flexible	0.5 to 4mm <sup>2</sup>					
Rigid	1 to 6mm <sup>2</sup>					
<b>Power</b>						
Flexible	1 to 6mm <sup>2</sup>					
Rigid	1.5 to 10mm <sup>2</sup>					

\*400V~ for the EPN540 and EPN541.

### Auxiliary Contacts (EPN051)

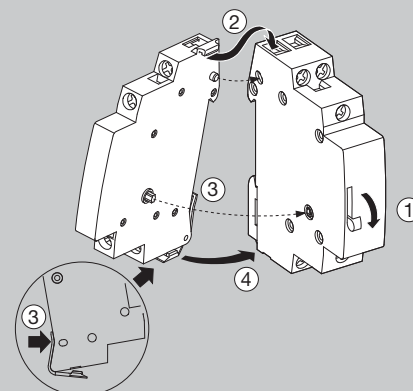
The range of latching relays have been designed for use with an auxiliary contact. The devices simply clip on the side of the relay.



### Technical Characteristics

	EPN	EPN051
<b>Voltage</b>	(a) 24 to 230V	-
<b>Contact Rating</b>	-	2A / 250V
<b>Imin / 230V</b>	-	15 mA
<b>Connection</b>		
Flexible	6mm <sup>2</sup>	
Rigid	10mm <sup>2</sup>	

(a) : Voltage dependant on associated relay





## Choice of Contactors

### Heating

The choice of the contactor depends on the mechanical resistance (number of operations) and on the electrical heating load i.e. resistive elements, infra-red element, convectors.

### Choice of Contactors

The choice of contactor is dependant upon many parameters i.e. operating voltage, size of contacts, number of operations, ambient temperature, type of load supplied etc.

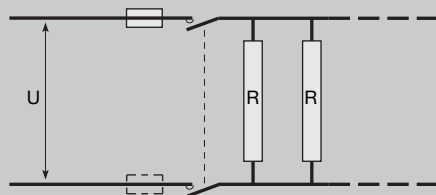
### Type of Load

Loads are categorised into various AC ratings, (AC1, AC2, AC3 etc.) and the higher the AC rating the more inductive the load becomes. All Hager contactor ratings are given at AC1, therefore they must be de-rated if used on other types of AC load.

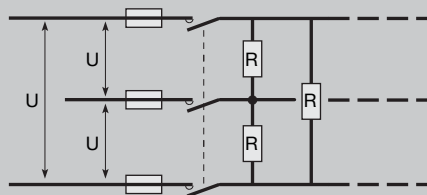
### Heat Dissipation Inserts

The ambient temperature around a contactor can affect its life expectancy, therefore, we strongly recommend that heat dissipation inserts (LZ060) are fitted between all contactors and adjacent devices. Please consult your Local Regional Office, if you require help selecting a suitable contactor.

### Single Phase



### Three Phase



Number of operations	50,000	100,000	150,000	200,000	300,000	Single phase 230V	Three phase*400V
Maximum load* in kW	4.4	4.4	3.9	3.5	2.9	ES220 - ES230	
	7.8	5.9	5	4.4	3.7	ESN240	
	12	8.8	7.7	6.6	5.9	ESN263	
	12	10.5	8.5	6.5	5.8		ESN320 - ESN430
	23.2	17.7	15	13.1	10.8		ESN340

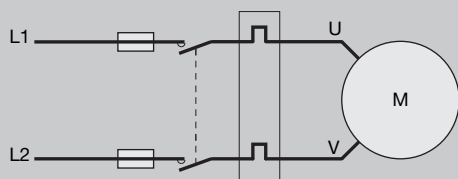
\* On three phase configuration the maximum load per phase corresponds to the values states divided by 3.

### Example:

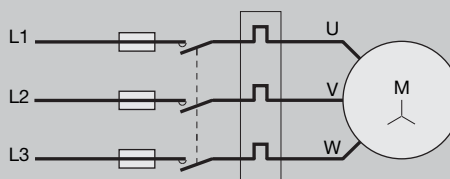
Function of a heating installation 200 days/annum, 100 operations per day (1 opening + 1 closing = 2 operations)  
Mechanical life = 10 years  
Total number of operations:  $200 \times 100 \times 10 = 200,000$   
in that case select an ES240 to control a load of 4.4 kW (single phase 230V)

### Motors

#### Single Phase 230V



#### Three Phase 400V



	Single phase with capacitor 230V	Three phase (AC3 cat.) 400V	Choice of contactor according to control diagram	
			2 wires	3 wires
Maximum load in kW	1.1		ES220	
	2.2		ESN240	
		4		ESN320 - ESN420
		7.5		ESN340 - ES345
		15		ESN365

### Requirements of use

#### Influence of working temperature:

Derating factor between 40°C and 50°C : 0.9

Example: Heating with convector

The maximum load of ES220 is 4.4kW for 50,000 operations and for

a temperature <40°C.

between 40°C and 50°C, the load is  $4.4 \times 0.9$  i.e. 3.96kW

#### Close fitting:

**It is necessary to put a heat dissipation insert (reference LZ060) between each contactor.**

## Technical Characteristics

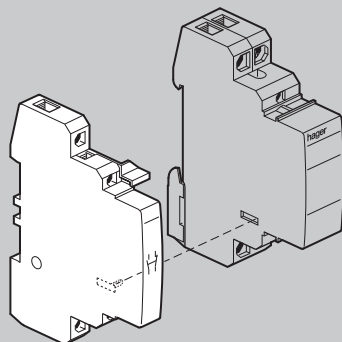
			Contactors							Relays	Interface Relay			
			ET201	ESN320	ES240	ESN263	ES224	ESN424	ER120	ER123	ER124	EN146	EN145	
			ES220	ESN340	ESN365									
			ET221	ESN420										
			ES230	ESN345	ES463B									
			ESN430		ESN470									
			ES237	ES238	ES440B	ESN490	ER135	ER138	ER139					
				ES441										
	ESN480													
Command voltage	V	230	230	230	230	24	24	230	24	12	230	10 to 26		
Frequency Hz	%	+10/ -15 50 } For all products										50/60Hz and ...		
Starting consumption	VA	15	20	50	50	15	20	15/20	15/20	15/20	5	(a)		
Maintained consumption	VA	5	5	7	7	5	5	5	5	5	5	(a)		
Max perm. Current AC1	A	20	20	40	63	20	20	16	16	16	5	5		
Insulation voltage	V	250	400	400	400	400	250	250	250	250	250	250		
Mech. endurance		1,000,000												
Working temperature	°C	-10/ +50 } For all products												
Storage temperature	°C	-40/ +80												
Connection														
Control	flexible	mm²	0.5 to 4	0.5 to 4	1 to 2.5	1 to 2.5	0.5 to 4	0.5 to 4	0.5 to 4	0.5 to 4	0.5 to 4	0.5 to 4	0.5 to 4	
	rigid	mm²	1 to 6	1 to 6	1.5 to 4	1.5 to 4	1 to 6	1 to 6	1 to 6	1 to 6	1 to 6	1 to 6	1 to 6	
Power	flexible	mm²	1 to 6	1 to 6			1 to 6	1 to 6	1 to 6	1 to 6	1 to 6	0.5 to 4	0.5 to 4	
	rigid	mm²	1.5to10	1.5to10	4to25	4to25	1.5to10	1.5to10	1.5to10	1.5to10	1.5to10	1to6	1to6	

**Note:** (a) Power consumption of EN145 and EN146

Control Voltage	Start and Maintained Consumption
12V DC	0.5W
24V DC	1.5W
12V AC	1VA
24V ac	2VA

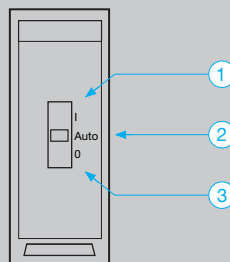
## Auxiliary Contacts

Auxiliary contacts are available for 20A contactors to indicate remotely the status of the main contacts - Cat Ref. EP071



## 20A Relays and contactors with manual override

1. Permanently on
2. Automatic
3. Permanently off



**Contactor Selection**

The table below indicates the number of lamps that can be connected to each pole of the contactor on 230V 50Hz circuits.

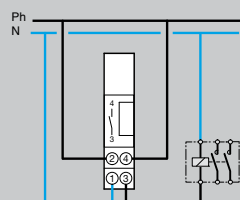
Type			16A		20A		40A		63A
Incandescent Lamps									
Tungsten filament and halogen 230V	40 W		45		50		100		120
	60 W		30		35		75		105
	75 W		24		28		65		90
	100 W		18		21		45		65
	150 W		12		14		33		45
	200 W		9		10		25		35
	300 W		5		6		16		23
	500 W		3		4		10		14
	1000 W		1		2		5		7
Halogen 12 or 24V with transformer electronic	20 W		70		80		160		240
	50 W		28		40		80		120
	75 W		19		26		52		78
	100 W		14		20		40		60
	150 W		9		13		26		39
Fluorescent Tubes									
Single with starter non compensated	15 W		29		50		110		150
	18 W		25		42		80		130
	30 W		25		35		70		110
	36 W		24		30		60		90
	58 W		14		20		40		60
Single with starter in parallel	15 W		25	C Max.	30	C Max.	45	C Max.	60
	18 W		25	112 µF	30	135 µF	45	202 µF	60
	30 W		20	90 µF	25	112 µF	40	180 µF	55
	36 W		20	90 µF	25	112 µF	40	180 µF	55
	58 W		15	67 µF	17	76 µF	22	99 µF	40
Double with starter compensated	2 X 18 W	2.7 µF	40		45		90		140
	2 X 20 W	2.7 µF	40		45		90		140
	2 X 36 W	3.4 µF	22		26		50		100
	2 X 40 W	3.4 µF	22		26		50		100
	2 X 58 W	5.3 µF	12		13		23		50
Single with electronic ballast	18 W		30		35		60		80
	36 W		26		30		32		45
	58 W		15		17		25		30
Double with electronic ballast	2 X 18 W		15		17		30		40
	2 X 36 W		13		15		16		22
	2 X 58 W		8		9		12		15
Compact flourescent with electromagnetic ballast, without compensation	7 W		50		55		100		130
	10 W		45		50		90		115
	18 W		40		42		65		90
	26 W		25		27		50		80
Compact flourescent with electronic supply incorporated	11 W		80		85		110		150
	15 W		60		63		100		130
	20 W		50		52		70		110
	23 W		40		42		60		100
Discharge Lamps									
High pressure mercury without compensation	50 W		11		12		36		50
	80 W		9		10		27		38
	125 W		7		8		19		26
	250 W		3		3		10		14
	400 W		1		2		7		10
High pressure mercury with parallel compensation	50 W		9	C Max.	10	C Max.	25	C Max.	30
	80 W		7	63 µF	8	70 µF	21	175 µF	25
	125 W		5	49 µF	6	56 µF	14	147 µF	17
	250 W		3	50 µF	3	60 µF	7	140 µF	9
	400 W		1	54 µF	2	54 µF	4	126 µF	6
Mixed	100 W		9		10		22		33
	160 W		6		7		19		27
	250 W		3		4		11		15
	400 W		1		2		8		11
High pressure sodium vapour or metal halide without compensation	70 W		9		10		20		30
	150 W		5		6		10		15
	250 W		3		4		6		10
	400 W		1		2		4		6
High pressure sodium vapour or metal halide with compensation	70 W		5	C Max.	6	C Max.	15	C Max.	20
	150 W		3	60 µF	3	72 µF	9	180 µF	16
	250 W		1	54 µF	2	54 µF	5	162 µF	7
	400 W		1	32 µF	1	64 µF	3	160 µF	5

### Technical Specifications

	EH011	EH010	EH111	EH110	EH171	EG103	EG103E	EG103V	EG203	EG203E	EG400
Width in 17.5mm	1	1	3	3	3	2	2	2	2	2	4
Version	Daily	Daily	Daily	Daily	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly & Annual
Voltage supply	230V 50/60Hz	230V 50Hz	230V 50/60Hz	230V 50Hz	230V 50/60Hz	230V AC 50/60Hz	230V AC 50/60Hz	230V AC 50/60Hz	230V AC 50/60Hz	230V AC 50/60Hz	230V AC 50/60Hz
Consumption	0.5VA	0.5VA	0.5VA	0.5VA	0.5VA	0.5VA	6VA	0.8VA	6VA	6VA	2 VA
Output	1 NO Contact Volt free	1 NO Contact Volt free	1 c/o Contact Volt free	1 c/o Contact Volt free	c/o Contact Volt free	1 volt free Changeover Contact	1 volt free Changeover Contact	1 volt free Changeover Contact	2 volt free Changeover Contact	2 volt free Changeover Contact	3 volt free Changeover Contact 1 NO
Switching capacity AC1	16A/ 250V	16A/ 250V	16A/ 250V	16A/ 250V	16A/ 250V	16A AC1 /250V 4A DC1/ 12V	16A AC1 /250V 4A DC1/ 12V	16A AC1 /250V 4A DC1/ 12V	16A AC1 /250V 4A DC1/ 12V	16A AC1 /250V 4A DC1/ 12V	16A AC1 /250V 4A DC1/ 12V
Inductive load cos 0.6	4A/ 250V	4A/ 250V	4A/ 250V	4A/ 250V	2.5A/ 250V	10A/ 250V	10A/ 250V	10A/ 250V	10A/ 250V	10A/ 250V	10A/ 250V
Incandescent lamp	900W	900W	900W	900W	900W	2300W	2300W	2300W	2300W	2300W	2300W
Halogen lighting 230V	-	-	-	-	-	2300W	2300W	2300W	2300W	2300W	2300W
Compensated fluorescent tubes // (max. 45µF)	-	-	-	-	-	400w	400w	400w	400w	400w	400W
Non compensated fluorescent tubes compen. in series	-	-	-	-	-	1000W	1000W	1000W	1000W	1000W	1000W
Compact fluorescent tubes	-	-	-	-	-	500W	500W	500W	500W	500W	500W
Minimum current AC1	-	-	-	-	-	100mA/ 250V	100mA/ 250V	-	100mA/ 250V	100mA/ 250V	100mA/ 250V
DC 1	-	-	-	-	-	-	-	100mA/ 12V	-	-	-
Galvanic insulation between power supply and output	-	-	-	-	-	< 4 KV	< 4 KV	< 4 KV	< 4 KV	< 4 KV	< 4 KV
<b>Characteristics</b>											
Technology	Quartz	Quartz	Quartz	Quartz	Quartz	-	-	-	-	-	-
Dial	24h	24h	24h	24h	7 days	-	-	-	-	-	-
Minimum switching	5 min	5 min	5 min	5 min	2h	-	-	-	-	-	-
Programming capacity	-	-	-	-	-	56 steps	56 steps	56 steps	56 steps	56 steps	102 steps
Minimum time between 2 steps	-	-	-	-	-	1 min	1 min	1 min	1 min	1 min	1 min
Working accuracy	1s per day	1s per day	1s per day	1s per day	1s per day	+/-1.5 sec/24h	+/-1.5 sec/24h	+/-1.5 sec/24h	+/-1.5 sec/24h	+/-1.5 sec/24h	+/-1.5 sec/24h
Supply failure reserve	200h	no	200h	no	200h	5 years lithium bat.	5 years lithium bat	5 years lithium bat	5 years lithium bat	5 years lithium bat	100 hrs lithium bat
Reached in	120h	120h	120h	120h	120h	-	-	-	-	-	-
Manual switch type	ON Auto ON	OFF Auto ON	OFF Auto ON	OFF Auto ON	OFF Auto ON	-	-	-	-	-	-
Protection degree	-	-	-	-	-	IP20	IP20	IP20	IP20	IP20	IP20
<b>Environment</b>											
Working temperature	-10°C to + 45°C	-10°C to + 45°C	-10°C to + 45°C	-10°C to + 45°C	-10°C to + 45°C	-5°C to + 45°C	-5°C to + 45°C	-5°C to + 45°C	-5°C to + 45°C	-5°C to + 45°C	-5°C to + 45°C
Storage temperature	-100°C to + 50°C	-100°C to + 50°C	-100°C to + 50°C	-100°C to + 50°C	-100°C to + 50°C	-20°C to + 70°C	-20°C to + 70°C	-20°C to + 70°C	-20°C to + 70°C	-20°C to + 70°C	-20°C to + 70°C
Connection											
Flexible	0.5 to 4mm	0.5 to 4mm	0.5 to 4mm	0.5 to 4mm	0.5 to 4mm	1.5 to 10mm <sup>2</sup>	1.5 to 10mm <sup>2</sup>	1.5 to 10mm <sup>2</sup>	1.5 to 10mm <sup>2</sup>	1.5 to 10mm <sup>2</sup>	1 to 4mm <sup>2</sup> 1.5 - 6mm <sup>2</sup>
Rigid	-	-	-	-	-	1 to 6mm <sup>2</sup>	1 to 6mm <sup>2</sup>	1 to 6mm <sup>2</sup>	1 to 6mm <sup>2</sup>	1 to 6mm <sup>2</sup>	-

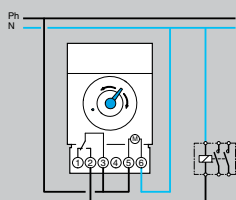
#### EH010 - EH011

230 VM ± 510 % 50/60 Hz



#### EH110 - EH111 - EH171

230 V ± 10% 50/60 Hz



## Modular - 1 Channel Electronic Time Switch Weekly Cycle

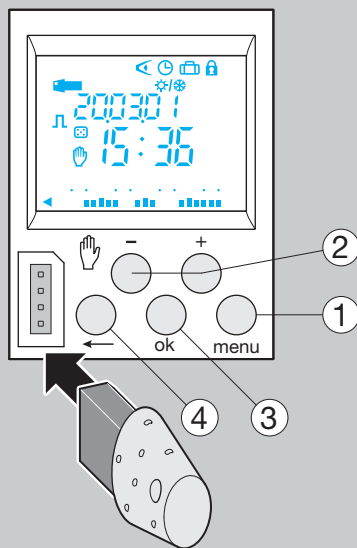
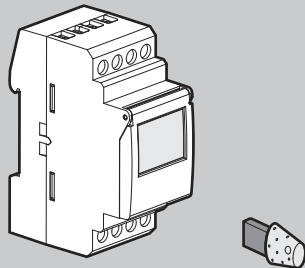
### 1 Channel Electronic Time Switches Weekly Cycle

#### EG103

**EG103E** with override entry,

**EG103V** with 12-24V voltage supply

#### 1 Channel



#### Keys

- ① Menu : Selection of operating mode
- Auto** : Mode of running according to the program selected.
- Prog** : New for programming mode.
- Prog** : Modif to modify an existing program.
- ◀ : Checking of the program.
- ⌚ : Modification of time, date and selection of the winter / summer time change mode .
- 📅 : Holidays.
- ② + and - : Navigation or setting of values.
- 👉 : In auto, mode, selection of overrides, waivers or random operation
- ③ OK : To validate flashing information on display.
- ④ ◀... : To return to the previous step.

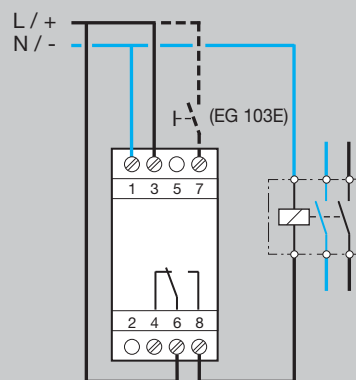
You may return into auto mode at any moment using menu.  
If no action is taken for 1 min, the switch returns into auto mode.

### Major characteristics

- Product delivered with current time and date set
- Automatic change of winter / summer time ⌚/⌚
- Programming key 🖱
  - For permanent waivers
  - For program copy or save
- Programming for day or group of days
- 56 program steps On, Off
- Impulses ⏏ (1 sec to 30 min)\*
- Permanent overrides On or Off (👉 permanent light on)
- Temporary overrides On or Off (👉 flashing)
- Holiday mode 📅 : overrides On or Off between two dates\*
- Simulation of presence 🏠 \*
- Display bar graph of daily profile
- Keyboard locking possible 🔒
- Programmable with power off
- Back lit display\*

\* Evolution models E or V only

### Connection Diagram

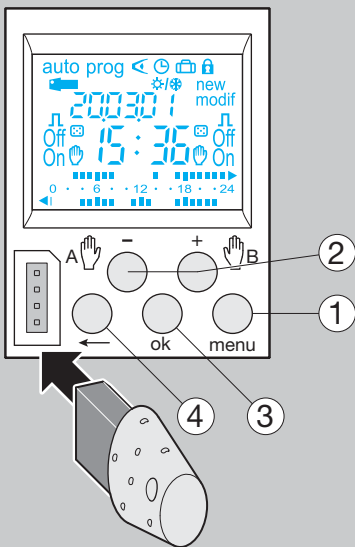
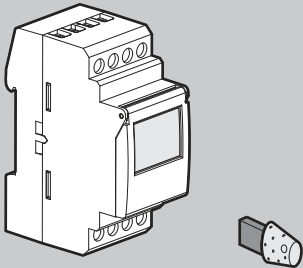


**EG103, EG103E EG103V**

## 2 Channel Electronic Time Switch Weekly Cycle

2 channel electronic time switches weekly cycle.  
EG203  
EG203E

### 2 Channel



### Keys

- ① Menu : Selection of operating mode
- Auto : Mode of running according to the program selected.
- Prog : New for programming mode.
- Prog : Modif to modify an existing program.
- ◀ : Checking of the program.
- ⌚ : Modification of time, date and selection of the winter / summer time change mode .
- 📅 : Holidays.
- ② +and- : Navigation or setting of values.
- A 🖐 - : In auto, mode, selection of overrides,
- B 🖐 - : Waivers or random operation
- ③ ok : To validate flashing information on display.
- ④ ◀... : To return to the previous step.

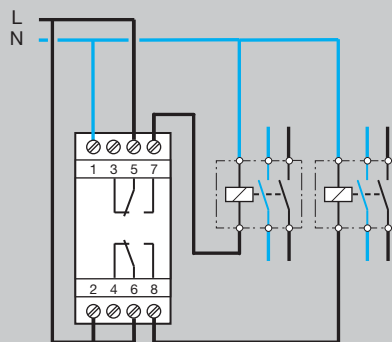
You may return into auto mode at any moment using menu.  
If no action is taken for 1 min, the switch returns into **auto** mode.

### Major characteristics

- Product delivered with current time and date set
- Automatic change of winter / summer time ⚙️/⚙️
- Programming key 🖐
  - For permanent waivers
  - For program copy or save
- Programming for day or group of days
- 56 program steps On, Off
- Impulses ⚡ (1 sec to 30 min)\*
- Permanent overrides On or Off (🖐 permanent light on)
- Temporary overrides On or Off (🖐 flashing)
- Holiday mode 📅 : overrides On or Off between two dates\*
- Simulation of presence 🏠 \*
- Display bar graph of daily profile
- Keyboard locking possible 🔒
- Programmable with power off
- Back lit display\*

\* evolution models E only

### Connection diagram



EG203, EG203E

## Digital Time Switch - EG010

### Technical Specifications

#### Electrical Characteristics

- Voltage supply : 230V +10/ -10% 50/60 Hz
- Consumption: 1VA
- Output : 1 changeover contact  
16A - 250V ;AC1  
3A - 250V cosw = 0.6  
1000W incandescent lighting

#### Functional Characteristics

- 5 adjustable pre-recorded programs
- Accuracy: +/- 6 min / year
- Supply failure reserve: total of 3 years

#### Environment

- Working temperature: -10 to +50°C
- Storage temperature: -10 to +60°C

#### Connection Capacity

- 1 to 4mm<sup>2</sup>

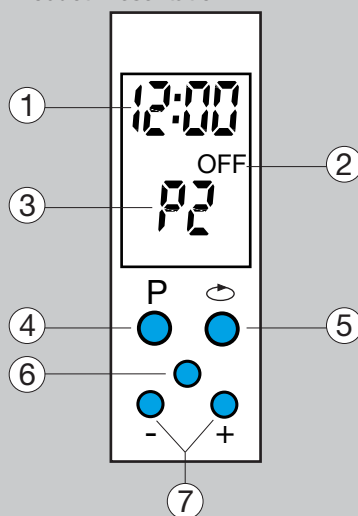
#### Main Characteristics

- Easy to program: 5 programs are pre-recorded. The user just have to select the program which corresponds to its use and modify time switches if necessary.

The 5 pre-registered programs are as follows

P	Prog
P0	OFF
P1	ON
P2	6.00 23.00
P3	6.00 8.00 17.00 23.00
P4	6.00 8.00 11.00 13.00 17.00 23.00

### Product Presentation



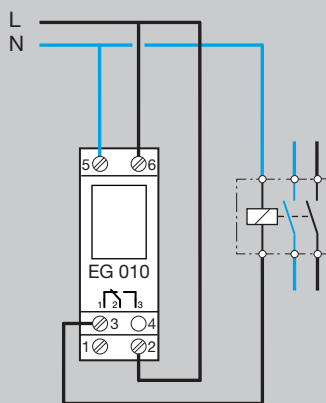
#### Display

- ① Time
- ② Circuit Status
- ③ Program Selection

#### Buttons

- ④ P to select the program to apply
- ⑤ Reset
- ⑥ ⤴ to scroll program steps
- ⑦ + and - : to input time

### Electrical Connection



## Digital Time Switch - EG071

### Technical Specifications

#### Electrical Characteristics

- Voltage supply : 230V +10/ -10% 50/60 Hz
- Consumption: 1VA
- Output : 1 changeover contact  
16A - 250V ;AC1  
3A - 250V cosw = 0.6  
1000W incandescent lighting

#### Functional Characteristics

- 20 program steps
- Each program step can be applied to one of several days
- Accuracy: +/- 6 min / year
- Supply failure reserve: total of 3 years

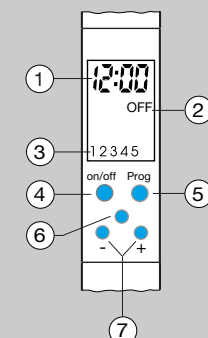
#### Environment

- Working temperature: -10 to +50°C
- Storage temperature: -10 to +60°C

#### Connection Capacity

- 1 to 4mm<sup>2</sup>

### Product Presentation



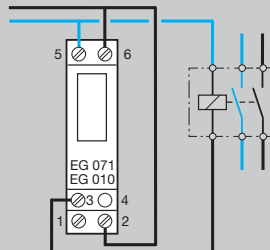
#### Display

- ① Time
- ② Circuit Status
- ③ Days of the week

#### Buttons

- ④ ON / OFF : to select the circuit status
- ⑤ Reset
- ⑥ Prog: to program the device and scroll program steps
- ⑦ To input time and day

### Electrical Connection





### Delay Timers

Delay timer devices are used to control a variety of processes where the requirement is for switching circuits on, off or delaying the on or off switching for a pre-set period of time. Typical device types are...

- Delay on - intended to delay the starting or switching of a circuit for a set period of time following the command signal e.g. to delay the starting of motor loads where a large number of motors are to be started by the same switch to reduce the effects of the starting currents.
- Delay off - intended to delay the stopping or switching off of a circuit for a set period of time following the removal of the command signal e.g. to overrun an extractor following the switching off of a process that creates fumes.
- Adjustable time on - intended to switch on for a set period, the command signal must remain on throughout the set period e.g. to switch on two sets of heaters with one set (the boost) switching off after the set period.
- Impulse timer - intended to switch on for a set period, the command signal length is not important e.g. to boost a time clock controlled circuit such as a water storage heater.
- Symmetrical timer - intended to toggle a circuit on and off in regular time patterns e.g. to run an extractor intermittently.

Multifunction timer - 6 individual functions

A = Timer.

B = Delay off (output relay opens either at end of command or after set time period - whichever is shorter).

C = Delay off.

D = Delay on.

E = Delay on (output relay closes either at end of command or after set time period - whichever is shorter).

F = Symmetrical timer.

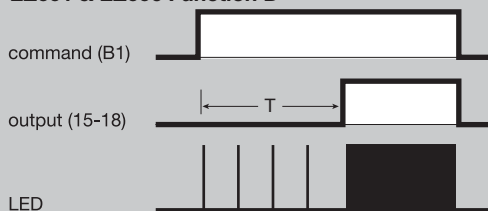
On selection - contact permanently closed

Off selection - contact permanently open

- \_\_\_\_\_ Output relay open - with no command
- | | | | | Output relay open - with command signal running
- \_\_\_\_\_ Output relay closed - with command signal running
- | | | | | Output relay close - with command signal removed
- \_\_\_\_\_ Output relay closed (EZ005)

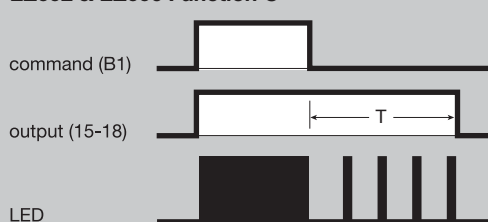
### Delay On

#### EZ001 & EZ006 Function D



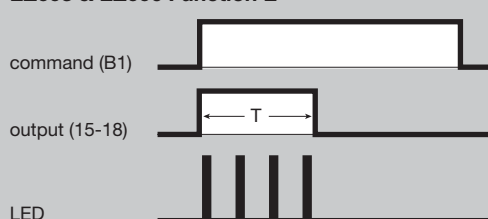
### Delay Off

#### EZ002 & EZ006 Function C



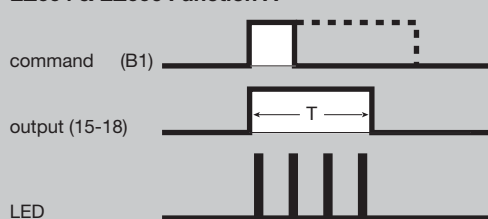
### Adjustable Time On

#### EZ003 & EZ006 Function E



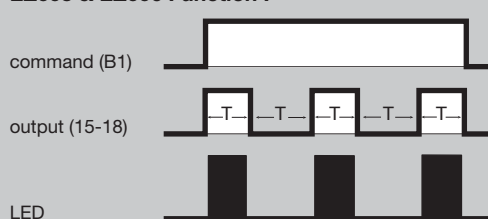
### Impulse Timer

#### EZ004 & EZ006 Function A



### Symmetrical Timer

#### EZ005 & EZ006 Function F



### Technical Specifications

<b>Product</b>	<b>EZ001, EZ002, EZ003, EZ004, EZ005, EZ006.</b>
<b>Electrical characteristics</b>	
Supply voltage	24-28 Vdc (+10% - 15%) terminals A1 & A2 24-230 Vac (+10% - 15%) terminals A1 & A2 12 Vac & dc (+10% -10%) terminals A3 & A2
Output	1 volt free C/O contact
<b>Life expectancy</b>	
Max load AC1	10A / 230V~ 50,000 cycles
Incandescent	450W~ 100,000 cycles
Fluorescent non comp.	600W~ 50,000 cycles
Inductive load 0.6pf	5A / 230V~ 100,000 cycles
<b>Min power</b>	
AC	100mA at 230V
DC	100mA at 12V
<b>Galvanic isolation</b>	2kV
<b>Standard / Norm</b>	EN60669-2-1
<b>Functional characteristics</b>	
Timer range	0.1s - 10 hours
<b>Min. command period</b>	
AC	50ms
DC	30ms
<b>Operating temperature</b>	
Working	-20°C to +50°C
Storage	-40°C to +50°C
<b>Connection Capacity</b>	
Flexible	1 - 6 mm <sup>2</sup>
Rigid	1.5 - 10 mm <sup>2</sup>

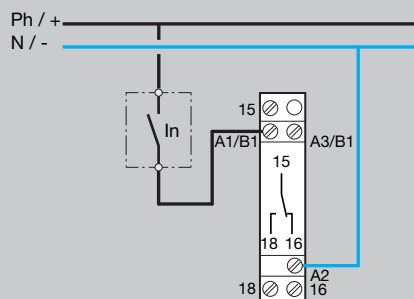
### Functional characteristics

**EZ001, EZ003, EZ005, EZ006 (functions D,E,F)**

CD : Command.

O : Output.

T : Time delay.

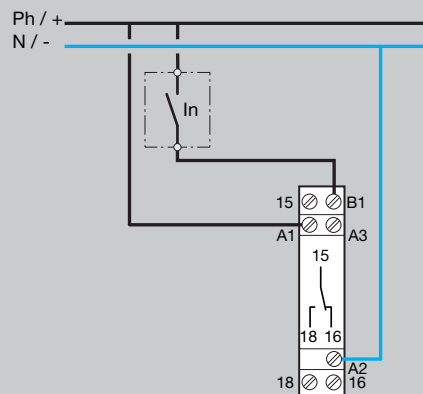


### EZ002, EZ004, EZ006 (functions A,B,C)

indicator light (for versions with NO contact).

ON

OFF



### Each time delay bracket is divided into 4 ranges

Time Delay Brackets	1s to 1h	0.1min to 10h	0.1s to 10min	0.2min to 20h
Ranges	1s to 10s	0.1min to 1min	0.1s to 1s	0.2min to 2min
	0.1min to 1min	1min to 10min	1s to 10s	2min to 20min
	1min to 10min	0.1h to 1h	0.1min to 1min	0.2h to 2h
	0.1h to 1h	1h to 10h	1min to 10min	2h to 20h

### Environment

working temperature: -10°C to +60°C.

storage temperature: -20°C to +70°C

### Time Lag Switches

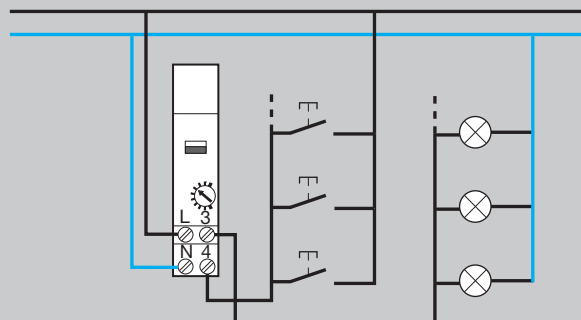
A common area where time delay devices are used is stairways and corridors in multi occupancy buildings where they provide a level of energy efficiency. The EM001N device provides basic time lag control that can be enhanced to offer a pre-warning by adding a EM002 device, suitable only for incandescent and halogen loads up to 1000W.

#### Technical Specifications

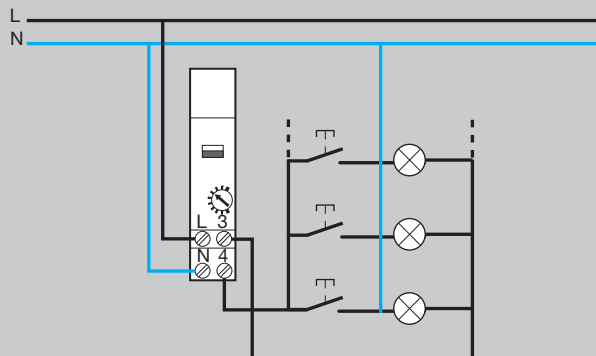
Cat Ref.	EM001N	EM002
<b>Electrical characteristics</b>		
Supply voltage	230V +10 - 15%	230V +10 - 15%
	50/60 Hz	50/60 Hz
Consumption	1VA	0.5 W permanent 8 W max.
Size	1	-
<b>Breaking capacity</b>		
AC1	16A 230V AC	4A 230V~
Incandescent	2300W	1000W
Halogen 230V	2300W	1000W
Fero magnetic transformer	1600W	-
Parallel compensated	Capacitor 112µF	-
Fluorescent lamps	1000W	
Series compensated	3600W	-
Fluorescent lamps		
Electronic transformer	2300W	-
Compact fluorescent lamps with electronic ballast	60 x 7W or 40 x 11W or 32 x 15W or 20 x 23W	-
with conventional ballast	2300W	-
<b>Functional characteristics</b>		
Time delay	30s to 10 min	24s
Retrigger	Yes	-
Max. current in rest position	100 mA	-
Automatic 3/4 recognition	Yes	-
Local command	Automatic / Override ON	-
<b>Environment</b>		
Working temperature	-10 to +55°C	-15 to +55°C
Storage temperature	-20 to +60°C	-25 to +70°C
<b>Connection</b>		
Flexible (mm²)	1 to 6	1 to 6
Rigid (mm²)	1.5 to 10	1.5 to 10
Connection EM001/EM002	-	2 wires 1.5

#### Wiring Diagrams

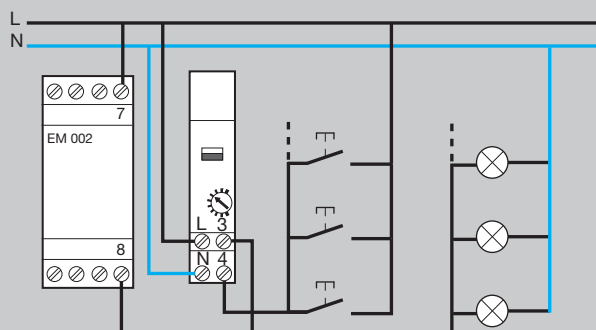
##### 4-Wire



##### 3-Wire



##### Combination EM002 with EM001N



### Light Sensitive Switches

Using light sensitive switches can prevent the unnecessary use of lighting circuits where sufficient daylight exists. The benefit of modular devices is the facility to set the ambient lighting level at which the device will operate, and as the device is fitted at the distribution point prevent unauthorised tampering. The remote photocell unit can be mounted up to a distance of 50 metres from the device. Two devices are available the standard EE100 light sensitive switch and an enhanced programmable version the EE171 that allows time clock control also.

### Principle of Operation

Both devices control lighting systems according to natural illumination;

- The user sets the working level;
- The photo cell measures the external light level

The output of the EE100 is:

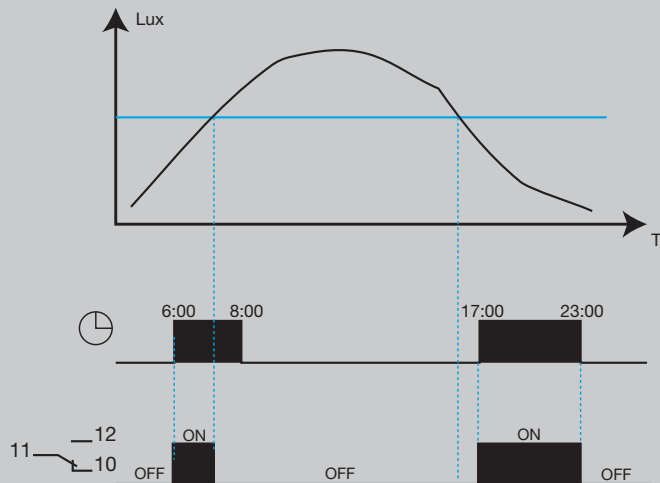
- ON, when the measured level is lower than the pre-set light level
- OFF, when the measured level is higher than the pre-set light level

The output of the EE171 during the programmed ON time period is:

- ON, when the measured level is lower than the pre-set light level
- OFF, when the measured level is higher than the pre-set light level

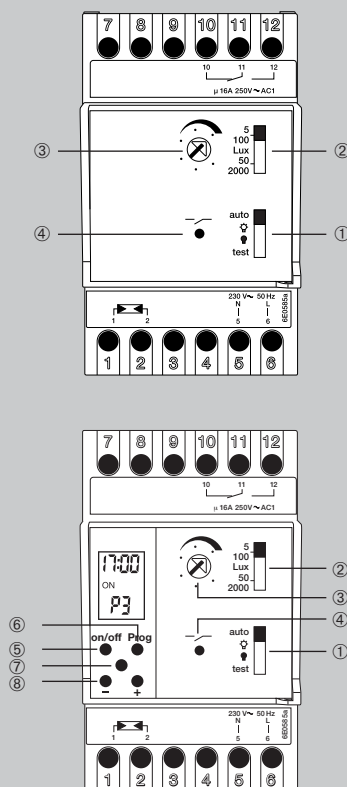
The output of the EE171 during the programmed off time period is:

- OFF, regardless of the lighting level



The light sensitive switches include a built in time delay which avoids unnecessary switching due to temporary factors such as car head-light beams etc...

### Description

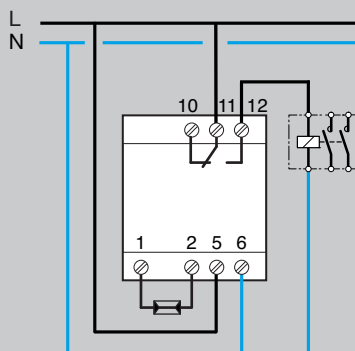


The programmable light sensitive switch EE171 has two main functions:

- Light sensitive switch comprising
  - ① Override selector switch to allow permanent ON or OFF, auto or test mode
  - ② Lighting range selector
  - ③ Potentiometer to set light level
  - ④ Indicator to show output switching status
- A programmer to establish the automatic operating cycle

The programmer comprises 4 keys:

- ⑤ **ON / OFF** to choose whether the circuit is on or off.
- ⑥ **Prog** to set the program and scroll program steps
- ⑦ **Reset**
- ⑧ **+** and **-** to change settings



### Mounting the Cell

To ensure correct operation of the light sensitive switch, the cell must not be influenced by artificial light or direct solar radiation and should be sheltered from dust and humidity. In case of disconnection of the link between the cell and the light sensitive switch, the output of the device will be switched on. Make sure the light sensitive switch is unplugged before connecting the cell.

Cells	EE002	EE003
Type	Flush mounting	Surface mounting
Dimensions (mm)	89 x 48 x 32	25 x 25 x 20 hole Ø 25mm
Connection	cable 1m 2 x 0.75mm <sup>2</sup>	0.75 to 4mm <sup>2</sup>
Protection class	IP54	IP54
Working & storage temperature	-30°C to +60°C	-30°C to +60°C

### Adjustment of the Working Level

The test position of the override selector 1 makes setting the preset level easier by removing the ON and OFF delay.

Select the sensitivity range which suits your application (selector 1)  
5 to 100 lux (low light level) application examples; public lighting, shop windows, signals...

50 to 2000 lux (high light level) application examples; controls of shades

At the appropriate moment of the day, put the selector 1 in test position; turn the potentiometer 2 up to the switching point (the indicator 4 lights); put the selector back to position 'auto' the normal operating mode of the device.

### Technical Specification

#### Electrical specification

- Voltage rating: 230V - + 10/-15% 50Hz
- Consumption: 1.5VA max
- Output: 1 voltage free changeover contact,  
max breaking capacity: AC1 16A 250V~  
incandescent lamp: 2000W 230V~  
halogen lamp: 1000W 230V~  
fluorescent lamp:  
uncompensated: 1000W 230V~  
compensated in series (10µF) 1000W 230V~  
// compensated (15µF): 200W 230V~  
duo: 1000W 230V~

#### Functional Characteristics

- 2 sensitivity range 5 to 100 lux, 50 to 2000 lux
- Weekly cycle\*
- 8 pre defined programs\*
- Program setting: 1 minute increments\*
- Accuracy: + 6 min. / annum\*
- Operating reserve: lithium battery total of 3 years supply failure\*
- On and Off delay: 15 to 60s
- Working temperature: -30°C to +60°C (cell)  
-10°C to +50°C (modular device)
- Storage temperature: -20°C to +60°C
- Protection class (cell): IP54
- Insulation class (cell): II

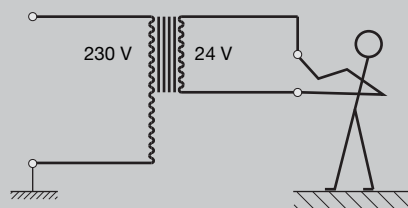
#### Connection Capacity

- Modular device: 0.5 to 4mm<sup>2</sup>
- Cell: 0.75 to 2.5mm<sup>2</sup>  
max. length between cell and modular device: 50m  
mounting of the cell with 2 screws: 2.5mm

\* items marked EE171 only.

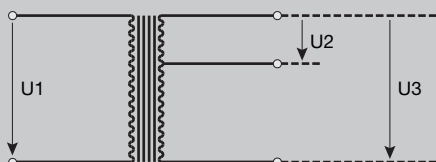
### Safety Transformers

These transformers are designed to ensure personal safety, their primary winding are electrically separated from their secondary windings and they are intended to feed safety extra low voltage circuits  $U \leq 50V$ . A thermal overload, in the primary windings, ensures that if a short circuit or an overload occurs in the output it will not damage the device.



### Bell Transformers

Bell transformers are similar to safety transformers but the secondary voltages do not exceed 24 volts, they are also similarly protected against short circuits and overloads, by thermal protection in the primary winding.



### Compliance with the Standards

The bell and safety transformers conform with EN 60742 (BS 3535). Where transformers are to be used in a common enclosure with other devices heat dissipation inserts LZ060 should be used.

### Technical Specification

Reference		ST301	ST303	ST305	ST312	ST313	ST314	ST315
Nominal power		4VA	8VA	16VA	25VA	16VA	40VA	60VA
Designation		Bell	Bell	Bell	Safety	Safety	Safety	Safety
Primary voltage		230 volts	230 volts	230 volts	230 volts	230 volts	230 volts	230 volts
	U2	12 volts	8 volts	8 volts	12 volts	12 volts	12 volts	12 volts
		In = 0.33A	In = 1A	In = 2A	In = 2.08A	In = 1.33A	In = 3.33A	In = 5.25A
Secondary voltage								
	U3	12 volts	12 volts	12 volts	24 volts	24 volts	24 volts	24 volts
		In = 0.5A	In = 0.67A	In = 1.33A	In = 1.04A	In = 0.67A	In = 1.67A	In = 2.63A
No load	U2	12 volts	15 volts	12.4 volts	14 volts	15.5 volts	13.7 volts	13.6 volts
Secondary voltage								
	U3	18 volts	21.8 Volts	18.5 Volts	29 Volts	29.7 V	26.5 Volts	27 Volts
Galvanic isolation		4kV	4kV	4kV	4kV	4kV	4kV	4kV
Max functional temperature		35°C	35°C	35°C	35°C	35°C	35°C	35°C
Overload and S/C protection		Thermal cut out in the primary winding						

Number of products that can be operated simultaneously by a transformer

Transformer	Reference	ST301	ST303	ST305	ST312	ST313	ST314	ST315R
		8V 12V	8V 12V	8V 12V	12V 24V	12V 24V	12V 24V	12V 24V
Power		4 4	8 8	16 16	25 25	16 16	40 40	63 63
Bell	SU212 8/12V	1 1	3 2	5 3	- -	- -	- -	- -
Buzzer	SU214 8/12V	1 1	3 2	5 3	- -	- -	- -	- -
Relays	ER124 12V	- -	- -	- -	4 -	2 -	7 -	8 -
	ER139 12V	- -	- -	- -	2 -	1 -	3 -	4 -
	ER123 24V	- -	- -	- -	- 2	- 2	- 7	- 8
	ER138 24V	- -	- -	- -	- 2	- 1	- 3	- 4
Contactors	ES224 24V	- -	- -	- -	- 5	- 3	- 11	- 12
	ES424 24V	- -	- -	- -	- 3	- 2	- 7	- 8
Latching relays	EPN519 12V	- -	- -	- 2	3 -	2 -	4 -	4 -
	EPN529 12V	- -	- -	- 1	2 -	1 -	3 -	3 -
	EPN513 24V	- -	- -	- -	- 2	- 2	- 3	- 3
	EPN518 24V	- -	- -	- -	- 2	- 2	- 3	- 3
	EPN525 24V	- -	- -	- -	- 2	- 2	- 3	- 3
	EPN528 24V	- -	- -	- -	- 2	- 1	- 3	- 3
	EPN541 24V	- -	- -	- -	- 2	- 1	- 3	- 3

### Technical Specifications

#### Electrical characteristics

- Voltage supply: 230V + 10 - 15% 50/60 Hz
- Consumption: 1.5VA
- Output: 1 changeover contact  
2A 230V ~ AC1

### Functional Characteristics

- 4 temperature ranges
- 30 to 0°C
- 0 to +30°C
- +30 to +60°C
- +60 to +90°C
- Varying accuracy

### Environment

- Working temperature: -10 to +50°C
- Storage temperature: -20 to +70°C

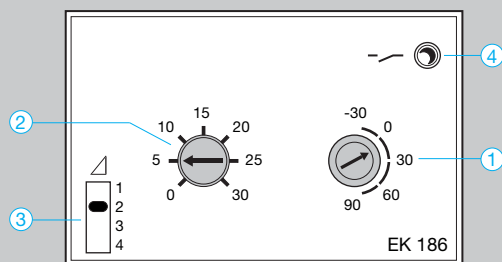
### Connection Capacity

- Flexible: 1 to 6mm<sup>2</sup>
- Rigid: 1.5 to 10mm<sup>2</sup>
- Probe: Maximum distance 50m

### Main Characteristics

- **Multiple applications**  
A single device to solve all your problems of regulation or temperature control, from cold room to incubator.
- **Varying accuracy**  
The accuracy can be adapted according to the application. e.g.: low for ambient temperature regulation, high for incubator regulation.
- **Safety feature for probe failure**  
To protect the installation in case of disconnection from the probe, various connections can be made so the thermostat will be:
  - Permanent OFF
  - Permanent ON
  - Cyclical operation: output ON 1 minute in every 4.
- Display  
State of output.

### Product Presentation



- ① Selection of the range
- ② Adjustment of the temperature setting
- ③ Selection of temperature range
- ④ Display of state of output

### Working Principle

the EK186 regulates the temperature according to all or nothing principle, it can be associated with different probes, according to the application the accuracy is a function of the temperature range and is selected by a slide switch.

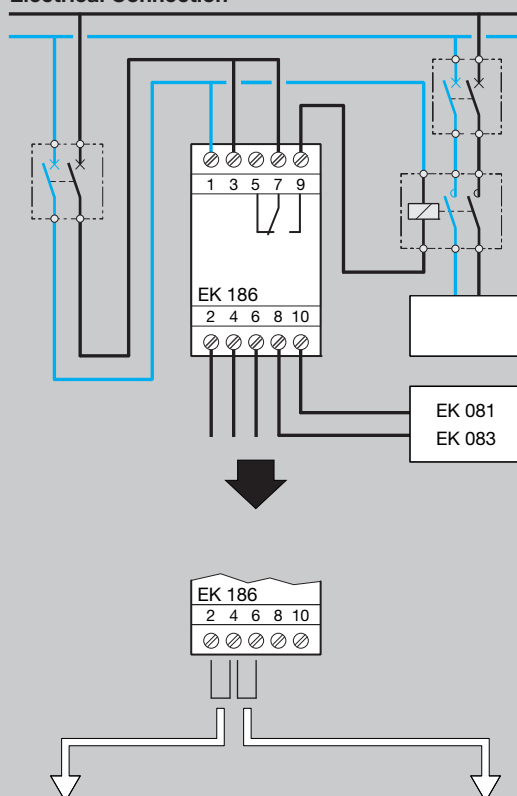
Position on slide switch	The temperature range °C			
	-30 to 0	0 to 30	30 to 60	60 to 90
1	± 2.15	± 2.54	± 2.98	± 3.43
2	± 0.15	± 0.18	± 0.21	± 0.24
3	± 0.38	± 0.45	± 0.53	± 0.61
4	± 1.23	± 1.45	± 1.70	± 1.96

**Bold** - Preferential accuracies for each temperature range.

### Example of choice of accuracy

- Regulation of ambient temperature  
Range : 0 to +30°C  
Accuracy : ± 0.18°C = 2
- Control of hot water outgoing circuit  
Range : 30 to +60°C  
Accuracy : ± 0.53°C = 3

### Electrical Connection



### Caution

When the temperature ranges 30 to 60°C and 60 to 90°C are selected and the temperature measured by the probe is below 30°C, the safety feature for probe failure must be "permanent on", until the measured temperature reaches the minimum temperature corresponding to the range (i.e. 30°C for the range 30°C to 60°C and 60°C for the range 60°C to 90°C).

### Electrical characteristics

- Voltage supply : 230V + 10 - 15% 50/60 Hz
- Consumption : 1.5VA
- Output: 1 changeover contact  
2A 230V;AC1

### Functional Characteristics

- 3 temperature controllable by external setting
  - Comfort: adjustable from +5 to +30°C
  - Reduced: decrease 2 to 8°C in comparison with comfort setting
  - Dispensation: adjustable from +5 to +30°C
- Accuracy:  $\pm 0.2^\circ\text{C}$

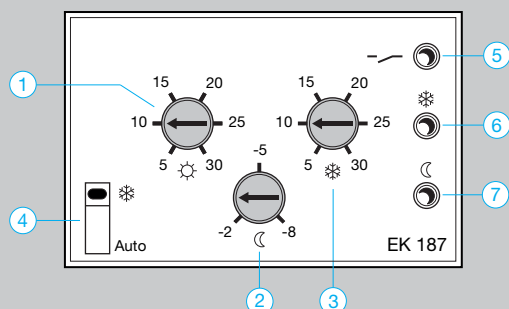
### Environment

- Working temperature:  $-10$  to  $+50^\circ\text{C}$
- Storage temperature:  $-20$  to  $+70^\circ\text{C}$

### Connection Capacity

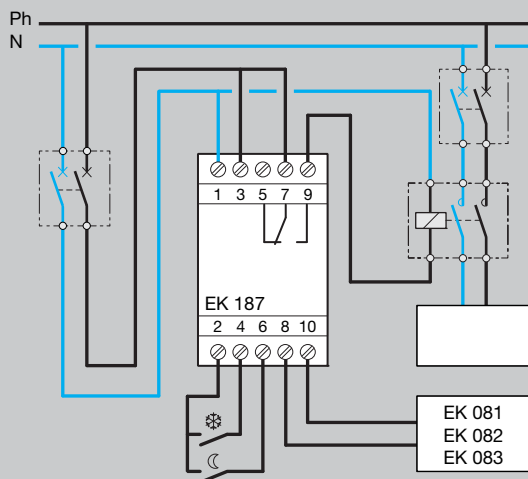
- Flexible: 1 to 6mm<sup>2</sup>
- Rigid: 1.5 to 10mm<sup>2</sup>
- Probe: maximum distance 50m

### Product Presentation



- ① Reference setting: comfort TO
- ② Decrease in comparison with reference setting: reduced to TO
- ③ Dispensation setting
- ④ Dispensation setting override
- ⑤ Display of state of output i.e. contact position
- ⑥ Pilot light indicating the regulation in comparison with a dispensation setting
- ⑦ Pilot light indicating the regulation in comparison with a reduced setting

### Electrical Connection



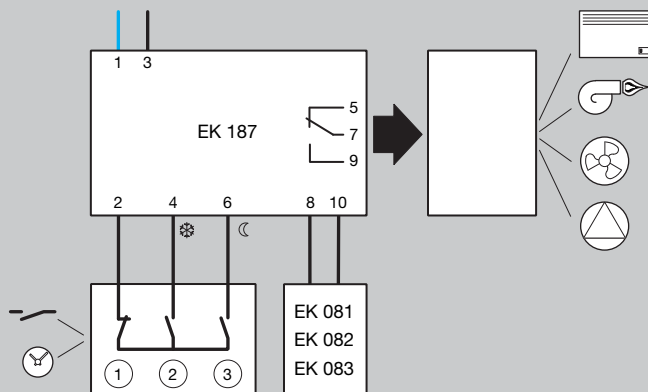
### Main Characteristics

- **Temperature settings controllable by external setting** when associating a digital time switch, it is possible to regulate the heating in relation with a program established by the user.
- **2 wires link** between the probe and the unit, enables the easy replacement of the ambient thermostats of an existing installation.
- **Safety feature for "probe failure"** in case of probe disconnection, the output will be switched 1 minute in every 4; so that in case of disconnection during winter, it will protect the installation from frost.
- **Display** of state of the output and of the setting.

### Working Principle

EK187 adjusts the temperature under the "all or nothing" principle it is associated to an ambient probe and thus works in closed loop the temperature settings are selected by external settings (contacts free of potential)

EK187 is thus generally associated to a time switch or a digital time switch in the case of absence of external signal, EK187 regulates the heating in comparison with the reference setting, a switch enables the override of the dispensation setting



①	↗	↗	↗	↗	↘	↘	↘	↘
②	↘	↘	↘	↘	↗	↗	↗	↗
③	↘	↘	↗	↗	↘	↘	↘	↘
	☀	☀	☀	☀	☀	☀	☀	☀



### Technical Specifications

#### Electrical characteristics

- Voltage supply: 230V + 10 - 15% 50 Hz
- Consumption: 4VA
- Output: 1 changeover contact  
2A 240V ~AC1

### Functional Characteristics

- Adjustment of temperature setting "comfort and reduced temp."  
From +8 to +28°C
- Fixed anti-frost temperature setting: +8°C
- Fixed accuracy:  $\pm 0.2^\circ\text{C}$
- Weekly cycle
- Programming capacity: 24 program steps
- Program setting: 1 minute increments
- Accuracy:  $\pm 5$  min./annum
- Supply failure reserve: 24h
- Loss of time setting only, program still in memory

### Environment

- Working temperature:  $-5$  to  $+45^\circ\text{C}$
- Storage temperature:  $-20$  to  $+60^\circ\text{C}$

### Connection Capacity

- Flexible: 1 to 6mm<sup>2</sup>
- Rigid: 1.5 to 10mm<sup>2</sup>
- Probe: Maximum distance 50m

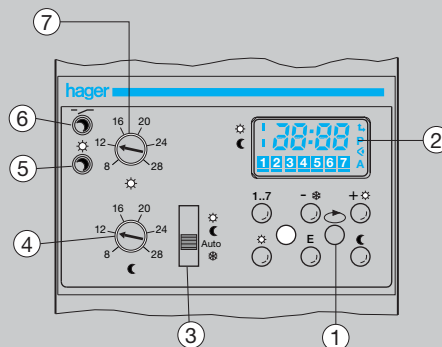
### Main Characteristics

- **Simplified summer/winter time setting**  
Summer/winter time setting is obtained by pressing two separate keys
- **No loss of program in event of unlimited power failure**  
Loss of time setting only, program still in memory
- **Override**
  - Permanent: "comfort, reduced, anti-frost" temperature setting:
  - With automatic return to: "comfort and reduced" temperature setting:
- **2 wires link**  
Between the probe and the unit, this enables the easy replacement of the ambient thermostats in an existing installation
- **Display Mode**  
Allows program to be checked without risk of alteration
- **Groups of days**  
Days can be grouped in order to save program steps (so, a common setting for several days counts only as 1 program step)

### Working Principle

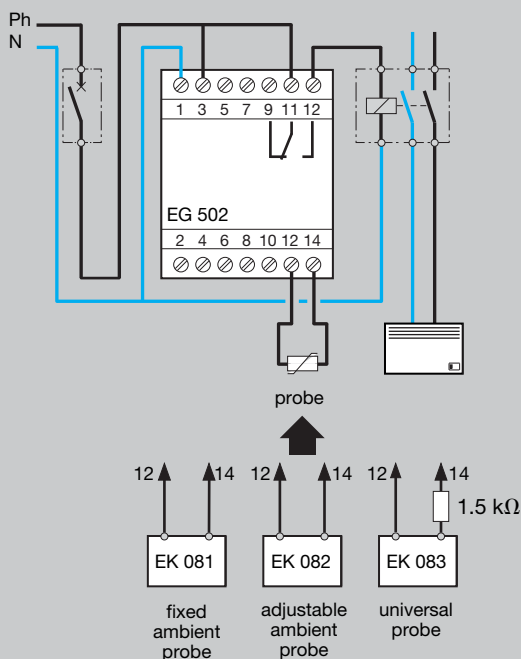
The programmable thermostat regulates the heating thanks to 2 temperature settings: "comfort" and "reduced", according to a program established by the user; in cases of long absence, it is possible to maintain an anti-frost temperature

### Product Presentation

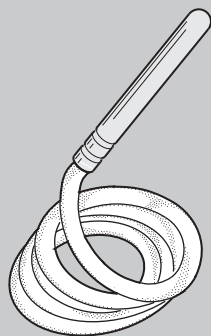


- ① programming of automatic cycle "comfort temperature", "reduced temperature", the principle of programming is similar to EG100.
- ② LCD screen
- ③ Facility for permanent override of "comfort temperature", "reduced temperature", or "anti-frost"
- ④ Adjustment of the reduced temperature setting
- ⑤ Display of setting (comfort or reduced)
- ⑥ Display of state of output
- ⑦ Adjustment of the comfort temperature setting

### Electrical Connection



### EK083 Universal Probe



- To associate with EK186 thermostat
- To associate with EK187 thermostat and EK618 time programmable thermostat (for those applications insert in series with the probe a resistance of 1500Ω)

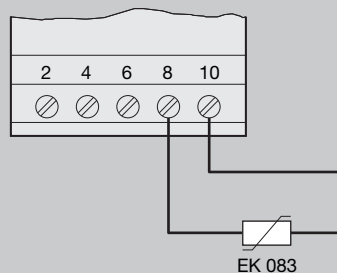
EK083: 10 kOhms at 25°C  
cable length: 4m

#### Environment

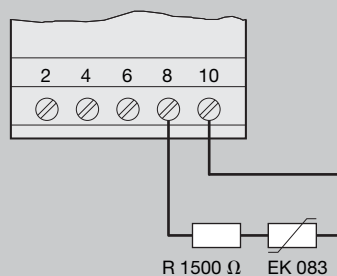
- Working temperature: -30 to +90°C
- Stocking temperature: -30 to +100°C

#### Electrical connection

- Associated with EK186



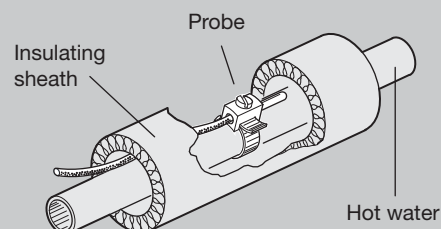
- Associated with EK187 - EK618



### Examples of Applications

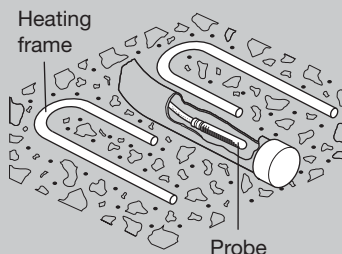
#### Use with the clamp collar

- For the control of hot water

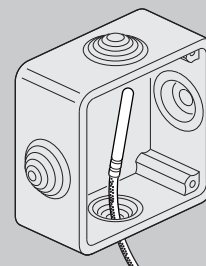


#### Use with the clamp collar

- Protected by a sheath for the control of floor temperature



- Used as an external probe in a weatherproof box.



### Resistance of probes according to temperature

Temperature	EK083	EK081*	EK081** EK082
T (°C)	R (KΩ)	R (KΩ)	R (KΩ)
+90	0.91	On a wall	-
+80	1.25	1.25	2.83
+70	1.75	1.75	3.33
+50	3.60	3.60	5.18
+30	8.06	8.06	9.64
+25	10	10	11.58
+20	12.49	12.49	14.07
+15	15.71	15.71	17.28
+10	19.90	19.90	21.48
+5	25.39	25.39	26.98
+0	32.65	32.65	34.23
-5	42.31	-	-
-10	55.29	-	-
-15	72.89	-	-
-20	96.97	-	-
-25	130.24	-	-
-30	176.68	-	-

Face value at 25°C

Note: \* Association with EK186

\*\* Association with EK187 and EK618

## Digital Voltmeters, Ammeters & Hours Counter

### Technical Specification

- Working voltage : 230 V~ 50/60 Hz - resolution : 1 unit
- Update of the display: 3 / seconds
- Input impedance > 1 MV for the voltmeter SM501
- Isolating resistance : 10 MV
- Maximum voltage: 660 V - number of digits : 3

### Connection

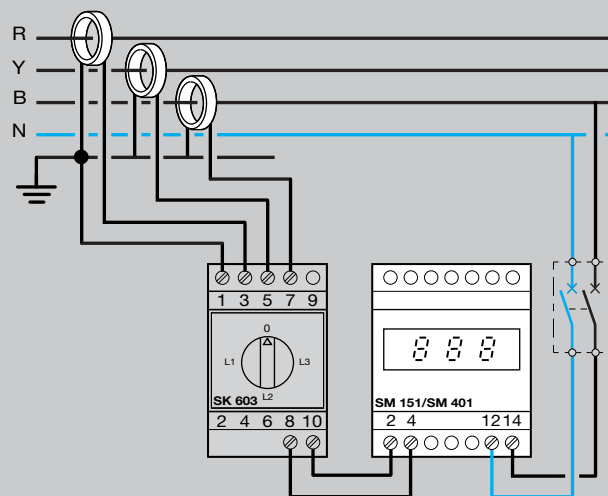
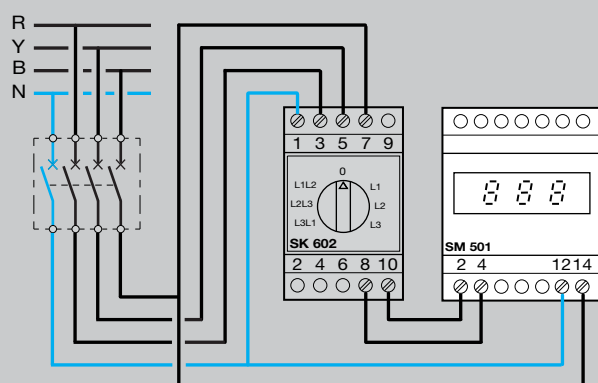
- Flexible: 6mm<sup>2</sup>
- Rigid: 10mm<sup>2</sup>

### Environment

- Working temperature: -10 to +55 °C
- Storage temperature : -40 to +70 °C

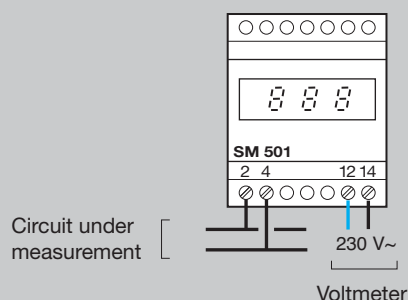
Cat Ref.	Product	Range	Consump.	Accuracy %	Ref. Temp °C	Accuracy Variation °C	Maximum continuous	Momentary maximum	Frequency Hz	Isolating voltage
SM501	Voltmeter	500V	≤4.5 VA	± 1	23 ± 1°C	± 0.03% / °C	1.2 Un	2 Un / 5 sec.	45-65	2kV/50Hz - 1 min
SM151	Ammeter	0-150A	≤1 VA	± 1	23 ± 1°C	± 0.03% / °C	2 In	10 In / 5 sec.	45-65	2kV/50Hz - 1 min
SM401	with CT	0-400A								

### Electrical Connection

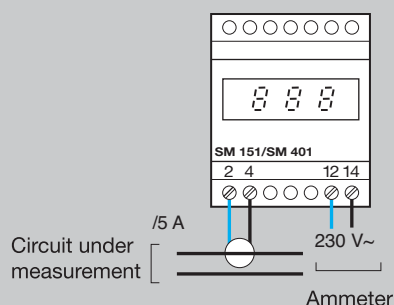


### Electrical Connection

#### SM501



#### SM151, SM401



### Hours Counter

#### Technical Specifications

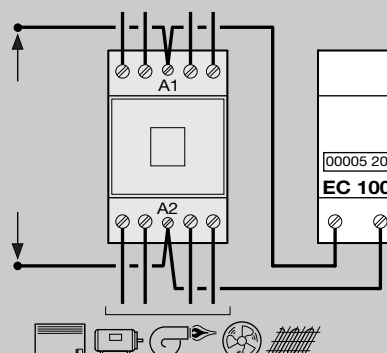
#### Electrical Characteristics

- Working voltage: 230V~

#### Electrical Connection

- Connection in parallel on the command of the receiver (contactor coil)

### Electrical Connection



### Technical specification

#### Environment

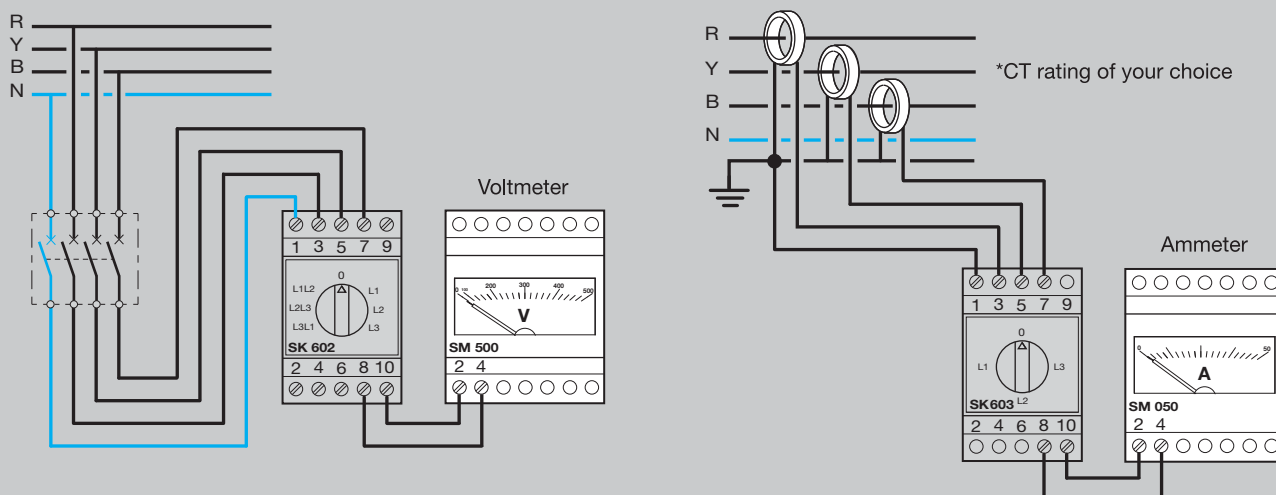
- T° working: -25 to +50 °C
- T° storage: -40 to +80 °C

#### Connection

- Flexible: 1 to 6mm<sup>2</sup>
- Rigid: 1.5 to 10mm<sup>2</sup>

Cat Ref.	Product	Range	Consump.	Accuracy %	Ref. Temp °C	Accuracy Variation °C	Maximum permanent overload	Momentary overload	Frequency Hz	Isolating voltage
SM500	Voltmeter	500V	≤3 VA	1.5	23 ± 2°C	± 0.03% / °C	1.2Un	2Un / 5 sec.	45 - 65	2kV/50H z-1min
SM050	Ammeter	0-50A	≤1.1 VA	1.5	23 ± 2°C	± 0.03% / °C	1.2Un	10Un / 5 sec.	45 - 65	2kV/50H z-1min
SM100	with CT	0-100A								
SM150		0-150A								
SM250		0-250A								
SM400		0-400A								

### Electrical Connection



### Current Transformers (CT)

#### Technical Specification

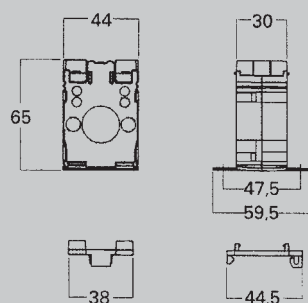
- Secondary current: 0 - 5 A
- Frequency: 50/60 Hz
- Maximum permanent overload: 1,2 In
- Working T°: -25 to +50 °C
- Storage T°: -40 to +80 °C

#### Accuracy Class / VA

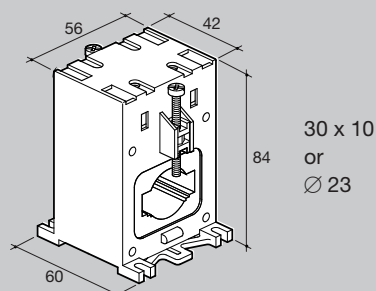
Cat Ref.	Rating	Accuracy %		
		0.5	1	3
SR051	50A	-	1.25	1.5
SR101	100A	2	2.5	3.5
SR150	150A	-	-	1.5
SR200	200A	-	2	3
SR250	250A	-	2	3
SR300	300A	4	8	12
SR400	400A	8	12	15
SR600	600A	12	15	15

### Range of CT's

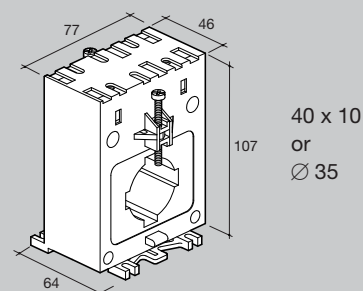
SR051, SR101, for cable Ø 21  
Max busbar 20 x 5mm



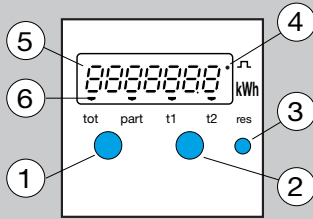
SR 150, SR 200, SR 250, for cable B 23 max  
busbar 30 x 10 max



SR 300, SR 400, SR600, for cable B 35 max  
maximum busbar 40 x 10 max

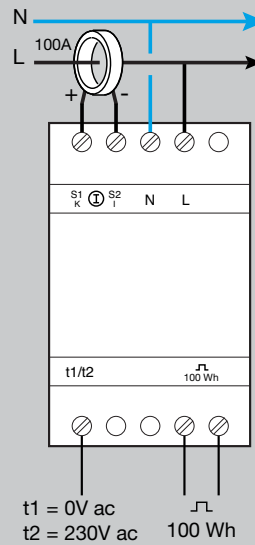


### Technical Specifications EC120 / EC121 Product Presentation

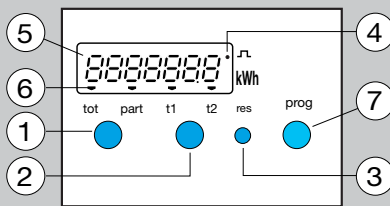


- ① Tot. / part. to select display of total or partial consumption.
- ② t1 / t2 to select display of tariff 1 or 2 (EC121 only)
- ③ Res to reset the partial counter.
- ④ LED flashing every 10Wh.
- ⑤ 7 digit display.
- ⑥ Indication of operating mode.

### Electrical Connection



### Technical Specifications EC320 / EC321 Product Presentation



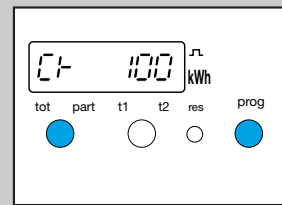
- ① tot. / part. to select display of total or partial consumption.
- ② t1 / t2 to select display of tariff 1 or 2 (EC321 only).
- ③ Res to reset the partial counter.
- ④ LED flashing every 10Wh.
- ⑤ 7 digit display.
- ⑥ Indication of operating mode.
- ⑦ Prog to set the counter (to select the ratio of the CT and the type of network).

### Electrical connection: - ec320 / EC321

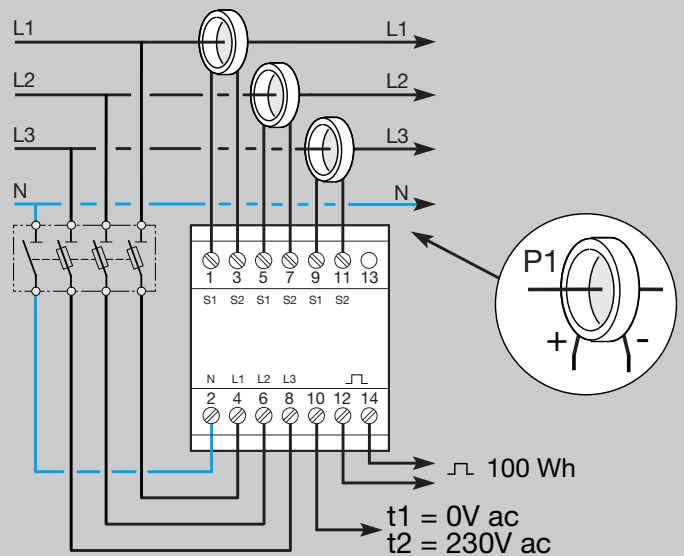
According to the type of network, different connections are possible:

- 4 wires (3 phase + neutral) with 3 CT or 1 CT
- 3 wires (3 phases) with 3CT or 1 CT
- 2 wires (2 phases) with 2 CT

### Current Transformers (C.T.) To set the C.T. ratio



1. Press key Δ for 3 seconds, the counter will display the ratio in memory (CT primary current. 100A pre-registered).
2. Press successively key ⏮ to scroll the different ratios. The display will flash.
3. To register the ratio press key Δ. The display will stop flashing.
4. To switch back to the consumption display, press key Δ for 3 seconds.
5. Available CT ratios are 50 / 100 / 150 / 200 / 250 / 300 / 400 / 600 / 800 / 1000 / 1250 / 1500 : 5



Voltage input		EC050	EC051	EC120	EC121	EC310	EC320	EC321
	Working Voltage	230V ~ ± 20%						
	Frequency	50/60Hz ± 2Hz						
	Comsumption	≤ 7VA		≤ 15VA				
Current Input								
	Measurement	Single phase direct		Single phase with CT		Three phase with CTs		
	Primary current	32A		100A		80A	1500A	
	Secondary current	-		5A		-	5A	
Electrical Characteristics								
	IP rating	IP40						
	Insulation	Insulation class II						
Accuracy								
	Class	Class 1		Class 2				
Functional Characteristics								
	Direct reading:	Unit = 0.1kWh						
	Display capacity	99 999.9 digital						
	Instant consumption	Flashing LED 10Wh						
Pulse output								
	1 Pulse =	-	100Wh duration 100ms	100Wh duration 15ms		100Wh duration 60ms		
Environment								
	Working temperature	-5°C to +45°C						
	Storage temperature	-20°C to +70°C						
	Relative humidity	85% without condensation						
Connection capacity								
	Flexible	1 to 6mm²						
	Rigid	1.5 to 10mm²						
		Installation: for connection with flexible wires, use ferrules						
Size								
	Modlue width	1 mod of 17.5mm		3 mods of 17.5mm		4 mods of 17.5mm		

Saving of measurement are made regularly in case of power failure

Established for over 15 years, Tebis provides an alternative and simplistic approach to control.

Tebis utilises a bus-based approach to control, offering benefits such as increased Flexibility, Functionality, Future proofing and Safety.

Tebis differs from a conventional installation in that there are two distinct circuits; one for power and one for control. With a conventional installation power and switching are combined, which can often be complex when multi-way switching is required.

Wiring simplicity is achieved with Tebis, as the only devices cabled on the LV (240V ac) side are the loads. All controls for these loads are connected to the bus circuit, which is rated at 30V DC.



### Flexibility

The function of any switch can be changed at any time, without the need to touch the wiring.



### Functionality

A single load can be controlled from several positions. Conversely several loads can be controlled from one position.



### Future proofing

Tebis can work with any brand of pushbuttons giving you the choice both now and in the future. Adding extra control points is simply achieved by extending the control bus.



### Safety

The control bus voltage is 30V DC thus increasing the safety of the installation and reducing the risk of electrocution.





Tebis TX system components and accessories	5.2
Input products	5.4
Room controller	5.5
Time switches	5.6
Light sensitive switches	5.7
Presence detectors	5.8
Automation products	5.9
Output products lighting and heating	5.10
Lighting	5.11
Shutters and blinds	5.12
Radio frequency products 2 or 4 inputs (for flush mounting)	5.13
Radio system push buttons and remote controls	5.14
RF products for combination system (flush mounted)	5.15
RF output products (flush mounted) for lighting or shutter control	5.16

Customers who have benefited from using Tebis





## Tebis TX System Components and Accessories



The Tebis system enables the installer and user to control the electrical installation in a simple and comfortable way (lighting, blinds, heating,...)

The Tebis offer includes radio and twisted pair products, which are suitable for use in new installations and renovation. Products comply to the KNX standard.

The products below are the components needed to perform, configure or extend an existing Tebis TX installation.

### TX 100 configurator :

This tool is used for programming of the entire system whether it is wire, radio or both. The dialogue and download with the wire products is carried out via the media coupler.




Other functions :

- Tests the links and commands
- Measurement of radio environment interference level
- Copy of the system data on SmartMedia card for creation of project documentation with additional software.

**SmartMedia card;** Delivered with TX100, TX101 kit.

They allow :

- The back-up of the data for a project and access protection to the system by an identifier (1 card per project)
- Updating of the software of TX100 (system card)

Description	Characteristics	Config-uration	Cet Ref.
 <p>TX101 configuration kit delivered with :</p> <ul style="list-style-type: none"> <li>• TX 100 configurator</li> <li>• TR 130B media coupler with 230V power cable</li> <li>• 2 SmartMedia cards</li> <li>• 4 rechargeable batteries Ni-Mh 1,2 V 1550 mA/h</li> <li>• 230 V / 9 V 1 A mini charger</li> </ul>	<p>Radio frequency: 868.3 Mhz</p> <p>Supply of TX 100 4X Ni-Mh 1.2V 1550mA/h or by 4X AA battery cells R6 1.5V</p> <p>Box size: 345 x 291 x 65 mm</p> <p>TX 100 size: 217 x 75 x 36 mm</p>	TX	<b>TX101</b>
 <p>TX100 configurator delivered in box with:</p> <ul style="list-style-type: none"> <li>• 2 SmartMedia cards</li> <li>• 4 rechargeable batteries Ni-Mh 1.2V 1550 mA/h</li> <li>• 230V / 9V 1A mini charger</li> </ul>	<p>Supply of TX100 4X Ni-Mh 1.2V 1550mA/h or by 4 AA battery cells R6 1.5V</p> <p>TX100 size: 217 x 75 x 36 mm</p>	TX	<b>TX100</b>
 <p>Kit of 5 Smartmedia cards The cards allow the back-up of projects carried out with TX100. One card can be used for each project</p>	Memory size: 16MB		<b>TX152</b>

TX101

TX100

TX152

## Tebis: System Components and Accessories



**Line coupler** : Allows you to carry out the extension of a wire/bus line.

**Media coupler** : Serves as link between the wire and radio product

**Repeater** : Amplifies the KNX radio signal.  
Utilisation : if distance is important or unfavourable environment.  
Note: all the KNX bidirectional radio products can be configured in receiver by TX100

**Supply** : Supplies 30V DC power supply from the bus which serves directly as remote supply for most of the wire products.

### EIB / KNX bus connection cables and terminals

Bus cable (ST) Y 2 x 2 x 0,8mm with length of 100 and 500m (4KV test voltage).



TA008



TR130B



TX110

Description	Characteristics	Width in 17.5mm	Config-uration	Cat Ref.
<b>Line coupler</b> <ul style="list-style-type: none"> <li>Allows extension of a wire line and repeats the messages</li> <li>Ensures a galvanic insulation between lines</li> <li>Necessary in case of systems with more than 64 wire products</li> </ul>	Supply: bus 30V DC connects at the front and back by two TG008 bus connectors	2	TX/ETS	<b>TA008</b>
<b>Media Coupler</b> Allows transmission of messages of twisted pair products towards radio products and vice versa	Supply: 230V~ Frequency 868.3 MHz Bi-directional product Size: 111 x 51 x 18 mm		TX	<b>TR130B</b>
<b>Radio repeater</b> To be used in case of poor communication, amplifies the radio messages	Supply: 230V~ Frequency: 868.3MHz Bi-directional product Size: 11 x 51 x 18 mm		TX	<b>TR140B</b>
<b>Power Supply module</b> Supplies the 30V power supply of the system for an installation carrying up to 64 TX products	Supply: 230V~ 50Hz, 15VA Output voltage:			
	30V DC; 320mA Resistant to short-circuits	4		<b>TX111</b>
	30V DC; 640mA Resistant to short-circuits	6		<b>TX110</b>
<b>Bus cable</b> EIB-Y (ST) Y x 2 x 2 x 0.8mm Insulated 4kV, possible installation near LV conductors	Length 100m			<b>TG018</b>
	Length 500m			<b>TG019</b>
Bus connector (package = 50 pieces)	4 links per connector			<b>TG008</b>
They allow to carry out: <ul style="list-style-type: none"> <li>Derivations of bus</li> <li>Connection of TX products by plugging</li> </ul>	Connection capacity 0.6 to 0.9mm <sup>2</sup> rigid			

## Tebis: Input Products



Input interfaces which manage the information flow to control and manage the electrical equipment of the installation.

They carry out, via the bus, orders they receive to the Tebis system output products.

**Input modules** for managing the ON/OFF contacts (potential free or 230V) coming from traditional control devices (PB, switch, thermostat, clock,...)

**The automation** products like the time and photocell switches as well as presence detecting devices.

All these products communicate directly.

A single connection to the bus ensures supply of the products and information exchange, considerably reducing cabling.



TX302



TX308



TX314

Description	Characteristics	Width in 17.5mm	Config-uration	Cat Ref.
<b>Input modules for flush mounting</b>	<ul style="list-style-type: none"> <li>• 2 inputs for volt free contacts</li> </ul>		TX/ETS	<b>TX302</b>
h. 35 x l. 38 x d. 12mm	<ul style="list-style-type: none"> <li>• 4 inputs for volt free contacts</li> </ul>		TX/ETS	<b>TX304</b>
Functions: <ul style="list-style-type: none"> <li>• Allow the volt free contact link</li> <li>• All the commands are of the VLSV type (very low safety voltage)</li> </ul>	Supply: bus 30V DC  Installation: These modules are placed behind standard electrical fittings (push-button or switch) in fixed box with a minimum of 40mm depth			
<b>4 Input modules 4 LED outputs</b>	<ul style="list-style-type: none"> <li>• 4 inputs for volt free contacts</li> <li>• 4 outputs for state indication by LED for synoptic (unfurnished)</li> </ul>		TX/ETS	<b>TX308</b>
h. 35 x l. 38 x d. 12 mm	I max: 0.85A U = 5V DC			
Functions: <ul style="list-style-type: none"> <li>• Allows the volt free contact link</li> <li>• LED control for state signalling</li> </ul>	Supply: bus 29V			
<b>230V Input modules</b>	Supply: <ul style="list-style-type: none"> <li>• Bus 30V DC</li> </ul>			
Functions: <ul style="list-style-type: none"> <li>• Allows 230V contact link (automatic controls, time switch, telephonic transmitted, ...)</li> <li>• Visualisation of the state of each input</li> <li>• Possibility to simulate the condition of each input (selector in position)</li> </ul>	4 230V phase inputs  6 230V phase inputs	2  4	TX/ETS  TX/ETS	<b>TX314</b>  <b>TX316</b>
The TX 316 module allows in addition the connection of luminous push buttons as well as detection of power failure				

## Input Sensors Room Controller

The room controller is a versatile device that groups 4 push buttons and an LCD display for information.

### 4 Pushbuttons:

The four sides of the product act as a push button (touch sensitive keys) for ON/OFF controls, Up/Down, Scene selection, etc All the 4 keys are freely and independently programmable.

Visual symbols can be selected on the display for clear identification of the function / control associated with each key.

### Display:

This device can indicate the state of other input devices such as pushbuttons that are connected to the bus.

Examples: On/Off state, lighting signal delivered by a light sensitive switch, outside-inside temperature, alarm, etc...

The data can be displayed by symbols that can be selected from an in-built library or by plain text.

### Display arrangement:


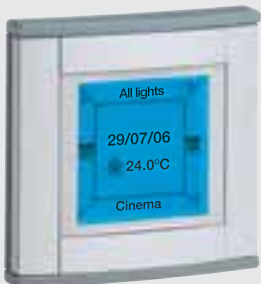
It includes:

- Central part allows 4 separate lines of text to be displayed
- 4 external zones corresponding to the four keys to identify the control associated with each key.

### Other functions:

- Ambient temperature measurement,
- Display of hour and date,
- Alarm clock function (4 alarm tones)
- Back-lit display - activated by pushing any button or alarm clock deactivated automatically after adjustable time delay.

Assembly and installation - assembled with a standard flush mounting box of 60mm diameter. Programming is achieved by using the configuration device TX 100 via media coupler or by ETS software.

Designation	Description	Cat Ref.
	<b>Room controller</b> Supplied with coupling unit and front fascia (pushbuttons with display)	
	Functions : • ON/OFF control • Up/Down control • Dimming control • Scenario selection • Heating control • Timing functions • Switching functions with AND/OR logic • Display of parameter status	
	Power supply from Bus 30V DC Dimensions : 80 x 80mm Connection - bus	
	Colour white	<b>TX450A</b>
	Colour silver	<b>TX450B</b>
	<b>Room controller with temperature regulator</b> Modes of operation:	
	• Comfort • Standby • Night • Frost/heat • PID automatic	
	Colour white Colour silver	<b>TX460A</b> <b>TX460B</b>

TX450A

TX450B

## Input Products Time Switches

2 Channel time switch with bus communication feature. Control commands are transmitted directly onto the bus without the need for output controls. Wiring is simplified as power supply is taken direct from the bus and bus supports transmission of control commands.

Time switches are used in control of lighting, heating, shutters movement, domestic appliances, sockets, etc. in order to improve comfort and saving energy.

### Functions

- 7 day programmer, 56 steps of program, minimum setting step of 1 minute
- Possible to program impulses (1s to 30min)
- Automatic change of schedule for summer/winter

### Programming key EG005 - for

- programming the time switch
- Copy or saving the program
- Making circuit On or Off temporarily (blinking)
- Permanent priority settings On or Off (manual)

### Provided with software and cable

- For programming from PC or on the product not connected in the system
- 5 years functioning reserve with lithium battery
- Bar graph display of day profile

### Other functions

- Impulse programming (1s to 30min)
- Presence simulation
- Back light screen
- Holiday mode - priority setting On or Off between two dates
- Possible to lock keyboard and programming by EG004 key

### TX 023

- Can be synchronized on radio via signal DCF77 with help of EG001 antenna.
- Via bus, master timer can set time and date of other TX022 - TX023

### Installation

Programming is carried out by configuration device TX 100 via media coupler or by ETS.



TX023



EG001



EG004



EG005



EG006

Designation	Description	Width in ■ 17.5mm	Cat Ref.
<b>Time switches</b> 2 channel 7 day Function - ON/OFF, up/down, heating control scene selection, master or slave clock function,	Supply : bus 30V DC Product setting on current hour and day		
Tebis timer		2	<b>TX022</b>
Tebis timer with radio pilot DCF77 (antenna)		2	<b>TX023</b>
<b>RF antenna</b> for RF synchronization of TX 023	For maximum distance of 200m		<b>EG001</b>
<b>Locking key</b> (Yellow colour)	To stop unauthorised change of the program		<b>EG004</b>
<b>Blank programming key</b> (Grey colour)	To save program from switch or software		<b>EG005</b>
<b>Interface software and adaptor</b> to allow the transfer of the program on the PC to the key	For programming of the key by the PC and transfer of the data from		<b>EG003</b>
As above with USB connection			<b>EG003U</b>
<b>Storage module</b>	For 3 keys EG 004 or EG 005		<b>EG006</b>

## Input Products

### Light Sensitive Switches

Light sensitive switches are used for automatic control of indoor and outdoor lighting or for the control of blinds, or curtains or shutters according to ambient lighting.

**Energy saving** : It maximises natural light resulting in energy savings.

Principal applications :

- Residential building - outdoor lighting
- Commercial and industrial sector - classrooms, offices, windows, car parking, etc.

#### Comfort

Light sensitive switch will avoid excessive light or will limit overheating of the premises by appropriately managing shutter or blind operation.

#### Assembly

Light measurement is carried out with the help of a photo resistive cell connected to the product.

The cell has two versions :

- Flush mounted ref.EE 002
- Surface ref.EE 003

Note - switch and cell are required.

#### Installation

Programming is carried out by configuration device TX 100 via media coupler or by ETS.



TX025



EE002



EE003

Designation	Description	Width in ■ 17.5mm	Cat Ref.
Light sensitive switch functions : • Control of indoor or outdoor lighting circuits (ON, OFF, dimming) as well as the blinds, curtains or shutters according to the ambient light. • Measure ambient light via cell EE002 or E003 and transmit control command when preset level is reached. The information of the cell connected on TX025 can be shared via Bus with several other TX025. This makes several levels of regulation possible.	Power supply from bus 30V DC • sensitivity - 2 ranges - 2 to 200 lux and 200 to 20000 lux • switch auto/manu/test • potentiometer for level setting LED for set point crossing indication • max. distance between cell and TX025 100m (delivered without cell)	2	<b>TX025</b>
Photo resistive cells for TX025	Flush mounted cell has 1m 2x0.75mm <sup>2</sup> cable		<b>EE002</b>
	Surface mounted cell has 4m 2x0.75mm <sup>2</sup> cable		<b>EE003</b>



## Input Products Presence Detectors

Used for automatic lighting control or heating of the premises based on occupancy and lighting level.  
Principal applications - Offices, corridors, conference rooms, classrooms, etc  
Functions - ON/OFF control, Up/Down control, heating control, scene selection, time delay and priority setting, setting dimming levels, Master/slave function.

The bi-directional detector head can be oriented at 90° to adapt the zone of detection depending on the configuration of the room. A large area of detection - with the help of two integrated sensors, these products are able to detect movements in a large area and detect presence (person working in office) in a smaller area.  
Products delivered with BCU (coupling unit to the bus)

2 versions of detectors  
• 2 channel detector with On/Off control AND  
• 1 channel lighting regulator detector (for maintaining constant light)

**Installation**  
Programming is carried out by configuration device TX100 via media coupler/ETS.

	Designation	Description	Cat Ref.
 TX510	<b>Presence detector 360°</b> • 2 channel Channel 1 - switching based on presence and lux level. Switching takes place when presence is detected and the lux level is below the set point. Lux level settings - 5, 100, 200, 300, 500, 800, On permanent, Delay off time - 1min to 30min Application - switching off lighting, blinds, curtains or shutters.	<b>Power supply 30V DC by bus</b> Product setting - • Light intensity from 5 to 1200 Lux • Time delay for lighting, • Time delay for presence	TX510
	Channel 2 - switching based on presence only. Uses both delay on and delay off for switching. Delay off 30 sec > 10 mins - Delay on = 30 secs Delay off 10 mins ≤ 60 mins - Delay on = 5 - 60 mins Application - heating, ventilation	Area covered up to 13x7m at 2.5m height Dimension of detector alone diameter 110mm x height 31mm	
 EE813	<b>Presence detector 360°</b> Lighting regulator • 1 channel associated with Tebis dimmers, it is possible to maintain light intensity in a room at a constant level as long as there is presence in the room irrespective of changes in the natural lighting	Power supply 30V DC by bus Product setting - • Light intensity from 5 to 1200 Lux • Time delay for lighting Area covered - 13x7m at 2.5m height Dimension of detector alone - diameter 110mm x height 31mm 3 operating modes • Mode 1 - dimming inactive (only presence info used) • Mode 2 - dimming active as per light setting on product potentiometer • Mode 3 - dimming active. Lighting instruction can be changed by long push on communicating PB of presence detector	TX511
	Accessory for assembly surface mounting (white colour) surface mounting box for assembly	Dimensions - diameter 40 x depth 45mm	EE813



## Automation Products

Automation products provide commands in form of contacts. Input information such as rain, wind, sunrise, sunset, indoor and outdoor temperature, as well as commands from remote telephone interface are received and forwarded to input modules for controlling the outputs in the Tebis system.

Wind detector - helps in protecting blinds and shutters in the event of strong wind by creating a closing command.

Weather station - it includes a sensor block and a modular unit for interpretation. It is a complete system with input sensor, processing and weather data transmission. It also integrates a weekly programmer equipped with DCF77 antenna.



TG050



TG051



TH020B

Designation	Description	Width in ■ 17.5mm	Cat Ref.
<b>Wind detector</b> functions : <ul style="list-style-type: none"> <li>• It helps protect blinds in the event of strong wind,</li> <li>• Consists of an anemometer and electronic box.</li> </ul> Use with the Tebis system - contact of anemometer can be connected to input module TX314 and TX316	Power supply 230V AC 50Hz Level of detection : <ul style="list-style-type: none"> <li>• Adjustable from 5 to 55km/h (preset in factory to 25km/h)</li> <li>• Blocking time against the wind - 10 minutes</li> </ul>		<b>TG050</b>
<b>Weather station</b> The station is supplied with sensors for wind, sun, rain and temperature. 8 relay outputs can be freely programmed. It is possible to obtain output by crossing a set point of a parameter or information from several pieces of data can be combined by switching functions AND/OR (e.g. : rain-wind) Input modules are necessary for connecting weather station to Tebis system.	Interpretation unit power supply - <ul style="list-style-type: none"> <li>• 230V AC/50Hz</li> <li>• 8 outputs common input potential</li> <li>• Power supply to sensor block via interpretation unit</li> </ul> Dimensions - L 65 x h 120 x D110mm Operating temperature (-) 30° to 50°C Maximum distance between interpretation unit and sensor block 30m Connection cable for sensor block - 3 x 0,75mm² 24V		<b>TG051</b>
<b>Telephone gateway, 3 inputs, 3 outputs</b>  Functions <ul style="list-style-type: none"> <li>• Remote control : 3 relay outputs</li> <li>• Status indication : for each output</li> <li>• User friendly voice guide in English</li> <li>• Remote alarm detection and sending of voice messages to 3 programmed telephone numbers</li> <li>• Recording of your own messages</li> <li>• Voice messages for room temperature indication</li> </ul> possibility to use together with an answering machine on the same telephone line Personal secret code to limit access to the device Timed switch-off of the relay output (from 1 second up to 59h59min 59sec)	<b>Electrical characteristics:</b> Power supply : 230VM, +/-15%, 50/60Hz Consumption : 2W Analog telephone line (PSTN), 48VDC 3 relay output 5A-250V AC1 1 temperature measurement, CTN 10kOhm 2 alarm inputs : 1 input 0-30VAC/DC, 5mA min 1 input 0-230V AC, 5mA min Power shutdown detection  <b>Environment:</b> Working temperature : 0/+50°C Storage temperature : -20/+70°C IP 30, IK03  <b>Connection:</b> Flexible 2*2,5mm² max Rigid : 2*2,5mm² max	5	<b>TH020B</b>



## Output Products Lighting and Heating




These products serve as output interfaces for the Tebis system. They ensure the control of the electrical devices by taking commands transmitted by the input products.

Lighting output products allow control of all types of devices by On/Off control or dimming.

Without modifying the wiring, it is possible to achieve

- On, Off or dimming controls in individual and grouped or general controls
- Functions such as time delays, priority settings, scene selection or multi-applications.

All the output modules are equipped with output status display and with a manual override setting on front of the product.

Designation	Description	Width in ■ 17.5mm	Cat Ref.
 TXA204C	<b>Output devices for lighting and heating</b> For control of : <ul style="list-style-type: none"> <li>• Lighting *</li> <li>• Heating *</li> <li>• Power outlets</li> <li>• Any load controlled by a simple contact</li> </ul>		
	*Lighting and heating functions in each device configurable per channel		
 TXA206D	Functions : <ul style="list-style-type: none"> <li>• ON / OFF</li> <li>• ON / OFF override</li> <li>• LED indication of each output state</li> <li>• High end timer functions</li> <li>• Full quick connect connections</li> <li>• Full symmetrical top down cross through connections</li> <li>• Large front labelling</li> <li>• Local on device hand override : permanent or time limited</li> </ul>		
	Outputs : <ul style="list-style-type: none"> <li>• 4 volt-free contacts</li> <li>• Supply : 30V DC twisted pair (bus)</li> </ul>	4	TXA204C
	Outputs: <ul style="list-style-type: none"> <li>• 6 volt-free contacts</li> <li>• Supply : 30V DC twisted pair (bus)</li> </ul>	4	TXA206A
	10A AC1	4	TXA206B
 TXA207C	16A AC1	4	TXA206C
	16A AC1 / 1500W - 140 uF adapted for parallel compensated fluorescent tubes	4	TXA206D
	Outputs: <ul style="list-style-type: none"> <li>• 10 volt-free contacts</li> <li>• Supply 30 VDC twisted pair (bus)</li> </ul>		
	Note: Refer to technical information for de-rating for alternative load types.		
	16A AC1	6	TXA207C

## Output Products Lighting

### Dimmers

#### TXA210, TXA210A, TXA213, TXA215

Universal dimmer with automatic load recognition  
Min/Max level local setting  
Manual mode that allows dimming even when the bus is disconnected  
Power rating specified at 45°C

Easy mode: (TX100)  
Implementation of the channel dimming actuator scene

S-mode: (ETS software)  
Easy channels features  
32 light scenes with a related scene speed

Fixing of output state when bus is disconnected  
Enhanced override modes (forced)

#### TXA210 Universal dimmer 1 channel 600W

#### TXA210A Universal dimmer 1 channel 300W

#### TXA213 Universal dimmer 3 channels 300W

3 modes possible :

- 3 channels 3 x 300W
- 2 channels 600W / 300W
- 1 channel 900W

#### TXA215 Universal dimmer 1 channel 1000W

Dimmer with LCD display  
Local setting of the dimming parameters (min/max, soft ON, soft OFF, dimming speed) and light scenes  
8 light scenes that can be activated locally



TXA210



TXA213



TXA215



TX211

Designation	Description	Width in ■ 17.5mm	Cat Ref.
<b>TXA210 Universal dimmer 1 channel 600W</b>	600W 45°C incandescent/halogen 600VA VLV halogen associated to electronic or ferromagnetic transformer	4	<b>TXA210</b>
<b>TXA210A Universal dimmer 1 channel 300W</b>	300W 45°C incandescent/halogen 300VA VLV halogen associated to electronic or ferromagnetic transformer	4	<b>TXA210A</b>
<b>TXA213 Universal dimmer 3 channels 300W</b> • 3 channels dimmer that can be used as • 3 x 300W or 600W/300W or 900W Selector on device.	3 x 300W 45°C 3 x 300VA VLV incandescent/halogen associated to electronic or ferromagnetic transformer	6	<b>TXA213</b>
<b>TXA215 Universal dimmer 1 channels 1000W</b> • LCD display used to indicate the dimming level and to set the dimming parameters min, max, diming speed, soft on, soft off, scenes	1000W 45°C incandescent/halogen 1000VA VLV halogen associated to electronic or ferromagnetic transformer	6	<b>TXA215</b>
<b>Ouput modules for variable lighting (dimmer control)</b>	1 output 1/10V	4	<b>TX214</b>
	3 output 1/10V	4	<b>TX211</b>
For • Incandescent and halogen lamps 230V • Halogen lamps ELV supplied with variable or ferromagnetic electronic transformer Function - • ON/OFF, variation in lighting / dimmer control			

## Output Products Shutters and Blinds

These products serve as output interfaces for the Tebis system. They ensure opening and closing control of shutters, roller shutters, curtains, blinds, flaps etc. They interpret commands such as Up, Down, priority setting for Up or Down and Wind detection commands transmitted by input modules.

All the output modules are equipped with output status display and with a manual override setting on the front.



TXA223



TXA224

Designation	Description	Width in ■ 17.5mm	Cat Ref.
<b>Output device for 4 shutters or blinds</b>	4 shutter outputs 230V	4	<b>TXA223</b>
	4 shutters or blinds outputs 230V	4	<b>TXA224</b>
For control of roller-shutter curtains or venetian-blinds motors, KNX/EIB	4 shutter outputs 24V DC	4	<b>TXA225</b>
Functions: • UP/DOWN • Blind inclination and STOP • UP/DOWN/STOP manual override • LED indication of each output state • Wind security functions • Blocking • Priority • Scenes • After bus failure position	4 shutters or blind outputs 24V DC	4	<b>TXA226</b>
Note: • Shutter output modules will open and close KNX/EIB compatible acutators • Blind output modules will open, close and incline the slats of KNX/EIB compatible acutators			

## Radio Frequency Products 2 or 4 Inputs (for flush mounting)

RF input modules of EIB/KNX are used as interfaces for volt free contact and switches or conventional pushbuttons. Using these modules it is possible to control the electrical devices connected in the network by transmitting an RF signal. They can control RF output modules as well as TP wired products with the help of the media coupler TR130B. These products are particularly useful for renovating or extending existing installations.

### 2 or 4 inputs - 230V or battery operated

These input modules are available in following versions

- 2 or 4 input module version - flush mounted
- With power supply of 230V AC or with battery.

Operating temperature : 0°C to 45°C

Assembly - in box of 60mm diameter for flush mounting

### Installation

Link allocation is to be done by configuration device TX 100.

These products can also communicate with TP wired products with the help of media coupler TR130B.

### General characteristics of the radio system

Frequency - 868,3 MHz

Range - variable according to the environment - up to 30m indoor, 100m in free air. Noise measurement is possible by TX100.

### RF system

- Maximum number of RF products = 256
- Maximum number of RF input translations by the media coupler to twisted pair output products = 63

### Designation

### Description

### Cat Ref.



TR304A

RF input modules (battery operated)

frequency - 868,3 MHz

Functions :

- ON/OFF, dimming
- Up/Down + alarm - priority setting
- Scenarios
- 2 KNX input modules

Power supply by lithium battery CR1/2 AA 3,0V

Life - 5 years

Dimensions :

Diameter 50 x 16mm

Transmission indication by LED, for one-way transmission

- For 2 volt free contacts

TR302A

• 4 KNX input modules  
RF input modules - 230V

frequency - 868,3 MHz

Functions :

- ON/OFF, dimming
- Up/Down + alarm - priority setting
- Scenarios
- 2 KNX input modules

• For 4 volt free contacts  
Power supply - 230V AC

50Hz

Dimensions

- Diameter 52x30mm

Transmission indication by LED

For one-way transmission

- For 2 volt free contacts
- For 4 volt free contacts

TR302B

TR304B



TR304B

• 4 KNX input modules

RF Configuration Tool

Configuration device TX100 is necessary for programming all products of an installation - TP wired, RF or combination

Functions :

- Saving of the programming on SMART MEDIA card.
- Management of the evolutions of versions of the tool

Frequency - 868,3 MHz

Can be supplied as-

- TX100 alone
- Or in TX101 kit

TX100



TX100

## Tebis: Radio System Push-Buttons and Remote Controls

Radio push-buttons and remote controls enable easy addition of control points without wiring work. They are suitable for all situations : new systems, renovations or post installation. These products are included in Tebis system. They control both radio output modules as well as twisted pair products via TR130B.

### Radio push-buttons

These are unidirectional radio emitters in the KNX standard. They exist in 2, 4 or 6 ways in surface mounting boxes of white or silver colour.

### Solar radio push-button

Does not require replacement batteries.

### Radio remote control

These are portable radio emitters of EIB/KNX standard. The remote controls are available in 4, 8 and 24 ways.

### Putting into service

Allocation of the links is carried out by TX100 configurator. These products also communicate with twisted pair products via the TR130B bus radio / twisted pair





General characteristics of the radio system

- frequency : 868,3 MHz
- range : it is variable according to the environment : up to 30m inside, up to 100m in free air.
- Working temperature : 0°C to +45°C

A measurement of the signal interference is possible by TX 100

RF system

- Maximum number of RF products = 256
- Maximum number of RF input translations by the media coupler to twisted pair output products = 63

	Designation	Description	Cat Ref. Door labels: Without With	
	Push-buttons radio KNX with labels holder	Supply by C 2430 3.0V battery cells Life of battery cell: 3 years Size: 80.5 x 80.5 x 12mm Emission signalling by LED Unidirectional products: Emitter		
	Functions: • Start / Stop, dimming • Up / Down + alarm • Override • Scenarios			
TD210	Left / right toggle key with or without holder labels			
	<b>2 way push-button key</b>	- Colour: White Silver	<b>TD100</b> <b>TD101</b>	<b>TD110</b> <b>TD111</b>
	<b>4 way push-button key</b>	- Colour: White Silver	<b>TD200</b> <b>TD201</b>	<b>TD210</b> <b>TD211</b>
	<b>6 way push-button key</b>	- Colour: White Silver	<b>TD300</b> <b>TD301</b>	<b>TD310</b> <b>TD311</b>
	<b>KNX solar push-button 6 way push-button keys</b>	- Colour: White Silver	<b>TD250</b> <b>TD251</b>	
	<b>KNX radio remote controls</b>	Supply by CR 1/3 N 3V lithium battery cell Life: 3 years Size: 111 x 51 x 18mm Unidirectional product: Emitter		
	Functions: • Start / Stop, dimming • Up / Down + alarm • Override • Scenarios			
	<b>4 way remote control</b>	4 keys		<b>TU204A</b>
	<b>8 way remote control</b>	8 keys		<b>TU208A</b>
	<b>24 way remote control</b>	8 + 1 keys		<b>TU224A</b>

TU204A

## RF Input/Output Products for Combination System (flush mounted)

The RF EIB/KNX input/output modules are used as an interface between volt free contacts of switches or conventional pushbuttons at input level and electrical devices at output level for direct control. These combination and two-way products are able to communicate with other RF or TP wired products (via media coupler TR130B). They are particularly useful for renovating or extending existing installations.

### 1 input + 1 output 10A

For creating simple lighting functions for integrating in a group, general controls or other scenario functions by simple programming.

### 2 inputs+1 output shutter/blind

For creating shutter control function for integrating in a group, general control or other scenario functions by simple programming.

### Installation

Link allocation is carried out by configuration device TX100. These products also communicate with TP wired products with the help of media coupler TR130B.

### General characteristics of RF system

Frequency - 868,3 MHz  
Range - variable according to the environment - up to 30m indoor, 100m in free air.  
Noise measurement is possible with the TX 100.

### RF system

- Maximum number of RF products = 256
- Maximum number of RF input translations by the media coupler to twisted pair output products = 63



TR501

### Designation

### Description

### Cat Ref.

1 input + 1 output 10A

Functions of input

- ON/OFF, dimming
- Priority setting
- Scenarios

Functions of output

- ON/OFF control
- Time delay
- 8 scenes
- Priority setting

Product supplied with input/output module pre-configured for control of the connected output

Power supply 250V AC 50Hz

1 volt free input for pushbutton switch

1 output -

- 10A AC1 230V AC
- For manual control by TX100

- Output status display by LED

Dimensions : diameter 56 x 30mm

Two-way product for transmitting and receiving

TR501



TR521

2 inputs + 1 output shutter/blind

Functions of input -

- Up/Down by brief push > 400ms
- Priority setting

Output for shutter motor -

- Scenarios

Functions of output -

- Up/Down control
- Inclination of flaps
- Alarm security for wind, rain
- Time delay
- 8 scenes
- Priority setting

product supplied with input/output module pre-configured for control of the connected output

Power supply 230V AC 50Hz

2 inputs:

Volt free contact

6A AC1 230V AC

- For manual control by TX100
- Output status display by LED

Dimensions : diameter 52 x 27mm

Two-way product for transmitting and receiving

TR521

## RF Output Products (flush mounted) for Lighting or Shutter Control

RF KNX output modules take commands transmitted by input modules. They interface between commands and electrical equipment.

These two-way products are able to communicate with all other RF or TP wired products (via media coupler TR130B). They are particularly useful for renovation or for equipment already installed.

### 1 RF output 16A

This flush mounted module helps control circuits of lighting, VMC, heating, solenoid valves, etc.

### RF multi-stage sockets

They are used to convert a fixed socket into a flexible socket. It can supply power to shutter or blind motors.

### Expansion

All RF output products can be integrated by simple programming, in zone wise group control, general or centralized controls and in scenarios functions.

### Installation

Link allocation is carried out by configuration device TX100.

These products can also communicate with TP wired products via media coupler bus/radio TR130B.

General characteristics of the radio system

Frequency - 868,3 MHz

Range - variable according to the environment - up to 30m indoor, 100m in free air.

Noise measurement is possible with the TX100.

### RF system

- maximum number of RF KNX products - 256



TR201



TR210



TR221

Designation	Description	Cat Ref.
1 output 16A For control of lighting, heating, of the VMC, etc. Functions of output : • ON/OFF control • Time delay • 8 scenes • Priority setting	Power supply : 230V AC 50Hz 1 output - 16A AC1 230V AC • Manual control by TX100 • Output status display by LED Dimensions : diameter 52 x 30mm Two-way product for transmitting and receiving	TR201
1 flush mounted dimming output 200W for remote control of dimmable lighting Functions : • ON / OFF • Dimming 0-100% • LED indication of each output state • Time functions • 8 memorised scenes	Max. load with incandescent lamps : 200W - 45°C Max. load with 230V halogen lamps : 200W - 45°C Max. load with halogen ELV lamps via ferromagnetic transformer : 200VA - 45°C Max. load with halogen ELV lamps via electronic transformer : 200VA - 45°C Supply : 230V Frequency : 868,3Mhz Bidirectionnal product	TR210
Output device shutter/blinds for the control of shutters, blind or blinds with directional flaps Functions of output : • Up/Down control • Inclination of flaps • Alarm security wind, rain • Time delay • 8 scenes • Priority setting	Power supply : 230 V AC 50Hz Output for 1 motor • Pushbutton switch 6A AC1 230V AC • Manual control by TX100 • Output status display by LED • Dimensions : diameter 52 x 27mm Two-way product for transmitting and receiving	TR221

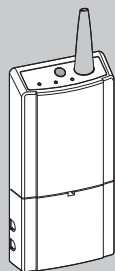
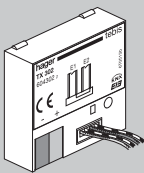
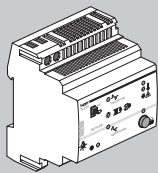
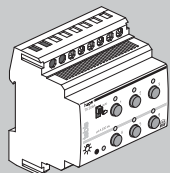




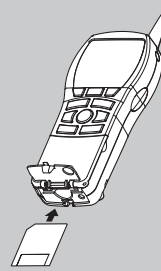
## Configuration of System

Configuration of a system containing only wired TX products

Related products : all TX input/output products and for configuration : TX100 configurator, SmartMedia card, media coupler.



Media Coupler

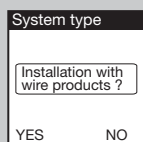


TX100 and Smart Media Card

1. Put the TX100 into operation  
The method is the same for RF systems.

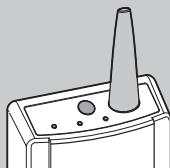


Choose the system type. As there are only wire products, reply **YES**



It is necessary to select a wire installation by pressing on the media coupler button until the red light is switched on (4s).

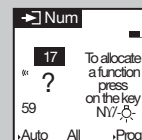
When the pairing is carried out a signal sounds. Wait for the screen display Auto to continue



Select the Num mode

### 3. Numbering of the inputs in the Num mode

For numbering the inputs it is necessary to activate them by pressing on the push-buttons or the switches which are connected to them. The configurator allocates them a number automatically

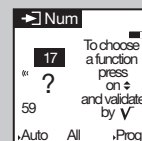


Do not press on next input until input number is assigned to current input.

Allocate a function to the input

### 4. Selection of a function in Num mode

After the numbering of inputs one can select a function. For this purpose, press on the key Select the function with the left keys Validate by press on



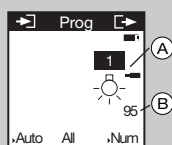
Go to Prog mode

Select Prog

### 2. Configuration and numbering of the outputs in Prog mode

A long press on the key starts configuration of the outputs and their automatic numbering.

At the end of configuration the screen displays first found output and the number of outputs detected



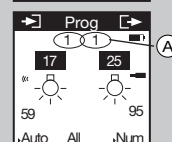
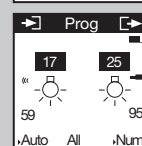
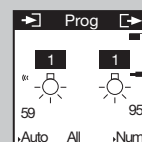
### 5. Creation of a link between an input and an output in the Prog mode

Select an input with the left arrow key or by activating the push-button or the switch, which is connected to it.

Select an output by its number with the right keys or locate the output by a press on which will activate the output displayed.

Validate the link by a long press on

A symbol confirms the creation of the link



Configuration of a combined system containing both TX wire products and RF radio.

Means to be used for configuration : TX100 configuration, SmartMedia card and media coupler  
products : TX wired or RF radio, input or output products

## Configuration of a system with TX 100

After having installed all products, wires and radio, one proceeds to configuration of installation which consists of creating links between inputs and outputs of each product and allocate them with functions.

To begin:

Insert SmartMedia card in TX100, start and format the card (follow the indications on the display).

Then, to configure, follow the steps below :

- Learning and numbering of outputs
- Numbering of inputs
- Allocation of a function
- Creation of links between inputs and outputs.

There are several possibilities to make the configuration :

- Configuration of the installation from a given place (at the distribution board for example)
- Configuration by going through each room.

## Configuration of a system containing only radio products

Related products : RF products of input / output and for configuration : TX100 configurator and SmartMedia card.

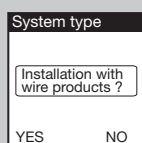
### 1. Start TX100

the information contained in memory card is displayed. For new installation, Zero products

Press on the screen key ✓



Determination of the type of system. If it is fully radio, press on **NO**



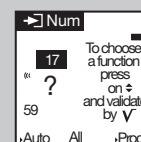
### Allocate a function to the input.

#### 4. Selecting a function in Num mode

After the numbering of the inputs, you can select a function. For this purpose, press on the key

Select the function with the keys on the left

Validate by pressing on ✓



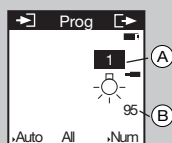
### Go to Prog mode

### Select the Prog mode

#### 2. Configuration and numbering of outputs in Prog mode

a long press on the key start the configuration of outputs and their automatic numbering.

At the end of configuration, the screen displays the first found output (A) and the number of outputs detected (B)



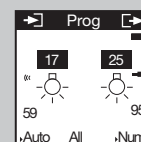
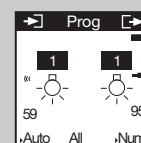
#### 5. Creation of a link between an input and an output in the Prog mode

Select an input with the arrow keys on the left or by activating the push button or the switch that is connected to it.

Select an output by its number with the keys on the right.

Locate the output by pressing on which will activate the output displayed.

Validate the link by a long press on ✓

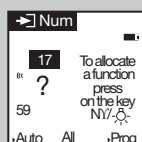


### 3. Numbering of inputs in Num mode

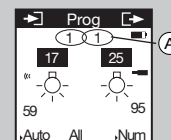
For numbering the inputs it is necessary to activate by pressing the PB on the switches which are connected to them. If the input is bi-directional, it is numbered automatically.

If it is about a unidirectional input, it is necessary to place the configurator nearby and press on the screen key **Call**.

Keep pressing the button or the switch connected to the input. A signal sounds as soon as the input is detected. A number is then allocated to it automatically.



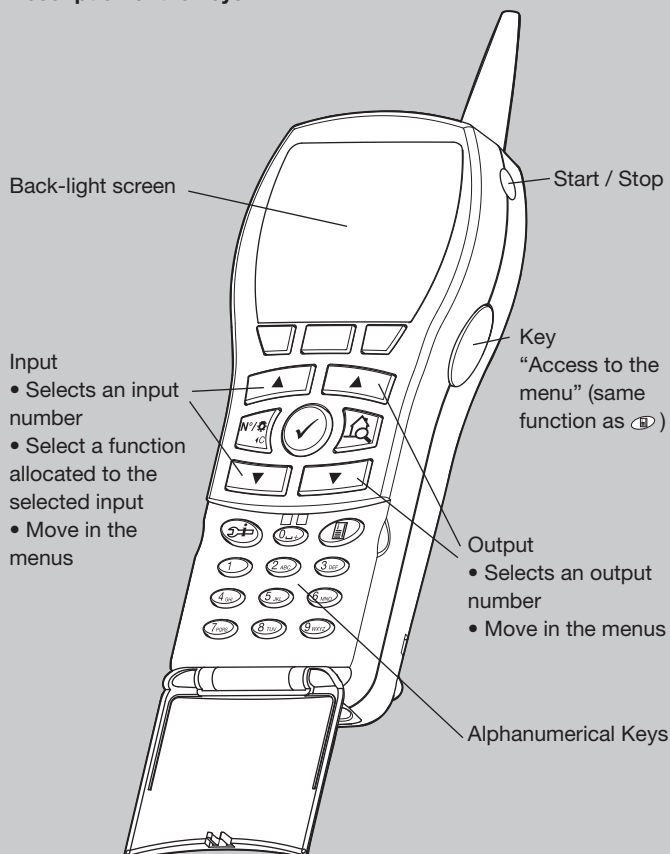
A symbol confirms the creation of the link (A)




### TX100 configurator

The TX100 portable configurator is the tool which programs the desired functions and displays the links between all the products being found in an installation : wire products and/or unidirectional or bi-directional radio system. If the system contains wire products, it is necessary to use the media coupler TR130B. A SmartMedia memory card inserted in TX100 backs-up all the data relating to a system.

### Description of the keys




### Description of the keys:

 Screenkeys  
Function of each key is indicated on the screen above them, the function changes depending on the screen



- Validates the operation in progress
- Selects the menu
- Validates the entry



- Change the function of the keys  on the left (selection of either an input number or a function) - return to the previous menu



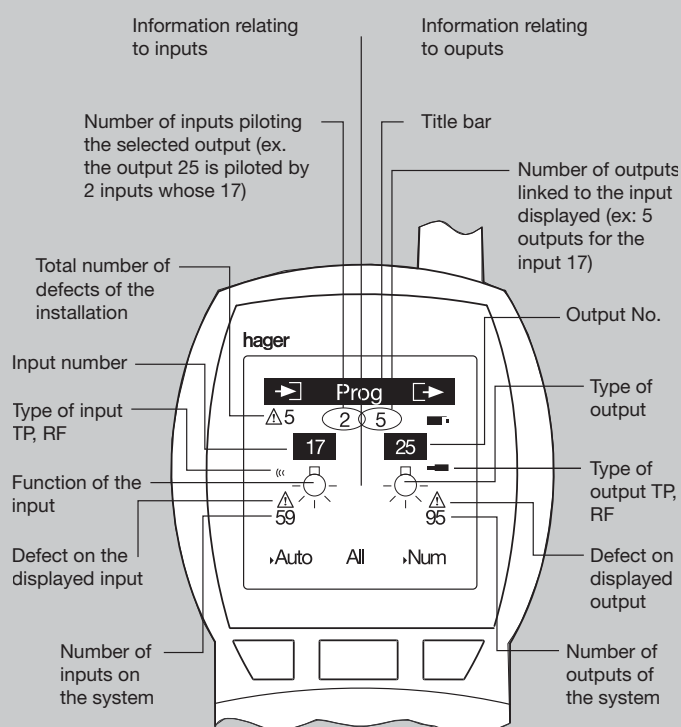
- Activates the selected output
- Starts the numbering of the outputs of the installation











- Access to the help screens for installation




- Access to menus



### Description of the symbols:

-  Battery charge level
-  Output
-  Input
-  Radio product
-  Wire product
-  Preparation of a link
-  Link established
-  Delete a link


### Sound

-  A single "beep" indicates a succeeded operation
- A double "beep" indicates an operation which has failed.

### Trick

2 ways to select a channel :

- Selection of an input by acting on the appliance that control it : push-button, switch or remote control. Selection of an output by acting on the manual control of the output product.

- Selection of the inputs or outputs with TX100 by their numbers with the help of keys 

### Radio system

The TR radio system (to KNX standard) exists in input products, output products and products with combined input/output. They communicate between themselves by using the 868 MHz radio frequency. The products are classified into 2 categories :

- The unidirectional input products : they are only emitters and have only information sent.
- The bidirectional products : they are both emitters and receivers and can thus send and receive information.

These latter ones can also be configured as radio repeaters by TX100 to increase globally the reliability of the transmission.

Supply of radio system is done, in the following way :

- By 230V mains
- By a battery cell

In an installation containing only radio system, the configuration is done only with TX100 configuration tool; the media coupler is not used.

The products with combined input/output are preprogrammed; for example for a 2 input products and 1 output or control of roller shutters, the basic functions as for example up/down are preregistered. Only modification of functions, as for example to carry a centralized control, need the use of TX100.

### Radio range (indicative data) :

- in open field : 100 m
- Inside a building : up to 30 m

A pure radio system can contain **up to 250 TR products**.

### The MHz 868 : a dedicated frequency

The frequency used is 868 MHz. This frequency is harmonized at the European level. There are 2 levels emission power :

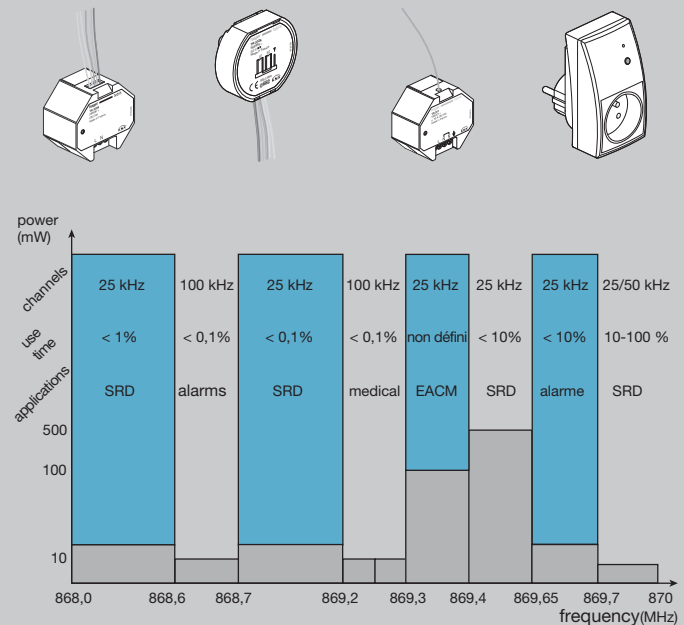
- Repeater products : 25mW maximum
- Battery cell products : 10mW maximum

As comparison, a portable telephone emits with a power of around 2000 mW.

It is to be noted that the regulator authorities have specially attributed the band of 868 MHz to building automation and home automation : the occupation or "duty cycle" rate is predefined and thus avoids the saturation problems of the band. The 868 MHz is outside ISM bands and cannot be thus saturated by permanent emissions ( headphones for example).

### Topology 2 :

#### Tebis radio system



### Combined system : Wire + Radio

The combined system needs to put in place a TR130B media coupler to transmit the messages of wire products to the radio system and vice versa.

For systems which contain both wire and radio products, the information given above for topics 1 and 2 remain valid. But you must take into account the following limitations :

- Maximum of 63 products of 250 possible radio systems can communicate with TP wire products.
- Maximum 50 links can be established from the wire part to the radio part.
- 1024 channels are available and distributed in 512 channels of inputs and 512 channels of outputs.

Example :

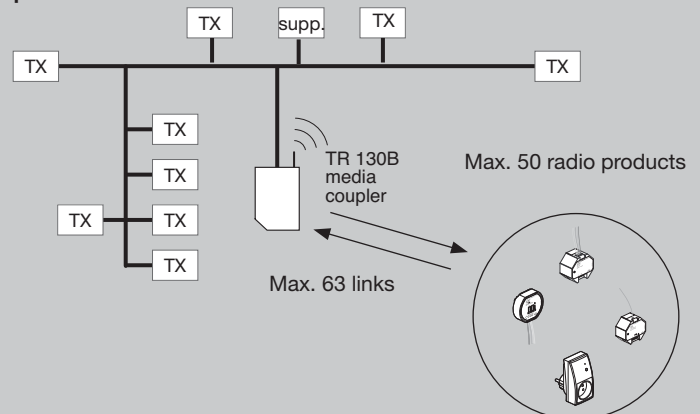
6 output products = 6 channels

4 input products = 4 channels

2 input radio products = 2 channels

### Topology 3 :

#### Mixed Tebis system containing both twisted pair and radio products



## Topology of the System

### Topology and architecture of a system

Each installation consists of input and output products which can be wire or radio.

For wire products, a TX111 bus supply must be installed.

Media and communication support :

- wire products : use of the bus cable (2 x 2 x 0,8mm)
- radio system : the link is done by 868 MHz reserved radio frequency

### Topology 1 : Wire installation

Each Tebis product (also called bus participant) can exchange Information with all other Tebis products connected to the bus cable. Supply of bus is done in continuous 30V DC ELV.

The right side outline gives the maximum lengths of the bus cable with a TX111 supply.

The following values must not be exceeded :

- Total maximum length : 1000m
- Maximum distance between twisted pair 2 products : 700m
- Maximum distance between supply and a product : 350m

The above data define an EIB line. Each EIB line needs a supply and can have up to 64 communicating products.

### Role of the TA008 line coupler

The line coupler “expand” and put back into form the signals on the bus cable and allow to extend the system

Thanks to the coupler the primary line can be extended up to 3 times.

### Maximum limit of an “extended” line:

The diagram on the right shows the maximum limits of the system with 4 supplies and 3 line couplers. The lengths of different elementary lines remain the same but at the end, the following

- Total maximum length : 4 x 1000 m
- Maximum distance between 2 products on the same line : 700 m
- Maximum distance between supply of an elementary line and any product of the same elementary line : 350 m

You can thus install at the maximum 4 x 64 = 256 TX products

### Role of the TR130B

In the configuration phase of the installation, the TR130B is the interface between the TX products, connected among themselves by the bus cable and TX100 radio configuration tool.

After putting into service, the TR130B can be withdrawn and reused to configure other systems.

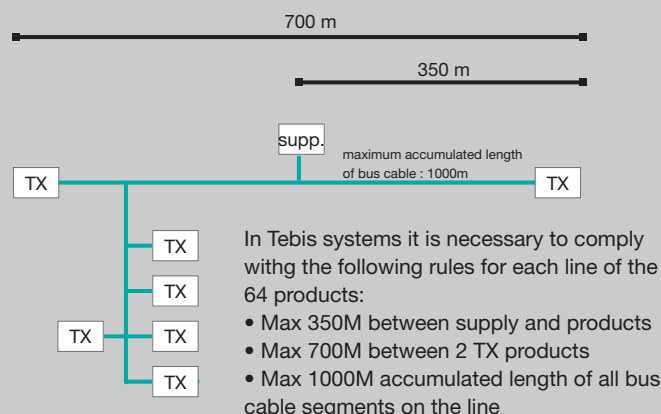
Nevertheless in case of modification of the system or for maintenance needs it will be necessary to reinstall again the media coupler, that is why, we recommend to **leave TR130B in the system**.

Several system architectures can be found :

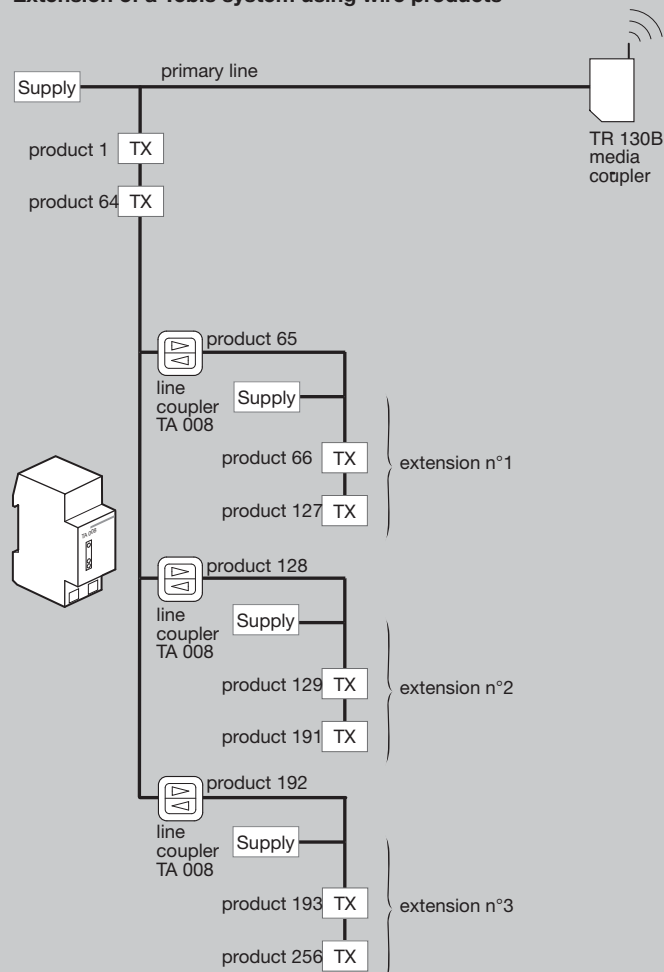
1. fully wire systems
2. fully radio systems
3. combined wire and radio systems

The topologies corresponding to these 3 types of systems are described below :

### Tebis wire system



### Extension of a Tebis system using wire products










































You can extend a line and install more than 64 products by using line couplers and additional supplies (maximum 3).

Note: Power supplies do not count as product, but line couplers do.





## Control Types

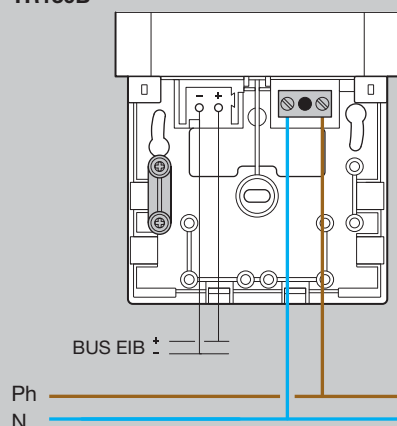
Symbol and function			
Applications	Symbols	Control Type	Control Product
Lighting		Switching on only	Automatic contact or push button, or TX512, TX022-TX023, TX025
		Switching off only	Automatic contact or push button, or TX512, TX022-TX023, TX025
		Switch type ON/OFF	Automatic contact or push button, or TX512, TX022-TX023, TX025
		Remote break type ON/OFF	Push button
		Remote break type ON/OFF for unidirectional products	RF Push button
		Increase the dimming level	Push button
		Decrease the dimming level	Push button
		Dimming on push button	Push button or detector, TX511, TX022-TX023
		Priority setting STOP	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Priority setting START	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Timed start - delay before ON	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Timed stop - delay before OFF	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Lighting level 25%, 50%, 75% or 100%	TX510, TX022-TX023, Tx025
Blinds/ Roller Shutters		Push button type UP	Push button
		Push button type DOWN	Push button
		Push button type UP-DOWN	Push button
		Switch type UP-DOWN function	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Switch type UP function	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Switch type DOWN function	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Override UP	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Override DOWN	Automatic switch or contact, or TX510, TX022-TX023, TX025
		Wind safety	TG050 air safety detector or TG051 weather station contact
Heating		Comfort	Temp. regulator, TX510 automatic push button or contact
		Eco	Temp. regulator, TX510 automatic push button or contact
		Comfort / Eco	Temp. regulator, TX510, TX022-TX023 automatic contact
		Frost free or without frost	Temp. regulator or automatic contact TX510, TX022-TX023
		Stop override	Automatic switch or contact or TX022-TX023
		Comfort override	Automatic switch or contact or TX022-TX023, TX510
		Eco override	Automatic switch or contact or TX022-TX023, TX510
		Timed comfort	Push button or detector TX510-TX511
		Timed eco	Push button
TX022 TX023 Clocks		Master clock	Diffusion TX022-TX023 of the hour on the bus for synchronizing the slave clocks
		Slave clock	TX022-TX023 synchronization on the hour emitted by the master clock
TX025 Photo electric switch		Master photocell switch	TX025 light sensitive switch (master) spreads on the bus the light intensity measured by the cell
		Slave photocell switch	TX025 light sensitive switch reads the light intensity measured by the cell and broadcasted by the master light sensitive switch
TX450A TX450B Ambient controllers		Display zone on the room controller (1 to 4)	Each zone (1 to 4) can display information (temperature hours, date) as well as states or measurements (lighting, heating, physical measurements or functions)
		Logical function	Creation of logical functions for displaying information on the system
All applications		No function	
		Scenario 1 to 8	Push button

# Technical characteristics

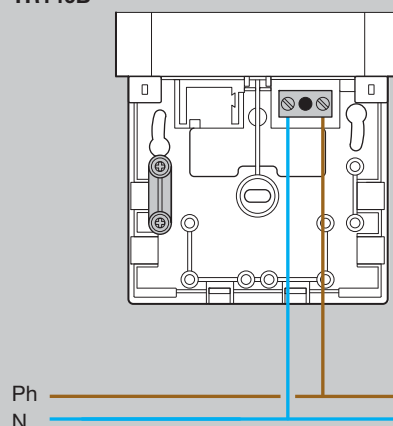
	TX100	TR130B	TX140B
Supply	4 batteries or LR6 battery cells	230 VM~ 50Hz ± 15% bus: 30V/DC	4 outputs (230 V phases)
Batteries	Ni-Mh 1.2V 1950mAh		
Battery cells	1.5V alkaline		
Working autonomy	AA 230V / 9V 1A charger type		
Consumption	0.5A (per appliance)		
Loss of Max. power	2W (per appliance)		
Functioning autonomy	8 hours		
Max recharge time	3h 30 mins		
Broadcast frequency	868.3 Mhz	868.3 Mhz	868.3 Mhz
Broadcast power	Max. 10mW	Max. 25mW	Max. 25mW
Safeguard card	Smart Media from 8 to 64MB		
Working temperature	0°C to +45°C	0°C to +45°C	0°C to +45°C
Storage temperature	-20°C to +70°C	-20°C to +70°C	-20°C to +70°C
Ingress protection	IP 20	IP30	IP40
Weight	340 g		
Size	75 x 169 x 34.9mm	203 x 77 x 26.5mm	203 x 77 x 26.5 mm
Antenna	52mm	52mm	52mm

## Electrical connection

### TR130B

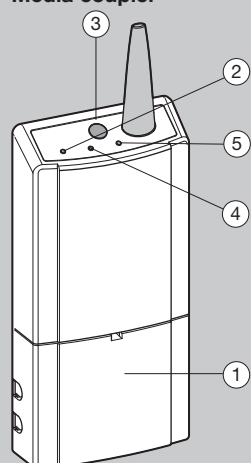


### TR140B



## Introduction of TR130B

### Media coupler



- ① Cover
- ② 230V supply lighting
- ③ Pairing button : pairing with TX100 (to be activated when synchronising with TX100 : Select the coupler by pressing on its pairing button for a period of 4 up to 10 seconds)
- ④ Physical addressing light
- ⑤ EIB / KNX communication light bus/radio



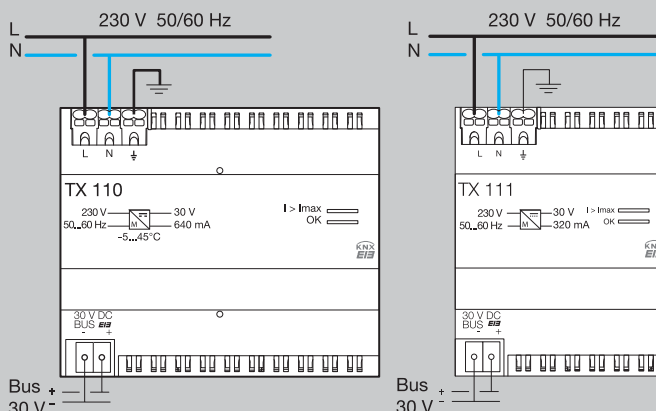
### TX 110, TX 111 Supply Modules

#### Functioning principle

This module is the supply source of the bus.  
The output voltage is of the ELV 29V type ...

	TX110	TX111
Power voltage	230 VM 50/60Hz	
Output voltage	26 V 640 mA	29 V 320mA
Absorbed power	24 VA	15 VA
Connection:	Rapid connection	Screw terminal
Flexible	1.5□	0.75 to 2.5□
Rigid	2.5□	0.75 to 4□
Size	6 ■	4 ■
Working temperature	-5°C to +45°C	
Storage temperature	-20°C to +70°C	

#### Electrical Connection TX110, TX111



### TG050 Wind Safety Detector

Composition of the products:

- An anemometer and its fixing support,
- Weatherproof interface box,
- The fixing screws of the box (piercing Δ 6 mm).

Electrical characteristics:

- Supply voltage : 230 VM 50 Hz,
- Contact type (wind safety) : 230 VM 4 A (protection by slowed 4A fuse)

Functional characteristics:

- Wind speed threshold adjusting : up to 55km/h per potentiometer factory setted 25km/h)
- Reaction time at the threshold excess : 3 seconds (5 seconds max.)
- Wind blocking time : 10 minutes (fixed)

Environment:

- Class II insulation
- IP65 protection index
- Working temperature : -25 °C to + 50 °C.

Connection:

Capacity : 0.5 to 2.5□

Overall size:

- Size of weatherproof box (overall) : 80 x 100 x 52mm
- Centre distance from fixing : 90mm

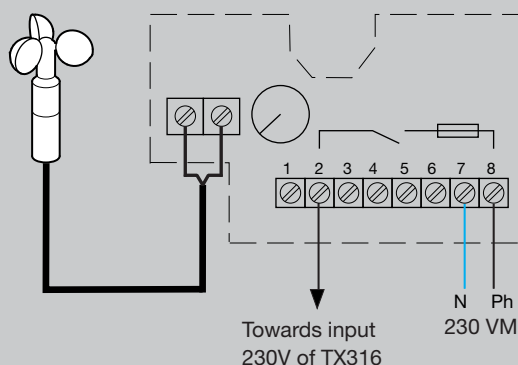
#### Working Principle

To exploit the wind safety function with TX Tebis system, it will be necessary to link the contact of the anemometer to an input of the TS316 module and programme the wind safety link with the configurator. The TG050 wind safety detector is used as protection device for blinds against gusty winds.

If the speed of the wind measured by the anemometer exceeds for 3 consecutive seconds a threshold adjusted by potentiometer, the total assembly of the blinds is launched instantaneously and the blinds are maintained in high position for 10 minutes at the minimum. (other controls become inactive)

If the speed of the wind has weakened sufficiently after 10 minutes, the wind safety is deactivated; the control of the blinds is authorized again.

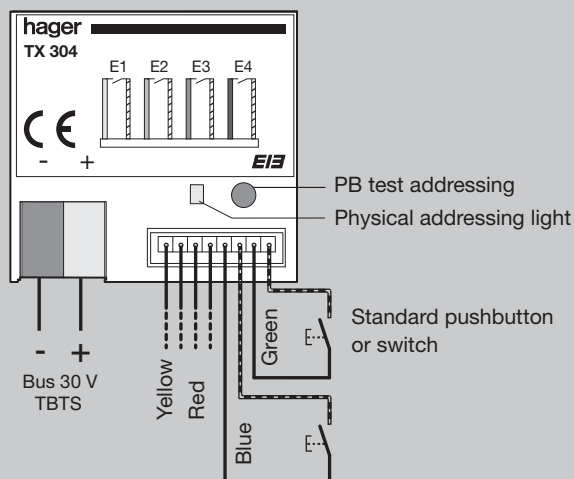
#### Electrical connection



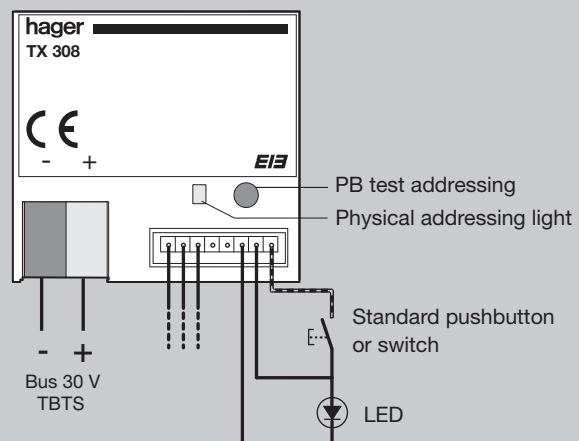
### Technical specifications

	TX302	TX304	TX308	TX314	TX316
Size	35 x 38 x 12mm			3	4
Supply	30V by TX111				
Inputs	2 for potential free contacts	4 for potential free contacts		4 inputs 230V	6 inputs 230V
Outputs	-		4 outputs 5V DC I <sub>max</sub> 850 μA	-	
Voltage delivered	5V DC impulse supplied by the product			230V AC (-15 / +10%)	
Contact current	0.5mA			19mA	
Spacing current	-			7.3mA	3.9mA
Distance between contacts and the products	Slide in or separable connector with 200mm length being able to be lengthened up to 5m			30m maxi	100m maxi
Link to EIB bus	Red and black terminal TG008				
Links of inputs	Separable connector of 200mm length			Through terminals: • Flexible: 1 to 6□ • Rigid: 1.5 to 10□	
Temperature: • Working • Storage	-25°C to +55°C -5°C to +45°C				

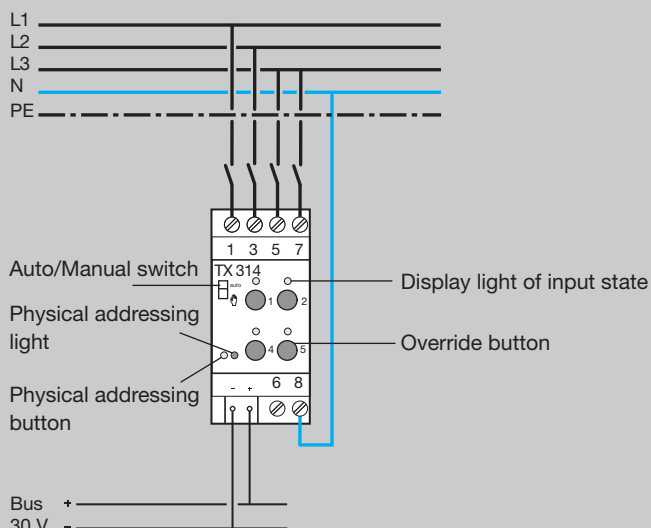
#### 4 Input Module Flush Mounted : TX304



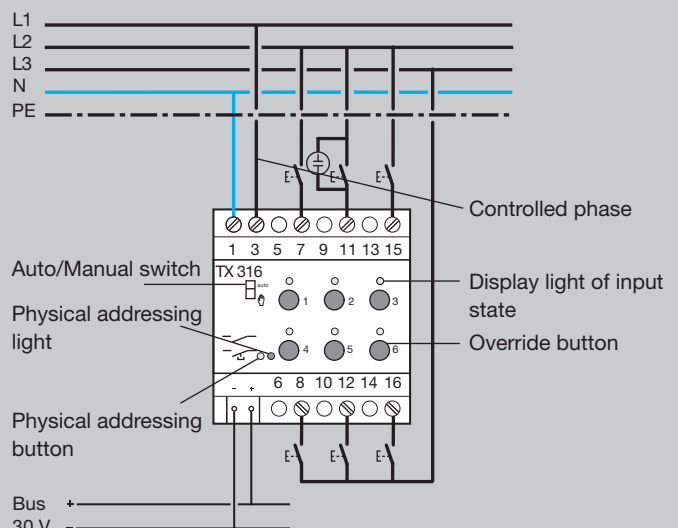
#### 4 Input Module / 4 LED Outputs Flush Mounted : TX308



#### 230V 4 Input Modules : TX314



#### 230V 6 Input Module : TX316



### Technical specifications

	TX450A	TX450B
Colour	White	Silver
Supply	30V DC bus EIB from TX111	
Consumption	150 mW	
Assembly	Surface mounting (flush box 60mm)	
Accessories included	BCU	
Configuration	With TX100 or with ETS software and the application : TL450A	
Working temperature	0°C to +45°C	
Size	80 x 80mm	

### Function

The room controller is a control and display wall appliance for the Tebis system.

It is offered in 2 colours (white or silver)

It combines several functions in a single product

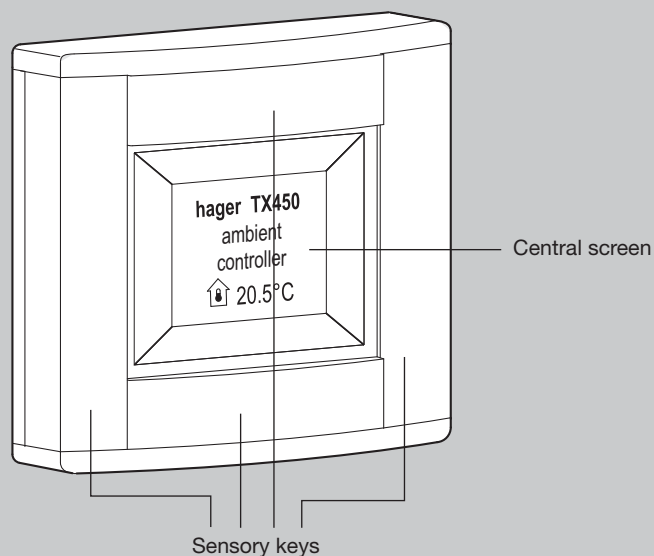
Through its 4 sensory keys, it allows :

- The control of lighting, rollershutters, heating etc...
- The control of functions developed as scenarios

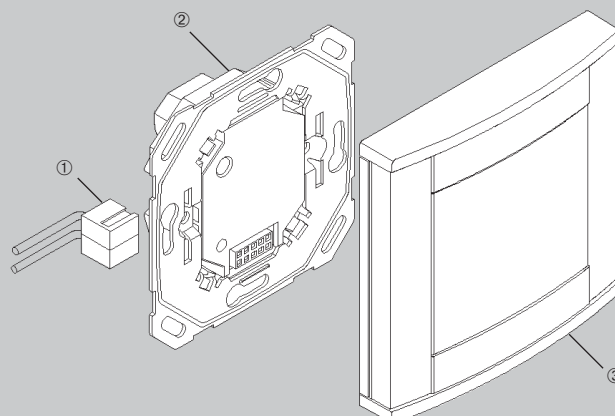
The central screen :

- Display of information on the state of equipment
- Display of the hour , date, ambient temperature...

This different information is parametered through the “**Adjustments**” and “**Configuration**” mode included in the product.



### Electrical Connection



- Connect the BCU ② to EIB bus by EIB connector
- Screw the assembly plate with BCU on anchoring box ①
- Clip the front face ③ to the BCU.

In order to ensure a good visibility, install the room controller at a height of 1,30m up to 1,50m.

### Technical specifications

#### Electrical characteristics

- Supply : 30 V DC bus EIB
- TX 022 : consumption : max. 9,5 mA
- TX 023 : consumption : max. 10 mA

#### Working characteristics

- Programming capacity : 56 steps to be distributed over the two channels
- Minimum time between 2 steps : 1 minute
- Start precision : 5 1.5 sec / 24h
- Start reserve : lithium battery cell, total of 5 years of mains cut
- The product is placed in home position (display switched off) after 1 minute of voltage absence. It returns to Auto mode immediately on return of the voltage or on pressing on a key.
- Protection index : IP 20

#### Environment

- Working temperature: -5 to +45 °C
- Storage temperature : -20 to +70 °C

#### Connection with cage terminals

- Flexible : 1 to 6 mm<sup>2</sup>
- Rigid : 1,5 to 10 mm<sup>2</sup>

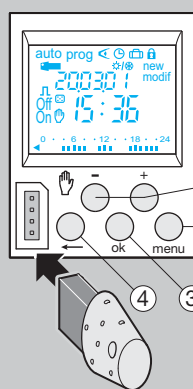
#### Reset :

- Of the programme : it can be fully reset by simultaneous press on the following 3 keys : menu, ok and . The time and date are maintained
- Total : by simultaneous press on the keys +, -, menu, ok and . All the product content is deleted. After a total reset, it is necessary to reset the clock switch to hour and day.

### Main characteristics

- Product delivered set to current hour and day
  - Automatic changing of summer / winter time
  - Programming key for permanent exemptions for copying or safeguard of the programme
  - Programming by day or group of days
  - 56 step of program On, Off, 1 sec to 30 mn or dimming
  - Permanent manual On or Off (fixed),
  - Temporary manual On or Off that can be parametered by configuration tools
  - Temporary exemptions On or Off (flashing),
  - Vacation mode : forcing On or Off between two dates
  - Presence simulation
- Bar chart displaying daily profile
- Possibility of locking the key
  - Programmable off-voltage
  - DCF synchronization (TX023 ONLY)
  - Possible display of date and hour on the bus

### Product presentation

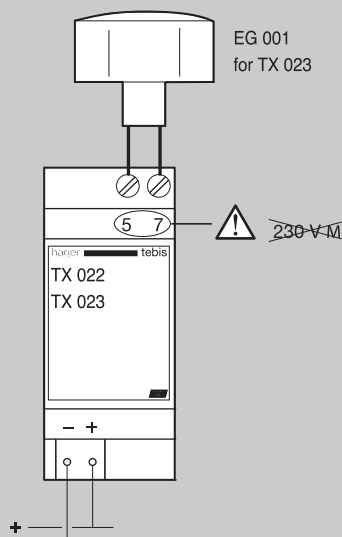


- ① menu : selection of the functioning mode
- auto : functioning as per the programm established
- prog : new for programming
- prog : modification to modify or delete a programme existing step
- : display of the programme
- : modification of hour, date and choice of the summer/winter time changing mode /
- : adjustment of vacation
- ② + et - : navigation or adjustment of values
- A : in Auto mode, selection of vmanual, exemptions or unpredictable functioning
- B
- ③ OK : validate the flashing info
- ④ : come back to the previous step

You can go to Auto mode at any time with the menu key. If no action is done for 1 min, the switch returns to Auto mode.

### Connection diagram

#### TX 022 - TX 023



### TX 025 Twilight Switch

#### Function

This product is intended for automatic control of lighting, of shutters and blinds according to the measured light intensity. When set lux level is reached, the order of control is transmitted via the Bus to output modules.

#### Electrical characteristics

##### Supply

30 V ELV Bus

- Time delay at the initialisation : 30s
- Adjustment range : 2-200 and 200-2000 lux
- ON / OFF in Manu mode

#### Environment

- Working temperature : 0 °C to +45 °C
- Storage : -20 °C to +70 °C

#### Connection

Capacity :

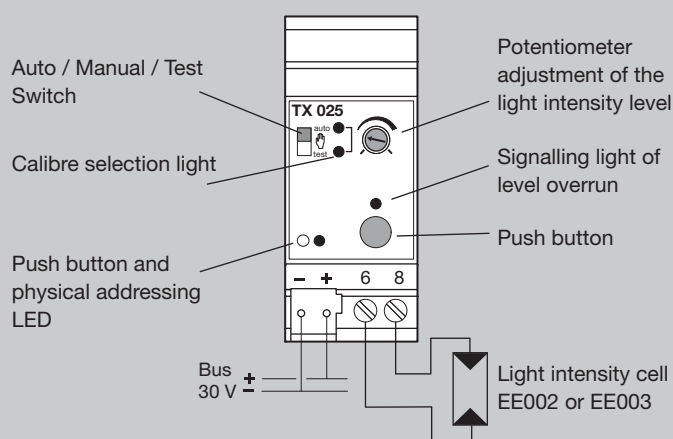
- Flexible : 1□ to 6□
- Rigid : 1.5□ to 10□

#### Probe

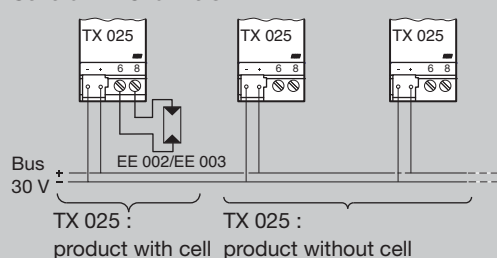
Use double insulated cable for wiring of the EE003 surface mounted cell or for lengthening the cable of the EE002 flush mounted cell.  
Max. distance : 100m

Overall size

- Size : 2 ■



#### Several TX Channels



It is possible to adjust a level by photocell switch. The light intensity measurement is carried out by a unique probe connected to a TX025 which retransmits the value of light intensity to other TX025 on the system via the EIB Bus.

### TG051 Weather Station

#### Function

It allows the control of level of the following data : rain, wind, sunshine and temperature. The information about excess is available on relay contacts. The TG051 can be used in an autonomous or integrated manner in the Tebis system by using input modules. The weather station contains an interpretation unit and a sensor block with :

- SOUTH, WEST, EAST sun sensor
- Rain sensor with heating element being started below 10°C
- DCF 77 receiver
- Wind sensor (electronic measurement with hybrid component)
- Internal / external temperature cell
- Rain and wind parameters are delayed by 5 min., at the start
- Sun parameter adjustable with 0-99min, time delay at the start/stop from 1klux to 99 klux
- Cell parameter of 1-50 lux (at step from 1) and 50-990 lux (at step from 10).

#### Technical specifications

##### Electrical characteristics

- System supply : 230 V/50 Hz
- Power dissipated : 2 W
- Programmer : 5 programs / day / output
- Synchronization : antenna DCF
- Contacts : 8 relay outputs

#### Environment

- Working temperature : 0 °C to +45 °C  
Probe : -30 °C to +50 °C (IP65)
- Storage temperature : -20 °C t +70 °C

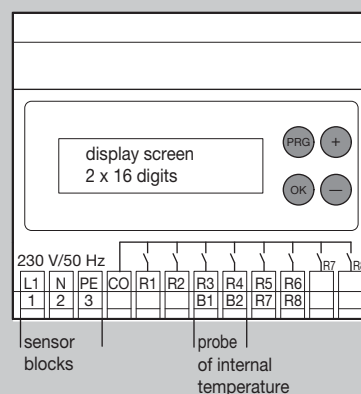
#### Connection

- Flexible : 1□ to 6□
- Rigid : 1.5□ to 10□, sensor 3 x 0.75

#### Overall size

- Size : 6 ■

#### Electrical Connection



- L1 : phase 230 V / 50 Hz
- N : Neutral
- PE : Earth or ground
- CO : Common output relays
- R1 : Relays 1
- R8 : Relays 8
- 1 : Sensor block
- 2 : Sensor block
- 3 : Sensor block
- B1- B2 : Probe of interior temperature KTY81-210

### Technical Specifications

	TX510	TX511
Type	Presence detector EIB/KNX TOR	Presence detector EIB/KNX light regulator
Supply	30V Bus EIB, 12mA	
Channel 1 / Channel 2	ON/OFF Switching	
Channel 3	-	ON/OFF Switching
Light intensity	-	Communication with light intensity level
	-	Adjustment to light intensity level
Light	OFF : Auto ON : Movement	
Consumption	< 0.2W	
Working temperature	0°C to +45°C	
Storage temperature	-10°C to +60°C	
protection index	IP41	
Connection	By TG008 connector	
Size	110 x 44mm	

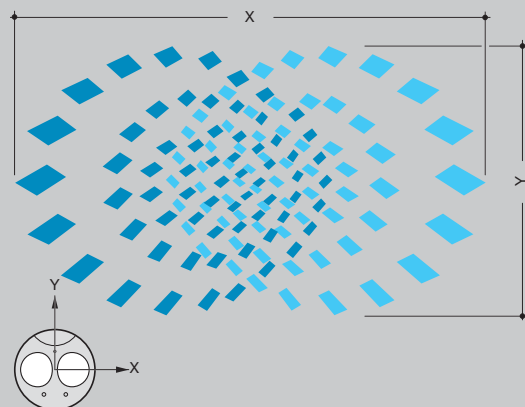
### Function

- Lighting time delay adjusted by potentiometer : 1 to 30min.
- Period of presence adjusted by potentiometer : 30s to 60min.
- Brightness range : 5 to 1200 lux
- System height : 2,5m to 3,5m

### Adjustment of Light Intensity Level

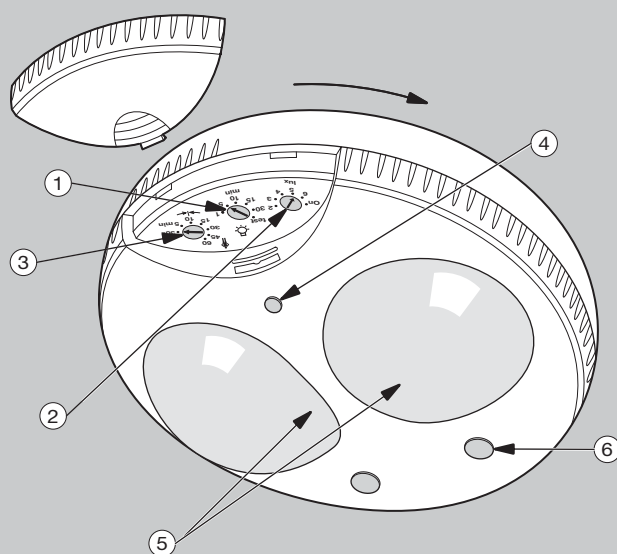
Potentiometer Position	Light intenisty In Lux	Equivalent in a building
1	5	-
2	100	Circuiation
3	200	Circuiation. WC
4	300	Work plan
5	500	Office
6	800	Class room laboratory
ON	Measurment of light intensity inactive	-

Position (1 ...6) do not take into account the environment (office, furniture)

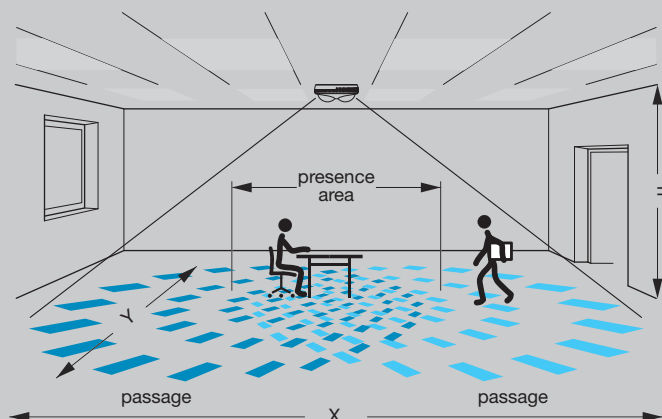
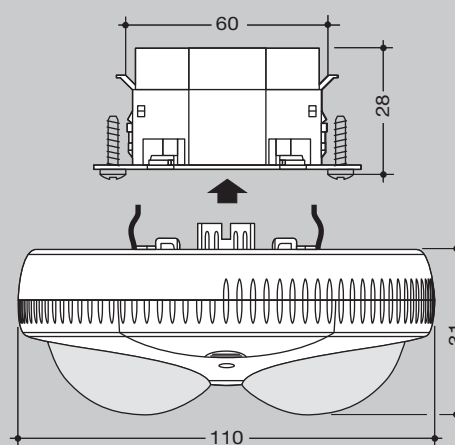


H	2.5m	3m	3.5m
X	13	15.5	18
Y	7	8	9

### Presentation




- 1 Potentiometer adjusting of the lighting time delay
- 2 Potentiometer adjusting of the light intensity level
- 3 Potentiometer adjusting of the presence output (TX510 only)
- 4 VI signalling light
- 5 Detection lens
- 6 Sensor for light intensity measurement



The output modules TXA 204C, TXA 206A/B/C et TXA 207C have 4,6 or 10 independent outputs (free of potential) to carry out the following controls :

- ON/OFF
- time delays ON or OFF of 1 second to 12 hours
- priority settings start or stop
- sophisticated time lag switch 1 sec. to 24 hours

In "Auto" mode, the start and stop orders come from the input modules of Tebis.

In "Manu" mode , these controls are accessible by the push-buttons in front of the module (priority setting).

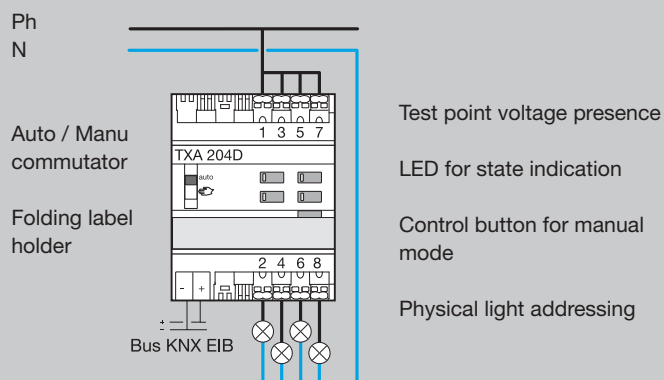
These products are configured with tool TX100 or by ETS Software\*

\*additional functions : heating application with TXA 204C and TXA 206A/B/C/D

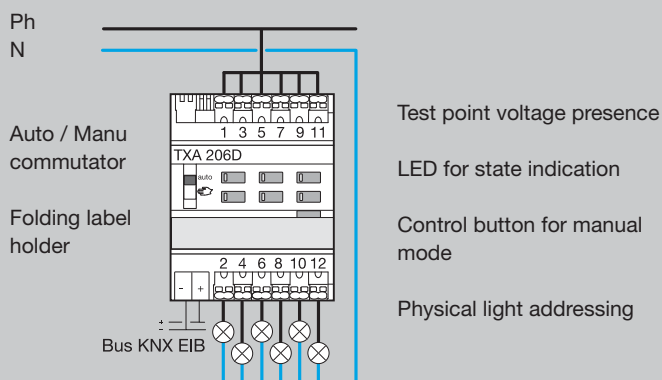
	TXA206A	TXA206B TXA206C	TXA204C	TXA206D	TXA207C
No of outputs, In	6 outputs, 4A	6 outputs, 10A	4 or 6 outputs, 16A capacitive loads	6 outputs, 16A	10 outputs, 16A
Breaking capacity :					
• Incandescent and halogen 230 V	800W	1200W	2300W	2300W	2300W
• Halogen ELV ferromagnetic transformer	800VA	1200VA	1600VA	1600VA	1600VA
• Halogen ELV electronic transformer	800VA	1000VA	1200VA	1200VA	1200VA
• Non compensated fluorescent tubes	800W	1000W	1200W	1200W	1200W
• Parallel compensated fluorescent tubes	Not adapted	Not adapted	Not adapted	1500W with 200µf	Not adapted
• Fluorescent tubes for electronic ballast	12 x 36W	15 x 36W	20 x 36W	20 x 36W	20 x 30W
• Compact fluorescent lamps	6 x 23W	12 x 23W	18 x 23W	18 x 23W	18 x 23W
Supply of the module	Bus 30V DC	Bus 30V DC	Bus 30V DC	Bus 30V DC	Bus 30V DC
Maximum dissipation	1W	5W	12W	12W	15W
Working temperature	0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C	0°C to +45°C
Storage temperature	-20°C to +70°C	-20°C to +70°C	-20°C to +70°C	-20°C to +70°C	-20°C to +70°C
Degree of protection	IP30	IP30	IP30	IP30	IP30
Width of the module	4■	4■	4■	4■	6■
Connection	0.75 to 2.5■	0.75 to 2.5■	0.75 to 2.5■	0.75 to 2.5■	0.75 to 2.5■

### Electrical Connection

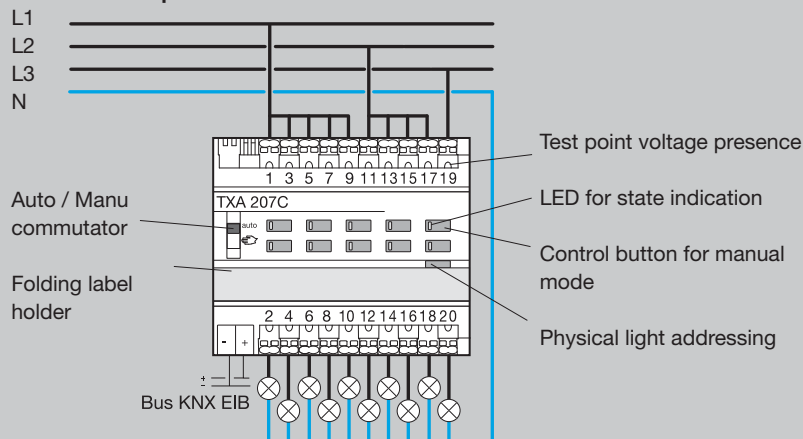
#### TXA204C 4 outputs



#### TXA206A/B/C/D 6 outputs



#### TXA207C 10 outputs



**Note:** Each output has a volt-free contact whose terminals are laid in a crossing way upstream/downstream and labelled by a contact number C1, C2, ... Decking staples TG200A/B/C allow the decking upstream of several outputs.

The outputs contacts of the modules can be used in a single-phase or three-phase installation.

## Technical characteristics

### Dimmers

The Tebis dimming offer includes :

- Dimmers with direct output 300, 600 or 1000 W
- Pilots with 1 or 3 outputs

### Dimmers with direct output

Completely renewed, this extended range integrates the **new design and the quick connect**.

It includes the following products :

- TXA 213 : 3 outputs 300 W
- TXA 210 : 1 output 600 W
- TXA 215 : 1 output 1000 W
- TXA210A : 1 output 300W

These products allow the direct connection of the incandescent LV or ELV halogen loads. They adapt automatically with the type of connected load and have an integrated overheating and overload protection.

### Other advantages

- Manual control even when bus is disconnected.
- Mini/maxi level local setting
- Memorizing up to 8 different scene levels of lighting.
- Call of present level by priority setting

### Pilot dimmers 1-10 V : TX 211, TX 214

The modules TX 211 and TX 214 are provided for control by output :

- Up to 30 dimmers EV 100 or EV 102,
  - Up to 25 electronic ballasts at 20mA
  - Possibility to memorize up to 3 different scene lighting levels.
- In manual mode, the push-buttons situated on the product allow the priority setting of the outputs when there is supply voltage on the bus.

### Dimming principles

Only one push-button is needed to order a dimming circuit according to following principle :

- 1 brief press = start or stop
- 1 long press = increase or decrease

At each switching on, the dimmer restores the last stored level, except when scenes are called.

The dimming control is also possible with 2 push-buttons :

- 1 push-button for start or increase by short or long press
- 1 push-button for stop or decrease by short or long press

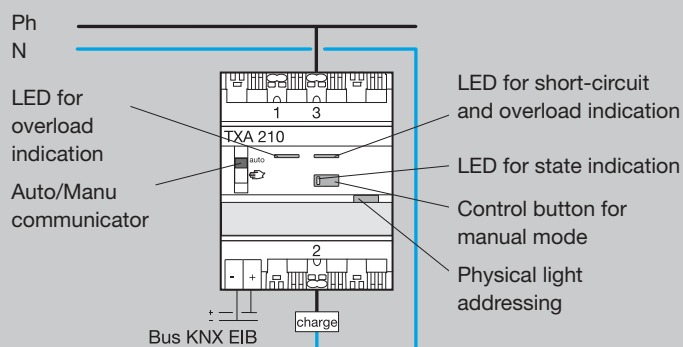
## Technical characteristics

	TXA210A	TXA210	TXA213	TXA215	TXA211/TX214
Number of outputs	1 output 300W	1 output 600W	1 to 3 output according to selector	1 output 1000W	1 or 3 outputs 1-10V
Dimming range in 230V or in VLV ferromagnetic or electronic transformer	25 to 600W / 600VA		20 to 300W / 300VA 20 to 600W / 600VA 20 to 900W / 900VA	20 to 1000W / VA	Output 1-10V : Current max. 50mA + contact TOR 16A AC1
Supply	30V DC + 230V - 50/60Hz				
Max; dissipation of the product	4W	7.5W	9W	10W	9W
Working temperature	0 to +45°C				-20 to +70°C
Storage temperature	-20 to +60°C				-20 to +60°C
Degree of protection	IP30				
Width of module	1			6	4
Connection	0.75 to 2.5 mm <sup>2</sup> with flexible or rigid wire quick connect terminal				Flexible: 1 to 6 mm <sup>2</sup> Rigid: 1.5 to 10 mm <sup>2</sup>

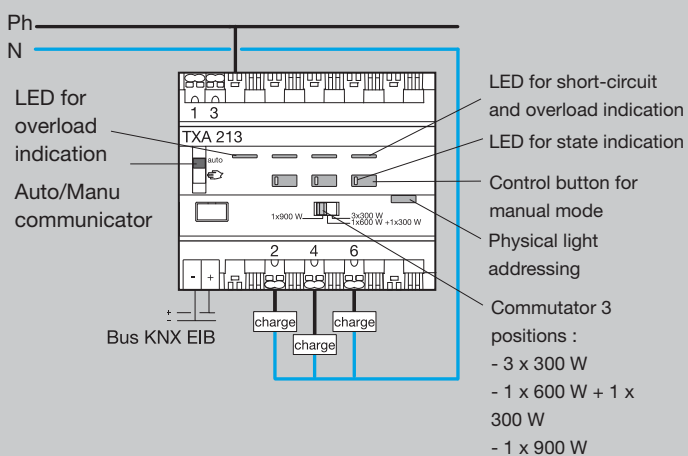


### Electrical Connection

#### TXA210/TXA215 : 1 Output 600W / 1000W



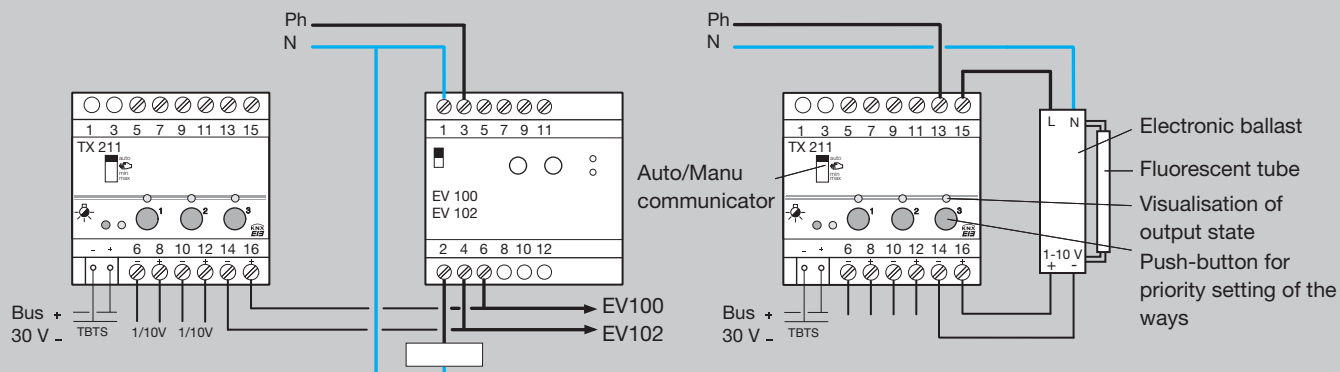
#### TXA213 : Single phase 1-3 outputs



#### Functions and setting available on TXA 215

- Display of the dimming level
- Dimming rise time from 0 to 100% adjustable from 1s to 60s (4s by default)
- Dimming start and stop time adjustable from 0s to 30min
- Setting of minimum dimming threshold : 1% per default
- Setting of maximum dimming threshold : 100% per default
- Setting of reached transition time for call of scenario of 0s to 9h59min

#### Plot dimmers TX211/TX214



Output module 4 shutters, blinds or curtains TXA 223, TXA 224, TXA 225 and TXA 226.

The whole range of the products blinds and shutters is divided into two applications :

- TXA223 and TXA225 modules manage the controls up, down and stop. They are used to control roller shutters, awning blinds,...
- TXA224 and TXA226 modules manage the controls up, down, stop, as well as the inclination of strips. They are used to control blinds or curtains with strips.

The TXA 225 and TXA 226 products are used for direct current motor control. The controls UP and DOWN are obtained by polarity reversal.

In "Auto" mode, the movement orders come from the input modules of the tebis system.

In "Menu" mode, these controls are accessible by the push-buttons in front of the module (priority setting).

### Technical Characteristics

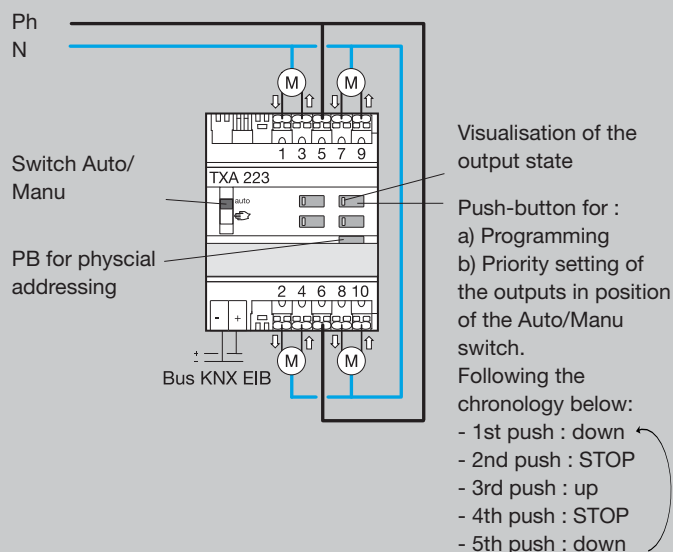
References	TXA223, TXA224	TXA225, TXA226
Number of outputs	4	4
Breaking capacity	6A AC1 250VM	6A DC1 24V ...
Supply of module	Bus 30V DC	
Time setting between 2 controls of opposite direction	600ms	
Max. dissipation of product	2W	
Working temperature	0 to +45°C	
Storage temperature	-20 to +70°C	
Degree of protection	IP30	
Width in modules	4	
Connection flexible or rigid	0.75 to 2.5 mm <sup>2</sup> quick connect terminals	

### Note : Connecting of motors

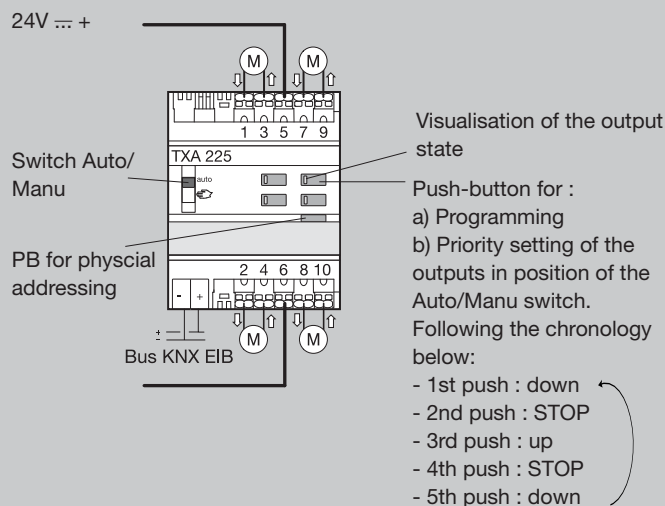
- Alternative current motors  
Never connect any motors in parallel
- Continuous current motors  
Two motors powered in CC can be connected in parallel on condition to meet the nominal current of the TX225 or TX226 modules

### Electrical Connection

#### TXA223 / TXA224



#### TXA225 / TXA226



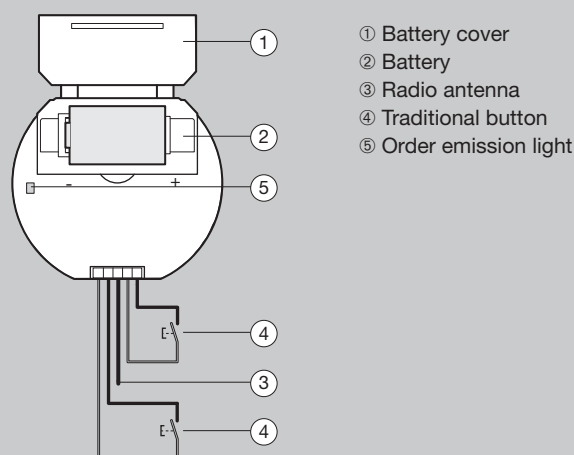
## Radio: Input Modules

### Technical Characteristics

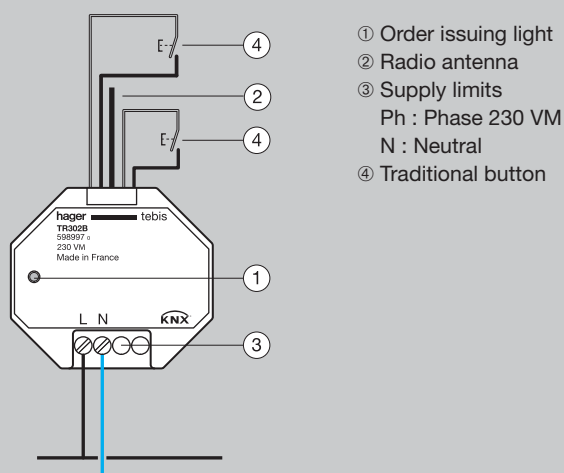
	TR302A / TR304A	TR302B / TR304B
Supply	CR 1/2AA (3.0V) Battery	230V M 50Hz ± 15%
Input	2/4 inputs potential free contacts	2/4 inputs potential free contacts
Contact current	30µA	30µA
Input current	19mA	19mA
Life of battery	5 years	-
Emission frequency	868.3 Mhz	868.3 Mhz
Emission range		
• Inside a building	max. 30m	max. 30m
• Open area	max. 100m	max. 100m
Working temperature	0°C to +45°C	0°C to +45°C
Storage temperature	-20°C to +70°C	-20°C to +70°C
Protection index	IP30	IP20
Size	45 x 51 x 16mm	48 x 53 x 27mm
Connection	Slide-in connector with 200mm length	Slide-in connector with 200mm length

### Product presentation

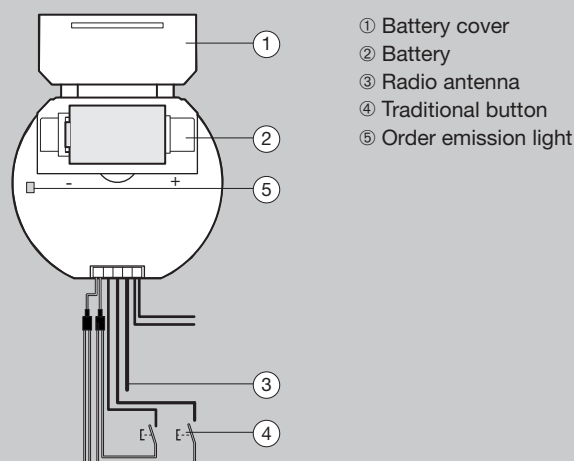
2 Input modules : TR302A (Battery Cell)



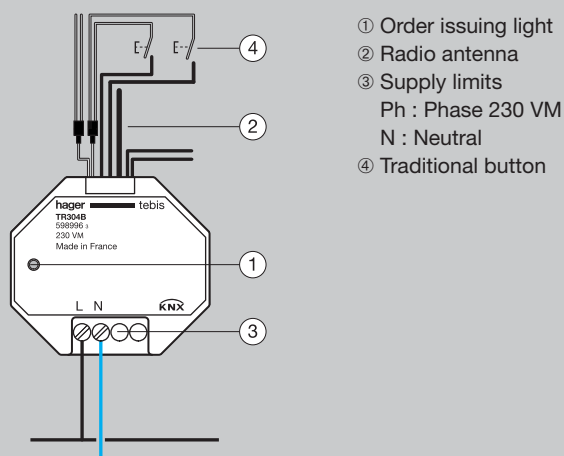
2 Input modules : TR302B (230VM)



4 Input modules : TR304A (battery cell)



4 Input modules : TR304B (230VM)



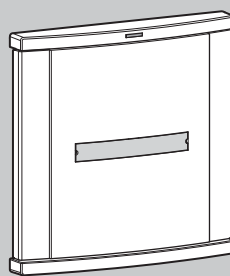
## Radio: Push Buttons and Remote Controls

### TD push button (KNX radio)

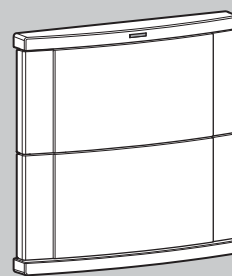
These are unidirectional or standard EIB / KNX emitters. The radio extra flat push buttons are offered in 2 colours (white and silver) and in 2, 4 or 6 ways version (keys with left / right horizontal direction). All products are with the label folder, and with a radio emission LED. The allocation of the ways is carried out with the TX100 configurator.

#### Technical Characteristics

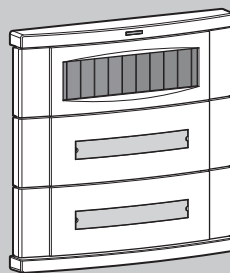
	KNX Radio Push Button
Supply	CR2430 (3V) battery cell
Life of the battery	3 years
Emission range	
• Inside a building	Max. 30m
• Open area	Max. 100m
Emission frequency	868.3MHz
Working temperature	0°C to +45°C
Storage temperature	-20°C to +70°C
Protection index	IP30
Size	80.5 x 80.5 x 12mm



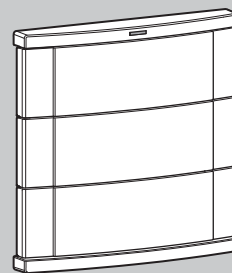
TD1\*\*



TD2\*\*



TD25\*\*\*



TD3\*\*\*

### How to choose RF push-buttons

Number of commands	1 key	2 ways	2 keys	4 ways	3 keys	6 ways	2 keys 4 ways	+ Solar
Colour	White	Silver	White	Silver	White	Silver	White	Silver
With label holder	TD110	TD111	TD210	TD211	TD310	TD311	TD250	TD251
Without label holder	TD100	TD101	TD200	TD201	TD300	TD301	-	-
Supply	2 Cr 2430 (3V) battery - 3 years							

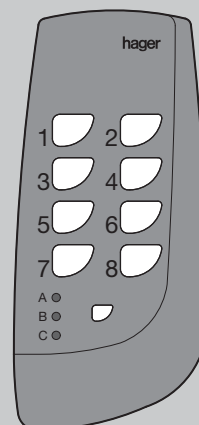
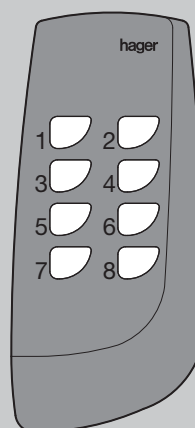
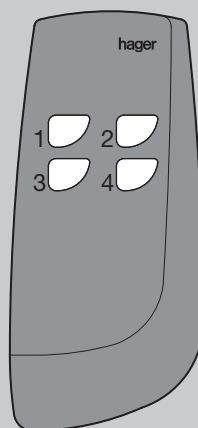
### Radio remote controls

These are unidirectional emitters in standard EIB/ KNX.  
The allocation of the keys is carried out with TX100 configuration.

#### Technical Characteristics

	TU204A / TU208A / TU224A
Supply	CR 1/3N (3V) battery cell
Life of the battery	3 years
Emission range	
• Inside a building	Max. 30m
• Open area	Max. 100m
Emission frequency	868.3 Mhz
Working temperature	0°C to +45°C
Storage temperature	-20°C to +70°C
Protection index	IP30
Size	111 x 51 x 18mm

#### Product presentation



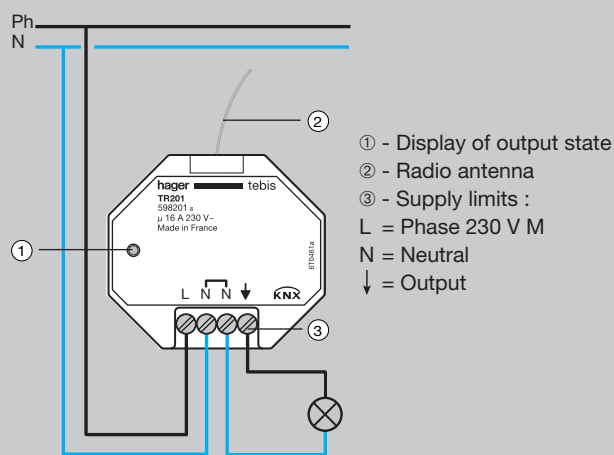
#### Remote control:

- TU204A 4 keys, 4 commands
- TU208A 8 keys, 8 commands
- TU224A 9 keys, 24 commands, 8 commands x 3 channels

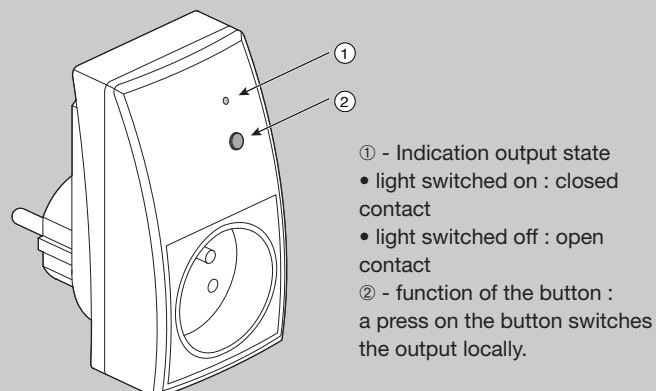
## Radio: Output products for lighting

Technical Characteristics	TR201	TR501	TR270F	TR271F
Supply	230V M 50Hz ± 15%			
Inputs		1 potential free contact		
Ouputs	16A 230V M AC1			
Power to cut:				Load:
• Incandescence	2300W	1500W	2300W	300W 35°C
• 230V halogen	2300W	1500W	2300W	
• Ferromagnetic transfero. ELV halogen	1600VA	800VA	1600VA	200VA 35°C
• Electronic transfero. ELV halogen	1200VA	800VA	1200VA	
• Parallel compensated fluor; tubes	20 x 36W	11 x 36W	20 x 36W	
	Max. 120ϕf	Max. 47ϕf	Max. 120ϕf	
Connection through cage termainal:				
• Flexible	0.5 to 2.5mm²			
• Rigid	0.5 to 2.5mm²			
Emmision frequency	868.3 MHz			
Emission range				
• Inside a building	Max. 30m			
• Open area	Max. 100m			
Working temperature	0°C to +45°C			
Storage temperature	-20°C to +70°C			
Protection index	IP30			
Size	48 x 53 x 30mm		54 x 98 x 80mm	

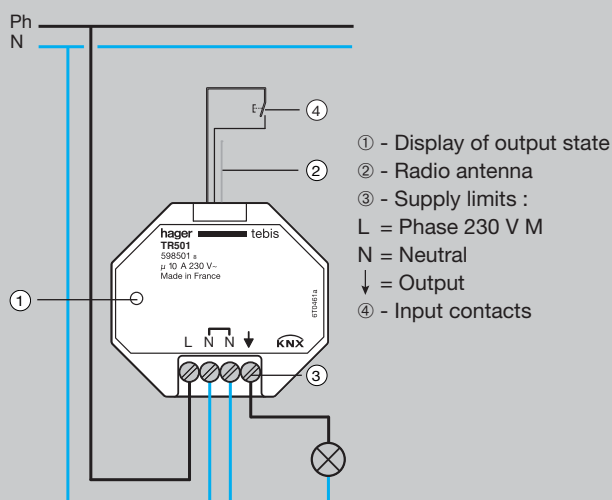
### Output Module TR201 : 1-output 16A



### TR270F / TR271F 16A socket



### TR501 : 1-input / 1-output

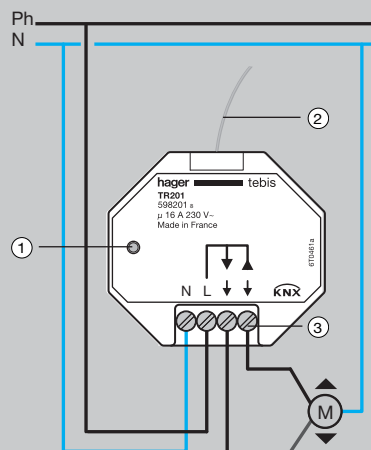


## Radio: Blinds and Rolling Shutters Output Products

Technical Characteristics	TR221	TR521
Supply	230V M 50Hz $\pm$ 15%	230V M 50Hz $\pm$ 15%
Input		2 inputs, potential free
Output	1 shutter output, 6A 230V M AC1	1 shutter output, 6A 230V M AC1
Maxi. power loss	2W	2W
Min. time between revertive pulsing	600ms	600ms
Emission frequency	868.3Mhz	868.3Mhz
Emission range		
• Inside a building	Max. 30m	
• Open area	Max. 100m	
Working temperature	0°C to +45°C	0°C to +45°C
Storage temperature	-20°C to +70°C	-20°C to +70°C
Protection index	IP30	IP30
Size	48 x 53 x 30mm	48 x 53 x 30mm
Connection through cage terminal		
• Flexible	0.5 to 2.5mm <sup>2</sup>	0.5 to 2.5mm <sup>2</sup>
• Rigid	0.5 to 2.5mm <sup>2</sup>	0.5 to 2.5mm <sup>2</sup>

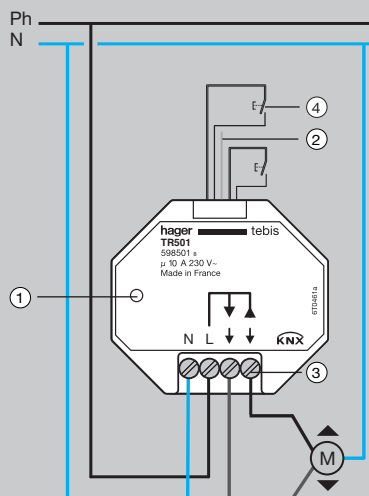
### Rolling shutters / blinds

#### TR221 : 1 output



- ① - Display of output state
- ② - Radio antenna
- ③ - Supply limits :  
L = Phase 230 V M  
N = Neutral  
▼ = Down  
▲ = Up

#### TR521 : 2 inputs / 1 output



- ① - Display of output state
- ② - Radio antenna
- ③ - Supply limits :  
L = Phase 230 V M  
N = Neutral  
▼ = Down  
▲ = Up
- ④ - Input contacts

The Ashley range of white wall accessories has been re-invented. The new design presents a sleek, slimline profile with a unique wedge-shape. With modern curves and a radius finish you can be sure of a unique style that will take wiring accessories beyond the 21<sup>st</sup> century.



Cage terminals accept up to 5 x 2.5mm<sup>2</sup> conductors for easy installation.



Double pole switching for assured disconnection.



Terminal screws are "taptite" to prevent loss in transit.

Terminal screws have hardened heads that accept flat driver blades for confident torquing.



Recessed rivets allow simple patress of trunking installations.





Wall switches	6.2
Bell push	6.3
Isolator switch	6.3
Data front plate	6.4
Wall dimmers	6.4
13 Amp socket outlet	6.5
Fused connection units	6.6
20 Amp double pole switches	6.7
45 Amp double pole switches	6.7
Cooker controls	6.8
Moulded blank plates	6.8
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TV socket outlets	6.9
Telephone socket outlets	6.9
Euro front plates and modules	6.10
Mounting boxes	6.11
<b>Safety lampholders and pendants</b>	<b>6.12</b>
<b>Ceiling switches</b>	<b>6.16</b>
<b>Junction boxes</b>	<b>6.20</b>



Shutters on live and neutral pins for protection against accidental contact.



Flat top edge allows easy removal of any emulsion over-paint



Smooth low gloss finish allows easy cleaning.

Hard "urea" frontplate provides high resistance to scratching.



Lifetime guarantee on majority of products.



## Wall Switches

- Complies with BS EN 60669-1, a.c. only
- 'X' rated - No need to derate for fluorescent loads
- Min. flush denotes minimum depth flush metal box required to BS 4662
- Supplied with M3.5 x 25mm long fixing screws
- Capacity of each terminal 2 x 2.5mm<sup>2</sup> conductors
- Two way switches can be wired either 1 way or 2 way
- Terminal markings denote:  
L1 = One way  
L2 = Two way
- For multigang switches use of a 25mm mounting box will allow for increased wiring space
- For mounting boxes see selection chart on page 6.24



PPS12



PPS32

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Plate switch 1 gang 1 way 10 Amp Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PPS11</b>
Plate switch 1 gang 2 way 10 Amp Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PPS12</b>
Intermediate plate switch 1 gang 10 Amp Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PPS16</b>
Plate switch 2 gang 2 way 10 Amp Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PPS22</b>
Plate switch 3 gang 2 way 10 Amp Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PPS32</b>
Plate switch 4 gang 2 way 10 Amp Dimensions: h = 86mm w = 120mm d = 7mm	25mm	120.6mm	5	<b>PPS42</b>

## Bell Push

- Bell push can be wired to make or break 250V a.c. or 24V d.c.
- Marking of bell push can be varied i.e. "press" see printing section on page 6.28



PPBP12

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
1 Gang bell push, marked with "Bell" symbol dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PPBP12</b>

## Isolator Switches

## 3 pole isolator switches

- For isolation of 2 poles and neutral for fan maintenance in electrical installations
- Available with or without fan symbol



PPS3PIF

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
3 Pole fan isolator plate switch 10 Amp Dimensions: h = 86mm w = 86mm d = 7mm	25mm	60.3mm	10	<b>PPS3PI</b>
3 Pole fan isolator plate switch - marked "fan" 10 Amp dimensions: h = 86mm w = 86mm d = 7mm	25mm	60.3mm	10	<b>PPS3PIF</b>

## Wall Dimmers

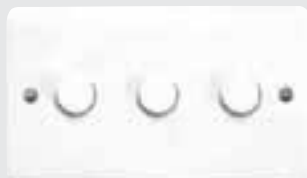
### - Resistive loads only

- The dimmer range can be used on incandescent lighting up to 400w.



PSD1

Description	W Max	Mounting box min. flush	Fixing centres	Pack qty.	Cat Ref.
1 Gang 2 way dimmer Dimensions: h = 86mm w = 86mm d = 7mm	400W	25mm	60.3mm	1	<b>PSD1</b>
2 Gang 2 way dimmer Dimensions: h = 86mm w = 86mm d = 7mm	250W	25mm	60.3mm	1	<b>PSD2</b>
3 Gang 2 way dimmer Dimensions: h = 86mm w = 120mm d = 7mm	250W	25mm	120.6mm	1	<b>PSD3</b>
4 Gang 2 way dimmer Dimensions: h = 86mm w = 120mm d = 7mm	250W	25mm	120.6mm	1	<b>PSD4</b>

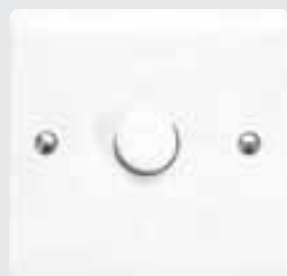


PSD3

## Wall Dimmers

### - Resistive, mains halogen or dimmable electronic transformer inductive

- This dimmer range can be used for resistive, mains halogen or dimmable electronic transformer inductive loads.



PSD1/M

Description	W Max	Mounting box min. flush	Fixing centres	Pack qty.	Cat Ref.
1 Gang 2 way dimmer Dimensions: h = 86mm w = 86mm d = 7mm	400W	25mm	60.3mm	1	<b>PSD1/M</b>
2 Gang 2 way dimmer Dimensions: h = 86mm w = 86mm d = 7mm	250W	25mm	60.3mm	1	<b>PSD2/M</b>
3 Gang 2 way dimmer Dimensions: h = 86mm w = 120mm d = 7mm	250W	25mm	120.6mm	1	<b>PSD3/M</b>
4 Gang 2 way dimmer Dimensions: h = 86mm w = 120mm d = 7mm	250W	25mm	120.6mm	1	<b>PSD4/M</b>

## 13 Amp Socket Outlets

## 13 Amp socket outlets

- Complies with BS 1363 Pt 2, A.C. only
- Double pole switching mechanism on switched sockets
- All terminal screws grouped in-line and upward facing for ease of installation
- Flat head terminal screws
- Twin socket comes with twin earth as standard
- Rocker is printed 'ON'
- Capacity of each terminal: 5 x 2.5mm<sup>2</sup> conductors switched; 4 x 2.5mm<sup>2</sup> unswitched (for other sized conductors see terminal capacities on page 6.27)
- Tough plastic back for durability
- Min. flush denotes minimum depth flush metal box to BS 4662
- For mounting boxes see selection chart on page 6.30
- Supplied with M3.5 x 30mm long fixing screws



PS81



PS82

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Single unswitched socket 13 Amp Dimensions: h = 86mm w = 86mm d = 9mm	25mm	60.3mm	10	<b>PS81</b>
Twin unswitched socket 13 Amp (with twin earth) Dimensions: h = 86mm w = 146mm d = 9mm	25mm	120.6mm	5	<b>PS82</b>
Single switched socket 13 Amp Dimensions: h = 86mm w = 86mm d = 9mm	25mm	60.3mm	10	<b>PSS81</b>
Twin switched socket 13 Amp (with twin earth) Dimensions: h = 86mm w = 146mm d = 9mm	25mm	120.6mm	5	<b>PSS82</b>

## Fused Connection Units

- Complies with BS 1363 Pt 4 a.c. only
- All switched units are double pole
- All terminal screws face upwards for ease of installation
- Cable clamp accommodates up to 2.5mm<sup>2</sup> flexible cord
- Flat head terminal screws
- Tough plastic back for durability
- All units fitted with a 13 Amp fuse link to BS 1362, can be supplied with a 3 Amp fuse link. Simply add '3' as a suffix to the catalogue reference e.g. PSSU83/3
- Flex outlet at edge of plate consists of removable insert - for choice of use
- Min. flush denotes minimum depth flush metal box to BS 4662
- For mounting boxes see selection chart on page 6.30
- Supplied with M3.5 x 30mm long fixing screws
- Capacity of each terminal: switched; 5 x 2.5mm<sup>2</sup>; unswitched 4 x 2.5mm<sup>2</sup> conductors (for other sized conductors see terminal capacities on page 6.27)
- Many more printing options are available. Units can be marked according to individual needs i.e. "Microwave", "Freezer" see page 6.28



PSSU83

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Unswitched unit 13 Amp Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PSU83</b>
Switched unit 13 Amp Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PSSU83</b>
Switched unit with neon 13 Amp Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PSSU83N</b>



PSSU83N

<b>Printed units</b>				
Switched unit 13 Amp, marked "Washing Machine"	25mm	60.3mm	1	<b>PSSU83/WM</b>
Switched unit 13 Amp marked "Microwave"	25mm	60.3mm	1	<b>PSSU83/MW</b>
Switched unit 13 Amp marked "Dishwasher"	25mm	60.3mm	1	<b>PSSU83/DW</b>
Switched unit 13 Amp marked "Freezer"	25mm	60.3mm	1	<b>PSSU83/FR</b>



PSSU83/MW

## 20 Amp Double Pole Switches

- Complies with BS EN 60669-1 a.c. only
- Min. flush denotes minimum depth flush metal box to BS 4662
- Supplied with M3 x 30mm long fixing screws
- Capacity of each terminal: 3 x 2.5mm<sup>2</sup> conductor



PDP84



PDP84N

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
DP switch 20 Amp Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PDP84</b>
DP switch with neon 20 Amp Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PDP84N</b>
DP switch - marked "Waterheater" 20 Amp Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PDP85</b>
DP switch with neon, 20 Amp marked "Waterheater" Dimensions: h = 86mm w = 86mm d = 13mm	25mm	60.3mm	10	<b>PDP85N</b>

## 45 Amp Double Pole Switches

- Complies with BS EN 60669-1 a.c. only
- Min. flush denotes minimum depth flush metal box to BS 4662
- Supplied with M3.5 x 40mm long fixing screws
- Capacity of each terminal: 1 x 16mm<sup>2</sup> conductor  
1 x 10mm<sup>2</sup> earth conductor  
(For other sized conductors see terminal capacities on page 6.27)



PDP445N

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
1 Gang plate, neon Dimensions: h = 86mm w = 86mm d = 13mm	35mm	60.3mm	5	<b>PDP445N</b>
2 Gang vertical plate, neon Dimensions: h = 146mm w = 86mm d = 13mm	35mm	120.6mm vertical	1	<b>PDP845N</b>

Also printed variants, cooker, hob etc. see page 6.8

## Cooker Controls

**Cooker control units**

- Complies with BS 4177, a.c. only

**45 Amp double pole switches**

- Complies with BS EN 60669 - 1, a.c. only

**Cooker cable outlets**

- Complies with BS 5733 a.c. only
- Combined switch / sockets have double pole 45 Amp

main switch and 13 Amp switched socket outlet

- Min. flush denotes minimum depth flush metal box to BS 4662
- Supplied with M3.5 x 40mm long fixing screw
- Capacity of each terminal:  
1 x 16mm<sup>2</sup> conductor  
1 x 10mm<sup>2</sup> earth conductor  
(For other sized conductors see terminal capacities on page 6.33)

- Marking on cooker control units: ON, OFF and circuit identification cooker
- See printing section for more details on printed options available on page 6.34

*Description**Mounting box  
min. flush**Fixing  
centres**Pack  
qty.***Cat Ref.**

PCCU2000N

**45 Amp cooker control unit**

DP cooker control switch 45 Amp  
Dimensions: h = 86mm w = 146mm d = 13mm

35mm

120.6mm

1

**PCCU2000**

DP cooker control switch with neon 45 Amp  
Dimensions: h = 86mm w = 146mm d = 13mm

35mm

120.6mm

1

**PCCU2000N****45 Amp double pole switches**

1 Gang plate with neon, marked "cooker" 45 Amp  
Dimensions: h = 86mm w = 86mm d = 13mm

35mm

60.3mm

5

**PDP445N/CK**

1 Gang plate with neon, marked "hob" 45 Amp  
Dimensions: h = 86mm w = 86mm d = 13mm

35mm

60.3mm

5

**PDP445N/HB**

1 Gang plate with neon, marked "oven" 45 Amp  
Dimensions: h = 86mm w = 86mm d = 13mm

35mm

60.3mm

5

**PDP445N/OV**

PDP445N/CK

**Cooker cable outlets**

Cooker cable outlet - c/w terminals  
Dimensions: h = 86mm w = 86mm d = 23mm

35mm

60.3mm

10

**CCO503****Flex outlet plate**

Dimensions: h=86mm w=86mm d=13mm

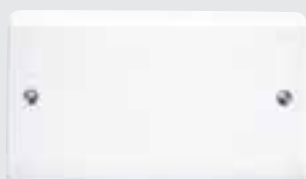
16mm

60.3mm

10

**FOP102**

## Moulded Blank Plates

*Description**Mounting box  
min. flush**Fixing  
centres**Pack  
qty.***Cat Ref.**

PPSB82

1 Gang  
dimensions: h = 86mm w = 86mm d = 7mm

16mm

60.3mm

20

**PPSB81**

2 Gang  
dimensions: h = 86mm w = 146mm d = 7mm

16mm

120.6mm

10

**PPSB82**

## Shaver Socket

- Shaver socket complies with BS EN 60742 / BS 3535 and BS EN 55014
- Designed for use in bathrooms and washrooms and incorporates a double wound isolating transformer for an earth free supply. Input 230V A.C. output dual voltage 230V A.C. and 110V a.c. outlets rating 20VA on either voltage
- Primary circuit is protected by a self- resetting thermal overload device. Insertion of shaver plug automatically switches on the transformer, removal automatically switches it off. A positive interlock prevents 2 plugs being inserted simultaneously
- Capacity of each terminal: 2 x 2.5mm<sup>2</sup> conductors
- See page 6.11 for mounting boxes

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Shaver socket outlet - dual voltage, neon Dimensions: h= 146mm w = 86mm d= 13mm	47mm	120.6mm vertical	1	<b>SO100</b>

## TV Socket Outlets

- Co-axial socket outlets
- Suitable as indoor terminations for VHF and UHF systems up to 860MHz (bands)
- Will accept standard co-axial plugs to BS 3041
- Isolated co-axial outlets suitable for use in multi-outlet communal aerial systems, providing necessary safety
- isolation rated at 2000 volts A.C.



PTV102

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Single co-axial TV socket outlet Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PTV102</b>
Double tv / fm co-axial socket outlet Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PTV202</b>
Single co-axial socket outlet, isolated Dimensions: h = 86mm w = 86mm d = 7mm	16mm	60.3mm	10	<b>PTV1103</b>

## Telephone Socket Outlets

- Telephone socket outlets**
- Complies with BS 6312 Pt. 2
- All sockets have rapid connection, insulation displacement connections (IDC)
- Each socket supplied with IDC tool, cable tie and installation instructions.



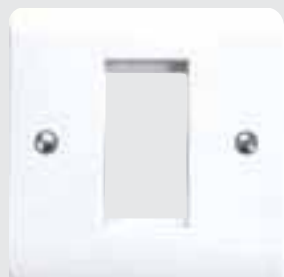
PTS03/1A

<i>Description</i>	<i>Mounting box min. flush</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Master telephone socket outlet - flush Dimensions: h = 86mm w = 86mm d = 7mm	25mm	60.3mm	10	<b>PTS03/1A</b>
Secondary telephone socket outlet - flush Dimensions: h = 86mm w = 86mm d = 7mm	25mm	60.3mm	10	<b>PTS03/3A</b>



## Euro Frontplates &amp; Modules

- Allows data and power accessories to aesthetically co-ordinate
- The front plates can be used to fit a variety of industry standard modules
- Accepts standard 25 x 50mm ■



PTS01/EURO

Description	Width	Fixing centres	Pack qty.	Cat Ref.
<b>Single moulded front plates</b>				
1 Gang 1 Module europlate Dimensions: h = 86mm x w = 86mm x d = 7mm	1 ■	60.3mm	1	PTS01/EURO
1 Gang 2 Module europlate Dimensions: h = 86mm x w = 86mm x d = 7mm	2 ■	60.3mm	1	PTS02/EURO
2 Gang 2 Module europlate Dimensions: h = 86mm x w = 146mm x d = 7mm	4 ■	120.6mm	1	PTS04/EURO



PTS04/EURO

Description	Euro modules width	Pack qty.	Cat Ref.
Single IEC - Female - non isolated	■	1	PPS1EW
Single IEC - Male - non isolated	■	1	PPS2EW
Single satellite 'F' connector	■	1	PPS3EW
Single blank	■	1	PPS4EW
Diplexer - TV & FM Radio	■ ■	1	PPS5EW
Diplexer - TV & Satellite	■ ■	1	PPS6EW
Triplexer - TV, Satellite, FM Radio	■ ■	1	PPS7EW
Quadplexer - TV, Satellite, FM Radio & return	■ ■	1	PPS8EW
BT telephone secondary	■	1	PPS9EW
BT telephone master	■	1	PPS10EW
RJ11 - Modem	■	1	PPS11EW
RJ45 - Data (cat 5e)	■	1	PPS12EW
Phono plugs - red/black - gold plated	■	1	PPS13EW
Speaker terminal posts - gold plated	■	1	PPS14EW



PPS10EW



PPS14EW



PPS8EW

## Mounting Boxes

- For use with white moulded products (see selection chart on page 6.24)
- Knockouts are provided in base and sides for cable entry
- Earth terminals are provided in P815, and P825
- Cable clamps in P81XD and P82XD accommodate 4mm<sup>2</sup> to 16mm<sup>2</sup> cable
- **Partition Wall Boxes**
  - Partition wall boxes are for installation in walls / boards up to 15mm thick
- MB81 / MB82 fixing lugs are snapped into position after insertion in the wall, flange around edge stops box falling into wall space
- All products manufactured from flame retardant material
- MB81, MB82 knockouts in side and base.



P815



P82D

<i>Description</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>Single Moulded Boxes</b>			
Mounting box - 20mm deep, 1 gang earth Dimensions: h = 87mm x w = 87mm x d = 20mm	60.3mm	10	<b>P815</b>
Mounting box - 28mm deep, 1 gang Dimensions: h = 87mm x w = 87mm x d = 28mm	60.3mm	10	<b>P81D</b>
Mounting box - 46mm deep, 1 gang Dimensions: h = 87mm x w = 87mm x d = 46mm	60.3mm	5	<b>P81XD</b>
<b>Twin moulded box</b>			
Mounting box - 28mm deep, 2 gang Dimensions: h = 87mm x w = 148mm x d = 28mm	120.6mm	5	<b>P82D</b>
Mounting box - 46mm deep, 2 gang cable clamp Dimensions: h = 87mm x w = 148mm x d = 46mm	120.6mm	1	<b>P82XD</b>
<b>Twin converter frame</b>			
2 Gang, 18mm deep Dimensions: h = 147mm x w = 87mm x d = 18mm	60.3mm to 120.6mm	5	<b>CF2</b>
<b>Partition wall boxes</b>			
Partition wall box - 35mm deep, 1 gang Dimensions: h = 83mm x w = 83mm x d = 35mm	60.3mm to	10	<b>MB81</b>
Partition wall box - 35mm deep, 2 gang Dimensions: h = 83mm x w = 144mm x d = 35mm	120.6mm to	5	<b>MB82</b>

## Shaver Box



SB105

<i>Description</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Shaver box - 51mm deep Dimensions: h = 146mm x w = 85mm x d = 51mm (vertical)	120.6mm	1	<b>SB105</b>

Safety products are designed to make life easy for you. When the lamp is removed from the lampholder body the power is automatically disconnected at the contacts - ensuring that there is no risk of access to live parts.

You can be sure that your clients or tenants are safe from risk of shock. In addition the safety range is the only product on the market to comply with the new British Standard BS 7895 for safety enhanced products with high temperature resistance. And with a Lifetime Guarantee as standard you can just fit and forget!



The inner body of the lampholder is a separate moving part which rotates as the lamp is twisted into place.



The solid switching action ensures that the contacts only become live when a lamp is fully inserted and held correctly in place by the 'J' slots.



Clip on terminal cover prevents casual removal. Integral cordgrip and easier to access screws and terminals allow faster wiring.



Made from an advanced high temperature polymer (resistant up to 210°C), all lampholders are T2 rated.





Safety lampholders 6.14

Safety pendant set 6.15



All products are designed and tested to comply with new British Standard BS 7895 for safety enhanced products.



Large multiple knockouts for easier cable installation and twin earth terminals will easily accommodate up to 4 earth conductors and are positioned for ease of cable access.







Angled terminal back for ease of wiring. Cables can be cut to the same length because all terminals are in-line.



Lifetime guarantee on majority of products.

## Safety Lampholders

- Complies with BS 7895
- T2 = heat resistance rating (210°C)
- Automatically disconnect power at the contacts when the lamp is removed
- 50.8mm fixing centres for non-access versions. Use with mounting blocks MB326E/MT
- Solid brass plungers and copper plated steel springs maintain plunger pressure throughout their long life
- Body angle of angled batten set at 30°
- Access lampholders have integral RL624 ceiling rose base and heat resisting PVC tails
- All pendants incorporate automatic cord grips and sleeve caps for ease of flexible cord stripping
- Home office shield encloses the lamp cap for extra safety (enabling compliance with BS 7671 in locations containing bath or shower)

	Description	Pack qty.	Cat Ref.
	<b>Bayonet cap cord grip lampholders</b>		
	Safety cord grip lampholders - short skirt	20	<b>SEL212</b>
	Safety cord grip lampholders - home office shield	20	<b>SEL214</b>
SEL212	<b>Straight BC batten lampholder</b>		
	3 terminal, home office shield	20	<b>SEL354</b>
	<b>Access BC batten lampholder</b>		
	Straight, 2 terminal body, 3 terminal and earth base, home office shield	10	<b>SEL96T</b>
	Angled, 2 terminal body, 3 terminal and earth base, home office shield	10	<b>SEL106T</b>
SEL214			
			
SEL354			
			
SEL96T			

## Safety Pendant Sets

**Ceiling rose**

- Pendant set complies with BS EN 60598 -1 : 2000
- Capacity of each terminal: 3 x 1.00mm<sup>2</sup> conductor
- Common base with 'access' batten lampholders
- Barriers between terminals
- Flexible pendant cord restraining hooks
- Fixing centres 50.8mm
- Feet on base to aid mounting on uneven surfaces
- 3 separate knockouts accept 1, 2 or 3 x 1.5mm<sup>2</sup> conductors
- Optional halo RL602 (see page 6.19)

*Description**Pack  
qty.***Cat Ref.****Pendant sets with access ceiling rose**

Safety pendant set 6", short skirt

10

**624SEL2126**

Safety pendant set 9", short skirt

10

**624SEL2129**

Safety pendant set 12", short skirt

10

**624SEL21212**

Safety shield pendant set 6", home office shield

10

**624SEL2146**

Safety shield pendant set 9", home office shield

10

**624SEL2149**

Safety shield pendant set 12", home office shield

10

**624SEL21412****Super access terminal bank type ceiling rose**

Access terminal bank type

10

**RL624**

Ceiling rose 3 terminal

Dimensions: 81mm dia x 26mm (halo = 108dia)

**Low Energy Pendant**

1

**LE212/6**

624SEL2126



624SEL2129



The range of Ashley ceiling switches have superior specification and performance standards.

The range includes the 50 Amp double pole ceiling switch for the control of electric showers and other equipment up to 11.5kW of rating, together with the latest 3 pole 10 Amp isolator ceiling switch. Each has a mechanical flag 'OFF' indicator to enable compliance with BS 7671 (the current IEE Wiring regulations). The 6 Amp ceiling switch versions incorporate an integral base as standard for ease of installation.



Integral base makes installation easier.



All ceiling switches are unobtrusive and are finished in brilliant white to match all other moulded accessories in the Ashley range.



Fixing screws are retained for easier installation.



Mechanical flag indicator can be seen from all angles.



Ceiling switches	6.18
Accessories	6.19



50 Amp rated switch facilities control of electric showers and other equipment up to 11.5kW of rating.



## Ceiling Switches

- Complies with BS EN 60669 -1
- 'X' rated - no need to derate for fluorescent loads
- Earth terminal in base

**6 Amp**

- Optional halo available, RL602 (see page 6.19)
- Switch will operate at up to an angle of 45°

- Pull cords 1.5m long
- Capacity of each terminal:  
6 Amp = 2 x 1.5mm<sup>2</sup> conductors  
(For other sized conductors see terminal capacities on page 6.27)

**10 Amp 3 pole isolating switch**

- Terminal capacity:  
3 x 1.5mm<sup>2</sup>  
50 Amp

- Complies with BS 3676 -1 : 1989
- Suitable for use with showers up to 11.5kW
- Flag indicator with 'OFF' marked in green is compliant with 16th edition wiring regulations 3mm contact gap identification
- Supplied with M3.5 x 30mm fixing screws
- Capacity of each terminal:  
1 x 16mm<sup>2</sup> conductors



CS160

Description	Halo dia	Fixing centres	Pack qty.	Cat Ref.
<b>6 Amp single pole ceiling switches</b>				
Ceiling switch 1 way 6 Amp Dimensions: 81mm dia x 36mm depth	108mm	50.8mm	10	<b>CS160</b>
Ceiling switch 2 way 6 Amp Dimensions: 81mm dia x 36mm depth	108mm	50.8mm	10	<b>CS260</b>

## Ceiling Switches

Description	Mounting min. flush	Fixing centres	Pack qty.	Cat Ref.
<b>50 Amp double pole isolating ceiling switch</b>				
Ceiling switch with neon 50 Amp Dimensions: h = 86mm w = 86mm d = 36mm (15mm rear projection)	35mm	60.3mm	5	<b>CS445N</b>
<b>3 pole isolating ceiling switched</b>				
3 Pole isolating ceiling switch 10 Amp Dimensions: h = 86mm w = 86mm d = 19mm	25mm	60.3mm	5	<b>CS3PI</b>
3 Pole isolating ceiling switch with fan symbol 10 Amp Dimensions: h = 86mm w = 86mm d = 19mm	25mm	60.3mm	5	<b>CS3PIF</b>



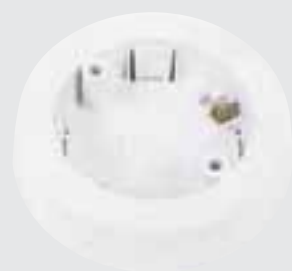
CS445N



CS3PIF

## Accessories

- Capacity of earth terminal for mounting blocks:  
3 x 1.5mm<sup>2</sup> cables
- Cable knockout entries:  
**MB326E/MT** - centrally in base. 4 on periphery will accept 16mm x 16mm or 16mm x 25mm mini trunking



MB326E/MT



MB2



221329/W



RL602

Description	Dimensions dia x h (mm)	Pack qty.	Cat Ref.
Mounting blocks			
Round mounting box with earth terminal	84mm dia x 19mm	20	<b>MB326E/MT</b>
Round surface box - 30mm deep	84mm dia x 30mm	10	<b>MB2</b>

#### Lampholder skirts, home office shield and shade ring

(Suitable for use with any lampholder or batten lampholder)

Short skirts	50	<b>HAL70</b>
Home office shield	50	<b>HAL72</b>

<b>Ceiling switch pull cord</b>		
Pull cord - white	5	<b>221329/W</b>

<b>Halo</b>		
Halo, 108mm dia	20	<b>RL602</b>

Ashley is a market leader renowned for the quality of its junction boxes. The most comprehensive range available. Slot terminals and knockout entries facilitate ease of wiring and cable positioning.



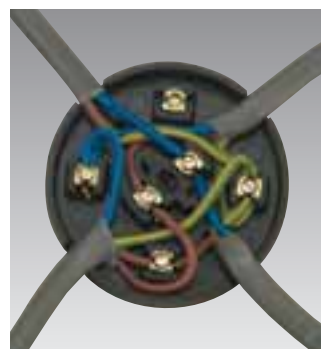
Solid brass terminals and screws, for excellent conductivity and positive clamping of conductors.



Extra strong terminals to hold multiple conductors.



Selective entry for cables.



Large capacity slot terminals for unbroken ring circuit installations.



Junction boxes

6.22

Profile  
Plus



## Junction Boxes

- Complies with BS 6220
- Slot terminals are ideal for taking spurs off uncut ring or loop circuit cables
- Solid machined brass terminals
- Junction box covers secured by single centre screws (apart from J701 which has two screws)
- J701 and J701/TB junction / adaptable box will accept 16mm x 16mm and /or 16mm x 25mm mini-trunking

	Description	Fixing centres	Terminal capacity	Pack qty.	Cat Ref.
	<b>Knockout slot terminal junction box</b> Junction box - brown 20 Amp 4 terminal Dimensions: 59mm dia x 25mm	32mm	3 x 1.5mm <sup>2</sup>	10	<b>J201</b>
	<b>Selective entry slot terminal junction boxes</b> Junction box - brown 20 Amp 4 terminal Dimensions: 79mm dia x 26mm	50.8mm	3 x 1.5mm <sup>2</sup>	10	<b>J301</b>
	Junction box - brown 30 Amp 3 terminal Dimensions: 89mm dia x 32mm	50.8mm	4 x 2.5mm <sup>2</sup>	10	<b>J401</b>
	Junction box - brown 20 Amp 6 terminal Dimensions: 89mm dia x 26mm	50.8mm	3 x 1.5mm <sup>2</sup>	10	<b>J601</b>
	<b>Junction / adaptable box</b> Junction box - no terminals Dimensions: h = 122mm x w = 156mm x d = 32mm			5	<b>J701</b>
	Junction box - with terminal block, Cable ties and related wiring card Dimensions: h = 122mm x w = 156mm x d = 32mm		4 x 1.5mm <sup>2</sup>	5	<b>J701/TB</b>
	<b>Downlighter Junction Box</b> Junction box complete with incoming and outgoing cable clamps. 3 plate terminals with separate terminals for flexible cords. Dimensions: h = 52mm x w = 53mm x d = 27 mm			10	<b>J501</b>
					



## White Products Selection Chart

Cat Ref.	Standard surface box Ref.	Deep box Ref.
<b>Wall Switches</b>		
PPS11	P815	P81D
PPS12	P815	P81D
PPS16	P815	P81D
PPS22	P815	P81D
PPS32	P815	P81D
PPS42	P82D	P82D
PPBP12	P815	P81D
<b>Dimmers</b>		
PSD1	P81D	P81XD
PSD2	P81D	P81XD
PSD3	P82D	P82XD
PSD4	P82D	P82XD
<b>Fan Isolator Switches</b>		
PPS3PI	P81D	P81XD
PPS3PIF	P81D	P81XD
<b>Sockets</b>		
PS81	P81D	P81XD
PS82	P82D	P82XD
PSS81	P81D	P81XD
PSS82	P82D	P82XD
<b>Fused Connection Units</b>		
PSSU83	P81D	P81XD
PSSU83N	P81D	P81XD
PSU83	P81D	P81XD
<b>20 Amp Double Pole Switches</b>		
PDP84	P81D	P81XD
PDP84N	P81D	P81XD
PDP85	P81D	P81XD
PDP85N	P81D	P81XD
<b>45 Amp double pole switches</b>		
PDP445N	P81XD	N/A
PDP845	P82XD	N/A
PDP845N	P82XD	N/A
<b>Cooker controls</b>		
PCCU2000	P82XD	N/A
PCCU2000N	P82XD	N/A
<b>Cooker cable outlets</b>		
CCO503	P81XD	N/A
<b>Ancillaries</b>		
SO100	SB105	n/a
FOP102	P815	P81D
PTV102	P815	P81D
PTVI103	P815	P81D
PTS03/1A	P81D	P81XD
PPSB81, PPSB82	P81D	P81XD



**Compliance with standards**

Regulation 511-01-01 of BS 7671 : 1992 Requirements for Electrical Installations, IEE Wiring Regulations Sixteenth Edition is of particular importance to specifiers and installers with respect to product standards.

Regulation 511-01-01 requires every item of equipment to comply with the relevant requirements of the applicable British Standard, or Harmonised Standard appropriate to the intended use of the equipment.

**British Standards (BS)**

The BSI (British Standards Institution) was the first national standards body in the world. There are now more than 100 similar organisations which belong to the International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC).

British Standards are drawn up by all those who have a particular interest in the subject i.e. manufacturers, users, research organisations, government departments and consumers. This work is co-ordinated by BSI staff, acting as secretaries to the committees where the work is done. All standards are made available for public comment before they are published.

**Harmonised standards**

A Harmonised standard is a European standard formally presented by CENELEC, to the European Commission and published in the commission's official journal. CENELEC is the Comité Européen de Normalisation Electrotechnique i.e. European Committee for Electrotechnical Standardisation.

BS 7671 part 2 defines a harmonised standard as a standard which has been drawn up by common agreement between national standards bodies notified to the European Commission by all member states and published under national procedures. The UK national standards body is the British Standards Institution. In the UK a harmonised standard will normally be published as a British Standard European Norm i.e. BS EN.

**British Standard European Norm (BS EN)**

CENELEC European standards are pre-fixed EN (European Norm). Adoption of the European Standard within the EC is mandatory and member countries of CENELEC are obliged to publish them unchanged. In the UK such standards are further endorsed with the additional prefix 'BS', for example BS EN 60669-1 : 1996 is the British Standard European Norm for Switches for household and similar fixed electrical installations.

Whilst a European Standard can be a direct replica of an IEC standard, discussions within CENELEC may result in the formulation of a standard which includes commonly agreed variations and Special National Conditions.

**International Electrotechnical Commission (IEC)**

Founded in 1906 the International Electrotechnical Commission (IEC) is the world organisation that prepares and publishes international standards for all electrical, electronic and related technologies. The membership consists of 60 participating countries, including all the world's major trading nations and a growing number of industrialising countries.

Foreign national standards based on IEC standards are permitted to be used by BS 7671. However the specifier must verify that any differences between the foreign standard and the corresponding British Standard or Harmonised Standard does not result in any lesser degree of safety than that afforded by compliance with the British Standard. This assessment would probably need to be made by specialists.

**Conclusion**

BS 7671 (IEE Wiring Regulations) recognises equipment which complies with a British Standard or Harmonised Standard appropriate to the intended use of the equipment without the need for further qualification.

Ashley products have always been designed and manufactured to a high standard to ensure compliance with the current British or Harmonised Standard. See the table below for further information.

Product Description	Ashley product identification	BS number	Description
Indicators	GSIN	BS 5733 : 1995	General requirements for Electrical Accessories
Fused Connection Unit, cord outlets	GFU13	BS 5733 : 1995	Switches for household and similar fixed electrical installations with particular requirements for timedelay switches (TDS)
Dimmers	GD	BS EN 60669-2 : 1998	Switches for household and similar fixed electrical installations with particular requirements for timedelay switches (TDS)
Frames and Plates	GF, GP	BS 5733 : 1995	Switches for household and similar fixed electrical installations with particular requirements for timedelay switches (TDS)
Boxes	MP, PB	BS 4662 : 1980 or BS 5733 : 1995	Specification for boxes for the enclosure of electrical accessories
10 Amp Wall Switch	PS, PBP, SMPS GMPS, MCPS REPS, PBPS, MPS	BS EN 60669-1 : 2000 BS 3676 : 1 : 2000	Switches for household and similar fixed electrical installations
Dimmer Switches	PBSD4, MCSD4 RES4, GMSD4 SMS4	BS 5518 : 1977	Electronic variable control switches (dimmer switches) for tungsten filament lighting

## Product Standards

Product description	Ashley product identification	BS number	Description
13 Amp Socket Outlets	PS, PSS	BS 1363 : Part 2 : 1995	13A plugs, socket-outlets, adaptors and connection units
20 Amp D.P. Switches	PDP BS 3676 : 1 : 2000	BS EN 60669-1 : 2000	Switches for household and similar fixed electrical installations
13 Amp Fused Connection Unit	PSU, PSSU	BS 1363 : Part 4 : 1995	Specification for 13A fused connection units switched and unswitched
45 Amp D.P. Switches	PDP	BS EN 60669-1 : 2000 BS 3676 : 1 : 2000	Switches for household and similar fixed electrical installations
45 Amp Cooker Control Units	PCCU	BS 4177 : 1992	Cooker control units
Cooker Cable Outlets	CCO	BS 5733 : 1995	General Requirements for Electrical Accessories
Shaver Socket Outlet	SO	BS 3535 : 1990 BS EN 60742 : 1996	General Requirements Isolating transformers and safety isolating transformers Electromagnetic compatibility, immunity requirements for household appliances tools and similar apparatus.
15 Amp Flex Outlet Plate	FOP	BS 5733 : 1995	General Requirements for Electrical Accessories
Safety Enhanced Lampholder	SEL	BS 7895 : 1997	Specification for bayonet lampholders with enhanced safety
6 Amp S.P. Ceiling Switches Installations	CS	BS EN 60669-1 : 2000	Switches for household and similar fixed electrical
50 Amp D.P. Ceiling Switch Isolating	CS	BS 3676 : 2000	Switches for household and similar fixed electrical installations
Ceiling Switch 3 Pole, 10 Amp	CS	BS EN 60669-1 : 2000	Switches for household and similar fixed electrical installations
Super Access Terminal Bank Type Ceiling Rose	RL	BS 67 : 1987	Ceiling Roses
Knockout Slot Terminal junction boxes	J	BS 6220 : 1983	Junction Boxes for use in electrical installations with rated voltages not exceeding 250V
Selective Entry Terminal Bank Junction Box	J	BS 6220 : 1983	Junction Boxes for use in electrical installations with rated voltages not exceeding 250V
Selective Entry Terminal Bank Junction Box	J	BS 6220 : 1983	Junction Boxes for use in electrical installations with rated voltages not exceeding 250V

## Terminal Capacities

Product	No. of cable cores to each terminal hole						
	1.0 mm <sup>2</sup>	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup>
<b>Wall range</b>							
10 Amp switches	4	3					
<b>Power range</b>							
13 Amp & 15 Amp socket outlets - switched			5	3	2		
13 Amp & 15 Amp socket outlets - unswitched			4	3	2		
20 Amp double pole switches			3	2	1	1	
20 Amp double pole switches / earth term only			4	3	2		
13 Amp fused connection units - switched			5	3	2		
13 Amp fused connection units - unswitched			4	3	2		
45 Amp double pole switches				3	2	1	1
45 Amp double pole switch / earth term only			4	3	2	1	
<b>Cooker control units</b>							
All 45 Amp units				3	2	1	1
Cooker cable outlets				4	3	1	1
<b>Accessories</b>							
Shaver socket outlet	3	2					
Flex outlet plate	5	4	3				
Dimmer units	4	3					
<b>Lampholders</b>							
Batten lampholders & safety	3	2	1				
<b>Ceiling switches</b>							
6 Amp ceiling switches	3	2					
15 Amp ceiling switches	5	4	3				
45 Amp ceiling switches				3	2	1	1
<b>Ceiling roses</b>							
Ceiling roses RL624	3	2	1				
<b>Junction boxes</b>							
20 Amp junction boxes	5	3	2				
30 Amp junction boxes			4	3	2		
JB701/TB	5	4	3				

## Printing

Available with Ashley is a front plate marking service, where relevant legends or marks can be included on the accessory during manufacture.

This is offered as an added value service to all our customers.

### Process

Each legend is produced by a touch printing process using Epoxy inks.

Periodic random sampling of each batch is carried out, where the marking is subject to solvent and abrasion tests that far exceed BS 3955 indelibility of markings requirements.

The result is a clean well defined legend which has no dirt catching apertures, that will look good for many years, can be applied to any type of front plate finish e.g. Metalclad.

### Range

A number of accessories include relevant legends on the front plate as standard i.e. 'Water heater' on a profile 20Amp D.P. switch - cat. ref. DP85. As well as this standard marking it is possible to print face plates with other information. Available marks are listed opposite. The standard colour of printing is black.

Other special markings can be supplied, please contact National Sales Hotline on 0870 240 2400 with details of marking required and availability.

### Ordering

Each order for printing of front plate must be confirmed in writing with exact description of the marking and order quantity before any order can be processed.

These are non-standard products therefore please ring to check for availability prior to placing an order.

Pack quantities apply to these orders as per those of the base unit.

**Contact National Sales Hotline on 0870 240 2400**

### Available markings

Air conditioner
Bell
Boiler
Central heating
Central heating use 3 Amp fuse use 3 Amp fuse
Cooker
Cooker Hood
Dishwasher
Extract Fan
Fan
Fan heater
Freezer
Fridge
Fridge / freezer
Heater
Heating
Heating Circuit
Heating Pump
Hob
Intruder Alarm Syst.
Microwave
Off/On
On
Oven
Press
Press to exit
Pump
Refrigerator
Refrigerator using 3 Amp fuse
Shower
Socket below
Tumble Dryer
Towel rail
Water heater
Washerdryer
Washing Machine
Washing machine
Use 13Amp fuse
Waste Disposal

**Objective of CE marking**

CE marking is a “technical passport” which indicates that a product conforms to all relevant directives which require CE marking, thus enabling the product to travel within the E.U. A directive is a piece of mandatory European Legislation implemented by regulations in all member countries. Its purpose is to allow free movement of goods that are safe and fit for use into and within the European Union. CE marking is not a quality mark and it does not indicate that any testing or certification has been carried out.

**The marking**

CE marking is a statement by the manufacturer that the product complies with the essential requirements of all relevant Directives, notably in the area of technical safety and conformity assessment. CE marking can appear on the product or packaging or documentation or combination thereof dependant upon which directive it has to comply with. CE marking is a very specific graphical symbol and must be clearly separated from other marks.

**Directives**

It is the responsibility of the manufacturer or his authorised representative who places the product onto the EC market to decide which Directive(s) apply and to ensure the CE marking is affixed by the dates stated in the relevant directive(s). For the majority of Ashley products only one directive is applicable this is referred to as the Low Voltage Directive. Where some products incorporate electronic devices the Low voltage Directive and the Electromagnetic Compatibility Directive are applicable.

**The Low Voltage Directive**

EC directives are requirements adopted by the European Council and published in the Official Journal of the European Communities and

are addressed to the member states.

European Council Directive 73/23/EEC with an amendment 93/68/EEC is known as the Low Voltage Directive.

The Low Voltage Directive has been implemented into UK law by the “Electrical Equipment (Safety) Regulations 1994” and apply to all electrical / electronic equipment operating at a voltage of 50-1000 V a.c. or 75-1500 V d.c.. They do not apply to plugs, socket outlets and adapters which are covered by the Plugs and Sockets (Safety) Regulations 1994.

***Relationship between the Electrical Equipment (Safety) Regulations, Harmonised standards and the IEE Wiring Regulations Sixteenth Edition.***

The Electrical Equipment (Safety) Regulations requires electrical equipment to be safe. Electrical equipment which satisfies the safety provisions of Harmonised standards shall be taken to comply with this requirement, unless there are reasonable grounds for suspecting that the equipment does not so comply.

Regulation 511-01-01 of BS 7671 Requirements for Electrical Installations, IEE Wiring Regulations Sixteenth Edition requires every item of equipment to comply with the relevant requirements of the applicable British Standard, or Harmonised Standard appropriate to the intended use of the equipment.

Ashley products have always been designed and manufactured to a high standard to ensure compliance with the current British or Harmonised Standard.

## Ingress Protection Chart

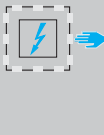
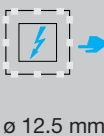

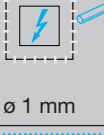
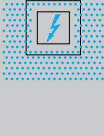
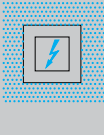
The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards BS EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

**The first character numeral** indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

**The second character numeral** indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

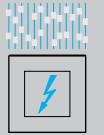
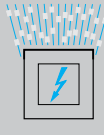
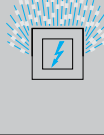

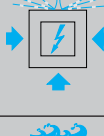

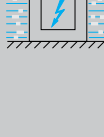
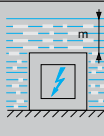
**The first character numeral**

Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

**The second character numeral**

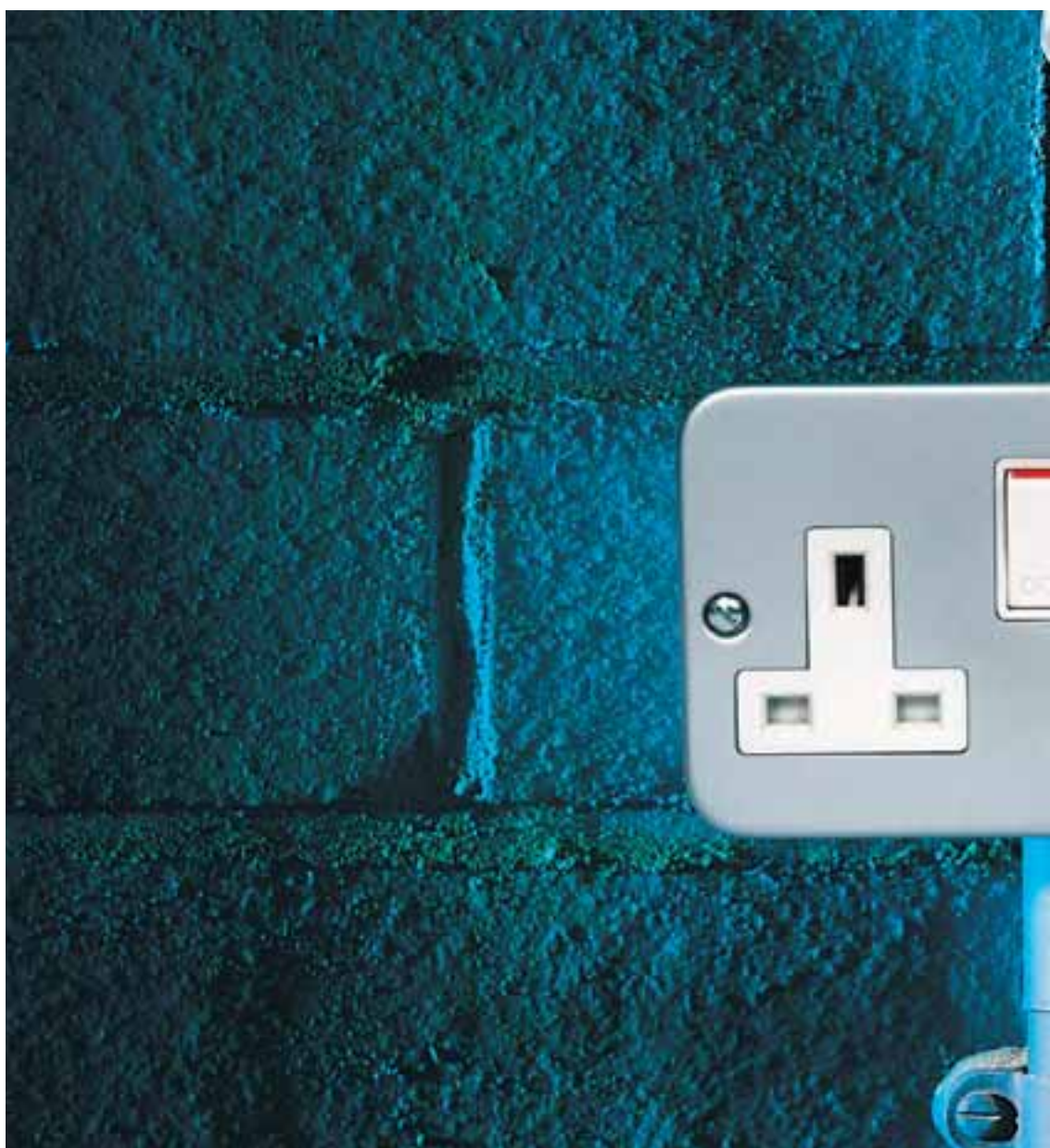
Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-protected	No special protection
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer



The hard-wearing range of metalclad accessories are designed to withstand the toughest conditions and heaviest knocks, particularly in industrial installations. The front plate is coated with a two layer tough paint finish and will maintain its good looks through years of hard labour.

The backs of the switched power sockets and fused connection units are manufactured in a new unique, specially developed tough blue PBT plastic for added strength necessary during installation.







Switches	7.2
Bell push	7.2
Sockets	7.3
Fused Connection Units	7.4
Additional products	7.4
Metalclad Boxes	7.5

## Switches

- Complies with BS EN 60669-1 A.C only
- 'X' rated - no need to derate for fluorescent loads
- 1, 2 and 3 gang units supplied with a two knockout matching surface box, cat. ref. MP811
- 4 gang unit supplied with MP812
- Knockouts accept 20mm diameter conduit
- Earth terminal supplied with each box
- Capacity of each terminal: 2 x 2.5mm<sup>2</sup> conductors  
5 x 1.5mm<sup>2</sup> earth terminal (box)
- Supplied with M3.5 x 14mm long fixing screws
- individually wrapped and identified



MPS12



MPS22

<i>Description</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>10 Amp Single pole switches</b>			
Switch 1 gang 2 way 10 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MPS12</b>
Switch 2 gang 2 way 10 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MPS22</b>
Switch 3 gang 2 way 10 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MPS32</b>
Switch 4 gang 2 way 10amp Dimensions: h = 80mm x w = 138mm x d = 44mm	120.6	5	<b>MPS42</b>

## Bell Push

- Complies with BS EN 60669-1 A.C only
- Knockouts accept 20mm diameter conduit
- Earth terminal supplied with each box
- Bell push / press can be wired to main 250V A.C
- Supplied with M3.5 x 14mm long fixing screws
- Supplied with MP811






MPBP12

<i>Description</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>10 Amp Bell push</b>			
Bell Push 1 Gang, marked with bell symbol dimensions h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MPBP12</b>

## Sockets

- Complies with BS 1363 pt2, A.C only
- Double pole switching mechanism on switched sockets
- Capacity of each terminal:  
3 x 2.5mm<sup>2</sup> conductors switched sockets;  
4 x 2.5mm<sup>2</sup> conductors unswitched sockets
- Supplied with M3.5 x 14mm long fixing screws
- Supplied with boxes

	<i>Description</i>	<i>Fixing centres</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
	<b>13 Amp socket outlets</b>			
	Single socket 13 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MS81</b>
	Twin socket 13 Amp Dimensions: h = 78mm x w = 138mm x d = 44mm	120.6mm	5	<b>MS82</b>
	Single switched socket 13 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MSS81</b>
	Single switched socket 13 Amp with neon Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MSS81N</b>
	Twin switched socket 13 Amp Dimensions: h = 78mm x w = 138mm x d = 44mm	120.6mm	5	<b>MSS82</b>
	Twin switched socket 13 Amp with neon Dimensions: h = 78mm x w = 138mm x d = 44mm	120.6mm	5	<b>MSS82N</b>

## Fused Connection Units

- Complies with BS 1363 pt4 a.c. only.
- All switched units are double pole and all terminal screws face upwards for ease of installation.
- Flex clamp accommodates up to 2.5mm<sup>2</sup> flexible cord.
- Tough plastic back for durability.
- All units fitted with a 13 Amp fuse link.
- Supplied with M3.5 x 14mm long fixing screw.
- With or without flex outlet type.
- Capacity of each terminal: 3 x 2.5mm<sup>2</sup> conductors switched units; 4 x 2.5mm<sup>2</sup> unswitched units.
- Earth terminal in each box.
- Supplied with boxes.



MSSU3N

Description	Fixing centres	Pack qty.	Without flex outlet	With flex outlet
<b>13 Amp Fused Connection Units</b>				
Unswitched unit Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MSU3</b>	<b>MSUO3</b>
Switched unit Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MSSU3</b>	<b>MSSUO3</b>
Switched unit with neon Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MSSU3N</b>	<b>MSSUO3N</b>

## Additional Products

**Double pole switches**

- Complies with BS EN 60669-1, a.c. only
- Capacity of each terminal: 2 x 2.5mm<sup>2</sup> conductors (20A)
- Capacity of each terminal 2 x 6.0mm<sup>2</sup> conductors (45A)
- Each unit supplied with a two knockout matching surface box cat. ref. MP811
- Supplied with M3.5 x 14mm fixing screws



MDP4

Description	Fixing centres	Pack qty.	Cat Ref.
<b>20 &amp; 45 Amp double pole switches</b>			
DP switch 20 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MDP4</b>
DP switch with neon 20 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MDP4F/N</b>
DP switch with neon 45 Amp Dimensions: h = 80mm x w = 80mm x d = 44mm	60.3mm	10	<b>MDP45N</b>
<b>Blank plates</b>			
Blank plate 1 gang Dimensions: h = 80mm x w = 80mm x d = 5mm	60.3mm	10	<b>MPSB81</b>
Blank plate 2 gang Dimensions: h = 78mm x w = 138mm x d = 5mm	120.6mm	5	<b>MPSB82</b>
<b>Outlet plates</b>			
25 Amp connection unit Dimensions: h = 80mm x w = 80mm x d = 5mm	60.3mm	10	<b>MOP25</b>



MDP4F/N

## Metalclad Boxes

- Complies with BS 4662:1980 or BS 5733:1995 where applicable

- All boxes are fitted with an earth terminal

Knockouts  
 1/2 gang: 5 x 20mm  
 3/4 gang: 7 x 20mm  
 6/8 gang:  
 9/12 gang:



MP811

<i>Description</i>	<i>Depth mm</i>	<i>Dimensions mm</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>With knockouts</b>				
1 / 2 gang	40	78 x 78	10	<b>MP811</b>
3 / 4 gang	40	78 x 132	5	<b>MP812</b>
6 / 8 gang	40	132 x 132	1	<b>MP68</b>
9 / 12 gang	40	192 x 132	1	<b>MP92</b>
<b>Without knockouts</b>				
1 / 2 gang	40	78 x 78	10	<b>MP83</b>
3 / 4 gang	40	74 x 132	10	<b>MP87</b>
6 / 8 gang	40	132 x 132	1	<b>MP608</b>
9 / 12 gang	40	192 x 132	1	<b>MP902</b>

The Ashley IP66 range of switches and sockets are designed to provide power and control in harsh environments around the home, in commerce and in industry.

The products are rated to IP66 in accordance with BS EN 60529 and will withstand dust and water jet ingress. Their housings are made from UV stabilised chemically resistant polycarbonate to ensure high impact resistance and a long maintenance free life.

The attractive, ergonomic design and subtle grey colour of Ashley IP66 switches and sockets will ensure their ready acceptance in all locations, that are heavily exposed to dust and splashing water.



Products are dust tight and can be used with a pressure hose.



Product has easy to open catch.



The neoprene seals will not stick together, and do not need replacing.



The neoprene seals will not stain the cable.





IP66 Switches	8.2
IP66 Bell push	8.2
IP66 Sockets	8.3
IP66 FCU	8.4
IP66 RCD	8.4
IP66 Timer socket	8.4



Lid can be closed fully when 13A plug with cord grip is inserted.



## IP66 - Switches and Bell Push

- IP66 rated to BS EN 60529 (see page 8.6)
  - Fixing holes are for No. 8 woodscrews (not supplied)
  - The enclosure has 4 x 20mm entries, 1 on each side
  - These switches (except push switches) do NOT have to be derated when used with fluorescent or inductive loads
  - Earth terminal supplied in back box
  - Switch cable capacity 3 x 2.5mm<sup>2</sup>
  - All products supplied with neon indicators
  - All switches are AX rated
- Switches**
- Complies with BS 60669-Pt1



WPS12

<i>Description</i>	<i>entries</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>Switches</b>			
Single pole switch 1 gang 2 way 10 Amp Dimensions: h = 92mm x w = 88mm x d = 67mm	4 x 20 mm	1	<b>WPS12</b>
Single pole switch 2 gang 2 way 10 Amp Dimensions: h = 92mm x w = 88mm x d = 67mm	4 x 20 mm	1	<b>WPS22</b>
Double pole switch 1 gang 20 Amp Dimensions: h = 92mm x w = 88mm x d = 67mm	4 x 20 mm	1	<b>WPS14</b>
<b>Bell push</b>			
One gang bell push Dimensions: h = 92mm x w = 88mm x d = 67mm	4 x 20 mm		<b>WBP12</b>



WPS22

## IP66 - Sockets

- IP66 rated to BS EN 60529 (See page 8.6)
- Fixing holes are for No. 8 woodscrews (not supplied)
- The enclosure has 4 x 20mm entries, 1 on each side
- Socket cable capacity 3 x 2.5mm<sup>2</sup>
- Earth terminal supplied in back box

**Sockets**

- Complies with BS 1363 Pt. 2
- IP66 rated to BS EN 60529
- SRCD complies with BS7288
  - Operation is passive
- SRCD continues to protect with
  - Loss of neutral
  - Pulsating DC earth fault

- SRCD provides disconnection of both live and neutral poles in the event of an earth fault



WSS81



WSS82



WSS82R30

<i>Description</i>	<i>Entries</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
<b>Sockets</b>			
One gang switched socket 13 Amp Dimensions: h = 130mm x w = 115mm x d = 73mm	4 x 20 mm	1	<b>WSS81</b>
Two gang switched socket 13 Amp Dimensions: h = 130mm x w = 155mm x d = 73mm	4 x 20 mm	1	<b>WSS82</b>
RCD protected socket Pulsating D.C. and A.C. Fault current sensitive 30mA Control circuit 240V A.C. 50Hz only Dimensions: h = 130mm x w = 155mm x d = 73mm	4 x 20 mm	1	<b>WSS82R30</b>

## IP66 - FCU, RCD, Timer Socket

- IP66 rated to BS EN 60529 (See page 8.6)
  - Fixing holes are for No. 8 woodscrews (not supplied)
  - Each switch is fitted with a neon which can be wired as a locator
  - The enclosure has 4 x 20mm entries, 1 on each side of the back box
  - Earth terminal supplied in back box
  - FCU and socket terminal capacity 3 x 2.5mm<sup>2</sup>
  - RCD spur operation is passive
- Sockets**
- Complies with BS 1363 Pt. 2
  - IP66 rated to BS EN 60529



WSSU83

<i>Description</i>	<i>Entries</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
One gang switched fused spur 13Amp Dimensions: h = 130mm x w = 115mm x d = 73mm	4 x 20 mm	1	<b>WSSU83</b>
One gang RCD spur Dimensions: h = 130mm x w = 115mm x d = 73mm	4 x 20 mm	1	<b>WSU83R30</b>
Combined timer and socket Dimensions: h = 130mm x w = 155mm x d = 73mm	4 x 20 mm	1	<b>WSS81TS24</b>



WSU83R30



WSS81TS24

## Ingress Protection Chart

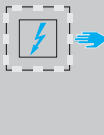
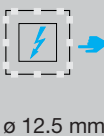
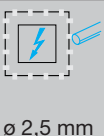
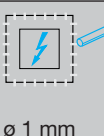
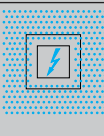
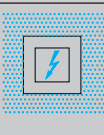
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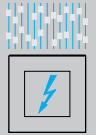
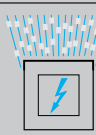
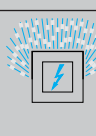
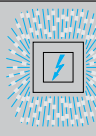
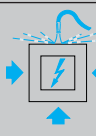

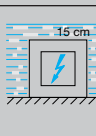
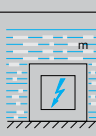
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7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

The Klik Connector System, simply brings plug-in convenience and versatility for lighting.

It is a unique modular plug and socket interface that provides simultaneous mechanical and electrical connection in one click-in action.

Luminaires can be plugged in, in seconds, in absolute safety, without circuit isolation. All live contacts are inaccessible and the earthing connection is made before any other.

The non-wander design prevents disconnection of the plug from its socket by vibration or snatch withdrawals. Strong load grips provide support for luminaires up to 10kg, so all types and sizes of luminaires can be safely used.

The electrical connection is made by latch contacts perpendicular to the natural load direction thus eliminating strain on the contacts. Klik exceeds the relevant British Standard requirements and enables compliance with IEE Wiring Regulations and Safety Regulations.



Klik LDS can be hung from the ceiling suspension system via drop rod and Caddy Clips™. *Caddy Clip is a registered trade mark of Erico Europa (GB) LTD – Reading.*



Compact dimensions allow for installation in confined ceiling voids. Terminal cover slides off from the front facilitating KLDS usage in confined spaces.



LDS can be fixed direct to ceiling or wall with No. 8 screws.



Each socket outlet will accept 3 or 4 pin plugs.



Klik LDS - Marshalling boxes	9.2
Klik OS	9.3
6 Amp plug-in ceiling roses	9.4
6 Amp lighting trunking socket with clamp	9.4
6 Amp plugs	9.5
6 Amp socket outlets	9.6
Klik AX 6 Amp plug-in ceiling rose	9.7
Klik AX 6 Amp plugs	9.8
Klik AX 6 Amp sockets	9.8
Moulded mounting boxes	9.9
IP66 outdoor enclosure	9.9
Pre-wired 6 Amp plug-in ceiling roses	9.11
Pre-wired 6 Amp plugs	9.11
Klik AX 6 Amp plug-in ceiling roses	9.12
Pre-wired Klik AX 6 Amp plugs	9.13



Single or dual switching capability is selected via a copper link. Use of this link will switch all outlets as one circuit or remove it to control two lighting circuits from one LDS unit.



Moulded parts are manufactured from PC-ABS, which is a low smoke and fume material and provides a “halogen free” product.



A separate terminal block is provided for connection of flexible cords. Large barriers between terminals provide improved segregation.



Clear circuit and terminal identification simplifies the installation process.

## Klik LDS - Marshalling Boxes

- Complies with BS 5733
- Main terminal capacity 5 x 4 mm<sup>2</sup>
- Flexible conductor terminal capacity 1 x 1 mm<sup>2</sup>
- Main terminals rated 16 Amps. Each socket outlet rated 6 Amps. Flexible conductor terminals rated at 10 Amps.
- All socket outlets factory connected and tested.
- Aluminium extruded body
- All plastic 'V0' rated.
- Socket outlets accept either Klik lighting (3 pin) plugs, Klik AX (4 pin) plugs and Klik pre-wired leads
- Cable entries will accept 20mm or can be drilled out to 25mm
- Self-retained cover screw.

	Description	Dimensions	Pack qty.	Cat Ref.
	4 outlet lighting distribution box	73mm x 222mm x 238mm	1	<b>KLDS4</b>
KLDS4				
	6 outlet lighting distribution box	73mm x 222mm x 288mm	1	<b>KLDS6</b>
KLDS6				
	8 outlet lighting distribution box	73mm x 222mm x 338mm	1	<b>KLDS8</b>
KLDS8				
	10 outlet lighting distribution box	73mm x 222mm x 388mm	1	<b>KLDS10</b>
KLDS10				
	12 outlet lighting distribution box	73mm x 222mm x 438mm	1	<b>KLDS12</b>
KLDS12				



## Klik OS

- Switching capacity 6 Amps for all fluorescent loads.
- Connections: live, neutral and earth inputs to occupancy sensor. Switched live output to luminaire(s) or Klik LDS
- Residual current consumption: 30mA @24V
- Occupancy sensor range: 6m diameter at 2.4m high
- Occupancy time out period: 2 to 37 minutes
- Materials: All materials 'V0' rated
- OS2/P supplied with 3m conductor 1.00mm<sup>2</sup> low smoke zero halogen as standard.
- All parts factory connected and tested
- Factory settings 20min delay off photocell deactivated. N.B. OSRCA programming tool required to change factory settings.



OS2/P



OS2/PSM



OSRCA







OSRCB

<i>Description</i>	<i>Fixing</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
Time adjustable occupancy sensor	Flush	1	<b>OS2/P</b>
	Surface mounted	1	<b>OS2/PSM</b>
Remote control on/off Switching and programmer 2 to 37 minute time out settings light level setting	N/A	1	<b>OSRCA</b>
Remote control on/off switching	N/A	1	<b>OSRCB</b>


## 6 Amp Plug-In Ceiling Roses

- Complies with BS 6972 and BS 5733
- PCR2000 plug cat. ref. P22, socket cat ref. S27 and Cover, cat. ref. A1.
- PCR2900 plug cat. ref. P22, Surface socket cat. ref. S29 and Cover cat. ref. A1.
- PCR2900 base accepts Ashley RL602 halo.
- PCR2900 provides loop-in terminal bank wiring within integral surface mounting socket base.
- PCR2900 base terminals accepts 1 x 4mm<sup>2</sup> conductor.
- 6 Amp 250V a.c.
- Sockets have 4 terminations: live, neutral, earth and loop-in.
- Plugs have 3 terminations: live, neutral and earth.
- Static loading 10kg, except when load suspended by flexible cord - 5kg maximum.

	Description	Fixing	Pack qty.	Cat Ref.
   PCR2000   A1	3 pin ceiling rose 75mm dia x 44mm 7mm back projection	50.8mm standard Diagonal (BESA)	10	<b>PCR2000</b>
	Surface plug-in ceiling rose 80mm dia x 58mm	Surface	10	<b>PCR2900</b>
	A1 cover 75mm dia x 44mm A1 cover snap fits S27, S29 sockets		10	<b>A1</b>




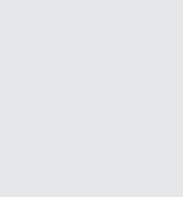
## 6 Amp Lighting Trunking Socket with Clamp

- Complies with BS 6972 and BS 5733
- The Klik lighting S26/TC socket is an S26 architrave socket pre-assembled with a trunking
- Clamp fast and easy installation of sockets, that have been prewired at bench level, into return edge trunking
- Designed to fit 50mm x 50mm return edge trunking profiles
- This product may not be suitable for all installations. Suitability should be checked prior to commencing work

	Description	Fixing	Pack qty.	Cat Ref.
 S26/TC	Lighting trunking socket 86mm x 33mm x 6mm 7mm back projection	via integral trunking clamp	10	<b>S26/TC</b>

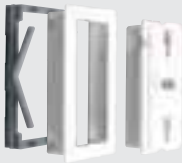



## 6 Amp Plugs

- Complies with BS 6972 and BS 5733
  - Suitable for use with any Klik lighting or Klik AX socket and Klik LDS
  - 3 pins and cord grip enable up to a 5kg load to be suspended by a flexible cord
  - Integral luminaire plugs enable support up to 10kg load
  - P22 plug is supplied in plug-in Ceiling Rose, Cat No. PCR2000 and PCR2900
  - Luminaire plugs are designed for incorporation by OEM's.
  - Plugs have 3 terminations: live, neutral and earth
  - Static loading 10kg, except when load suspended by flexible cord - 5kg maximum
- Warning**  
N.B. plugs must not be fitted on the supply side of any installation - they must be connected to the load/fitting/appliance side of the installation

	Description	Fixing	Pack qty.	Cat Ref.
	3 pin plug with cord grip and cover 57mm x 25mm x 25mm	Lead	10	<b>P22</b>
P22				
	Round luminaire plug 73mm dia x 9mm 7mm back projection with two M4 threaded inserts	50.8mm horizontal 2 x M4 inserts	10	<b>P25</b>
P25				
	Threaded entry luminaire plug (M10) 69mm dia x 33mm for use with rod and hook for chandeliers	M10 at centre	10	<b>P26</b>
P26				
	Round luminaire plug 63mm dia x 5mm 12mm back projection	50.8mm horizontal	10	<b>P27</b>



## 6 Amp Socket Outlets

- Complies with BS 6972 and BS 5733
- All suitable for use with any standard Klik lighting plug.
- All have four terminations: live, neutral, earth and loop. Cat. No. S29 provides loop-in terminal bank wiring within integral surface mounting base as standard ceiling rose.
- S27 socket is supplied in plug-in ceiling rose, Cat No. PCR2000.
- S29 socket is supplied in plug-in ceiling rose, Cat. No. PCR2900.
- S27 and S29 socket will accept A1 cover.
- 6 Amp 250V a.c.t

	Description	Fixing	Pack qty.	Cat Ref.
	3 socket module 54mm x 28mm x 13mm Complete with panel mounting kit	Panel cut-out 58mm x 32mm	10	<b>S20/MOP</b>
	Ultra flush socket 86mm x 36mm x 1.5mm 10mm back projection	60.3mm standard Vertical	10	<b>S21</b>
	Architrave socket 86mm x 33mm x 6mm 7mm back projection	60.3mm standard Vertical	10	<b>S26</b>
	Round socket 74mm dia x 7mm 7mm back projection	50.8mm standard Diagonal (besa)	10	<b>S27</b>
	Ultra flush round socket 86mm dia x 1.5mm 10mm back projection	60.3mm standard Vertical	10	<b>S28</b>
	Surface mounting socket 80mm dia x 27mm	Surface	10	<b>S29</b>

## Klik AX - 6 Amp Plug-in Ceiling Rose

- Complies with BS 6972 and BS 5733
- CR64AX plug cat. ref. P64AXR, socket cat. ref. S64AX and cover cat. ref. A1
- CR64AX/R plug cat ref P64AXR, socket cat cat S64AX and cover cat ref A1/R
- 6 Amp 250V a.c.
- Sockets have 5 terminations: live, neutral, earth, auxiliary and loop-in.
- Plugs have 4 terminations: live, neutral, earth and auxiliary.
- Static loading 10kg, except when load suspended by flexible cord - 5kg maximum.

	Description	Fixing	Pack qty	Cat Ref.
  CR64AX	4 pin, ceiling rose 74mm dia x 44mm 7mm back projection	50.8 standard diagonal (BESA)	10	<b>CR64AX</b>
	4 pin, ceiling rose, Red cover 74mm dia x 44mm 7mm back projection	50.8 standard diagonal (BESA)	10	<b>CR64AX/R</b>
  CR64AX/R	A1 cover 75mm dia x 44mm A1 cover snap fits S27, S29, S127/BL S64AX sockets		10	<b>A1</b>
	A1 Red cover 75mm dia x 44mm A1/R cover snap fits S27, S29, S64AX sockets		10	<b>A1/R</b>
* note other colours are available as specials				



A1



A1/R

## Klik AX - 6 Amp Plugs

- Complies with BS 6972 and BS 5733
- Special purpose 4 pin plug, suitable only for use with Klik AX sockets and Klik LDS
- 4 pins and cord grip enable a 5kg load to be suspended

- P64AXR plug as supplied in plug-in ceiling rose, Cat. No. CR64AX
- 6 Amp 250V a.c.
- Plugs have 4 terminations: live, neutral, earth and auxiliary
- Static loading 10kg, except

when load suspended by flexible cord - 5kg maximum

### Warning

N.B. plugs must not be fitted on the supply side of any installation - they must be connected to the load/fitting/appliance side of the installation



P64AXR

<i>Description</i>	<i>Fixing</i>	<i>Pack qty</i>	<i>Cat Ref.</i>
4 pin plug With cord grip and cover - white 57mm x 35mm x 44mm	LEAD	10	<b>P64AX</b>
4 pin plug with cord grip and cover - red 57mm x 35mm x 44mm	LEAD	10	<b>P64AXR</b>

## Klik AX - 6 Amp sockets

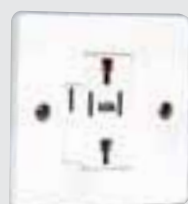
- Complies with BS 6972 and BS 5733
- Sockets suitable for use with any Klik lighting or Klik AX plug.
- All sockets have 5 terminations: live, neutral, earth, auxiliary and loop-in.

- For special purpose applications eg: emergency lighting.
- S64AX socket is supplied in plug-in ceiling rose, Cat ref. CR64AX.
- S64AX socket will accept A1 A1/R cover.

- S65AX supplied with M3.5 x 25mm fixing screws.



S60AX/MOP



S65AX

<i>Description</i>	<i>Fixing</i>	<i>Pack qty</i>	<i>Cat Ref.</i>
Socket module 54mm x 37mm x 13mm Complete with panel mounting kit	Panel cut-out 58mm x 59mm	10	<b>S60AX/MOP</b>
Round socket 74mm dia x 7mm 7mm back projection	50.8mm standard Diagonal (BESA)	10	<b>S64AX</b>
1 Gang, square socket 86mm x 86mm x 9mm 5mm back projection	60.3mm standard Horizontal	10	<b>S65AX</b>

## Moulded Mounting Boxes

- Complies with BS 5733
- To complement the range of Klik products a selection of moulded mounting boxes is available for either flush or surface mounting.
- For more hazardous areas, 1 gang and 2 gang metalclad boxes have been adapted to take the Klik socket interface.



MB1/E

<i>Description</i>	<i>Fixing</i>	<i>Pack qty</i>	<i>Cat Ref.</i>
Joist box 75mm x 30mm x 20mm	60.3mm standard	10	<b>MB1/E</b>
Round surface box 85mm dia x 31mm	50.8mm standard diagonal (BESA)	10	<b>MB2</b>
Architrave flush box 80mm x 29mm x 20mm	60.3mm standard vertical	10	<b>MB3/E</b>



MB2

**new**

## IP66 - Outdoor Enclosure

- This product will require an alternative to hardwiring external lighting connections.
- Interfaces two AX 6 Amp sockets into a weather proof enclosure.
- Fast connection during fit out.
- Suitable for use in hazardous / wet environments.
- Quick and secure method for lighting connections in hazardous areas.
- Complies with BS5733, BS EN 60529, BS EN 60670-1
- Dimensions: W 155mm x H 140mm x D 90mm.



WKAX2

<i>Description</i>	<i>Pack qty</i>	<i>Cat Ref.</i>
IP66 2 gang Klik socket (optional padlock)	1	<b>WKAX2</b>



## Mounting Box Selector

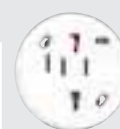

**S20/MOP**

**S21**

**S26**

**S27  
PCR2000**

**S28**

**S60/AX/MOP**

**S64AX  
CR64AX**

**S65AX**

### Mounting Boxes

#### Surface Mounting

Ceiling				MB2			MB2	
Wall							P815 Ashley	1 gang 20mm mounting box
Conduit				BESA Box			BESA Box	

#### Flush Mounting

Ceiling		MB1/E		Besa Box	MB1/E		Besa Box	
Partition Wall		MB3/E	MB3/E		MB3/E			MB81 Ashley 1 gang partition wall mounting box
Solid Wall		MB3/E	MB3/E	Besa Box	MB3/E		Besa Box	25mm 1 gang flush metal box
Panel	58mm x 32mm aperture					58mm x 59mm aperture		

## Pre-Wired 6 Amp Plug-In Ceiling Roses

- Complies with BS 6972 and BS 5733
- Comprehensive range of pre-wired Klik lighting plugs and ceiling roses reduces on-site installation time and cost. All leads have crimped ends to eliminate breakage, and minimise on-site cable preparation.
- Heat resisting PVC flexible cord, complies with BS 6500
- Low smoke zero halogen flexible cord, complies with BS 6500 and BS 7211



PCR2000/1.0

<i>Description</i>	<i>Length</i>	<i>Pack qty.</i>	<i>Heat resisting PVC</i>	<i>Low smoke zero halogen</i>
0.75mm <sup>2</sup> Flexible cord	1 metre	10	<b>PCR2000/1.0</b>	<b>PCR2000/LSF/1.0</b>
	2 metre	10	<b>PCR2000/2.0</b>	<b>PCR2000/LSF/2.0</b>
	3 metre	5	<b>PCR2000/3.0</b>	<b>PCR2000/LSF/3.0</b>
	4 metre	5	<b>PCR2000/4.0</b>	<b>PCR2000/LSF/4.0</b>
1.00mm <sup>2</sup> Flexible cord	2 metre	10	<b>PCR2000/1.0PVC/2</b>	<b>PCR2000/1.0LSF/2</b>
	3 metre	5	<b>PCR2000/1.0PVC/3</b>	<b>PCR2000/1.0LSF/3</b>
	4 metre	5	<b>PCR2000/1.0PVC/4</b>	<b>PCR2000/1.0LSF/4</b>
	5 metre	5	<b>PCR2000/1.0PVC/5</b>	<b>PCR2000/1.0LSF/5</b>

## Pre-Wired 6 Amp Plugs



P22/1.0

<i>Description</i>	<i>Length</i>	<i>Pack qty</i>	<i>Heat resisting PVC</i>	<i>Low smoke zero halogen</i>
0.75mm <sup>2</sup> Flexible cord	1 metre	10	<b>P22/1.0</b>	<b>P22/LSF/1.0</b>
	2 metre	10	<b>P22/2.0</b>	<b>P22/LSF/2.0</b>
	3 metre	5	<b>P22/3.0</b>	<b>P22/LSF/3.0</b>
	4 metre	5	<b>P22/4.0</b>	<b>P22/LSF/4.0</b>
1.00mm <sup>2</sup> Flexible cord	2 metre	10	<b>P22/1.0PVC/2</b>	<b>P22/1.0LSF/2</b>
	3 metre	5	<b>P22/1.0PVC/3</b>	<b>P22/1.0LSF/3</b>
	4 metre	5	<b>P22/1.0PVC/4</b>	<b>P22/1.0LSF/4</b>
	5 metre	5	<b>P22/1.0PVC/5</b>	<b>P22/1.0LSF/5</b>

## Klik AX 6 Amp Plug-In Ceiling Roses





- Complies with BS 6972 and BS 5733
- Heat resisting PVC flexible cord: BS 6500
- Low smoke zero halogen flexible cord: BS 6500 and BS 7211



CR64AX/1.0

<i>Description</i>	<i>Length</i>	<i>Pack qty</i>	<i>Heat resisting PVC</i>	<i>Low smoke zero halogen</i>
0.75mm <sup>2</sup> flexible cord	1 metre	10	<b>CR64AX/1.0</b>	<b>CR64AX/LSF/1.0</b>
	2 metre	10	<b>CR64AX/2.0</b>	<b>CR64AX/LSF/2.0</b>
	3 metre	5	<b>CR64AX/3.0</b>	<b>CR64AX/LSF/3.0</b>
	4 metre	5	<b>CR64AX/4.0</b>	<b>CR64AX/LSF/4.0</b>
1.00mm <sup>2</sup> flexible cord	2 metre	10	<b>CR64AX/1.0PVC/2</b>	<b>CR64AX/1.0/LSF/2</b>
	3 metre	5	<b>CR64AX/1.0PVC/3</b>	<b>CR64AX/1.0/LSF/3</b>
	4 metre	5	<b>CR64AX/1.0PVC/4</b>	<b>CR64AX/1.0/LSF/4</b>
	5 metre	5	<b>CR64AX/1.0PVC/5</b>	<b>CR64AX/1.0/LSF/5</b>

## Pre-Wired Klik AX 6 Amp Plugs

	<i>Description</i>	<i>Length</i>	<i>Pack qty</i>	<i>Heat resisting PVC</i>	<i>Low smoke zero halogen</i>
	0.75mm <sup>2</sup> flexible cord	1 metre	10	<b>P64AXR/1.0</b>	<b>P64AXR/LSF/1.0</b>
		2 metre	10	<b>P64AXR/2.0</b>	<b>P64AXR/LSF/2.0</b>
		3 metre	5	<b>P64AXR/3.0</b>	<b>P64AXR/LSF/3.0</b>
		4 metre	5	<b>P64AXR/4.0</b>	<b>P64AXR/LSF/4.0</b>
	1.00mm <sup>2</sup> flexible cord	2 metre	10	<b>P64AXR/1.0PVC/2</b>	<b>P64AXR/1.0LSF/2</b>
		3 metre	5	<b>P64AXR/1.0PVC/3</b>	<b>P64AXR/1.0LSF/3</b>
		4 metre	5	<b>P64AXR/1.0PVC/4</b>	<b>P64AXR/1.0LSF/4</b>
		5 metre	5	<b>P64AXR/1.0PVC/5</b>	<b>P64AXR/1.0LSF/5</b>
	0.75mm <sup>2</sup> flexible cord	1 metre	10	<b>P64AX/1.0</b>	<b>P64AX/LSF/1.0</b>
		2 metre	10	<b>P64AX/2.0</b>	<b>P64AX/LSF/2.0</b>
		3 metre	5	<b>P64AX/3.0</b>	<b>P64AX/LSF/3.0</b>
		4 metre	5	<b>P64AX/4.0</b>	<b>P64AX/LSF/4.0</b>
	1.00mm <sup>2</sup> flexible cord	2 metre	10	<b>P64AX/1.0PVC/2</b>	<b>P64AX/1.0LSF/2</b>
		3 metre	5	<b>P64AX/1.0PVC/3</b>	<b>P64AX/1.0LSF/3</b>
		4 metre	5	<b>P64AX/1.0PVC/4</b>	<b>P64AX/1.0LSF/4</b>
		5 metre	5	<b>P64AX/1.0PVC/5</b>	<b>P64AX/1.0LSF/5</b>

P64AXR/1.0

P64AX/1.0

## Product Standards

Product Description	Klik product identification	BS number	Description
Klik Lighting Distribution System	KLDS/KDCS	BS 5733:1995	General Requirements for Electrical Accessories
Occupancy Sensor	OS	BSEN 60669-2-1: 2000	Switches for household & similar fixed electrical installations Part 2-1 for Electronic switches.
Mounting Boxes	MB	BS 6972 : 1988	General requirements for Luminaire supporting couplers for domestic, light industrial & commercial use
Mounting Boxes	MP	BS5733 : 1995	General Requirements for Electrical Accessories
Klik ceiling roses, plugs, outlets & prewired leads	S, P, PCR"	BS5733 : 1995 BS6972 : 1988	General Requirements for Electrical Accessories General requirements for Luminaire supporting couplers for domestic, light industrial & commercial use
IP66 Outdoor Enclosure	WKAX2	BS5733 : 1995 BSEN 60529 : 1992 BSEN 60670-1 : 2005	General Requirements for Electrical Accessories Degrees of protection provided by enclosures Boxes and Enclosures for Electrical Accessories for household and similar
PVC flexible cord	PVC	BS6500 : 2000	Flexible cords rated to 300/350V for use with appliances & equipment intended for domestic, office & similar environments.
LSF flexible cord	LSF	BS6500 : 2000 BS7211 : 1998	Flexible cords rated to 300/350V for use with appliances & equipment intended for domestic, office & similar environments.

### Product materials

Klik plugs and sockets feature solid brass terminals and phosphor bronze contacts for good conductivity. Moulded components are manufactured from high quality thermoplastics.

### Klik terminal capacities

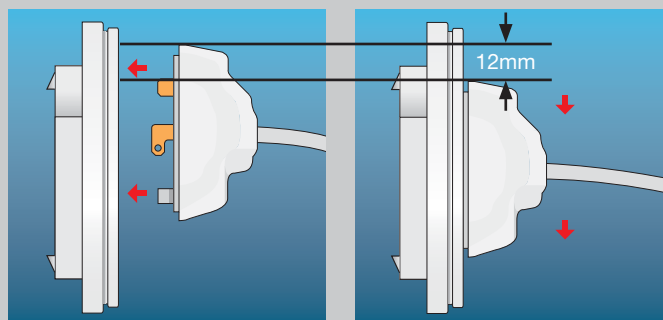
	Number of conductors				
	0.75mm <sup>2</sup>	1.0mm <sup>2</sup>	1.5mm <sup>2</sup>	2.5mm <sup>2</sup>	4.0mm <sup>2</sup>
Socket outlets	-	5	4	3	2
Plugs P22, P64AX, P26	1	1	-	-	-

The S29 socket terminal bank will accept up to 4.0mm<sup>2</sup> conductor in each terminal access

### Cables for klik plugs

	0.75mm <sup>2</sup> PVC/LSF 3 core	0.75mm <sup>2</sup> PVC/LSF 4 core	1.0mm <sup>2</sup> PVC/LSF 3 core	1.0mm <sup>2</sup> PVC/LSF 4 core
P22	Y	-	Y	-
P64AX	Y	Y	Y	Y

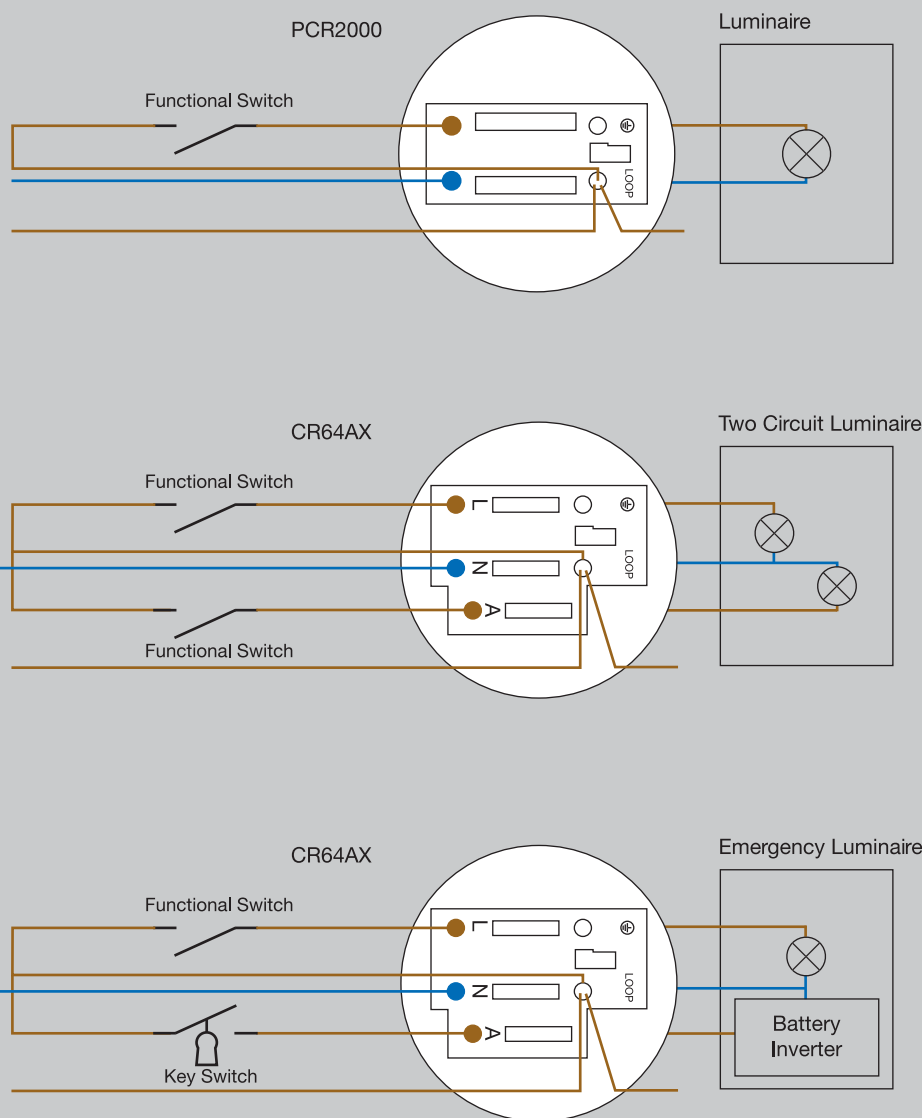
**Application notes.** The mating face of each interface module must be mounted 0.1mm minimum proud of its proposed surround. Engaged plug sits centrally on socket but a minimum of 12mm extra clearance should be maintained north of the upper load grip to allow plug travel.



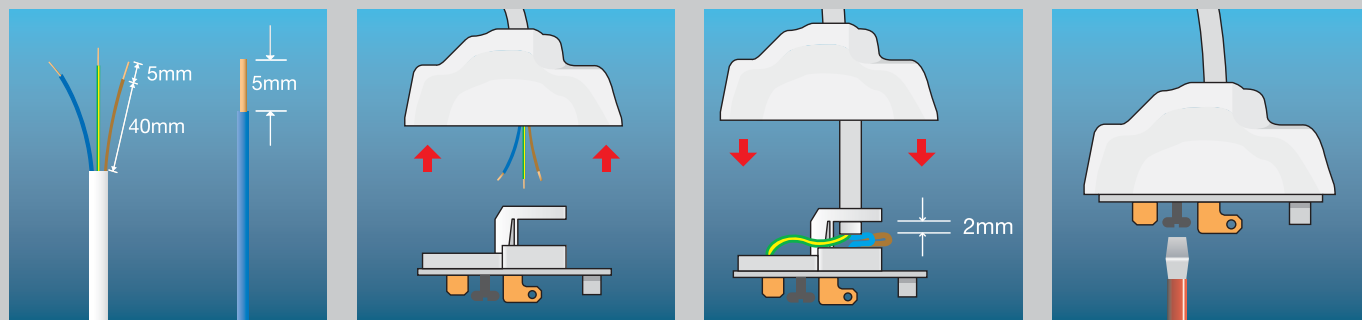
**For specific information contact our technical support helpline on: 0870 6076677**

## Wiring Diagrams

These wiring diagrams are typical examples of the applications shown.



**Note:** Earth connections omitted for clarity



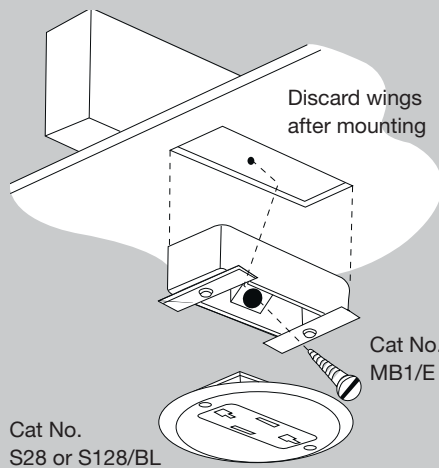
- 1 Strip cable as above - N.B. Trim cable tails to double over for better terminal contact.
- 2 Remove plug cover.
- 3 Pass cable through plug cover centre hole.
- 4 Terminate conductors into terminals.
- 5 Push outer sheath of cable firmly into jaws of sheath grip, making sure that at least 2mm of sheath protrudes below the grip.
- 6 Refit cover.

## Klik Mounting Box Installation

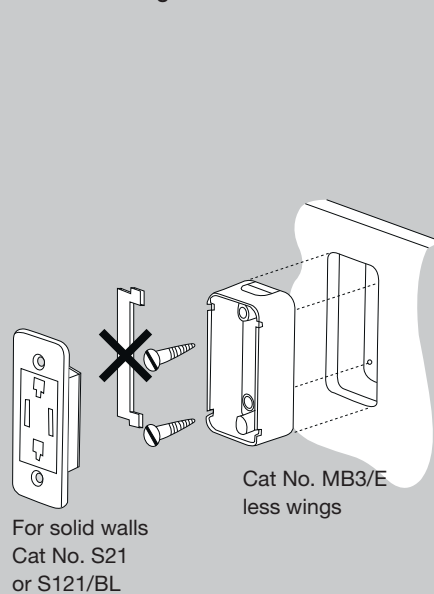
- MB1/E has specially angled screw fixing for mounting to side of ceiling joist. Single wood screw provided. Supplied with M3.5 x 20mm long fixing screws.
- MB2 knockouts in base and sides. Supplied with M4 x 20mm long fixing screws.
- MB3/E is dual purpose box for flush mounting in solid or partition walls. Provided with mounting wings for partition use. Supplied with M3.5 x 20mm long fixing screws. Cable entry in one end. Earth terminal.

### Flush ceiling mounting

The mounting wings sit on the ceiling and stop the box from being pushed through, while the box is secured via the angled fixing screw hole.

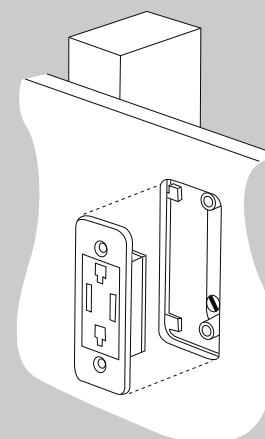
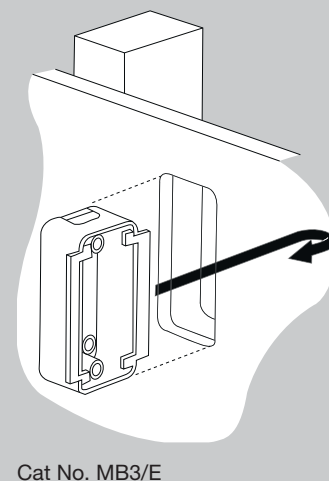


### Flush mounting for solid walls



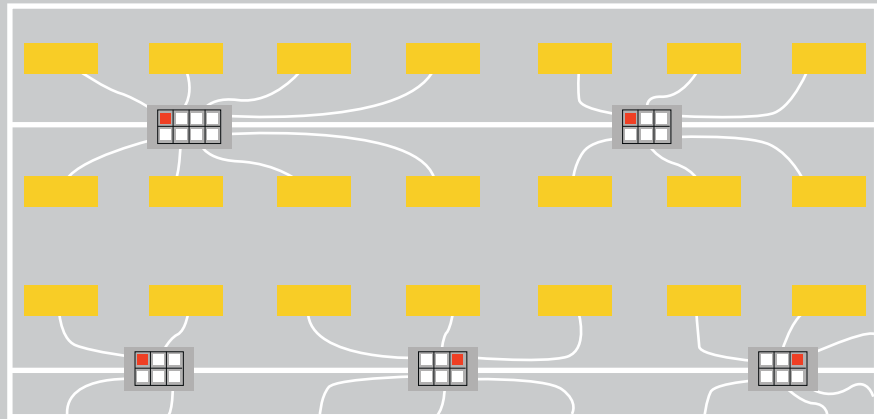
### Flush mountings for partition walls

The mounting wings act as a flange, stopping the box from being pulled out of the partition.

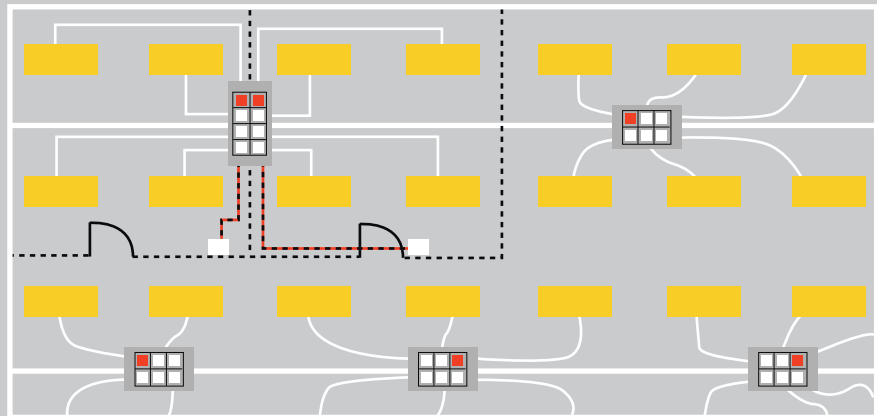




Typical lighting scheme utilising Klik LDS 6 and Klik LDS 8 way lighting distribution system for standard and emergency lighting. Also shown is an LDS 6 with only 4 luminaires connected leaving capacity for future connections.



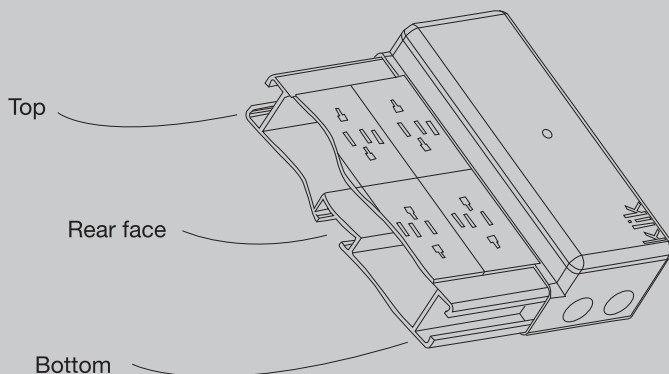
Office layouts are often changed requiring modifications to luminaire switching. This arrangement shows two different offices, each with 4 luminaires being supplied by a single Klik LDS 8. Each office is separately switched from standard wall switches.



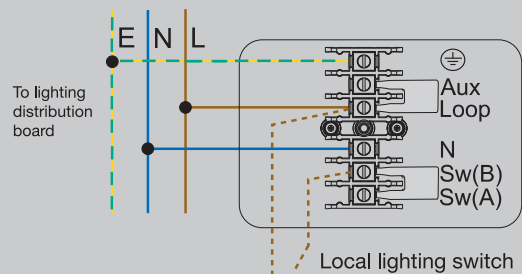
## Mounting methods

- Hanging from ceiling suspension system with Caddy Clips™
- Direct fixing to lighting trunking
- Direct fixing to ceiling or wall with No. 8 screws

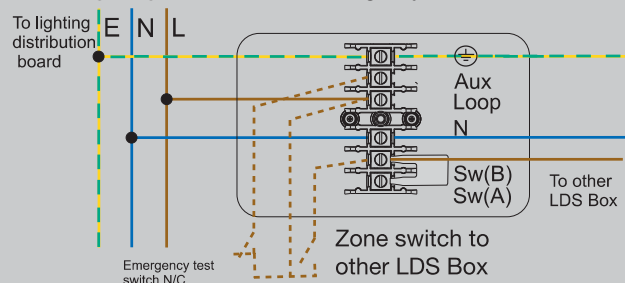
## Mounting positions



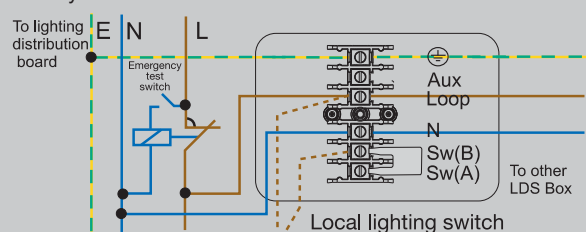
## 'Local' lighting switch control. Permanent emergency feed



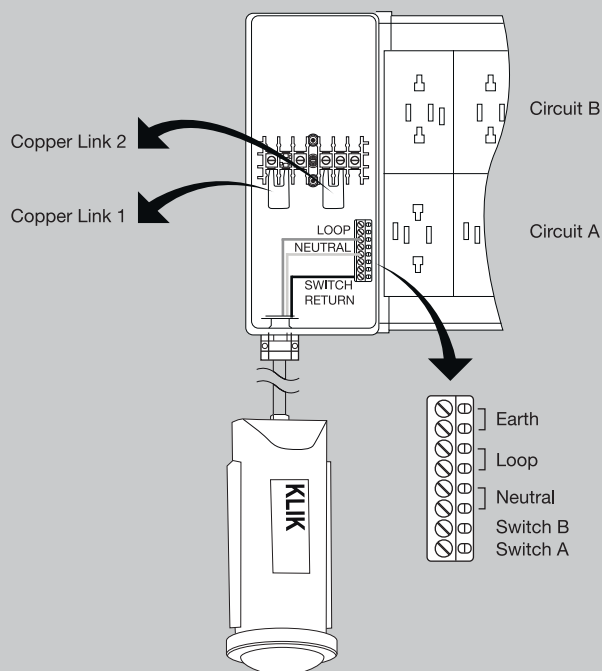
## 'Zone' lighting control. 'Local' emergency test control



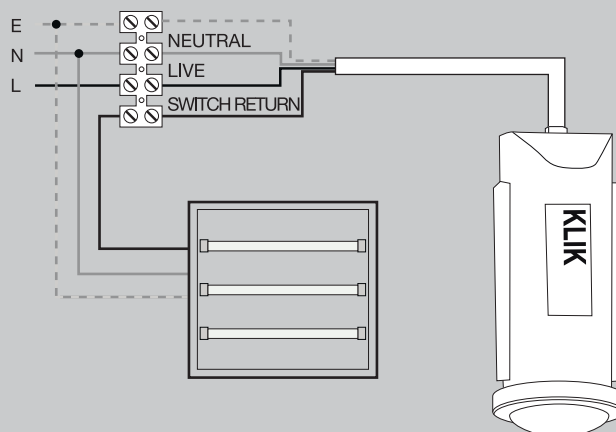
## 'Local' lighting switch control. Centralised emergency test via keyswitch



## Connected to Klik LDS lighting distribution box



## Connected directly to a single luminaire



## Infrared programming tool for Klik Occupancy Sensor OS2/P

### Setting the DIL switches

	Switch number	1	2	3	4	5	6
ON	Programming tool	Set timer	20 min	10 min	5 min	2min	
OFF	User override	Set photocell	0 min	0 min	0 min	0 min	

Switch number 1 can be used to make the OSRCA emulate the user override OSRCB. If switch number 1 is in the OFF position, all other switches become inactive. Programming of the OS2/P timer and photocell are separate operations; switch number 2 is used to select which setting is programmed.

### Programming the OS2/P timer Factory set time out is 20 minutes

1. Set switch 1 to ON
2. Set switch 2 to ON
3. Set switches 3, 4, 5 and 6 to give the required timer setting. Each switch contributes its associated time when it is set to ON, and nothing when set to OFF, e.g. for 25 minutes (3 - ON, 4 - OFF, 5 - ON, 6 - OFF).
4. Aim the handset at the OS1/P and give a short press on the switch.
5. The OS2/P turns the lights off then back on again to acknowledge a successful programming operation. If the lights were already off, the acknowledgement simply turns the lights on.

### Technical Notes:

For switching applications, refer to our technical support helpline  
Tel: 0870 607 6677

For manual switching of occupancy sensors use either OSRCA or OSRCB.

## Programming the OS2/P photocell Factory set with photocell deactivated

1. Set switch number 1 to ON
2. Set switch number 2 to OFF
3. Set switches 3, 4, 5, and 6 according to the following table:

	3	4	5	6
a) Disable photocell	OFF	OFF	OFF	OFF
b) Recall latest photocell calibration	Any pattern other than (a) or (b)			
c) Calibrate new photocell set-point	ON	ON	ON	ON

(To calibrate new photocell set-point it will be necessary to wait until the time of day, or to simulate the light level artificially, when the ambient light level is just at the point where it is desired that the photocell becomes active).

4. Aim the handset at the OS2/P and give a short press on the button
5. The OS2/P turns the lights off (or keeps them off, if they were already off)
6. Two seconds later (immediately for options a or b), the OS2/P turns on to acknowledge that the new photocell calibration has been programmed

### Notes

- i The operation of the photocell is such that it can only prevent lights from switching on as an area is entered. It never turns lights off in an occupied area.
- ii All parameters may be re-programmed any number of times and settings will be retained in the event of a power loss.

The Klik Digital Connection System (KDCS) is a marshalling box capable of distributing power and data to 4, 6, 8, or 10 digital ballasts.

KDCS can be sub-divided into two circuits for greater flexibility. Klik Digital plugs connect the luminaires to the KDCS marshalling box, a blue five pin plug for non emergency luminaires and a red auxiliary plug for emergency luminaires. All plugs are factory pre-wired with a bespoke cable that combines the power and data cables together but allows them to be separated by a double insulation.

High performance, programmable presence detectors that monitor and regulate the lighting level.

For lighting specialists who already install lighting management systems the KDCS can be used as part of a larger system in terms of the distribution box.



Presence detection is by passive infrared effectively enhanced to improve sensitivity to small movements.



Regulating photocell ensures a minimum maintained light level, taking account of the contribution from adjacent luminaires and daylight.



Incorporates simple scene setting, up to six scenes can be set via user remote.



Off delay in minutes following the last observed movement after which the lights switch off/dim down.



Digital Design Guide	10.2
Klik Digital Connection System	10.6
Pre-Wired Plugs	10.6
Pre-Wired Plugs for Emergency Luminaires	10.7
Occupancy Sensor and Associated Products	10.7



Detection pattern and range in metres under normal operating conditions.



Hand controller provides local user override.



Remote programming tool ensures changes can be easily accommodated.



Authorised User No. 00247

Klik Digital is an authorised member of the Energy Technology List.

## Lighting Design Considerations

The following factors should be considered when designing a lighting control system. This is not exhaustive it should only be used as a guide.

### Step 1



#### Survey Room

- Size of room
- Levels of light
- Natural corridors
- Quantity of detectors required

### Step 2



#### Type of Control

- Full or partial
- Override facility
- Remote control
- Wall switch

### Step 3



#### Layout of Marshalling Boxes and Detectors

- Switching requirements - single or dual circuit
- Overlap and natural corridors

### Step 4



#### Installation and commissioning

- Wiring diagrams
- Programming setup
- Functionality

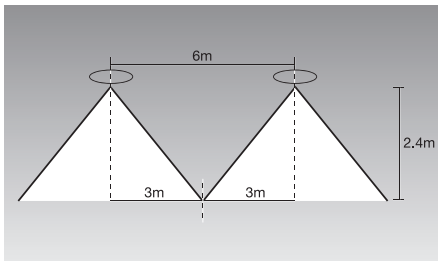
## Quantity and Type of Detectors

The following provides a guide to the number of occupancy sensors based on the room size.

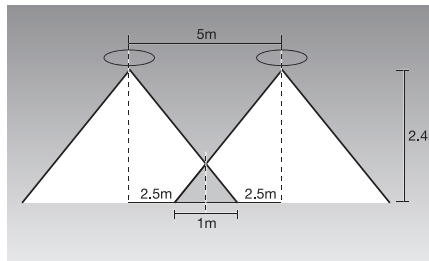
### Type of Detector

For digital lighting there are typically two types of ballast protocols, DSI or DALI. The type of detectors specified must correspond to the type of ballast being installed i.e. DSI or DALI

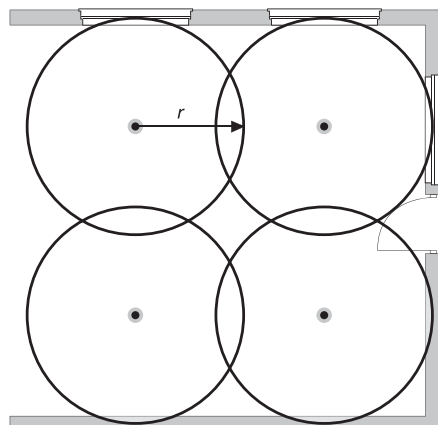
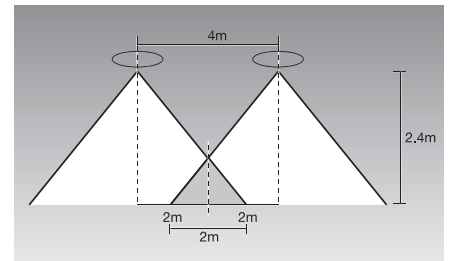
### No Overlap



### 1m Overlap



### 2m Overlap



Area coverage =  $\pi r^2$

Where  $r$  = radius @ 2.4m

For 1m overlap area coverage =  $\pi \times 2.5m^2$   
= 19.6m<sup>2</sup>

Example:

For an office of 110m<sup>2</sup> the number of sensors required could be approximated as below:

$$\text{No. of sensors} = \frac{\text{Area}}{\text{Coverage}} = \frac{110}{19.6} = 5.6$$

= 6 Sensors

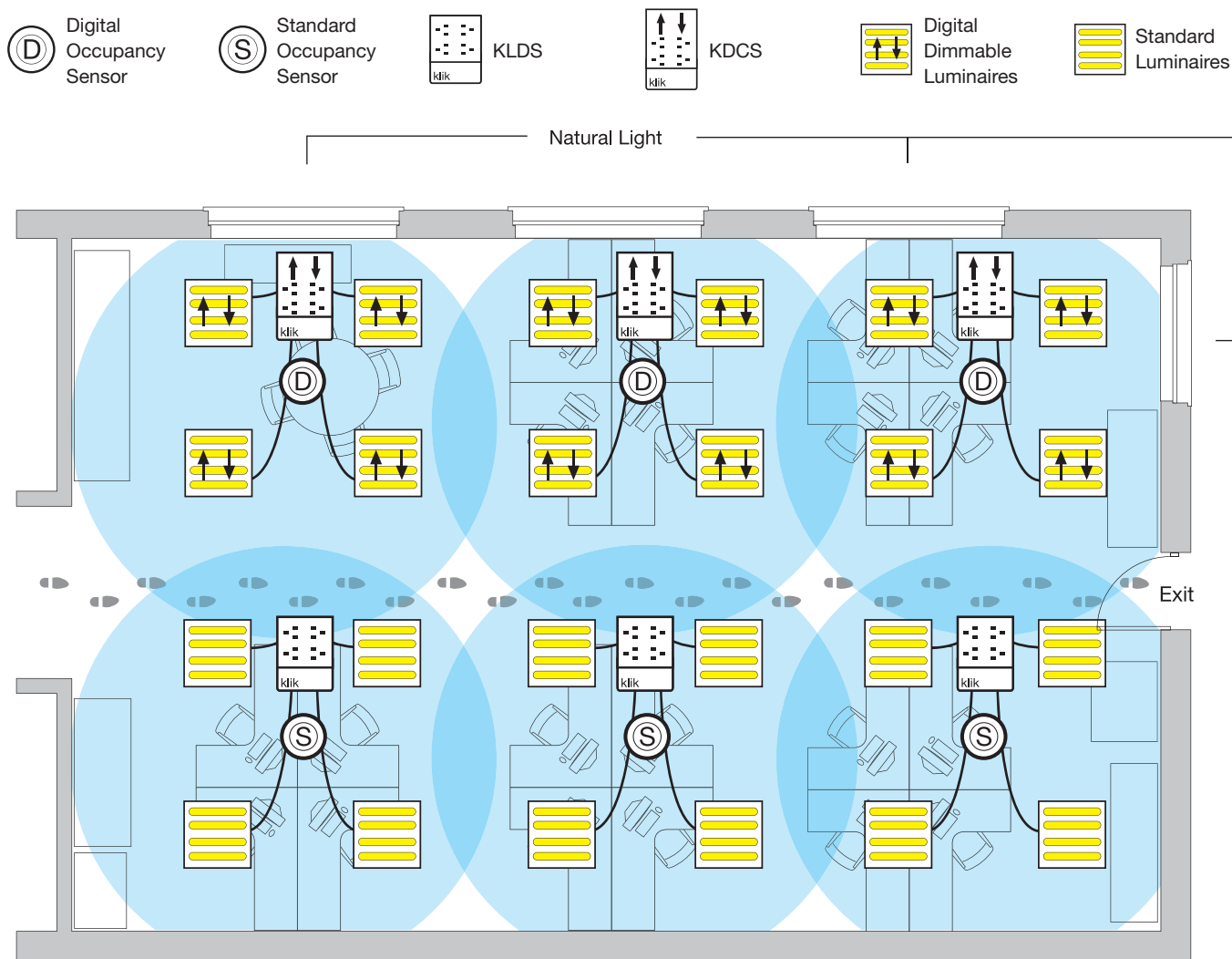
### Quick Reference Chart

Room Size m <sup>2</sup>	Zero Overlap	Min 1m Overlap	Min 2m Overlap
<15	1	1	1
<25	1	2	2
<50	2	3	3
<75	3	4	4
<100	4	5	6
<125	5	6	7
<150	6	7	8
<175	7	8	9
<200	8	9	11
Coverage per detector	28.3m <sup>2</sup>	23.8m <sup>2</sup>	19.6m <sup>2</sup>

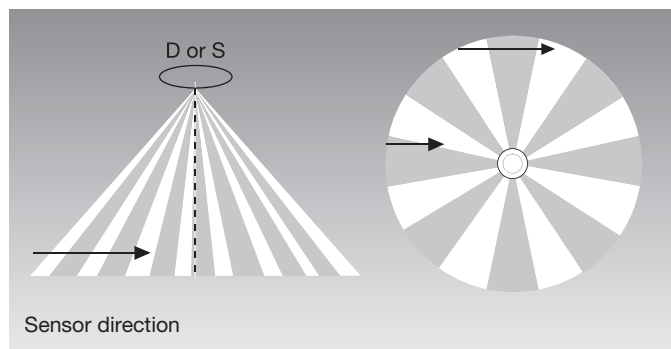
## Positioning of Sensors

KDCS makes best use of the available natural daylight. The digital sensors will regulate the light level in accordance with the natural daylight and light provided from adjacent luminaires.

In this example KDCS is installed around the edge of the room where natural daylight is available.

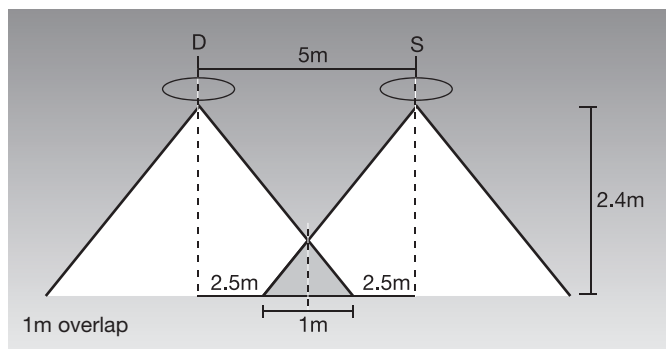


### Occupancy Sensor Positioning



Best detection is achieved by walking across the detector beams not towards them. This should be considered for natural corridors.

### Occupancy Sensor Spacing




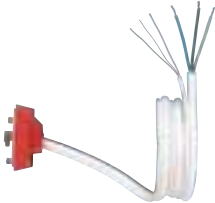






Increase the level of overlap to reduce the possibility of dead spots.

## Comparison Chart



KDCS can be used when an installation uses digital dimmable luminaires throughout. It can also be used in conjunction with KLDS if digital dimming is not required throughout the installation. This has the benefit of reducing the capital costs without compromising the performance.

The following provides a comparison between Klik LDS and Klik DCS part number references:

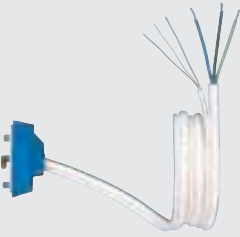
	<b>Klik LDS</b>	<b>Klik DCS</b>
Marshalling boxes	 <p>KLDS4 KLDS6 KLDS8 KLDS10 KLDS12</p>	 <p>KDCS4 KDCS6 KDCS8 KDCS10</p>
Pre-wired plugs	 <p>P22/1.0LSF/2 P22/1.0LSF/3 P22/1.0LSF/4 P22/1.0LSF/5  P64AXR/1.0LSF/2 P64AXR/1.0LSF/3 P64AXR/1.0LSF/4 P64AXR/1.0LSF/5</p>	 <p>P55/2 P55/3 P55/4 P55/5  P55AXR/2 P55AXR/3 P55AXR/4 P55AXR/5</p>
Occupancy sensor	 <p>OS2/P OS2/PSM</p>	 <p>OS3/D (for DSI ballasts) OS4/D (for DALI ballasts) OS3/DS (for DSI ballasts) OS4/DS (for DALI ballasts) OS3/DSW (for DSI ballasts) OS3/DSW (for DALI ballasts)</p>
Controller	 <p>OSRCA OSRCB</p>	 <p>OSDP OSDC or OSDCS</p>



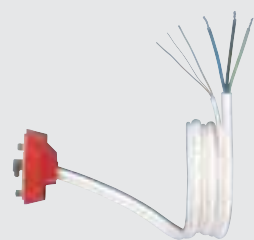
## Klik Digital Connection System - KDCS

	<i>Description</i>	<i>Dimensions</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
 KDCS4	4 outlet distribution box	73mm x 222mm x 238mm	1	<b>KDCS4</b>
	6 outlet distribution box	73mm x 222mm x 288mm	1	<b>KDCS6</b>
	8 outlet distribution box	73mm x 222mm x 338mm	1	<b>KDCS8</b>
 KDCS6	10 outlet distribution box	73mm x 222mm x 388mm	1	<b>KDCS10</b>
 KDCS10				

## Pre-Wired Plugs

	<i>Description</i>	<i>Pack qty.</i>	<i>Cat Ref.</i>
 P55/1	<b>Pre-wired plugs with low smoke zero halogen flexible cord</b>		
	Digital plug with 1 metre 1.0 mm² LS0H flexible cord	10	<b>P55/1</b>
	Digital plug with 2 metre 1.0 mm² LS0H flexible cord	10	<b>P55/2</b>
	Digital plug with 3 metre 1.0 mm² LS0H flexible cord	5	<b>P55/3</b>
	Digital plug with 4 metre 1.0 mm² LS0H flexible cord	5	<b>P55/4</b>
	Digital plug with 5 metre 1.0 mm² LS0H flexible cord	5	<b>P55/5</b>

## Pre-Wired Auxiliary Plugs for Emergency Luminaires



P55AXR/1

Description	Pack qty.	Cat Ref.
<b>Auxiliary plugs with low smoke zero halogen flexible cord</b>		
Digital AX plug with 1 metre 1.0 mm <sup>2</sup> LS0H flexible cord	10	<b>P55AXR/1</b>
Digital AX plug with 2 metre 1.0 mm <sup>2</sup> LS0H flexible cord	10	<b>P55AXR/2</b>
Digital AX plug with 3 metre 1.0 mm <sup>2</sup> LS0H flexible cord	5	<b>P55AXR/3</b>
Digital AX plug with 4 metre 1.0 mm <sup>2</sup> LS0H flexible cord	5	<b>P55AXR/4</b>
Digital AX plug with 5 metre 1.0mm <sup>2</sup> LS0H flexible cord	5	<b>P55AXR/5</b>

**new**

## Occupancy Sensor and Associated Products

- Occupancy sensor range 6m diameter at 2.4m high.
- Materials: All materials V0 rated.
- Pre-wired with 2m conductor 1.00mm<sup>2</sup> low smoke zero halogen as standard.



OS4/DS



OSDP



OSDC

Description	Pack qty.	Cat Ref.
Occupancy sensor with ON/OFF dimming for DSI ballasts	1	<b>OS3/D</b>
Occupancy sensor with scene setting for DSI ballasts	1	<b>OS3/DS</b>
Occupancy sensor with wall switch dimming - DSI	1	<b>OS3/DSW</b>
Occupancy sensor with ON/OFF dimming for DALI ballasts	1	<b>OS4/D</b>
Occupancy sensor with scene setting for DALI ballasts	1	<b>OS4/DS</b>
Occupancy sensor with wall switch dimming - DALI	1	<b>OS4/DSW</b>
Infrared programming tool	1	<b>OSDP</b>
Hand held controller	1	<b>OSDC</b>
Hand held controller (scene setting)	1	<b>OSDCS</b>
Plasterboard fixing kit	1	<b>OSPB64</b>

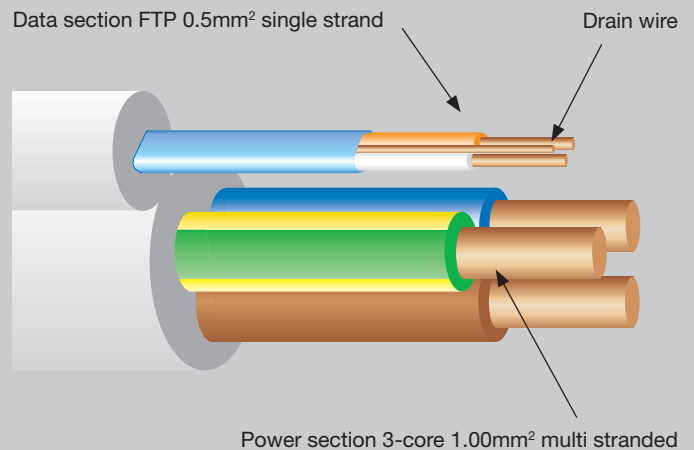
## Secure Connection System - KDCS Overview

### Wiring Digital installations with KDCS

For connection to non-emergency luminaires use the Klik digital pre-wired blue plugs, ref: **P55/1, P55/2, P55/3, P55/4 or P55/5**. These plugs have **Live** (brown), **Neutral** (blue), **Earth** (green/yellow) and both control pins (white and orange) connected.

For connection to emergency fittings, use Klik digital pre-wired red plugs, ref: **P55AXR/1, P55AXR/2, P55AXR/3, P55AXR/4, P55AXR/5**. These plugs have **Aux** (brown) **Neutral** (blue), **Earth** (green/yellow) and both control pins (white and orange) connected.

The bespoke “shotgun” cable (combined power and control) has a screened twisted pair for the control wired. The foil twisted pair section has been provided with a drain wire to allow easy termination at the luminaire. Where screening is required the drain wire should be connected to a convenient earth point.

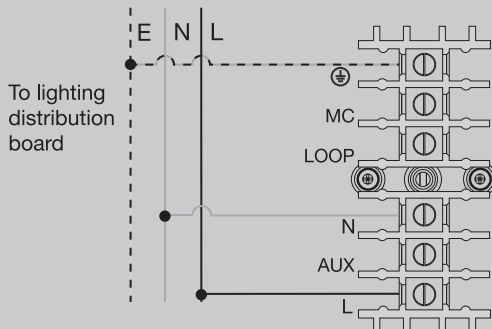


## Secure Connection System - KDCS Wiring Diagrams

### Power Wiring Arrangements

#### Permanent Supply

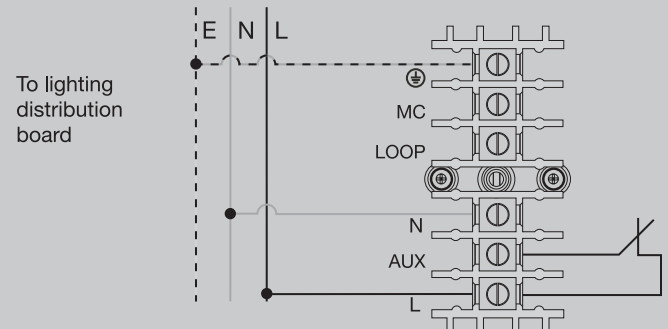
No emergency fittings



Remove copper link

#### Local Emergency Testing

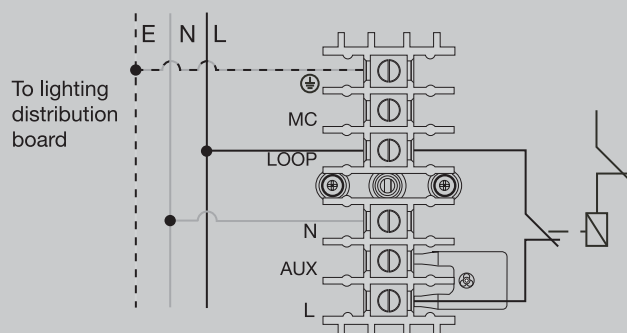
(Drops out Aux terminals only) i.e. only emergency fittings



Remove copper link

#### Central Emergency Testing

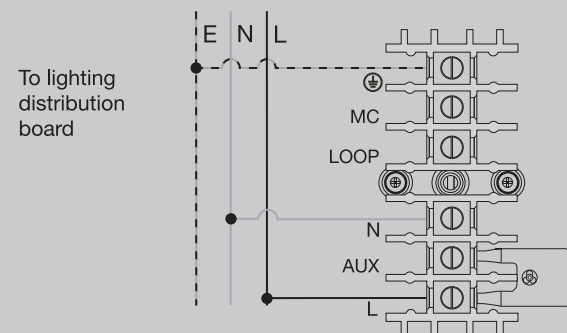
Drops out supply to all sockets (Live and Aux)



Ensure copper link is fitted

#### Permanent Supply

Emergency testing integral to luminaire

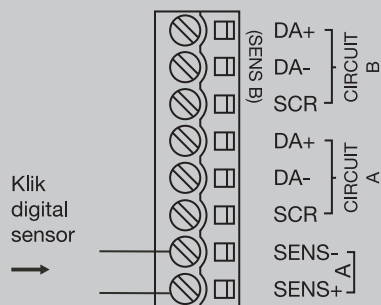


## Control Wiring Arrangements

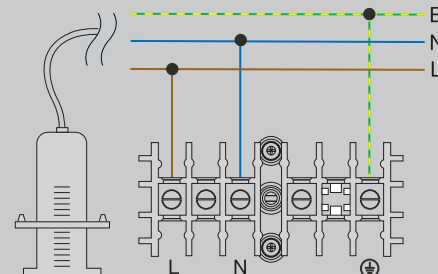
### OS3/D & OS4/D Klik Digital Sensors Control Wiring

#### In single circuit configuration

"Sensor+" and "Sensor-" can be used to connect a Klik digital sensor into the control wiring.

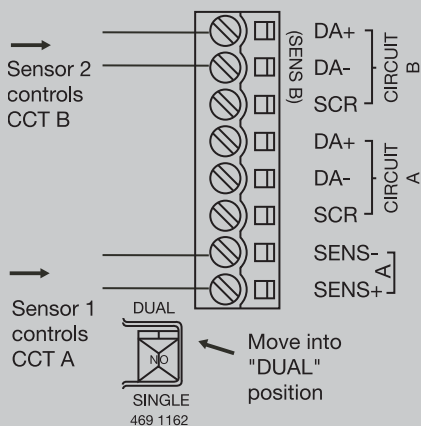


### OS3/D, OS4/D and OS3/DS, OS4/DS Klik Digital Sensors Power Wiring



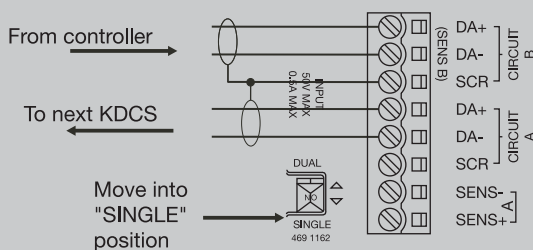
#### In Split Circuit Mode

You can connect two Klik digital sensors, one to CCTA and a second one to CCTB.



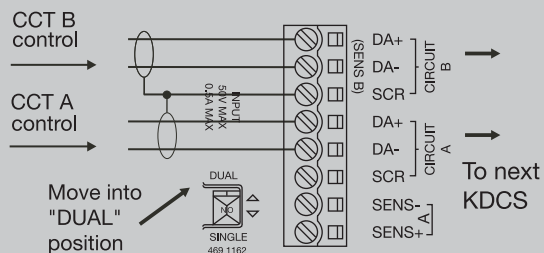
#### Single Circuit Configuration

The connections DA+ and DA- of CCT A are common with DA+ and DA- of CCT B respectively. Therefore all socket outlets receive the same control signal.



#### Dual circuit configuration

In split circuit mode, control circuits CCT A and CCT B are separate and can receive different control signals if required.



## Instructions for use

### Changing Pre-set parameters

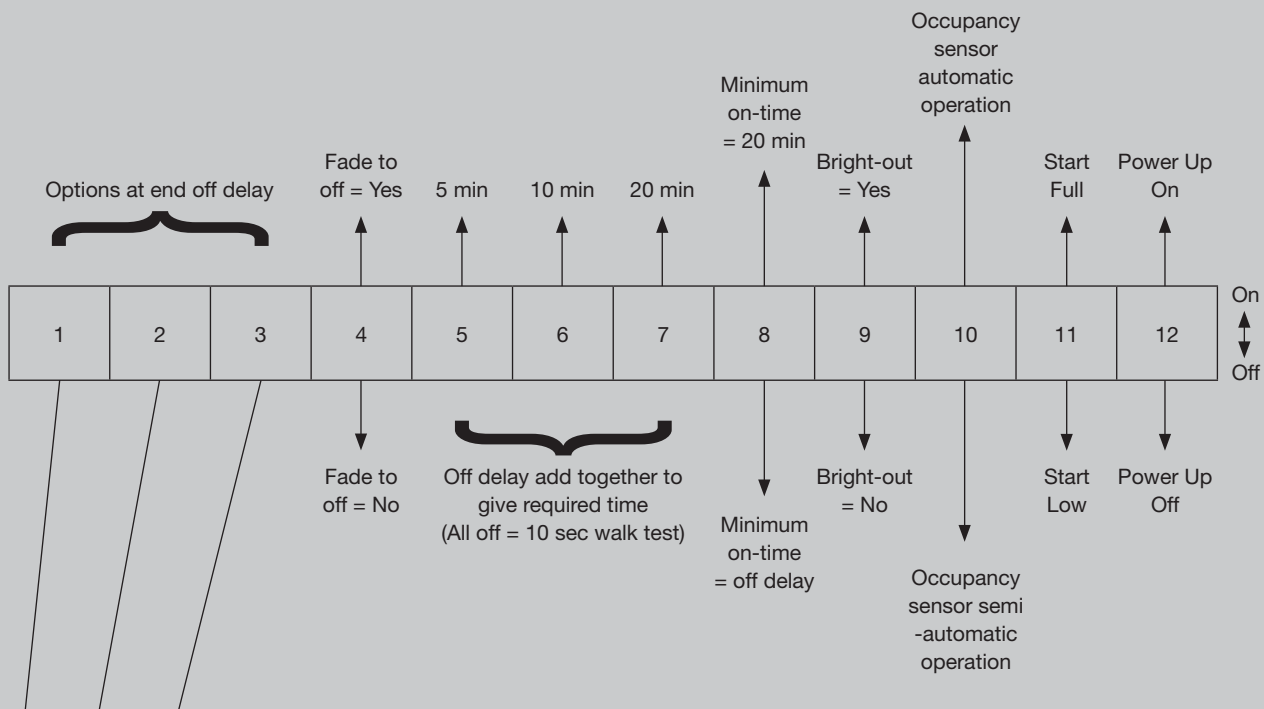
1. Set dill switches to ON or OFF according to desired settings.
2. Hold the programmer vertically beneath the occupancy sensor and press button A. The detector turns its load OFF to indicate the beginning of a programming event and turns back on almost immediately if the operation is a success. If the detector output does not turn back on, repeat the operation.

### Setting the regulating light level

1. Point this unit at the occupancy sensor and adjust the light output using the UP/DOWN buttons until the desired light level is achieved locally.  
Note: that it may not be possible to do this in the presence of strong natural light.
2. Press STORE, two seconds later the load (regulating ballasts) blinks to indicate a successful store operation. The occupancy sensor will now regulate the light output in order to maintain the level of illuminance at this new set point.

*All of these parameters will be preserved in the event of power loss and can be re-programmed any number of times.*

## Parameter options for OS3/D, OS3/DS, OS4/D, OS4/DS, OS3/DSW and OS4/DSW



Off	Off	Off	Lights turn off
On	Off	Off	Lights stay at minimum output until next occupancy
Off	On	On	Lights regulate below 25% for 3 hours then turn off
Off	On	Off	Lights regulate below 25% until next occupancy
On	Off	On	Lights stay at minimum output for 3 hours then turn off

## Optimum settings to perform 10 second walk test

Switches	Status
1-9	Off
10-12	On

## Commissioning

The factory default setting will be appropriate for most applications. However, the installer does have the facility to reprogramme a wide range of parameters and to set the regulating light level using OSDP Digital Programmer.

The following table shows the pre-set factory settings and a brief explanation of each parameter. These parameters may be re-programmed any number of times and all settings will be retained in the event of a power loss.

## Programming information

Parameter	Options	Pre-set	Application
Power-Up	On/Off	On	Sets the luminaire state at power up irrespective of occupancy. Useful in reducing start-up load following power cut. Power-Up off-responds to occupancy after 30 seconds.
Start-up level	Max/Min	Max	Sets the level at which lamps strike when turning on.
Responses	Auto/Semi Auto	Auto	If set to auto, the occupancy sensor switches the luminaires on and off automatically. If set to semi-auto, the luminaire will not turn on automatically when a person enters the area. It can be turned on using the OSDC or OSDCS hand-held controller by toggling the power switch. When the area is vacated, the light will turn off automatically.
Bright-out	Yes/No	No	If set to yes, movement fails to refresh the off delay if the ambient light level is 100% higher than its desired level, and the luminaire will switch off when the off delay has elapsed.
Minimum on time	Yes/No	No	If set to yes, the luminaire is guaranteed to stay on for at least 20 minutes, regardless of the off delay setting. This effectively overrides the off delay setting.
Off-delay	5-35 minutes	20 minutes	The time for which the luminaire will stay on following the last detected movement. Also 10 second setting for walk-testing.
Fade to off	Yes/No	No	When no presence is detected, and after the off delay period, the lamps can fade out instead of switching off (approx 80 seconds to fade from 100% to 0%).
Light level	1-100%	100%	Can be set to regulate at any level achievable within the light output range of the fitting.
When vacant	Low/Off/Reg <25%	Off	These are the options for a vacant area after it has timed out. Luminaires can turn off, remain at minimum output, or regulate with a 25% output limit, until the next period of occupancy. If programmed to remain at minimum or regulate below 25%, there is a programmable option to switch off after 3 hours.

## Hand Held Remote Controller

### OSDC and OSDCS infrared remote dimming controller for occupancy sensor

#### Operation instructions

Point the handset at the occupancy sensor and press a button. The beam angle is quite narrow, so accurate aiming is important. (Optimum distance 1m - 2.5m, LED indicates battery life)

#### Key assignment OSDC and OSDCS

- Short press to turn off, long press to dim.
- + Short press to turn on, long press to brighten.

#### Product compatibility

Please note that only those products designed for dimming, and connected to appropriate equipment, can effect dimming with this controller.

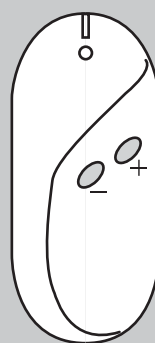
#### Key assignment OSDCS

- Short press to turn off, long press to dim.
- + Short press to turn on, long press to brighten.
- 6 scene recall buttons (only applicable for OS3/DS, OS4/DS, OS3/DSW, OS4/DSW).

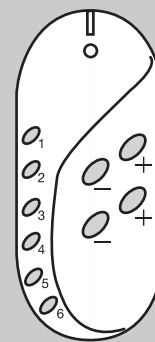
To store, set the lighting level requirements using - or +, then press and hold the scene button until the luminaires blink.

#### Technical data

Dimensions:	120 x 56 x 22mm
Weight:	115g
Battery type:	Alkaline AAA x 2
Typical battery life:	1 year
Operating range:	2.5m



OSDC



OSDCS

1.



A range of mounting options exist for the KDCS. The KDCS can be mounted on a flat surface, vertically or horizontally on drop rods, or beneath trunking or ladder trays.

2.



Large cabling compartment makes wiring easy under site conditions.

3.



Klik digital pre-wired plug are easily connected to the luminaire.

4.



Luminaires are connected to the marshalling box using the click in locking action.

5.



Parameters are selected using the handheld programmer (ODSP).

6.



Occupancy sensor is programmed with the desired settings using the OSDP.

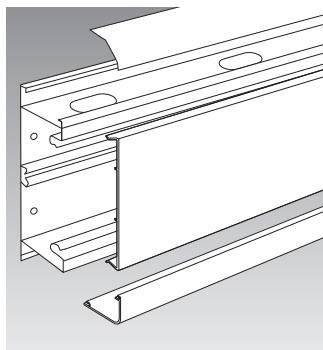
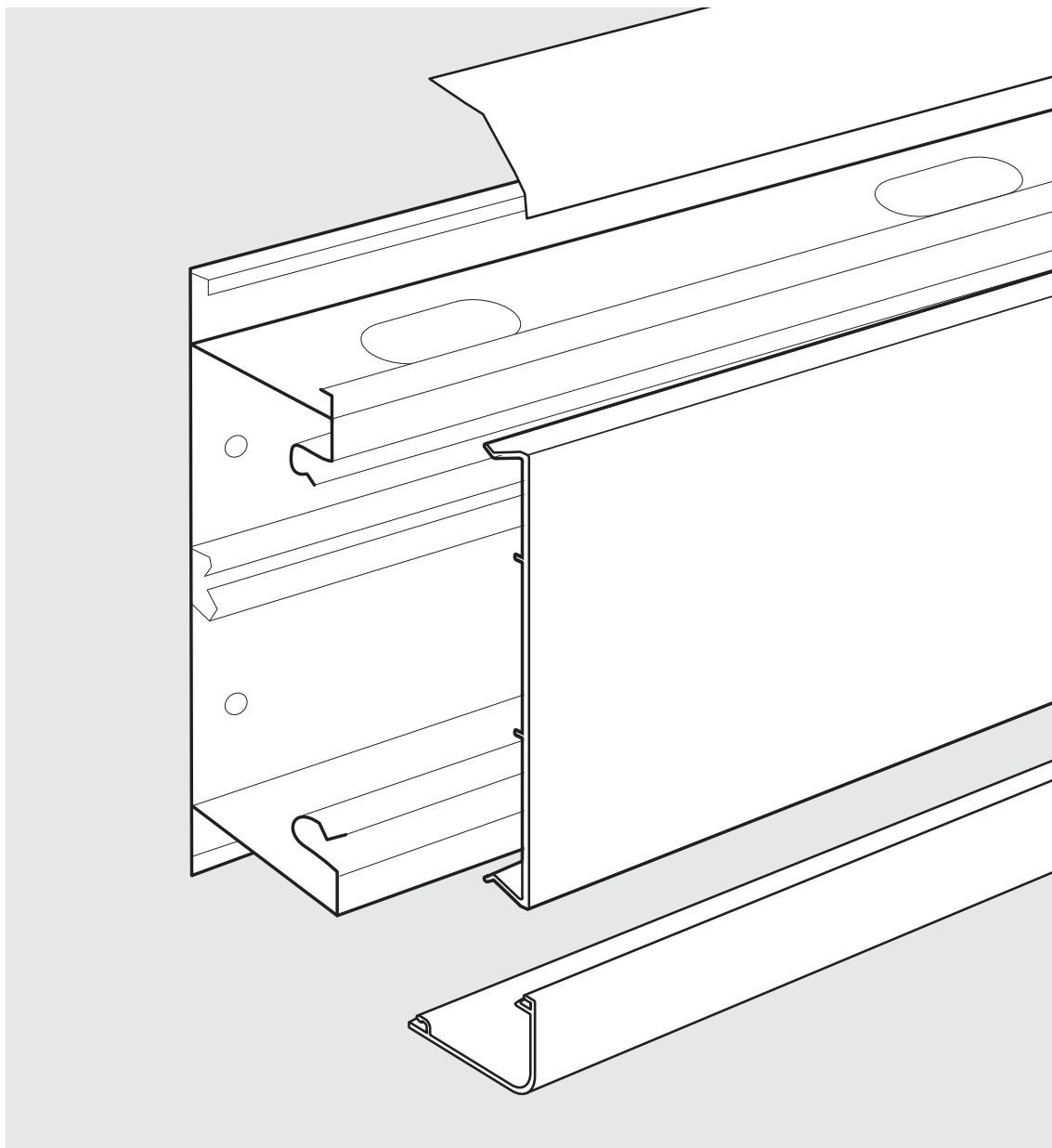


## C60 Perimeter Systems

Suitable for both new build projects and refurbishments the C60 range offers quality products combined with features to make installation and ordering easier.

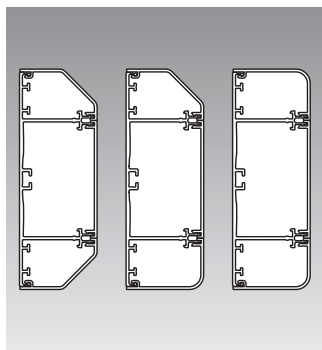
Available in two materials uPVC and Aluminium C60 is the ideal choice for all your 3 compartment trunking requirements.

The CA60 aluminium range is available in white, alumat and grey offering the combined benefits of aesthetics together with electromagnetic compatibility.

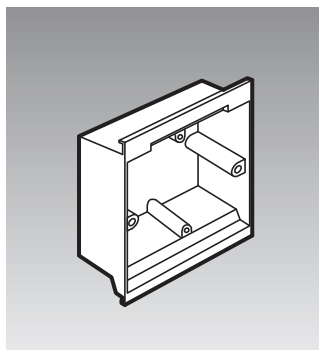


Can be supplied complete

- One reference provides base and lid together alternatively order base and lid separately.



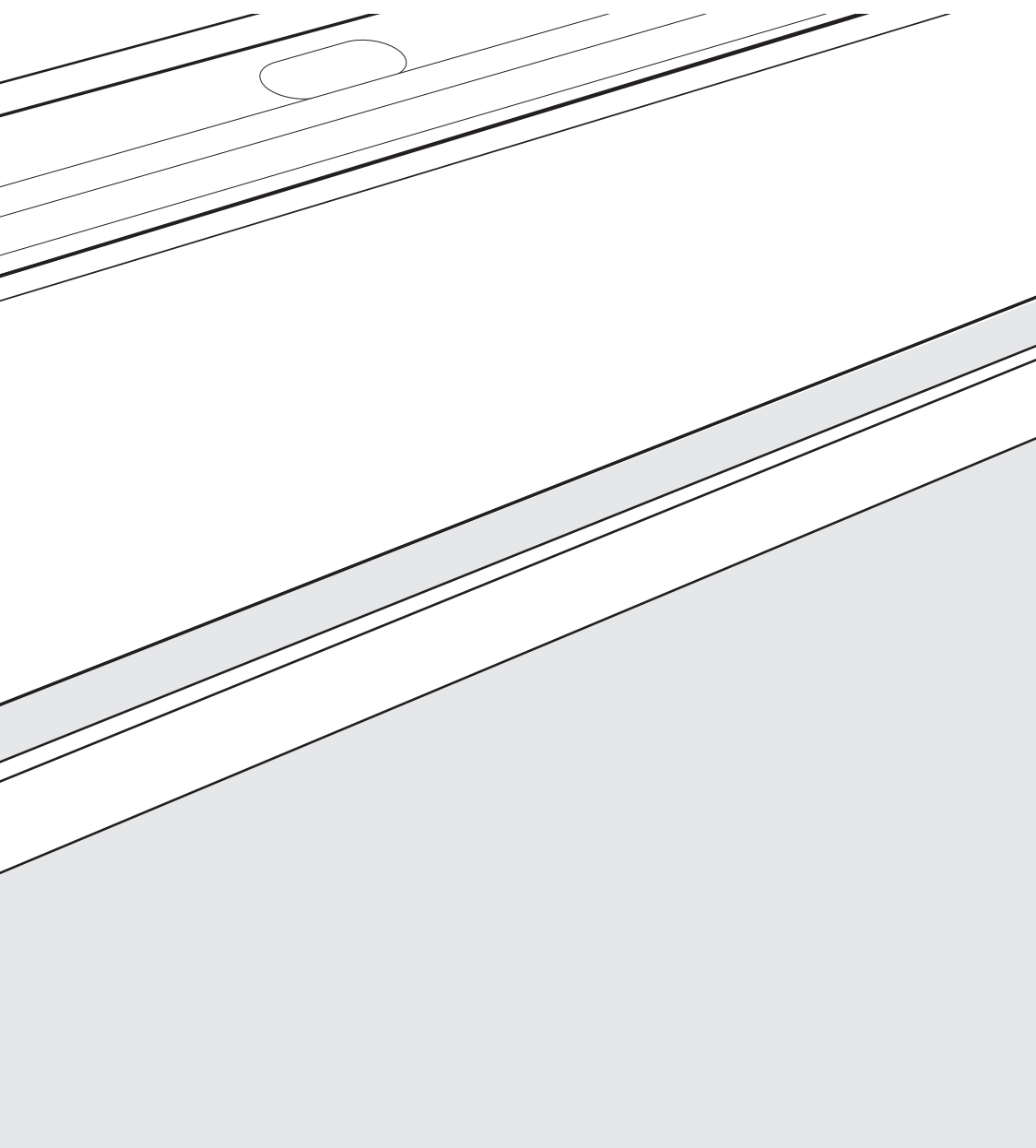
- Choice of three profiles.
- 170mm x 60mm provides additional cabling space.
- 3m lengths as standard 2m available.



- "Clip-Lock" outlet boxes simply clip into place and secure.
- 4 fixings make the box suitable for horizontal or vertical runs.
- 35mm deep box sufficient for today's modern data requirements.



Cable retaining clips ensure cables are secure when the covers are removed during installation or maintenance.

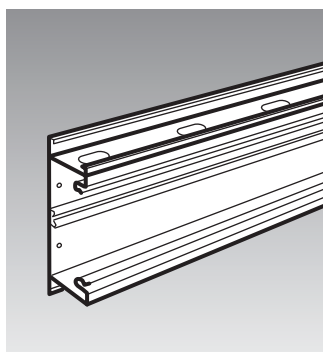


C60  
uPVC Perimeter Trunking

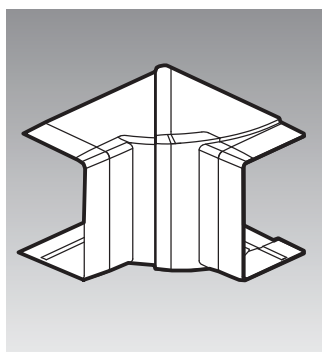
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CA60  
Aluminium Perimeter Trunking

11.4



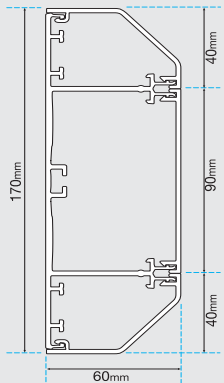
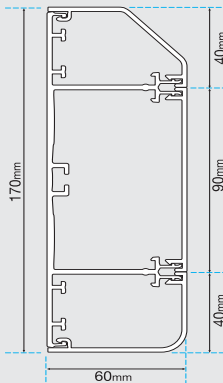
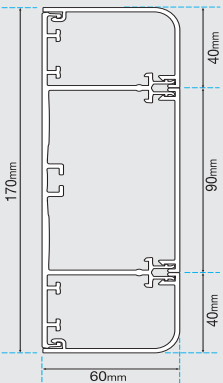

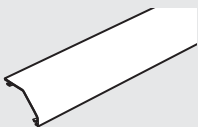
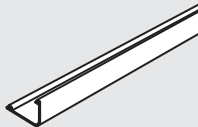
- Pre-punched bases for fast installation.
- Clean knock out slots provide simple routing for cables.



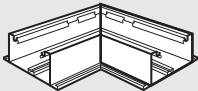
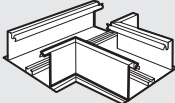
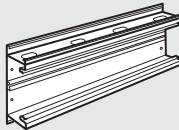
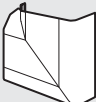

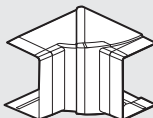
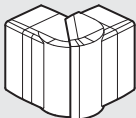

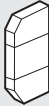



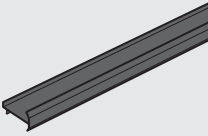
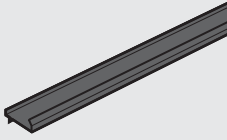
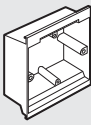
Adjustable moulded corners

## C60

### uPVC Perimeter Trunking

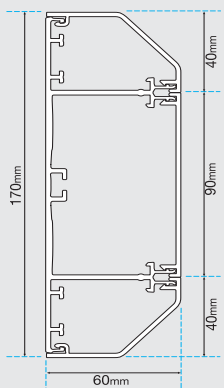
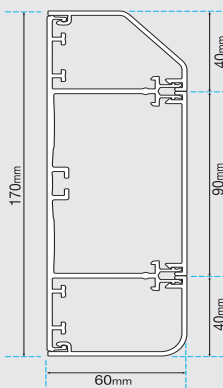
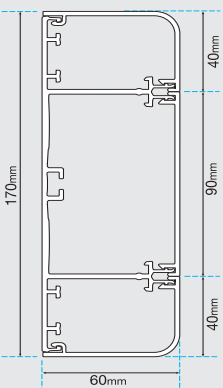

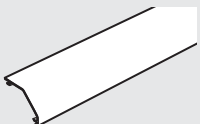
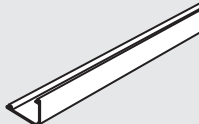
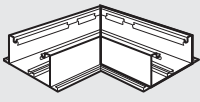
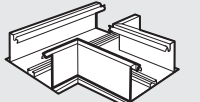
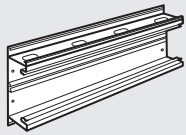

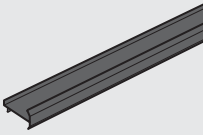

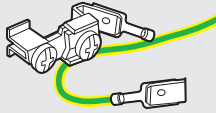
	 <p>CC Chamfered - Chamfered</p>	 <p>CR Chamfered - Round</p>	 <p>RR Round - Round</p>	
Base and Lid Supplied Complete	Length 3m <b>CU601L/W</b>  2m <b>CU601/W</b>	Length 3m <b>CU602L/W</b>  2m <b>CU602/W</b>	Length 3m <b>CU603L/W</b>  3m <b>CU603/W</b>	
				
Additional Lids (if required) Pack Qty. 24m Length 2m	<b>Centre Lid</b>  <b>CUL/W</b>	<b>Chamfered Lid</b>  <b>CULC/W</b>	<b>Round Lid</b>  <b>CULR/W</b>	

## C60 uPVC Perimeter Trunking

				
Base Pack Qty 1	250 x 250mm <b>CUFC</b>	250 x 250mm <b>CUTB</b>	Length 2m Pack Qty 12m <b>CU60B</b>	
				
Corner Cover Kits Pack Qty 1	CC CR ▼ CR ▲ RR <b>CUF1/W</b> <b>CUF2D/W</b> <b>CUFCU/W</b> <b>CUF3/W</b>	CC CR ▼ CR ▲ RR <b>CUT1/W</b> <b>CUT2D/W</b> <b>CUT2U/W</b> <b>CUT3/W</b>	CC CR RR <b>CI1/W</b> <b>CI2/W</b> <b>CI3/W</b>	CC CR RR <b>CE1/W</b> <b>CE2/W</b> <b>CE3/W</b>
				
Clips, Covers, Retainers and Cable Dividers	<b>Infill Centre Lid</b> Fits between outlet boxes. Pack Qty. 5  <b>CULI/W</b>  Used when two boxes are mounted next to each other.  28mm factory cut lid.	<b>End Caps</b> Pack Qty. 1  CC CR Left CR Right RR <b>CC1/W</b> <b>CC2L/W</b> <b>CC2R/W</b> <b>CC3/W</b>	<b>Joint Covers</b> Pack Qty. 1  CC CR RR <b>CJ1/W</b> <b>CJ2/W</b> <b>CJ3/W</b>  Supplied as kit.  At least one joint cover per straight run is recommended to aid lid removal.	<b>Cable Retainer</b> Pack Qty. 1  <b>M6846</b>  Outer compartment  2 outer cable retainers supplied per metre. Used for support when running cables in the bottom compartment.
				
Clips, Covers, Retainers Cable Dividers and Outlet Boxes	<b>Cable Retainer</b> Pack Qty. 1  <b>M6311</b>  Centre compartment.	<b>Cable Divider Centre Compartment*</b>  Sold in 2 metre lengths.  Plastic    Pack Qty. 1 <b>M1794</b>  Steel      Pack Qty. 1 <b>R9200</b>	<b>Cable Divider Outer Compartment</b>  Sold in 2 metre lengths.  Plastic    Pack Qty. 1 <b>M1831</b>	<b>Outlet Boxes</b> Pack Qty. 1  1 Gang <b>CB1/W</b> 2 Gang <b>CB2/W</b>


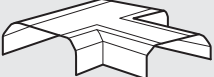
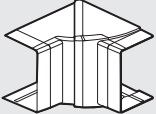
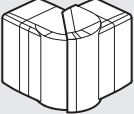

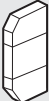

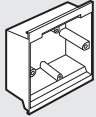
\* Partition retainer **L6705** used when the trunking is installed vertically.

## CA60 Aluminium Perimeter Trunking

				
	CC Chamfered - Chamfered	CR Chamfered - Round	RR Round - Round	
Base and Lid Supplied Complete Length 2m	Alumat Grey White	<b>CA601/A</b> <b>CA601/G</b> <b>CA601/W</b>	Alumat Grey White	<b>CA602/A</b> <b>CA602/G</b> <b>CA602/W</b>
				
Additional Lids (if required) Pack Qty. 20m Length 2m	<b>Centre Lid</b> Alumat Grey White	<b>Chamfered Lid</b> Alumat Grey White	<b>Round Lid</b> Alumat Grey White	
				
Base Pack Qty 1	250 x 250mm <b>CAFC</b>	250 x 250mm <b>CATB</b>	Length 2m Pack Qty 12m <b>CA60B</b>	
				
Retainers, Cable Dividers Dowel Pins and Bonding Conductors	<b>Cable Retainer</b> Outer compartment Pack Qty. 50 (4 included with every 2m length) <b>M6311</b>	<b>Cable Divider</b> Sold in 2 metre lengths. Plastic Pack Qty. 40 <b>M1794</b> Steel Pack Qty. 48 <b>R9200</b> Earth tag for steel divider Pack Qty. 50 <b>L4180</b>	<b>Dowel Pin Kit</b> For joining lengths Pack Qty. 100 <b>L5412</b>	<b>Base and Lid Earthing Terminal Kit</b> Pack Qty. 50 <b>L5802</b> <b>Equipotential Bonding Conductors</b> Pack Qty. 25 150mm <b>L4181</b> 300mm <b>L4182</b> 600mm <b>L4183</b>

## CA60

### Aluminium Perimeter Trunking

				
Corner Cover Kits Pack Qty. 1	<p>CR ▼ Down</p> <p>Alunat    <b>CAF2D/A</b></p> <p>Grey       <b>CAF2D/G</b></p> <p>White      <b>CAF2D/W</b></p> <p>CR ▲ Up</p> <p>Alunat    <b>CAF2U/A</b></p> <p>Grey       <b>CAF2U/G</b></p> <p>White      <b>CAF2U/W</b></p> <p>Cover Kit RR</p> <p>Alunat    <b>CAF3/A</b></p> <p>Grey       <b>CAF3/G</b></p> <p>White      <b>CAF3/W</b></p>	<p>Alunat    <b>CAT/A</b></p> <p>Grey       <b>CAT/G</b></p> <p>White      <b>CAT/W</b></p> <p>T-Piece kits are universal so cater for any profile, simply choose the colour.</p>	<p>CC</p> <p>Alunat    <b>CI1/A</b></p> <p>Grey       <b>CI1/G</b></p> <p>White      <b>CI1/W</b></p> <p>CR</p> <p>Alunat    <b>CI2/A</b></p> <p>Grey       <b>CI2/G</b></p> <p>White      <b>CI2/W</b></p> <p>RR</p> <p>Alunat    <b>CI3/A</b></p> <p>Grey       <b>CI3/G</b></p> <p>White      <b>CI3/W</b></p>	<p>CC</p> <p>Alunat    <b>CE1/A</b></p> <p>Grey       <b>CE1/G</b></p> <p>White      <b>CE1/W</b></p> <p>CR</p> <p>Alunat    <b>CE2/A</b></p> <p>Grey       <b>CE2/G</b></p> <p>White      <b>CE2/W</b></p> <p>RR</p> <p>Alunat    <b>CE3/A</b></p> <p>Grey       <b>CE3/G</b></p> <p>White      <b>CE3/W</b></p>
				
Lids, Covers, End Caps and Outlet Boxes	<p><b>Infill Centre Lid</b></p> <p>Fits between outlet boxes.</p> <p>Pack Qty. 5</p> <p>Alunat    <b>CALI/A</b></p> <p>Grey       <b>CALI/G</b></p> <p>White      <b>CALI/W</b></p>	<p><b>End Caps</b></p> <p>Pack Qty. 1</p> <p>CC</p> <p>Alunat    <b>CC1/A</b></p> <p>Grey       <b>CC1/G</b></p> <p>White      <b>CC1/W</b></p> <p>CR Left</p> <p>Alunat    <b>CC2L/A</b></p> <p>Grey       <b>CC2L/G</b></p> <p>White      <b>CC2L/W</b></p> <p>CR Right</p> <p>Alunat    <b>CC2R/A</b></p> <p>Grey       <b>CC2R/G</b></p> <p>White      <b>CC2R/W</b></p> <p>RR</p> <p>Alunat    <b>CC3/A</b></p> <p>Grey       <b>CC3/G</b></p> <p>White      <b>CC3/W</b></p>	<p><b>Joint Covers</b></p> <p>Pack Qty. 5</p> <p>CC</p> <p>Alunat    <b>CJ1/A</b></p> <p>Grey       <b>CJ1/G</b></p> <p>White      <b>CJ1/W</b></p> <p>CR</p> <p>Alunat    <b>CJ2/A</b></p> <p>Grey       <b>CJ2/G</b></p> <p>White      <b>CJ2/W</b></p> <p>RR</p> <p>Alunat    <b>CJ3/A</b></p> <p>Grey       <b>CJ3/G</b></p> <p>White      <b>CJ3/W</b></p>	<p><b>Outlet Boxes</b></p> <p>Pack Qty. 1</p> <p>1 Gang</p> <p>Alunat    <b>CB1/A</b></p> <p>Grey       <b>CB1/G</b></p> <p>White      <b>CB1/W</b></p> <p>2 Gang</p> <p>Alunat    <b>CB2/A</b></p> <p>Grey       <b>CB2/G</b></p> <p>White      <b>CB2/W</b></p>

**hager**

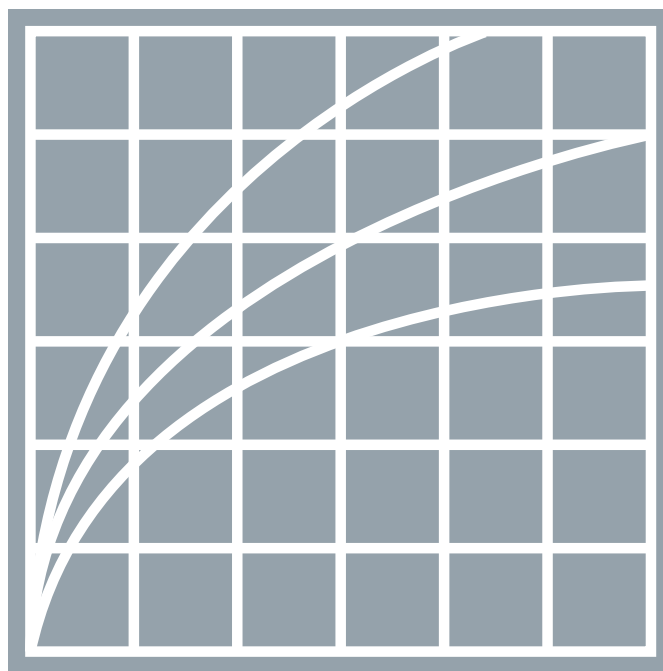
**ashley**

**klik**

**TEHALIT**

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VH712CG	1.4		
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VH712TG	1.5		
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Service

## 1. In these Terms the following expressions shall have the following meanings:

- 1.1 "Buyer" the purchaser of the Goods from the Seller.
  - 1.2 "Seller" Hager Limited.
  - 1.3 "Contract" the contract for the sale and purchase of the Goods made pursuant to these Terms.
  - 1.4 "Delivery" delivery of the Goods in accordance with these Terms.
  - 1.5 "Delivery Address" the location for Delivery agreed by the Seller and the Buyer (save where it is agreed that the Buyer shall collect the Goods from the Seller's premises).
  - 1.6 "Delivery Date" the date for Delivery agreed by the Seller and the Buyer.
  - 1.7 "Force Majeure" any circumstances beyond the reasonable control of the Seller.
  - 1.8 "Goods" the products which the Seller has agreed to supply to the Buyer pursuant to these Terms.
  - 1.9 "Loss" all actions claims demands losses (direct, indirect, consequential or otherwise) expenses costs actions and proceedings.
  - 1.10 "Payment Terms" the terms of payment in respect of the Price (and where relevant any delivery order or handling charges) which unless otherwise agreed by the Buyer and the Seller shall require payment not later than the last day of the month following that in which the Seller notifies the Buyer that the Goods are ready for despatch or have been dispatched.
  - 1.11 "Price" the price of the Goods as set out in the Seller's current price list at the date of despatch.
  - 1.12 "Quotation" includes any quotation, estimate, or tender given or made by the Seller.
  - 1.13 "Terms" the terms and conditions set out herein including any special terms and conditions agreed in writing by the Seller and the Buyer.
  - 1.14 "Product Lifetime" is the reasonable lifetime of a wiring accessory product in this catalogue and is taken to be 25 years from the date of manufacture.
2. All orders are accepted and all contracts are made subject to the Terms which shall prevail and be effective notwithstanding any variations or additions contained in any order or other document submitted by the Buyer including without limitation any standard conditions of purchase of the Buyer. No modification, of these Terms shall be binding upon the Seller unless made in writing by a duly authorised employee of the Seller.
3. A Quotation does not constitute an offer by the Seller to supply Goods and every acceptance of any Quotation by the Buyer shall be deemed an offer by the Buyer to purchase Goods from the Seller and will not be binding on the Seller until the Seller has given written acknowledgement or acceptance of such order.
4. The Seller reserves the right by giving notice to the Buyer at any time before Delivery to increase the price of the Goods or any installment of the Goods to reflect any increase in their cost of production, delivery, provision or otherwise which is due to Force Majeure, including but not by way of limitation any fluctuations in the cost of raw materials.
5. Unless otherwise agreed by the Buyer and the Seller, the Price shall be for Delivery to the Delivery Address. The Price shall include carriage and transit insurance costs to the Delivery Address. The Price is exclusive of any VAT (which will be applied in accordance with the legislation in force at the tax point date) for which the Buyer will be additionally liable.
6. In addition to the Price, an order charge of £10 shall be payable by the Buyer on orders under the value of £150. The Seller reserves the right to charge the Buyer a reasonable handling charge for special deliveries made at the Buyer's request.
7. The Seller shall be entitled to send the invoice for the Goods to the Buyer immediately the Goods have been dispatched or when they are ready for despatch but are prevented or delayed from being dispatched due to Force Majeure.
8. The Buyer shall pay the Price plus any VAT strictly in accordance with the Payment Terms. The Seller will afford the Buyer a 2.5% discount on the Price if payment is made on or before the due date. Non-compliance with the Seller's terms of payment shall constitute default without reminder. In case of default the Seller may without prejudice to any other of its rights under these Terms charge interest to accrue on a daily basis at the rate of 3% per month from the date upon which payment falls due to the actual date of payment such interest to be paid monthly. Except where insolvency laws provide otherwise the Buyer shall not be entitled to withhold or set off payment for Goods for any reason whatsoever.
9. If the Buyer shall fail to fulfil the Payment Terms in respect of any invoice of the Seller the Seller may demand payment of all outstanding balances from the Buyer whether due or not and/or cancel all outstanding orders and/or decline to make further deliveries except upon receipt of cash or satisfactory securities.
10. In addition to any right or lien to which the Seller may by law be entitled the Seller shall in the event of the Buyer's insolvency or the Buyer failing to render payment for any Goods supplied by the Seller when due be entitled to a general lien on all goods of the Buyer in the Seller's possession for the unpaid price of any Goods sold and delivered by the Seller under the same or any other contract.
11. In addition and without prejudice to its other rights the Seller may on 14 days notice to the Buyer sell any goods of the Buyer on which the Seller has a lien and shall be deemed the Buyer's agent for the purposes of effecting such sale. The Seller may apply the proceeds of sale towards the satisfaction of sums due from the Buyer without prejudice to the Seller's right to recover the balance thereof from the Buyer.
12. Any date or period set out in a Quotation or the Seller's acceptance of order or which is otherwise agreed by the Seller and the Buyer for the delivery of the Goods or any part of them is approximate only and time shall not be of the essence of such delivery. If the Seller is prevented from delivering any Goods at the time provided for delivery by reason of Force Majeure then the period for delivery shall in any event be extended by the time lost due to such Force Majeure.
13. Delivery shall be made by the Seller supplying the Goods to the Delivery Address and the Buyer shall be responsible for the unloading of the Goods at the Delivery Address and the cost thereof. Where the Seller and the Buyer agree in writing that the Buyer shall collect the Goods from the Seller's premises the Buyer shall arrange at its expense unless otherwise agreed in writing for the carriage of the Goods (including cost of insurance in transit) and the Goods shall be deemed to have been delivered upon their loading upon the carrier and for the purpose of these Terms "Delivery" shall be construed accordingly.
14. Should the Buyer fail to take Delivery on or before the Delivery Date the Seller shall be entitled:
- 14.1 If it has not already done so to invoice such Goods forthwith and to take the invoice into account;
- 14.2 To treat the Contract as repudiated by the Buyer and without prejudice to any other right it may have against the Buyer the Seller shall be entitled to resell the Goods and shall be entitled to be indemnified by the Buyer for any Loss which it suffers.
15. The Seller reserves the right to deliver the Goods by installments and where it does so each delivery shall constitute a separate contract and any failure by the Seller to deliver any one or more of the installments in accordance with these Terms or any claim by the Buyer in respect of any one or more installments shall not entitle the Buyer to treat the Contract as a whole as repudiated.
16. The Buyer shall store and transport the Goods in conditions that will preserve the Goods in good condition. The Buyer shall comply with all reasonable requests made by the Seller with regard to the conditions in which the Goods are to be stored and transported.
17. Packing cases and cartons in which the Goods are supplied are non-returnable and provided free of charge.
- 18.18.1 If the Goods are to be manufactured by the Seller in accordance with a specification submitted by the Buyer, the Buyer shall indemnify the Seller against all Loss suffered by the Seller in connection with any claim by a third party that the manufacture and/or supply of the Goods to such specification infringes the rights of any third party.
- 18.2 Unless otherwise agreed in writing all copyright and design rights in any drawings created by the Seller in the performance of the Contract shall vest in the Seller and remain the property of the Seller notwithstanding the purchase of the Goods by the Buyer.
- 19.19.1 Subject as expressly provided for herein all warranties, conditions, or other terms implied by statute or common law are excluded to the fullest extent permitted by law and the Seller shall have no liability to the Buyer other than as expressly set out herein.
- 19.2 The Seller makes no warranty as to the accuracy of all general drawings including weights and dimensions issued by the Seller and such drawings and any descriptions and illustrations contained in any catalogue, price list or other advertising material are for information only and are a general description of the Goods and do not form part of the Contract.
- 19.3 The Buyer shall be deemed to have inspected and quantified the Goods upon Delivery and the Seller shall have no liability to the Buyer in relation to short delivery or damage to the Goods in transit which was apparent on inspection or which would have been apparent on reasonable inspection unless such short delivery or damage is notified to the Seller and the carriers in writing

within 3 days of Delivery specifying (in such detail as the Supplier shall reasonably require) the shortage in or damage to the Goods.

- 19.4 The Seller shall have no liability to the Buyer in relation to non-delivery of the Goods unless such non-delivery is notified to the Seller in writing within 10 days of the Delivery Date.
- 19.5 Where any valid claim in respect of short delivery or non-delivery of or damage to the Goods is notified to the Seller in accordance with these Terms, the Seller shall be entitled to supply goods to remedy any short delivery or non-delivery or damage free of charge or, at the Seller's discretion refund to the Buyer the price of the relevant Goods but the Seller shall have no further liability to the Buyer except in the case of death or personal injury caused by the negligence of the Seller.
- 19.6 Where the Seller does not manufacture the Goods or any part thereof the Seller shall have no liability in relation to any defect in or failing of the Goods other than to use its reasonable endeavours to pass to the Buyer the benefit of any guarantee given in respect of the Goods or part thereof by their manufacturer.
- 19.7.1 The company undertakes to replace or repair at its discretion products should they become inoperable within the time periods as outlined below:
- | Brand  | Product lifetime | 10 years | 2 years |
|--|------------------|----------|---------|
| Ashley*  | ✓                |          |         |
| Klik**   | ✓                |          |         |
| Tehalit  | ✓                |          |         |
| Hager  |                  |          | ✓       |
| * Ikon & metalciad ranges                      |                  | ✓        |         |
| * dimmer switches shaver units, portable lamps |                  |          | ✓       |
| ** Occupancy sensors                           |                  |          | ✓       |
- 19.7.2 In all cases defects shall be taken as arising solely from faulty materials and or workmanship and the defective goods must always be returned to Hager Ltd and Hager Ltd must be notified of the defect or suspected defect immediately the same became known to the Buyer. The Guarantee will be invalidated if the product has not been installed or maintained in accordance with the Company's instructions, has not been used appropriately or if any attempt has been made to rectify, dismantle or alter the product in any way.
- 19.8 The Seller shall not be liable to repair or replace defective Goods or part thereof if the Goods or part thereof have been subject to any misuse, unauthorised repair replacement modification or alteration.
- 19.9 The Seller shall not be liable for any Loss suffered by the Buyer due to the Seller's failure to meet its obligations under the Contract due to Force Majeure.
- 19.10 Except in respect of death or personal injury caused by the Seller's negligence, the Seller shall have no liability to the Buyer for any loss of profit, business, contracts, revenues or anticipated savings or for any special indirect or consequential damage or loss of any nature whatsoever and whether caused by the negligence of the Seller or its employees, or agents) which arises out of or in connection with the supply of the Goods and/or their use or resale by the Buyer, except as may otherwise be expressly provided for in these Terms.
- 19.11 For the avoidance of doubt nothing herein contained shall be deemed to exclude or restrict the Seller's liability for death or personal injury arising due to the Seller's negligence.
20. The risk in the Goods shall pass to the Buyer immediately upon Delivery.
21. The Buyer shall indemnify the Seller against all Loss (including without limitation the Price in respect of Goods completed, costs incurred by the Seller in respect of partially completed Goods, reasonable cancellation charges incurred by the Seller due to any subcontracts entered into to perform the Contract and estimated profits on the Goods under the Contract on which work by the Seller has not been started) suffered by the Seller which arises as a result of the cancellation of the Contract by the Buyer, the breach by the Buyer of any provision of the Contract or the negligence of the Buyer or any of its representatives.
22. Until payment by the Buyer in full of the Price of the Goods and any other monies due to the Seller in respect of all other products supplied or agreed to be sold by the Seller to the Buyer (including but without limitation any costs of delivery):
- 22.1 The property in the Goods shall remain in the Seller and the Buyer shall hold the same as the fiduciary agent of and bailee for the Seller;
- 22.2 The Buyer shall store the Goods separately from other products in a manner which makes them readily identifiable as being the property of the Seller and shall keep them protected and insured but shall be entitled to resell or use the Goods in the ordinary course of its business.
23. Until such time as property in the Goods has passed to the Buyer (and provided that the Goods are still in existence and have not been resold) the Seller shall be entitled at any time to require the Buyer to deliver up the Goods to the Seller and if the Buyer fails to do so forthwith the Seller or its agents may enter the premises of the Buyer and take possession of any Goods in which property remains in the Seller and remove and dispose of them as the Seller thinks fit. The Seller shall apply the proceeds of disposal (after deduction of all expenses) in discharge of the amount unpaid by the Buyer.
- 24.24.1 Save as may be otherwise agreed in writing between the Seller and the Buyer where Goods are supplied for export from the United Kingdom they shall be charged for and delivered FOB the air or sea port of shipment and the Seller shall not be obliged to give the Buyer the notice specified in Section 32(3) of the Sale of Goods Act 1979.
- 24.2 The Buyer shall be responsible for complying with any legislation or regulations governing the importation of the Goods into the country of destination and for the payment of any duties thereon. In particular, if any licence or consent of any government or other authority shall be required for the acquisition, carriage or use of the Goods by the Buyer the Buyer shall obtain the same at its own expense and if necessary produce evidence of the same to the Seller on demand. Failure to do so shall not entitle the Buyer to withhold or delay payment of the Price. Any additional expenses or charges incurred by the Seller resulting from such failure shall be for the Buyer's account.
- 24.3 The seller supplies the goods to the buyer on the sole basis that goods are on-sold by the buyer to suitably qualified, professional installers only.
25. If the Buyer:
- 25.1 Shall default in or commit any breach of any of its obligations to the Seller under these Terms; or
- 25.2 Shall be involved in any legal proceedings in which its solvency is in question; or
- 25.3 Being a company shall present a petition or have a petition presented for its winding up or convene a meeting to pass a resolution for voluntary winding up or have a receiver appointed over all or any part of its assets or call a meeting of or enter into any composition or arrangement with its creditors or being an individual shall be presented with a bankruptcy petition; or
- 25.4 Shall cease or threaten to cease to trade or if in the opinion of the Seller serious doubts arise as to the Buyer's solvency then in any such case the Seller shall immediately become entitled (without prejudice to its other claims and rights under the Contract) to suspend further performance of the Contract for such time as it shall in its absolute discretion think fit or (whether or not notice of such a suspension shall have been given) to treat the Contract as wrongfully repudiated by the Buyer and forthwith terminate the Contract (either with or without notice to the Buyer) and if the Goods have been delivered but not paid for the Price shall become immediately due and payable notwithstanding any previous agreement to the contrary.
26. All Contracts shall be governed by English Law and the English Courts shall have nonexclusive jurisdiction for the hearing of any dispute between the parties.
27. These Terms supersede all previous Conditions of Sale of the Seller.
28. The Seller shall be entitled to assign or sub-contract all or any of its rights and obligations hereunder. The Buyer shall not be entitled to assign transfer sub-contract or otherwise delegate any of its rights or obligations hereunder.

## Conditions of Use

The products listed in this publication should be installed by suitably qualified professional personnel in accordance with the company's instructions, requirements of relevant legislation, regulations (including IEE Wiring Regulations) and the accepted practice in the industry.

July 2007

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