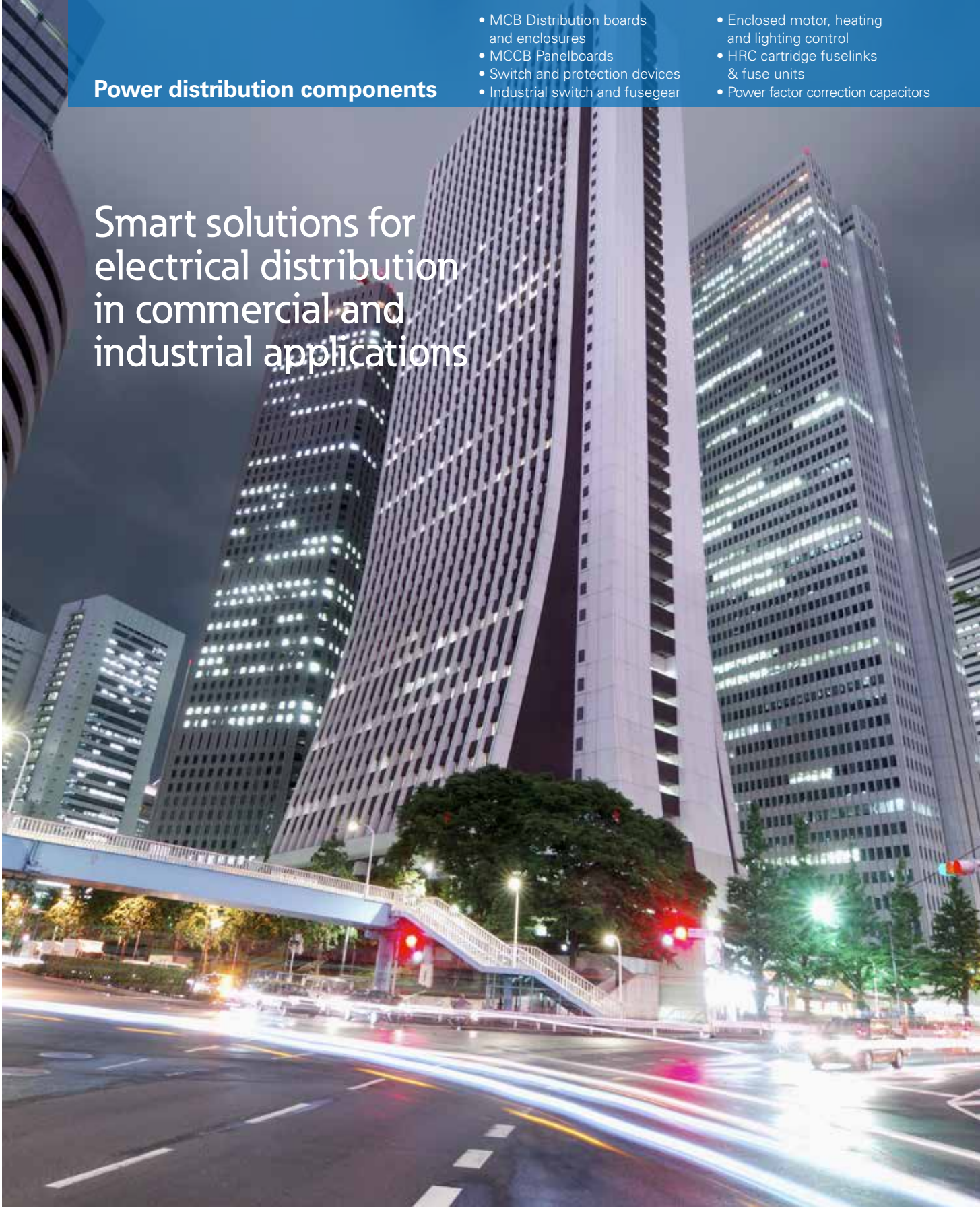
Power distribution components

- MCB Distribution boards and enclosures
- MCCB Panelboards
- Switch and protection devices
- Industrial switch and fusegear
- Enclosed motor, heating and lighting control
- HRC cartridge fuselinks & fuse units
- Power factor correction capacitors

Smart solutions for electrical distribution in commercial and industrial applications



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Powering Business Worldwide



Energizing a world that demands more.

We deliver:

- **Electrical solutions** that use less energy, improve power reliability and make the places we live and work safer and more comfortable
- **Hydraulic and electrical solutions** that enable machines to deliver more productivity without wasting power
- **Aerospace solutions** that make aircraft lighter, safer and less costly to operate, and help airports operate more efficiently
- **Vehicle drivetrain and powertrain solutions** that deliver more power to cars, trucks and buses, while reducing fuel consumption and emissions

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Power distribution components

Contents

1	Product overview	5
2	Memshield 3 MCB distribution boards and enclosures	31
3	Distribution board switch and protection devices	45
4	Modular control and switching devices	53
5	Memshield 3 MCCB panelboards	65
6	Industrial switch & fusegear	93
7	HRC cartridge fuselinks & fuse units	105
8	Enclosed motor, heating and lighting control	115
9	Power factor correction capacitors	121
10	Technical data	125
	Indices	185



Eaton's comprehensive range of power distribution solutions have been developed to meet today's challenging electrical sub-distribution applications in commercial and industrial buildings. Through a proven competency in electrical distribution, Eaton delivers an innovative approach to aid compliance with the wider regulatory requirements associated with modern buildings.

1.1 TYPE A, SPN 125A DISTRIBUTION BOARDS AND PAN ASSEMBLIES 6
1.2 TYPE B, TPN 125A/250A DISTRIBUTION BOARDS AND PAN ASSEMBLIES 8
1.3 TYPE B, TPN 250A DISTRIBUTION BOARDS 10
1.4 DISTRIBUTION BOARD METERING SOLUTIONS 12
1.5 DISTRIBUTION BOARD SWITCH AND PROTECTION DEVICES 13
1.6 MODULAR CONTROL AND SWITCHING DEVICES 14
1.7 MCCB PANELBOARDS AND PAN ASSEMBLIES 15
1.8 SURGE PROTECTION DEVICES 16
1.9 INDUSTRIAL SWITCH & FUSEGEAR 17
Glasgow fuse-switch-disconnectors & switch-disconnectors 17
Glasgow busbar chamber system 18
Exel 2 switch-disconnectors & switch-disconnector fuses 19
Rotary isolators and changeover switches 20
Exel – distribution fuseboards 21
HRC cartridge fuselinks, carriers and bases 22
1.10 ENCLOSED MOTOR, HEATING AND LIGHTING CONTROL 24
1.11 POWER FACTOR CORRECTION CAPACITORS 26

1.1 Product overview

Type A, SPN 125A distribution boards



IP3X robust steel enclosure to suit all applications

Modern, curved full door, covers all devices

Twist action handle, with optional door barrel locks also available

Hinged doors provide 180° opening for easy access



Removable gland plates are provided top/bottom for ease of installation

High quality clear sub circuit identification labels

Cover screwed by means of combination screws

Dual rated MCBs 10/15kA to IEC 60898 and IEC 60947-2 from 1A–63A

New 125A Switch Disconnector incomer option

Features & benefits

- Unique 'full form' blanking modules for unused MCB ways. Provides secure shrouding of unused busbar stabs for increased electrical safety. Blanking modules have interlinking form for improved positional security.
- Main busbar is removable for flexible installation.
- Fully shrouded Neutral busbar for increased safety.
- Choice of metering option to suit application needs and aid compliance with latest Building Regulation – part L2.
- Door opens 180° to provide easy access and device operation.
- Standard incomer Switch Disconnector rating of 125A provides higher rated solution for commercial buildings.
- Optional coupling kit available to electrically connect two distribution boards together vertically from a single supply cable to expand number of MCB ways.

General characteristics

Eaton's Memshield 3 MCB Distribution boards have evolved through an intimate knowledge and feedback from Electrical Contractors to provide solutions to a wide range of electrical distribution applications in commercial buildings. Memshield 3 delivers safe, reliable and high performance protection of electrical power distribution systems.

Type A Distribution boards are fully type tested with a conditional short circuit rating of 15kA to BS EN 61439. Associated devices are high performance MCBs, developed for Commercial and Industrial applications, dual rated at 10kA IEC – 60898 & 15kA IEC 60947-2 in B, C or D curves.



Type A SPN distribution boards

The SPN boards are rated at 125A as standard and available in 5 sizes with a choice of 4, 7, 10, 13 and 16 single pole outgoing ways. A choice of metering solutions are available as standard, providing clear electrical consumption information as well as a permanent capability of visualising information on a variety of other electrical parameters. The metering options have been developed to provide simple solutions to aid compliance with part L2 of the Building Regulations of England and Wales. A wide range of accessories including full profile blanking modules for unused MCB ways and door locking options, enhance electrical safety, whilst clean earth kits and vertical inter-connection kits to join two boards together, improves versatility of the range.

Type A SPN pan assemblies

The SPN pan assemblies offer a high degree of flexibility for custom applications and inclusion in other factory built assemblies. SPN types are rated at 125A and available with 4, 7, 10, 13, and 16 single pole outgoing ways.

Incoming devices

A range of incoming options are available, with the 125A SPSN switch disconnector being the most popular. In addition, there are a number of 100A RCCB options, which provide the added security of earth fault protection, covering 30mA–300mA applications. A direct connection terminal arrangement is also available for applications not requiring local isolation. Type A distribution boards can be stacked vertically to expand the number of outgoing ways using the vertical interconnection kit. For larger SP applications, requiring more outgoing ways – see our type B distribution boards with Single phase kit options.

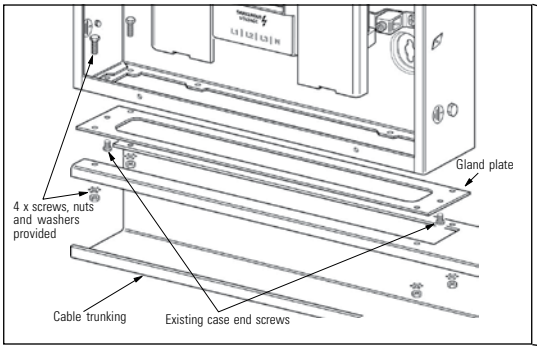
Outgoing devices

For type A distribution boards, there is a choice of single pole MCBs plus RCBOs. MCBs are available in current ratings from 1A–63A, with trip types B, C and D, 10kA to IEC 60898 and 15kA to IEC 60947-2. RCBOs to IEC EN 61009 10kA are also available in a choice of trip sensitivity options from 10mA–100mA.



1.2 Product overview

Type B, TPN 125A/250A distribution boards



Cable trunking interface kit fitting diagram



Modern curved edges enhance appearance of board

IP4X robust steel enclosure to suit all applications. IP42 available with gland plate accesory

Removable gland plates are provided top/bottom for ease of installation. IP42 gland plate kit option

Twist action access handle, with optional door barrel locks also available

Covers fit within enclosure dimensions allowing adjacent mounting

Cable trunking interface kit available

Removable front door to aid accessibility to devices

High quality clear sub circuit identification labels

Secondary cover slides over two location screws at bottom of board for easier fastening

Features & benefits

- Welded 'case end' design board with removable gland plates provides super 'stiff' construction, even with gland plates removed. Construction virtually eliminates distortion during installation, ensuring final assembly fit and alignment.
- Unique cable trunking interface kit simplifies mounting of cable trunking and protects cables.
- Improved Neutral cable clamp design for simple & secure cable connection.
- Unique 'full form' blanking modules for unused MCB ways, provides secure shrouding of unused busbar stabs for increased safety. Blanking modules have interlinking form for improved positional security.
- Removable busbar assembly to assist installation.
- Additional Functional Earthing options and Clean Earth options available.
- Auto-formed, curved construction of main cover adds to board rigidity, with improved appearance.
- Removable door aids installation and 'easy hang' hinge design makes re-attachment of door simple.
- 125A Switch Disconnector Incomer for general commercial building applications.
- 250A options on 18 and 24 way boards.
- Compact 250A options on 18 and 24 way boards, where used with cable trunking.

General characteristics

Eaton's Memshield 3 MCB distribution boards have evolved through an intimate knowledge and feedback from electrical contractors, consulting engineers and end users to provide solutions to a wide range of electrical distribution applications in commercial buildings. Memshield 3 delivers safe, reliable and high performance protection of electrical power distribution systems.

Type B distribution boards are fully type tested with a conditional short circuit rating of 25kA to BS EN 61439. Associated devices are high performance MCBs, developed for commercial and industrial applications, dual rated at 10kA IEC – 60898 & 15kA IEC 60947-2 in B, C or D curve.

A wide range of accessories including full profile blanking modules for unused MCB ways and door locking options, enhance electrical safety, whilst clean earth kits improve versatility of the range.

Where used with 250A sized incomers, an extension box or the provision of suitable sized cable trunking is required to accommodate incoming cabling. A new cable trunking interface kit is available to provide additional mechanical protection of incoming cables.

A choice of metering solutions are available as standard, providing clear electrical consumption information as well as a permanent capability of visualising information on a variety of other electrical parameters. The metering options have been developed to provide simple solutions to aid compliance with part L2 of the Building Regulations of England and Wales.

Type B TPN standard distribution boards

The optimised design for 125A TPN applications provides a choice of boards in sizes – 4, 6, 8, 12, 18 and 24 TP ways. 12, 18 & 24 TP way variants are also suitable for 250A applications, where the number of MCB ways could require a larger supply current rating. A choice of incomers are available to suit different applications including RCCB options and a single phasing kit to provide a large single phase board arrangement.

Incoming devices – 125A standard TPN board

The most popular choice will be the 125A switch disconnector incomer option, but other choices include a 4-pole TPSN, 2P SPSN, a range of RCCB switches and a contactor controlled incomer with switch disconnector for remote control of the supply to the board. A direct connection option is also available for applications that do not require local isolation.



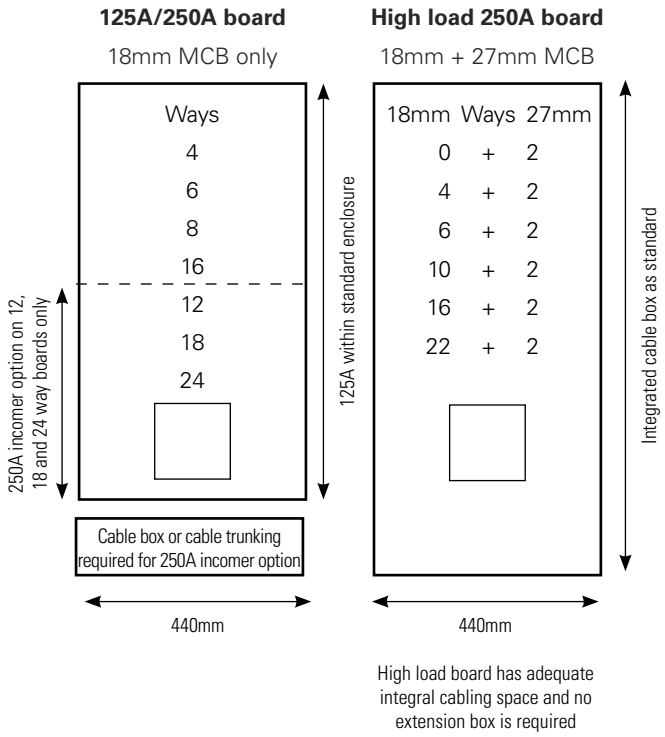
Type B SPN pan assemblies

The TPN pan assemblies offer a high degree of flexibility for custom applications and inclusion in other factory built assemblies. 125A TPN types are available with 4, 6, 8, and 12 triple pole outgoing ways. 250A TPN types are available with 12, 18, and 24 triple pole outgoing ways.



Type B, TPN 250A distribution board solutions





High load board has adequate integral cabling space and no extension box is required



Type B TPN 250A High Load distribution boards



Removable gland plates are provided top/bottom for ease of installation

Removable front door to aid accessibility to devices

Covers fit within enclosure dimensions allowing adjacent mounting

Modern, curved edges enhance appearance of board

Choice of SP & TP 18mm dual rated MCBs 10/15kA to IEC 60898 and IEC 60947-2 from 1A–63A

Two TP 27mm MCB ways, rated up to 125A

Secondary cover, slides over two location screws at bottom of board for easier fastening

Type B TPN 250A High Load distribution boards

Developed to respond to the needs of modern commercial building applications, a new 250A TPN range of MCB boards delivers increased versatility by having the ability to supply and protect sub loads up to 125A. Based principally around standard 18mm MCBs and RCBOs, this range has provision for two TP 27mm MCBs, up to 125A.

Available in sizes 2, 6, 8, 12, 18 and 24 TP ways, of which two ways are dedicated to the 27mm MCBs. 27mm MCBs are available SP or TP with ratings from 20A–125A.

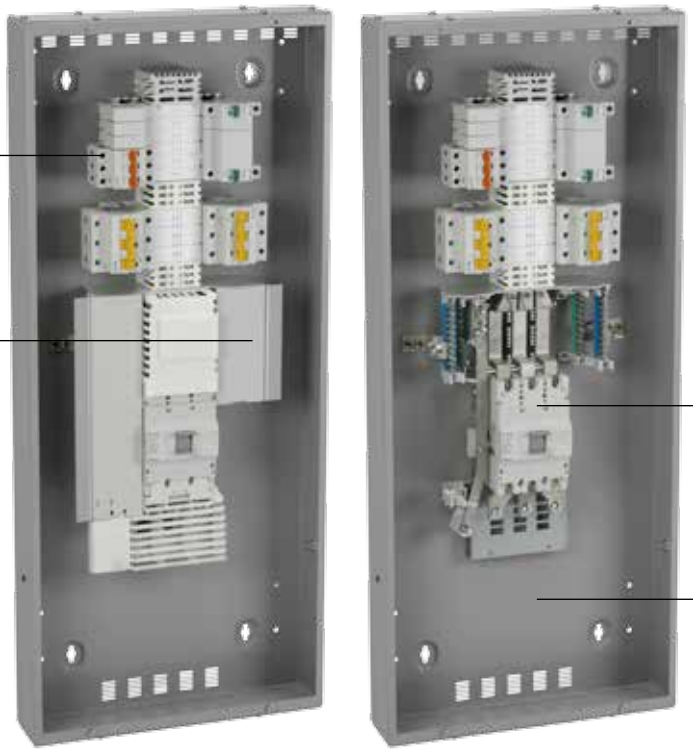
Incoming devices – 250A TPN board and 18/24 way 125A board

These incomer options can be used with the 250A board or with the 18 or 24 way variant of the 125A board to provide a greater choice of solutions at 250A.

The most popular choice will be the 250A TPN switch disconnector incomer option, but other choices include a 4-pole TPSN switch disconnector, a choice of MCCB incomers from 160A to 250A and a contactor controlled incomer pack. There is also a direct connection option available for applications that do not require local isolation.

Outgoing devices

For type B distribution boards, there is a choice of single pole or triple pole MCBs plus SP and TP RCBOs. MCBs are available in current ratings from 1A–63A, with trip types B, C and D, 10kA to IEC 60898 and 15kA to IEC 60947-2. RCBOs to IEC 61009 10kA are also available in a choice of trip sensitivity options from 10mA–100mA. For the 250A "High Load" board, provision is given to accommodate a number of 27mm MCBs available in SP or TP sizes from 20A–125A to IEC 60947-2 .





200A TPN type B distribution board, with integrated split meter for power/lighting

- TPN distribution board with 'smart' meter for power and lighting loads.
- Unique meter design calculates net values for each busbar section and total board load.
- Meter has both Pulsed and Modbus outputs as standard.
- Embedded vt technology and RJ 11 connections at meter minimises visible wiring.
- Supplied complete with factory fitted 200A Switch Disconnector incomer switch.
- Suitable for TPN and SPN applications as supplied (shorting link included).
- Increased earthing options supplied as standard.



The feature packed Eaton meter packs and boards

To meet the needs of part L2 of the Building Regulations introduced in England and Wales in 2006, Eaton's Memshield 3 meter packs provide simple integration with matched aesthetics. The EBMMPCT250 employs a multi-function, DIN rail mounted meter to measure electrical parameters on LV supplies to TPN distribution boards. It can also be used to meter single-phase loads. The unit is supplied complete with CTs and wiring terminals. This version is suitable for 100A–250A applications and as well as a pulsed output for kWh, the meter can be used to monitor other parameters, including line voltage and current. Electrical connection to the associated distribution board does not occupy any of the outgoing circuits. Modbus and MID certified meter versions are also available – see page 36.

The **EBMMPDC120** is supplied as a 120A direct connection solution, not requiring CTs. Cabling is simple and the meter provides a pulsed output for kWh. The meter is an MID certified unit, providing clear kWh information.

Double meter pack for two standard TPN distribution boards facilitate separate monitoring of "small power" and "lighting" from one main supply.

For single phase EAM boards, a 65A meter pack provides simple integration. (Amps, kW, kWh, kVar and kVarh pulsed output, MID compliant. See page 32 for single phase EAM boards with factory fitted meters, including split power and lighting boards.)



Metering solutions – type A metered boards

- Type A SPN boards with integrated meter.
- Split load versions utilise a two channel meter, feeding two independent busbars and groups of MCB/RCBOs.
- Split load versions provide independent monitoring of "Power" and "Lighting" loads and total load.
- Aids compliance with Part L2 of the Building Regulations (England & Wales).
- See page 127 for dimensions.

Metering solutions – type B meter pack assemblies

Eaton's Memshield 3 meter packs provide simple integration with matched aesthetics. Split metering for separate small power and lighting has been added to the range to meet the needs of the L2 Regulations introduced in England and Wales in 2006. The meters provide a pulsed output for kWh and display other useful parameters, including line voltage and current. Modbus versions are also available and provide remote access to additional electrical parameters. For details refer to page 36. For dimensions refer to page 127.



Miniature circuit breakers (MCBs)

The Eaton range of 10kA/15kA high performance miniature circuit breakers (MCBs) have been designed to meet the latest UK, European and international standards, with ratings from 1A up to 63A.

The Eaton miniature circuit breakers are designed and tested in accordance with BS EN 60898 and are available in B, C and D characteristic curve as standard.

Technical characteristics

- Modular design, DIN rail mountable.
- 1, 2, 3, and 4-pole MCBs for commercial and Industrial applications.
- Rated braking capacity 10kA to IEC 60898 and 15kA to IEC 60947-2.
- Rated currents from 1–63A in B, C and D characteristics.
- Positive contact indication.
- Box clamp barrier to prevent incorrect cable/busbar insertion.
- Calibrated at 40° C.
- Can be used with both pin and comb type busbars.
- Suitable for use in Eaton Memshield 3 distribution boards and a wide range of other applications.

Toggle colour for commercial MCBs changes dependant on the rating as shown below:

< 2A		16A	
2A		20A	
4A		25A	
6A		32A	
8A		40A	
10A		50A	
13A		63A	



Residual current circuit breakers with overcurrent protection (RCBOs)

The Eaton range of combined residual current circuit breakers with integral overload protection (RCBOs), combine the highest level of protection for both people and circuits for both single phase / single module and three phase / four module devices. Fully comply to IEC 61009.

Technical characteristics – single phase RCBOs

- Available from 6A to 45A in types B and C trip characteristics with a choice of 10mA, 30mA, and 100mA trip sensitivities.
- Compact modular design, DIN rail mountable, one module wide.
- Suitable for use in Memshield 3 single and three phase distribution boards.
- Unswitched neutral.
- Positive contact indication.
- Rated breaking capacity 10kA.
- Trip test button.

Technical characteristics – three phase RCBOs

- Options from 6A to 32A in type B, C, and D trip characteristics with a choice of 30mA, 100mA, and 300mA trip sensitivities.
- Compact modular design, DIN rail mountable, four modules wide.
- Suitable for use in Memshield 3 three phase distribution boards.
- Unswitched neutral.
- Positive contact and earth fault trip indication.
- Rated breaking capacity 10kA.
- Trip test button.



Residual current circuit breakers (RCCBs)

The Eaton range of residual current circuit breakers without integral overload protection (RCCBs), provide protection solutions to a wide range of applications.

The Eaton range of 2 and 4-pole RCDs are available with 10mA, 30mA, 100mA and 300mA sensitivities, and can be equipped with a wide range of modular accessories

Technical characteristics

- Modular design, DIN rail mountable, 2 or 4 modules wide.
- Double and four pole RCD for commercial and industrial applications.
- Rated short circuit capacity 10kA with fuse back up.
- Trip sensitivities 10, 30, 100 and 300mA.
- Positive contact indication.
- Test trip button.
- Rated currents from 16–100A.



The RCBO takes up 4 pole ways in a 3-phase distribution board, i.e. L1 / L2 / L3 and the 4th pole of the device fits over, and is insulated from, the L1 phase position of the neighbour circuit. Therefore the neighbour circuit only has two phase circuits available for single phase circuit feeds.

Switches and Twilight Switches



Timers & Twilight Switches are applied in any residential, commercial and industrial buildings wherever automatic control is required on predefined times and/or depending on daylight intensity.

The Eaton range comprises of a wide variety of different products which include analogue Timers, digital Timers, Twilight Switches and Staircase Timers.

These Timers can either be controlled by a 50 Hz netsynchronisation, quartz control and time synchronisation or using the DCF signal or GPS antenna, which guarantees 100% accuracy at all times. Except for net-synchronised timers all units do have self power reserve to secure the time setting and program storage in case a power interruption does occur.

Dedicated computer software and memory cards are available to support the programming of our most advanced timers.

Automatic summer and winter time, holiday and random switching programs complete the functionality of our range.

Twilight Switches are supplied with a remote light sensor, which can be easily installed on the outside wall where the required light intensity threshold can be simply adjusted on the modular device itself.

Technical characteristics (depending on type)

- Modular design.
- Analogue and digital timers.
- Time adjustment by 50 Hz net, quartz control, DCF[1)] or GPS signal reception[2)]
- Manual override switching function.
- Power reserve for all quartz and DCF or GPS driven switches.
- Remote Light Sensor for Twilight Switching.

Benefits

- Easily programmable on front of device.
- Computer aided programming software available.
- Compact 18 mm design for restricted space opportunities.
- Separate IP40 covers are available for direct wall mounting.
- High level of accuracy.
- Automatic summer and winter time adjustment.
- Holiday & Random program settings.
- High power reserve up to 10 years.

Notes: 1) Automatic calculation of sunrise and sunset times throughout the year, including the possibility of astro times + / -2 hour shift.
2) The DCF-signal can only be received within a 1000 km radius.

Contactors and impulse switches



Contactors are frequently applied for switching of lamp loads, fans or pumps in both utility as well as industrial areas.

Eaton's "CR" contactors are very specific due to the applied operating coil and the construction of the main contacts. All contactors with ac/dc coils ensure silent operation which is further enhanced by a low power consumption.

Optimal contacts and low heat dissipation guarantee a long lifetime of the contactor which is available in a wide range of characteristics.

Technical characteristics

- Designed according to IEC 60947-4-1 and IEC 61095 standards.
- Suitable for applications in general control, heating & lighting applications.
- Available in 20, 25, 40 & 63 A ratings with up to 4-pole contacts.
- Optional add-on auxiliary contact available.
- DIN modular profile.
- Spacers available to extend lifetime (it is recommended to use 1 spacer between every 2 contactors installed).
- Day/night contactors available with manual override function.

Advantages of Eaton contactors

- Low inrush power for all ac/dc types.
- Availability of combined ac/dc type contactors ensure silent operation.
- Contactors of ac/dc coil type are operable on both ac and dc voltage. The 20 A and 25 A versions are also available with ac coil. All combined ac/dc type versions are equipped with surge protecion on the operating coil.
- Equipped with contact indication.
- Optimal quality of contacts and low heat dissipation ensure a long life time.

The feature packed Memshield 3 MCCB panelboard distribution system

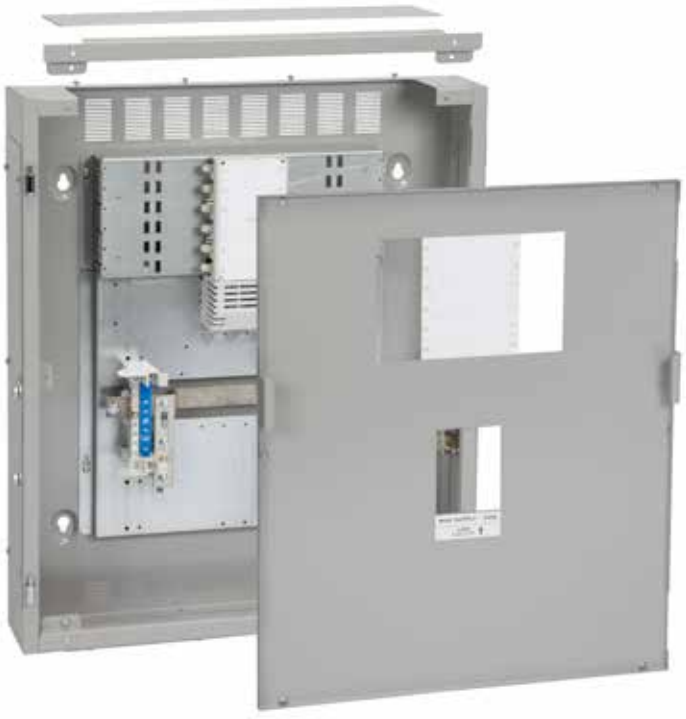
A complete range of MCCB panelboards and pan assemblies providing all the options you need from a straightforward panelboard to a comprehensive panelboard system. The range now offers a variety of incoming devices and a greater choice of outgoing ways to provide more flexibility and choice to the user.

- 250A, 400A, 630A & 800A panelboard versions available.
- Can be configured for incomer device at top of panelboard.
- 3 or 4 pole incoming devices can be fitted.
- 4 to 18 outgoing TP ways.
- Outgoing MCCBs up to 400A, available in 25, 36 and 50kA breaking capacity.
- All TP & 4P MCCBs have adjustable thermal and magnetic trip units as standard except for 630A and 800A incomer MCCBs which are fixed thermal / adjustable magnetic trip. MCCBs with additional trip unit functionality are available to special order:
  - Distribution circuit protection, electronic.
  - Motor protection, thermal/magnetic.
  - Motor protection, electronic.
  - Motor protection without overload release.
  - Selective (discriminative) and generator protection, electronic.
- IP3X construction.
- Form 3b type 2 segregation.
- Tin–plated busbar systems throughout the range.
- Incoming and outgoing metering options to ensure Part L2 Building Regulations compliance. Plug-in cabling system provides for faster and error-proof installation.
- Reliable & safe operation assured through DEKRA testing & certification.
- Wide range of extension boxes, metering, surge protection, and earth leakage incomer options available.
- Versatile solution, accommodating different frame size outgoing MCCBs to best match application needs.
- Enhanced safety through fully shrouded incoming devices, to protect against contact with live parts.
- Blanking plates finger protect unused outgoing ways.

Factory built assemblies

- Complete factory built assemblies can be specified for individual projects, on which the factory will be pleased to advise.
- Simple derivatives include: The fitment of side extension boxes, dual incomers and metering options etc.
- Through a modular panelboard system, more custom solutions can be accommodated to include:
- 4-pole switching options.
- Fused combination switch options for both incomers and outgoing ways.
- Form 4 type 2 solutions.
- For more details on these services please contact our customer support team on 08700 545 333.





Option to remove top and bottom cross rails provides the ability to lay cables into the board instead of feeding them through the gland plate aperture, resulting in big time savings.





Surge protection devices (SPD) for MCB distribution boards and MCCB panelboards

In order to enable designers, specifiers, and installers to comply with surge protection requirements in BS 7671 - IET Wiring Regulations - 17th Edition (Section 534), Eaton has a combined lightning current and surge arrester, as well as an individual surge arrester to provide a coordinated solution for lightning protection and surge suppression fully tested to BS EN 62305. This range of coordinated enclosed kits provides peace of mind that all equipment has comprehensive transient overvoltage protection caused by lightning strokes and switching in low voltage systems.

Surge arrester protection for distribution boards

EM3SSK1T2 (SPN distribution boards) & **EM3SSK3T2** (TPN distribution boards) technical summary:

- For the protection of low voltage distribution systems against transient overvoltage caused by indirect lightning strike and switching operations.
- The 3+1 circuit offers a universal solution for surge protection in low voltage distribution systems.
- Suitable for TT- and TN-S systems according to IEC 60364-5-53 Clause 534.
- Test class II according to IEC 61643-1+A1.
- SPD-type T2 according to EN 61643-11.



Combined lightning arrester and surge arrester protection for distribution boards and panelboards

EM3SSK3T12 (TPN distribution boards) & **EPBN1SPD123** (panelboards) technical summary:

- Lightning protection classes III and IV in accordance with IEC 62305.
- For the protection of low voltage distribution systems against transient overvoltage caused by direct and indirect lightning strike and switching operations.
- Application according to IEC 60364-5-53 Clause 534.
- Test class I, II, III in accordance with IEC 61643-1.
- SPD-type T1, T2, T3 in accordance with EN 61643-11.

Combined lightning arrester and surge arrester protection for panelboards

EPBN1SPD1234 technical summary:

- Lightning protection classes I, II, III and IV in accordance with IEC 62305.
- For the protection of low voltage distribution systems against direct lightning strike into the overhead power supply line or external lightning protection system and against indirect lightning stroke and switching operations.
- Application according to IEC 60364-5-53 Clause 534.
- Test class I, II, III in accordance with IEC 61643-1.
- SPD-type T1, T2, T3 in accordance with EN 61643-11.
- No discharge of ionised gases during operation.



Glasgow fuse-switch-disconnectors & switch-disconnectors

For many years, the Glasgow product name has been synonymous with quality, trust and reliability and as part of our long standing commitment to its tried and tested design we've reinvested for the future by re-tooling the whole range. All units are supplied with fuselinks or switchlinks fitted. Glasgow fuse switch disconnectors and switch disconnectors meet the constructional requirements for isolation of and are type tested to BS EN 60947-3. Conditional short circuit current rating tests at a value of 80kA rms Ue 415V have been carried out with Eaton HRC fuses fitted. Five frame sizes are available to provide a range from 63A to 800A, with utilisation category AC22A and AC23A Ue 415V ratings. Switch-disconnectors fitted with copper links give assigned AC20A Ui 660V and AC21A Ue 415V ratings. All units have retractable operating handles which drive overcentre mechanisms incorporating powerful operating springs. Opening and closing of the switches is thus independent of the action of the operator. Moving contact assemblies can be removed to facilitate installation or for contact inspection or renewal. Flag "on-off" indication is provided and terminal cover shields prevent contact with live metal. TPSN indicates triple-pole and switched neutral, the neutral pole making first and breaking last. Rated Insulation Voltage Ui 660V.

Enclosures

Surface-mounting enclosures comprise heavy gauge steel body plates incorporating cast iron frame members and are rustprotected, with a light grey paint finish (RAL7004). Front access doors, which are detachable, are fitted with dust-excluding gaskets and are interlocked to prevent opening when the switch is 'on'. The interlock can be defeated by a competent person for maintenance purposes. Operating handles may be locked in both the 'on' and 'off' positions. Castell type interlocks can be supplied to special order. Internal fixing holes allow units to be mounted closely side by side and all models have removable top and bottom end plates. These are pierced for connections, divided into front and rear (fixed) portions to simplify cabling using Eaton's MEM series split-type cable boxes, and provided with undrilled cover plates.

Fuses

Glasgow units are designed for use with HRC cartridge fuse links to BS88: Part 2. 63A and 100A units employ off-set contact fuse links. Details of suitable types of HRC cartridge fuse links are listed on page 101. All performance tests have been carried out using Eaton BS88 fuselinks.

Motor ratings

The motor ratings assigned to TPN switch-disconnector units are utilisation category AC23A (frequent operation) to BS EN 60947-3, which calls for make and break testing at 10 and 8 times rated current respectively for units having a motor rating up to and including 100 Amps. Ratings for switch-disconnector-fuses are dependent on suitable HRC fuses being fitted.

Auxiliary equipment

A comprehensive range of extension boxes and spreader boxes is available. Units are fitted with HRC Fuselinks of maximum rating but will accept fuselinks of a lower rating, refer to the Paramount HRC Fuselinks section on page 101. SPSN and TPSN indicate switched neutral. Neutral makes first and breaks last. If DP fuse-switch-disconnectors are required, use SPSN and replace the supplied switch link with a compatible fuselink.

Definitions of utilisation category

AC20a – Connecting and disconnecting under no load condition.

AC21a – Switching of resistive loads including moderate overloads.

AC22a – Switching of mixed resistive and inductive loads including moderate overloads.

AC23a – Switching of motor, or other high inductive loads.

Cable extension boxes

Fabricated sheet steel boxes boxes can be fitted top/bottom of Glasgow switch units to provide additional space for spreading multi-core PVC insulated cables with solid aluminium conductors and for some larger cables with stranded copper conductors. For 1–3PCB, a plain flame retardant plywood plate is provided for fitting between the box and switch unit, the steel endplate supplied fitted to the switch unit being used on the box's cable entry side. For 4PCB, a plain steel plate is provided for cable entry on box. The switch enclosure has 8mm thick insulated endplates fitted both ends. For 5–6PCB, a 10mm thick insulated plate is provided for cable entry on box. The switch enclosure has 10mm thick insulated endplates fitted both ends, 5PCB includes a flame-retardant plywood packer for fitting between PCB and switch unit's endplate to provide lid flange clearance.

Spreader boxes

Cast metal split pattern, supplied with fixing bolts and plain bushes. Two types are available, suitable for straight or angled entry. They permit conductor spreading of larger PVC cables and fit directly on to Glasgow fuse-switch-disconnectors and switch-disconnectors.



Glasgow busbar chamber system

Eaton's busbar chamber system is designed to provide either compact, wall-mounting installations or – by using optional pedestal sets – easily assembled switchboards. Every facility is provided to enable Eaton's switchgear and distribution gear to be mounted easily and economically to busbar chambers which can be applied either to a suitable load-bearing vertical surface; or, by means of a pedestal set, affixed to a vertical surface which need not be load-bearing.

Busbar chambers

These are produced in 100, 200, 400, 630 and 800 Amp. ratings and in four nominal lengths. 100, 200 and 400 Amp units are available in all four sizes; 630 and 800 Amp ratings are offered in the three longest units only. All units in the range share the same height and depth dimensions. Similarly the twin busbars are located in precisely the same positions throughout the range and vary in size only in their front-to-back dimensions according to rating. Detachable end plates enable all units to be extended by coupling to a second busbar chamber using extension sets. Both top and bottom plates are also readily detachable so that marking out and machining can be carried out conveniently on a bench to accommodate Eaton's switchgear either above or below the chamber. Complete mounting kits, including templates, are available for mounting all Exel and Glasgow switchgear. Eaton chambers are fabricated from rust-protected sheet steel with a light grey paint finish. They have been type tested to BS EN 61439 with a rated conditional short circuit current rating of 63kA at Ue 550V and a rated short-time withstand current Icw 20 times nominal rated current for one second. They are designed for use in factory-built assemblies to BS EN 61439. All chambers are subjected to an on-line dielectric test unit which provides a high voltage test between poles; and from poles to earth. Earth continuity is also tested. Rated insulation voltage 660V.

Connection sets for Glasgow fuse-switch-disconnectors & switch-disconnectors

Cable clamps covering all ratings are available for switchgear up to 200A. For connecting Glasgow units of 160A and above, solid copper connection sets are recommended as cost effective and convenient. These comprise pre-formed, insulated links in 4-pole sets supplied with all necessary clamps and fasteners. The appropriate switchgear mounting set (41, 51 or 61 BBMS) must be used with connection sets for 160–800A Glasgow units.

Busbar cable clamps and sockets

Incoming main cable clamps or sockets are not supplied due to the wide range which would be necessary to meet all requirements. Busbar cable clamps comprise plated brass U-clamps and steel slides with all bolts and washers. They are suitable for the connection of small solid or stranded copper conductors and also aluminium conductors using a barrier grease. Busbar cable sockets are plated brass castings complete with clamps and fixings, suitable for the termination of either copper or aluminium conductors. Both clamps and sockets allow for clamping on the busbars without drilling. For cabling direct on to busbars of 630–800A rating a special cable extension is required which can be made to special order.

Switchgear mounting sets

Available for all ratings of Exel switch-disconnectors/switchdisconnector fuses and Glasgow fuse-switch disconnectors and switchdisconnectors enabling these units to be mounted simply and efficiently either above or below the busbar chamber. Each mounting set comprises a template with instructions for machining the top/bottom plate of the busbar chamber; clamping channels, ready pierced for fasteners; all necessary fastenings; and, for Glasgow units, insulated shields and switch filler plates where appropriate.



Exel 2 switch-disconnectors & switch-disconnector fuses

Exel 2 switch disconnectors and switch-disconnector fuses meet the constructional requirements for isolation of and are type tested to BS EN 60947-3. Switches are of the quick make and break type, suitable for use on AC or DC. Units have removable moving contact assemblies to facilitate wiring. Exel 2 surface-mounting enclosures are fabricated from rust-protected sheet steel with a light grey paint finish. Removable blank top and bottom end plates (except for 20 and 32A top end plates which incorporate knockouts) and gasket doors give IP41 protection. Chromium-plated front operated handles, with "ON (I) OFF (O)" indication, and internal fixing enabling units to be mounted closely side by side. Interiors comprise porcelain bases fitted with non-ferrous conducting components.

Fuses and fuse carriers

HRC fuse carriers are designed for offset contact fuse links to BS 88: Part 2. Eaton HRC fuse links fitted to switchdisconnector- fuses are suitable on systems up to 415V AC. Eaton fuses used in these products are also suitable for 250V DC systems. All performance tests have been carried out using Eaton BS88 fuselinks. Units are fitted with HRC Fuselinks of maximum rating but will accept fuselinks of a lower rating, refer to the Paramount HRC Fuselinks section on page 101. HRC pattern switchfuses are fitted with type SCH carriers (20A, 32A, 63A-moulded; 100A, 125A-porcelain).

Motor ratings

The motor ratings assigned to TPN switch-disconnector units are utilisation category AC23A (frequent operation) to BS EN 60947-3, which calls for make and break testing at 10 and 8 times rated current respectively for units having a motor rating up to and including 100 Amps. Ratings for switch-disconnector-fuses are dependent on suitable HRC fuses being fitted.

Cable size

Maximum cable sizes are: 20A–6mm^2, 32A–10mm^2, 63A–35mm^2, 100/125A–70mm^2.

Type test compliance with standards

This range has been satisfactorily type-tested in accordance with BS EN 60947-3 with Eaton HRC fuselinks fitted.



Rotary isolators

Local switch-disconnectors standard duty, 20–63A, IP65, 3, 3+N, 6, and 8 poles

Complying with IEC/EN 60947-3, VDE 0660, and IEC/EN 60204, the surface mounting range of rotary switch disconnectors are suitable for on load switching of general distribution a.c. power circuits and infrequent duty motor isolation.

Light grey, moulded silicon and halogen free thermoplastic enclosures provide protection to IP65 making them suitable for most indoor and outdoor environmental conditions.

These compact isolators are fitted with red/yellow operating handles padlockable in the 'OFF' position with up to three padlocks.

The enclosure design allows for easy access for cabling. Solid neutral and earth termination points are a standard feature.



Changeover switches

20-100A, IP65, 4 pole

Suitable for on-load control of alternative supplies. Surface mounted, 4 pole on-load changeover switches have a rated voltage of 690V.

Switches comply with IEC/EN 60947-3, VDE 0660, IEC/EN 60204.

In all cases ample cable space is provided for both incoming and outgoing cables. Each unit is provided with an insulated IP65 black handle which may be padlocked in the 'OFF' position. Clear 'ON' (I) and 'OFF' (O) indication is provided.



Exel – distribution fuseboards

The Exel fuseboard range is available with standard enclosures to IP4X for the complete range of 20A to 200A distribution boards. A variety of extra features have been incorporated in the range including increased cabling space, superior door latches and locking devices (there is a choice of barrel lock or padlocking device), improved lid hinges and a unique safety carrier which effectively blanks off a single fuse-way allowing the circuit to be worked on in safety. Safety carriers have no provision for accepting a fuselink. The Exel distribution fuse boards are designed to comply with the requirements of BSEN 61439-2. All phase parts are fully shrouded so that additional circuits may be wired and connected in safety whilst the existing circuits remain live and on load. The type of enclosure available gives protection to IP4X and is supplied with removable endplates. The range covers a wide variety of ratings from 20–200A; 20A and 32A with up to 12 ways in SPN and TPN configurations; 63A up to 8 ways, 100A up to 8 ways and 200A 4 way in TPN configurations. All ratings available with moulded HRC carriers to BS88: Part 2. Testing has been carried out using Eaton 'S' type HRC fuselinks. Fuse base mouldings are of high quality thermosetting material. The fuse units have skirted fuse carriers to prevent accidental contact with live parts when inserting or withdrawing a carrier. Separate shields are provided for the base contacts to prevent accidental contact when the carrier has been withdrawn. All fuseboards are suitable for systems with a rated insulation voltage Ue 660V AC, 500V DC.

Safety carriers

A range of safety carriers are available for insertion in a fusebase when its normal fuse carrier has been removed for isolation. The safety carriers are marked yellow for identification and have no provision for fuselink fixing.

Enclosures

Rust protected sheet steel IP4X enclosures have a light grey paint finish and are fitted with internal fixing holes. Enclosures have a robust, reliable construction. Enclosures for units from 20A to 100A are of all welded construction, 200A IP4X units have cast corner pieces. Removable top and bottom endplates incorporate knockouts on 20A and 32A units while 63–200A boards have blank endplates. Blank endplates are available on request for 20A and 32A boards. The enclosure allows gasketed access doors to be reversed for left hand or right hand opening. All sides are free from external projections and fuseboards can be mounted in inverted form if required.

Main terminations

32A, 2-way fuseboards have the main phase termination (tunnel type) attached to the fusebanks. All other fuseboards have the main terminations mounted on the back of the enclosure and are intended for use with cable sockets (sweating or crimp type) which are not provided. Busbar and main terminals are fully shrouded. A cable shroud to cover the cable socket is provided.

Earthing and neutral bars

Multi-way earthing bars are fitted with an integral earth bolt and have an outgoing terminal per fuse. They are rail mounted adjacent to the fully rated neutral bars. Neutral bars have main terminals of the same capacity as the phase terminals and have one outgoing terminal per fuse. Earth/neutral bar rails are fitted at the bottom of enclosures on 20A and 32A fuseboards and at the top on all others.

HRC cartridge fuselinks, carriers and bases



Eaton's comprehensive range offers a selection of fuses to cater for many applications: Compact 415V a.c. S type industrial fuselinks complying with BS EN 60269-1 (BS88 – 1) or BS88 – 2 with ratings from 2 to 1250A. Skilful design techniques have meant that power dissipation has frequently been reduced despite the significant reduction in barrel size. Many ratings have also been tested for use in circuits up to 250V d.c.

Compact 415V a.c. S type motor circuit protection fuselinks complying with BS EN 60269-1 (BS88 – 1) or BS88 – 2 with ratings from 20M25A to 400M500A. This extended range of fuselinks is designed to withstand the inrush current associated with direct on line start motors whilst saving cost on the size of equipment to which they are fitted by virtue of their small dimensions.

Compact 240V and 415V a.c. SS, SN and SP type offset blade contact fuselinks complying with BS EN 60269-1 (BS88 – 1) or BS88 – 6 with ratings from 2 to 63A for use in industrial and commercial installations.

Compact 415V a.c. J type feeder pillar fuselinks complying with BS88 – 2 (formerly BS88: Part 5) for use by the Electricity Supply Industry in distribution systems. Ratings from 63–400A with 82mm fixing centres and 63–800A with 92mm fixing centres for wedge tightening contacts and 63–250A in ferrule form for single phase pole mounted cut outs.

Eaton HRC fuselinks are manufactured to exacting standards using precision assembly methods and undergo rigorous quality checking before dispatch including resistance testing all production. This ensures that performance will be consistent and conform with published characteristics within close tolerances. Type tests on Eaton equipment have been performed using Eaton fuselinks.

Eaton industrial and general purpose fuselinks have a breaking range and utilisation category gG which replaces the old class Q1 fusing factor. "g" indicates a full range breaking capacity fuselink and "G" indicates a fuselink for general application.

Eaton motor circuit protection fuselinks have a breaking range and utilisation category gM indicating a full range breaking capacity fuselink for the protection of motor circuits. These fuselinks have a dual current rating separated by the letter "M".

The lower current rating is the maximum continuous rating which also determines the rating and size of equipment to which the fuse is fitted. The higher current rating is the time current characteristic of the fuselink which determines its ability to withstand the motor starting current. Their selection frequently permits the use of lower rated switch and/or fusegear than would be the case using gG fuselinks with a consequent cost saving. Type gG fuselinks however may still be used and are the preferred option for assisted start motors where starting currents are reduced.

Eaton fuselinks are designed and manufactured in accordance with a Quality Management System in accordance with ISO 9001. Most fuselinks are ASTA Certified for a breaking capacity of 80kA at 415V a.c. and are endorsed ASTA 20 CERT showing compliance with the rules of the ASTA 20 scheme which includes assessment of the Quality Management System to ISO 9002 and detailed auditing of fuselink manufacture.

Eaton have for many years participated in developing and influencing fuse standards through BEAMA and BSI at national level and IEC at international level and therefore are able to produce designs incorporating forthcoming changes to standards.

Fuse carriers and bases – specification

A range of moulded HRC fuse units designed to accept bolt-in and clip-in HRC fuselinks.

Each unit is fully shrouded to prevent accidental contact with live parts when inserting or withdrawing a carrier and once the carrier has been removed completely.

The carrier and base mouldings are manufactured from high quality thermosetting material.

Units accepting bolt-in HRC fuselinks are available in ratings of 20, 32, 63, 100 and 200A and can be supplied in front connected, front/busbar connected, front/back connected and back connected versions.

They are designed to comply with BS88 – 2 and are suitable for systems up to 660V. Suitable HRC fuselinks are also to BS88 – 2. A full range of neutral links is available.

Those units which accept the clip-in fuselinks are rated at 32A and 63A, 415V.

They comply with BS88 – 2 and accept clip-in HRC fuselinks to the same standard.

Clip-in type units allow fuselinks to be replaced very simply – no tools are required. Fuselinks are removed from the carrier using side pressure on the fuselink end tags while replacement involves a simple push fit only.

Terminal capacities: 20A 6mm^2, 32A 16mm^2, 63A 35mm^2, 100A 70mm^2, 200A 150mm^2.

Fuse units are available in four types:

Type A – providing for busbar connection at one end and cable termination at the other.

Type B – providing for cable connection at each end.

Type C – with back connecting studs.

Type D – providing for cable connection at one end with back connecting stud at the other.

Fuse units have been ASTA certified to BS88 – 2 and are suitable for systems up to 660V.

100A fuse units may be fitted with SB3, SB4 or S0 fuselinks having 73mm fixing centres if used with adaptor **100MFLK**.

1.10 Product overview

Enclosed motor, heating and lighting control

Eaton's wide range of Motor Control Gear and Heating and Lighting Control equipment is an integral part of our single source commitment.

Since the late 1920's we have built countless motor starters, fitted and trusted by generations of contractors, while the increasing requirements of our markets have led us to constantly update and expand our ADS range to allow for an increased choice of current ratings and ingress protection.

This wealth of experience and expertise in the design and manufacture of Motor Control Gear is mirrored by our Heating and Lighting range which offers a versatile and comprehensive choice.

Standards

- IEC 60947-4-1
- VDE 0660
- IEC 60269
- BS EN 60947-4-1

ADS8 AC motor starters



Enclosures – moulded

- 9kW DOL max
- Tough polycarbonate in grey provides high IP protection to IP65
- Start and stop pushbuttons
- Internal earth terminals
- Cable entries – 20mm knockouts for M20 threaded glands

Enclosures – metalclad

- Attractively styled rust protected pressed steel finished in grey polyester powder paint
- Start and mushroom-headed stop pushbuttons
- Substantial earth terminal
- Cable entries – 20mm knockouts for M20 threaded glands

Switch-disconnectors

- Means of isolation and switching for mechanical maintenance
- Padlocking facility available
- Isolators type tested for on-load disconnection
- Interlocked with main cover

Overload relays

- Adjustable thermal pattern connected directly to contactor
- Ambient temperature compensated between -40°C to +60°C
- Phase failure sensitive relays
- Changeover trip contact
- Simple Auto-reset

Contactors

- Modern block type
- 6–15 x 106 mechanical and 1.5 x 106 electrical operations – AC3 duty.
- Provisions for fitting additional auxiliary contacts either N/O or N/C – depending on version

Optional fittings and specials

- Provision for various optional fitments on standard starters
- Special starter arrangements



MSU pushbutton control units

- The Push Button Units are supplied with robust plastic enclosure to IP67, in one, two and three push button types.
- Complies with IEC/EN 60947-5
- Simplicity, versatility and robust construction successfully allied to attractive styling
- One, two and three button types available in a variety of configurations
- 3-button type M23MSUL supplied with 2 sets of button legends, FORWARD, REVERSE and UP, DOWN. The required legend should be clipped onto the button as required
- Each contact block comprises 1 – N/O and 1 – N/C contact
- Start units are push to make (N/O)
- Stop units are push to break (N/C)
- Latching device where fitted holds stop pushbutton in depressed position until latch is released by clockwise rotation of mushroom head.
- Various conduit knockout options on side and rear of enclosures

Autoline heating and lighting contactors



Open contactors

- 18A, 25A and 32A, 4-pole, with optional auxiliary contacts

Enclosed contactors

- 25A and 40A, 4-pole; 40A and 64A, 2-pole; 70A and 112A, single pole with fitted neutral link
- Robust pressed steel enclosures, rust protected with grey paint finish
- 220…240V units available with or without rectifiers for silent running
- 90-225A, 3-pole enclosed contactors can be supplied with switch-disconnector-fuse including HRC main fuses

Power factor correction capacitors

How can you economise?

A great deal of money is spent annually to achieve savings in production methods, improved plant efficiency and optimum lighting arrangements; essential in the highly competitive world of industry today. However, poorly managed energy supplies result in unnecessary, and avoidable wastage. Power factor correction is the established method of reducing electricity costs in industry and commerce. You can eliminate waste in electricity consumption by improving your power factor and saving up to 20% on your electricity costs. This could also help you to increase your output without the need to install new cables or extra supply capacity. To find out more contact us for a power factor check.

What is power factor correction?

Most loads on an electrical distribution system fall into one of three categories; resistive, inductive or capacitive. In your own plant, the most common is likely to be inductive. Typical examples of this include transformers, fluorescent lighting and AC induction motors. Most inductive loads use a conductive coil winding to produce an electromagnetic field, allowing the motor to function.

All inductive loads require two kinds of power to operate:

- Active power (kwatts) to produce the motive force
- Reactive power (kvar) to energise the magnetic field

The operating power from the distribution system is composed of both active (working) and reactive (non-working) elements. The active power does useful work in driving the motor whereas the reactive power only provides the magnetic field.

The bad news is that you are charged for both!

The objective, therefore, should be to reduce the reactive power drawn from the supply by improving the power factor.

If an AC motor were 100% efficient it would consume only active power but, since most motors are only 75% to 80% efficient, they operate at a low power factor. This means poor energy and cost efficiency because the Regional Electricity Companies charge you at penalty rates for a poor power factor.

By installing capacitors to improve your power factor you could SAVE MONEY on your electricity bill.

Additional potential benefits include:

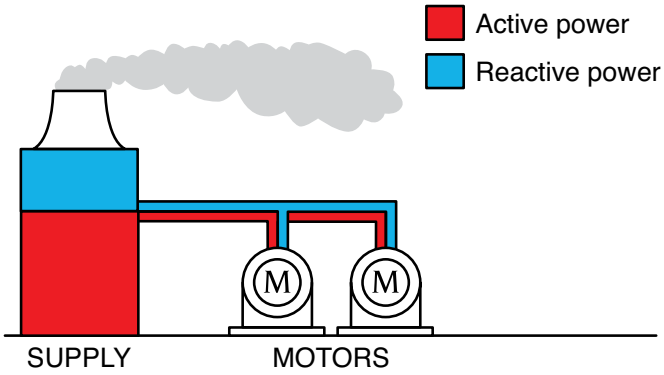
- Reduction of heating losses in transformers and distribution equipment
- Longer plant life
- Stabilised voltage levels
- Increase in capacity of your existing system and equipment
- Improved profitability

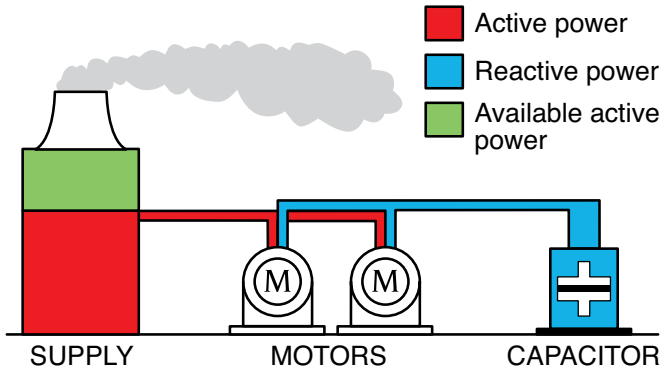
What do I have to do to save money?

Simply contact us on +44(0)121 685 2011 and we will arrange for an engineer to carry out a power factor survey. This will be done quickly, with no interruption to your operations and with absolutely no obligation on your part. We shall then be able to advise you of the savings you can achieve which could be as much as 20% of your current electricity bill.

Do you need to take action if you already have capacitors?

Modern capacitors are made of metallised polypropylene film. If they develop a fault, then instead of the whole capacitor failing, only a small section of the metallisation burns away,





leaving the capacitor working at a slightly lower output. Over the years, your capacitors could have lost so much output that you could be paying the penalty for a poor power factor.

Our engineers would be pleased to carry out a test on your installation to determine whether it is running economically.

As the power factor drops the system becomes less efficient. A drop from 1.0 to 0.9 results in 15% more current being required for the same load.

A power factor of 0.7 requires approximately 43% more current; and a power factor of 0.5 requires approximately 100% (twice as much) to handle the same load.

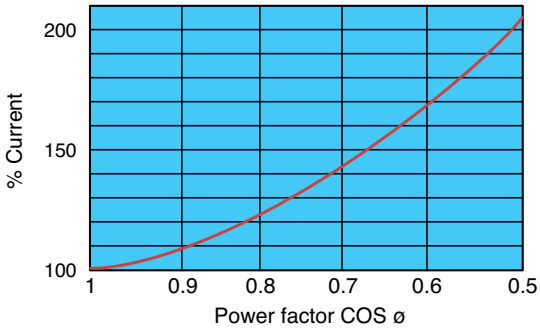
Do you have a problem with harmonics?

If you have…

- Nuisance tripping of circuit breakers or fuses blowing
- Erroneous operation of control system equipment
- Electronic communication interference
- Excessive heating and failure of transformers, motors, capacitors, fluorescent lighting ballasts etc.
- Excessive neutral current

…you could have a harmonic problem.

Our engineers will be pleased to check this for you.





Eaton capacitors non-auto range

The Eaton non-auto range of capacitors is designed for individual correction of motors, transformers and other items of plant. The capacitors are manufactured in robust steel cases suitable for the work place. They can be supplied with open terminals for mounting within cubicles or other switchgear or with fully enclosed terminals for use elsewhere. Single or three phase units are available in a wide range of sizes.

• Low loss • Self healing • Non flammable • Easily maintained • Environmentally friendly

Eaton capacitors non-auto application

Most AC electrical machines draw from the electricity supply apparent power in excess of the useful power required by the machine. By connecting the Eaton capacitor into circuit, it is possible to reduce the excess current. This saves energy and makes the most efficient use of your electricity installation.

Eaton capacitors non-auto construction

The capacitor consists of a number of low loss self healing elements assembled in a robust steel case which is suitable for the work place.

Protection system

Each element is fitted with a protection system which ensures an extended capacitor life and complete end of life safety.

Elements are self healing and have an over pressure double pole automatic disconnect feature that ensures that if the element fails it is electrically safe.

Capacitor features

Low loss – less than 0.5 Watts per kvar, including discharge resistors.

Environmentally safe – The dry type construction eliminates flammable impregnants and does not cause leakage or pollution problems.



Eaton capacitors 100

The Eaton 100 range of capacitors is designed for the automatic power factor correction of industrial loads. The capacitors are manufactured in robust steel cases suitable for the work place. The equipment is arranged to switch capacitors as the load requirement varies, thus ensuring that the system power factor is maintained at an economic level.

• Low loss • Self healing • Non flammable • Easily maintained
• Environmentally friendly • Fully automatic control

Eaton capacitors 100 application

Most AC electrical machines draw from the electricity supply apparent power in excess of the useful power required by the machine. By connecting the Eaton capacitor into circuit, it is possible to reduce the excess current. This saves energy and makes the most efficient use of your electricity installation.

Eaton capacitors 100 construction

The capacitor consists of a number of low loss self healing elements assembled in a robust steel case which is suitable for the work place. Each unit is available with a fusebase/fuseswitch or MCCB incomer.

Protection system

Each element is fitted with a protection system which ensures an extended capacitor life and complete end of life safety.

Elements are self healing and have an over pressure double pole automatic disconnect feature that ensures that if the element fails it is electrically safe.

Capacitor features

Low loss – less than 0.5 Watts per kvar, including discharge resistors.

Environmentally safe – The dry type construction eliminates flammable impregnants and does not cause leakage or pollution problems.



Eaton capacitors 300 – standard

The Eaton capacitors 300 cubicle is designed for the automatic power factor correction of industrial loads. It can be supplied with a reactive sensing relay or arranged to operate from existing control devices (slave). The equipment is arranged to switch capacitors as the load requirement varies, thus ensuring that the system power factor is maintained at an economic level.

• Fully automatic control • Easily extendable • Low loss • Self-healing
• Individually protected elements • Non flammable construction
• Environmentally friendly • Easy maintenance • Front or rear cable access

The cubicle is designed to be compatible with switchboards, its construction, therefore, is to the same exacting standards required by a switchboard manufacturer.

Hinged doors are fitted as standard which permits easy inspection and maintenance. The equipment is designed for full front access both for installation and maintenance. It can, therefore, be fitted where space is at a premium.

The modular body construction as standard, enables the equipment to be easily extended at a later date if required.

The cubicle incorporates capacitor units with the following features:

Dry long life low dielectric loss.

Metallised polypropylene windings encapsulated in epoxy resin and mounted within a sheet steel case.

Fitted with an internal fuse.

Self-healing – internal faults vaporize the metallisation.

Low losses – less than 0.5 W/kvar.

Environmentally friendly, non-toxic and non-flammable.

Complete with discharge resistors.

Cubicle construction

Each Eaton capacitors 300 cubicle can house up to 300 kvar of capacitors switched in stages of 25 to 100 kvar dependent upon requirements.

The control equipment comprises:

- Set of DIN removable fuses and carriers per 1 or 2 switching stages.
- Suitably rated contactor per switching stage.
- Hand/Off/Auto selector switch per switching stage when required.
- 'Capacitor Energised' indication lamp per switching stage when required.
- Set of control fuses.

The cubicle has throughgoing busbars and all internal wiring and interconnections. Control wiring is clearly labelled.

All switching stages are clearly numbered and the panel is complete with all necessary information labels.



Eaton capacitors 300 – detuned

The Eaton capacitors 300 cubicle is designed for the automatic power factor correction of industrial loads. It can be supplied with a reactive sensing relay or arranged to operate from existing control devices. The equipment is arranged to switch capacitors as the load requirement varies, thus ensuring that the system power factor is maintained at an economic level.

• De-tuned to reduce harmonics • Reduced nuisance tripping of MCCBs
• Fully automatic control • Easily extendable • Low loss • Self-healing
• Individually protected elements • Non flammable construction
• Environmentally friendly • Easy maintenance • Front or rear cable access

The cubicle is designed to be compatible with switchboards, its construction, therefore, is to the same exacting standards required by a switchboard manufacturer.

Hinged doors are fitted as standard which permits easy inspection and maintenance. The equipment is designed for full front access both for installation and maintenance. It can, therefore, be fitted where space is at a premium.

The modular body construction as standard, enables the equipment to be easily extended at a later date if required.

The cubicle incorporates capacitor units with the following features:

Dry long life low dielectric loss.

Metallised polypropylene windings encapsulated in epoxy resin and mounted within a sheet steel case.

Fitted with an internal fuse.

Self-healing – internal faults vaporize the metallisation.

Low losses – less than 0.5 W/kvar.

Environmentally friendly, non-toxic and non-flammable.

Complete with discharge resistors.

Cubicle construction

Each Eaton capacitors 300 cubicle can house up to 250 kvar of capacitors switched in stages of 25 to 100 kvar dependent upon requirements.

The control equipment comprises:

- Set of DIN removable fuses and carriers per switching stage.
- Suitably rated contactor per switching stage.
- Hand/Off/Auto selector switch per switching stage when required.
- 'Capacitor Energised' indication lamp per switching stage when required.
- Set of control fuses.
- Natural ventilation is deemed acceptable, however forced ventilation is available on request.

The cubicle has throughgoing busbars and all internal wiring and interconnections. Control wiring is clearly labelled.

All switching stages are clearly numbered and the panel is complete with all necessary information labels.

Reactor details:

- Aluminium or Copper windings (on request, dependant on customer specification).
- Low losses.
- Low noise.
- High overloading capacity.
- 7% de-tuning factor as standard, others available on request.
- 189Hz as standard.

What are harmonics?

Harmonic distortion in electrical power systems is becoming more and more prevalent. The ever increasing use of devices having non-linear operating characteristics means more harmonics are being produced in the power system.

This section looks at the problems this is causing and the solutions that can be achieved by the use of Eaton capacitors.

Harmonic problems must not be confused with transient disturbances. Harmonics are continuous, steady state disturbances whereas transient disturbances are of short duration caused by 'spikes', surges, or impulses.

For most electrical engineering applications it is assumed that all alternating currents and voltages have a sinusoidal waveform.

An alternating waveform that is not sinusoidal is said to be complex. This complex waveform may be shown to be built up of a series of sinusoidal waveforms whose frequencies are integral multiples of a frequency of the fundamental, or basic, wave. The sinusoidal components of a complex wave are called the harmonics.

Thus the second harmonic has a frequency of twice the fundamental, the third three times, etc.

Memshield 3 MCB distribution boards and enclosures



Eaton's Memshield 3 MCB distribution boards have evolved through an intimate knowledge and feedback from electrical contractors, consulting engineers and end users to provide solutions to a wide range of electrical distribution applications in commercial buildings. Memshield 3 delivers safe, reliable and high performance protection of electrical power distribution systems in accordance with BS EN 61439.

2.1 TYPE A SPN DISTRIBUTION BOARDS

125A SPN, type A distribution boards 32

Incoming devices 32

Meterpack assemblies 32

Surge protection devices 32

Outgoing devices, MCBs & RCBOs 33

General accessories 34

2.2 TYPE B TPN DISTRIBUTION BOARDS

125A TPN, type B distribution boards 35

125A Incomer kits 35

250A TPN, type B distribution boards 35

250A Incomer kits 36

Meterpack assemblies 36

Split metered power and lighting board 36

Surge protection devices 36

Outgoing devices, MCBs & RCBOs 37

General accessories 40

2.3 MODULAR ENCLOSURES

Enclosure accessories 41

2.4 MCB PAN ASSEMBLIES 42

2.1 Memshield 3 MCB distribution boards and enclosures

Type A, SPN distribution boards

See page 126 for technical data and overall dimensions

EAM10



125A SPN, type A distribution boards

- When more than 16 SP ways are required, see our TPN board ranges, complete with single phase kit options
- IP3X

Description	Rating (A)	Total no. of outgoing ways	Eaton list number
4 way SPN, type A distribution board	125	4	**EAM4**
7 way SPN, type A distribution board	125	7	**EAM7**
10 way SPN, type A distribution board	125	10	**EAM10**
13 way SPN, type A distribution board	125	13	**EAM13**
16 way SPN, type A distribution board	125	16	**EAM16**

EAMS1251N



Incoming devices for SPN, type A distribution boards

- Incoming devices supplied separate to distribution board

Description	Rating (A)	Poles	Sensitivity (mA)	Eaton list number
Switch-disconnector	125	SPSN	–	**EAMS1251N**
RCCB incoming device for SPN, type A distribution board	90	1P+N	30	**EAMS100HE**
RCCB incoming device for SPN, type A distribution board	90	1P+N	100	**EAMS100ME**
RCCB incoming device for SPN, type A distribution board	90	1P+N	300	**EAMS100LE**
Direct connection kit for SPN, type A distribution board	100	1P+N	–	**EAMBT1002**

EAMMP65



Metered SPN, type A distribution boards & standard meter packs

- Type A SPN boards, fitted with multifunction meters, can display; Amps, kW, kWh, kVar and kVarh pulsed output etc.
- Split load versions utilise a two channel meter, feeding two independent busbars and groups of MCB/RCBOs
- Split load versions provide independent monitoring of "Power" and "Lighting" loads and total load.
- Aids compliance with Part L2 of the building regulations (England & Wales and Section 6 Scotland)
- IP3X

Description	Rating (A)	Total no. of outgoing ways	Installed meter, characteristics[3)]	Eaton list number
Meterpack for SPN, type A distribution boards	65	–	Pulsed output, kWh	**EAMMP65**
9 way SPN, type A distribution board[1)]	65	9	Pulsed output, kWh	**EAM9M**
9 way SPN, type A distribution board[1)]	65	9	Modbus	**EAM9MB**
12 way SPN, type A distribution board[1)]	65	12	Pulsed output, kWh	**EAM12M**
12 way SPN, type A distribution board[1)]	65	12	Modbus	**EAM12MB**
Split metered SPN, type A distribution board[1), 2)]	100	9 + 3	Pulsed output, kWh	**EAMSL93M**
Split metered SPN, type A distribution board[1), 2)]	100	9 + 3	Modbus	**EAMSL93MB**
Split metered SPN, type A distribution board[1), 2)]	100	6 + 6	Pulsed output, kWh	**EAMSL66M**
Split metered SPN, type A distribution board[1), 2)]	100	6 + 6	Modbus	**EAMSL66MB**

[1)] Includes factory fitted switch disconnector and single channel meter
[2)] Includes two channel meter, 65A max load per channel
[3)] Output type is Pulsed or Modbus

EM3SSK1T2



Surge protection device for SPN, type A distribution boards

- See page 126 for technical data

Description	Eaton list number
Enclosed surge protection kit for SPN boards – type 2	**EM3SSK1T2**

EMDH104



Outgoing devices, MCBs – 10/15kA, single pole

- Trip types B, C and D
- Dual rated, 10kA to IEC 60898 and 15kA to IEC 60947-2

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	18	10/15	**EMBH101**	**EMCH101**	**EMDH101**
Miniature circuit breaker	2	18	10/15	**EMBH102**	**EMCH102**	**EMDH102**
Miniature circuit breaker	4	18	10/15	**EMBH104**	**EMCH104**	**EMDH104**
Miniature circuit breaker	6	18	10/15	**EMBH106**	**EMCH106**	**EMDH106**
Miniature circuit breaker	8	18	10/15	**EMBH108**	**EMCH108**	**EMDH108**
Miniature circuit breaker	10	18	10/15	**EMBH110**	**EMCH110**	**EMDH110**
Miniature circuit breaker	13	18	10/15	**EMBH113**	**EMCH113**	**EMDH113**
Miniature circuit breaker	16	18	10/15	**EMBH116**	**EMCH116**	**EMDH116**
Miniature circuit breaker	20	18	10/15	**EMBH120**	**EMCH120**	**EMDH120**
Miniature circuit breaker	25	18	10/15	**EMBH125**	**EMCH125**	**EMDH125**
Miniature circuit breaker	32	18	10/15	**EMBH132**	**EMCH132**	**EMDH132**
Miniature circuit breaker	40	18	10/15	**EMBH140**	**EMCH140**	**EMDH140**
Miniature circuit breaker	50	18	10/15	**EMBH150**	**EMCH150**	**EMDH150**[1)]
Miniature circuit breaker	63	18	10/15	**EMBH163**	**EMCH163**	**EMDH163**[1)]

[1)] 15kA to IEC60947-2 rating only

EMCH116R30C



Outgoing devices, RCBOs single pole – trip type C – 30mA sensitivity

- Eaton's range of residual current circuit breakers with integral overload protection (RCBOs), are manufactured to IEC/EN 61009 and meet the latest European and international standards.
- For other RCBO sensitivity options refer to full details on page 49.

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type C SP	6	C	30	**EMCH106R30C**
Eaton RCBO 10A 10kA type C SP	10	C	30	**EMCH110R30C**
Eaton RCBO 16A 10kA type C SP	16	C	30	**EMCH116R30C**
Eaton RCBO 20A 10kA type C SP	20	C	30	**EMCH120R30C**
Eaton RCBO 25A 10kA type C SP	25	C	30	**EMCH125R30C**
Eaton RCBO 32A 10kA type C SP	32	C	30	**EMCH132R30C**
Eaton RCBO 40A 6kA type C SP	40	C	30	**EMCH140R30C**
Eaton RCBO 45A 6kA type C SP	45	C	30	**EMCH145R30C**

EMBH116R30C



Outgoing devices, RCBOs single pole – trip type B – 30mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type B SP	6	B	30	**EMBH106R30C**
Eaton RCBO 10A 10kA type B SP	10	B	30	**EMBH110R30C**
Eaton RCBO 16A 10kA type B SP	16	B	30	**EMBH116R30C**
Eaton RCBO 20A 10kA type B SP	20	B	30	**EMBH120R30C**
Eaton RCBO 32A 10kA type B SP	32	B	30	**EMBH132R30C**
Eaton RCBO 40A 6kA type B SP	40	B	30	**EMBH140R30C**
Eaton RCBO 45A 6kA type B SP	45	B	30	**EMBH145R30C**

EMDL



EMPL



General accessories for SPN, type A distribution boards

Description	Eaton list number
MCB blanking module – 18mm	**EMBP**
Half MCB blanking strip – 9mm	**EMABP**
Universal device lockout attachment – fits MCBs, RCCBs and RCBOs	**ASPDL**
Padlock suitable for ASPDL	**PD2**
Door barrel lock with 2 keys	**EMDL**
Door padlocking kit	**EMPL**
Padlock suitable for EMPL	**PD1**
Vertical coupling kit for connecting 2 SPN Distribution boards (125A max. total load)[1)]	**EAMCK**
Clean earth for A board 5 terminals	**EAME5**
Clean earth for A board 11 terminals	**EAME11**

[1)] Incominging device required for each linked distribution boards

See page 126 for technical data and overall dimensions

EBM81



125A/250A TPN, type B distribution boards

- IP4X

Description	Rating (A)	Total no. of outgoing ways	Eaton list number
4 way TPN, type B distribution board	125	4	**EBM41**
6 way TPN, type B distribution board	125	6	**EBM61**
8 way TPN, type B distribution board	125	8	**EBM81**
12 way TPN, type B distribution board	125	12	**EBM121**
16 way TPN, type B distribution board	125	16	**EBM161**
12 way TPN, type B distribution board	125/225[1)]	12	**EBM122**
18 way TPN, type B distribution board	125/250[1)]	18	**EBM182**
24 way TPN, type B distribution board	125/250[1)]	24	**EBM242**

[1)] 225A/250A options – if used with cable extension box or with cable trunking. See 250A incomer options below

EBM121D



125A SPSN, type B distribution board

- SPSN main switch disconnector fitted
- IP4X

Description	Rating (A)	Total no. of outgoing ways	Eaton list number
12 way SPSN type B distribution board	125	12	**EBM121D**

EBMS1253



125A incomer options for type B distribution boards

- Incoming devices supplied separate to distribution board.

Description	Rating (A)	Pole configuration	Eaton list number
Switch disconnector	125	TP	**EBMS1253**
Switch disconnector kit (including single phasing link)	125	SPSN	**EBMS1251N**
Switch disconnector	125	TPSN	**EBMS1253N**
Direct connection (lugs connector)	125/250	TP	**EBMBT2503**
30mA RCCB[1)]	100	TPSN	**EBMR30**
100mA RCCB[1)]	100	TPSN	**EBMR100**
300mA RCCB[1)]	100	TPSN	**EBMR300**
300mA RCCB with time delay	100	TPSN	**EBMR300T**
Switch disconnector feeding 125A TP AC1 contactor, housed in extension box	125	TP	**EBMCC1253**

[1)] Includes 50mm^2 terminal adapter

EBM62H



250A TPN, type B high load distribution board

- These boards include 2 TPN outgoing ways for 27mm MCB (upto 125A)
- Adequate integral cabling space means that no extension box is required.
- IP4X
- Fitted with door lock as standard.

Description	Rating (A)	Total no. of 18mm TP outgoing ways (63A max)	Total no. of 27mm TP outgoing ways (125A max)	Total no. of outgoing ways	Eaton list number
2 way TPN, type B distribution board	200	0	2	2	**EBM22H**
6 way TPN, type B distribution board	250	4	2	6	**EBM62H**
8 way TPN, type B distribution board	250	6	2	8	**EBM82H**
12 way TPN, type B distribution board	250	10	2	12	**EBM122H**
18 way TPN, type B distribution board	250	16	2	18	**EBM182H**
24 way TPN, type B distribution board	250	22	2	24	**EBM242H**

EBMMB250



250A incomer options for type B distribution boards

- Incoming devices supplied separate to distribution board.
- Where used with **EBM122** or **EBM242**, a separate cable extension box or suitable cable trunking is required

Description	Rating (A)	Pole configuration	Eaton list number
Switch-disconnector	250	TP	**EBMS2503**
Direct connection (lugs connector)	250	TP	**EBMBT2503**
MCCB incomer kit (includes MCCB)	250	TP	**EBMMB250**
MCCB incomer kit (includes MCCB)	200	TP	**EBMMB200**
MCCB incomer kit (includes MCCB)	160	TP	**EBMMB160**
Switch disconnector feeding 250A TP AC1 contactor, housed in extension box	250	TP	**EBMCC2503**
Single phase conversion kit for 250A rated board only (requires **EBMS2503** to be ordered seperately)			**EBMS25**

EBMMPCT250



Meterpack assemblies – TPN, type B distribution boards

Description	Rating (A) (total load)	Installed meter, characteristics	Eaton list number
Meterpack for TPN, type B distribution boards	250	Pulsed output, kWh	**EBMMPCT250**
Meterpack for TPN, type B distribution boards	250	Modbus + pulsed output, kWh	**EBMMPCT250M**
Meterpack for TPN, type B distribution boards	250	MID certified meter	**EBMMPCT250MID**
Double meterpack for 2 x TPN, type B distribution boards	250	Pulsed output, kWh	**EBMMPSL250**
Double meterpack for 2 x TPN, type B distribution boards	250	Modbus + pulsed output, kWh	**EBMMPSL250M**
Double meterpack for 2 x TPN, type B distribution boards	125	Pulsed output, kWh	**EBMMPSL125**
Double meterpack for 2 x TPN, type B distribution boards	125	Modbus + pulsed output, kWh	**EBMMPSL125M**
Meterpack for TPN, type B distribution boards	120	MID certified meter	**EBMMPDC120**

EBMSL642MB



Split metered power and lighting board – 200A TPN, type B

- Includes factory fitted 200A switch disconnector and two channel meter
- Adequate integral cabling space means that no extension box is required.
- IP4X
- Meter has both pulsed and Modbus outputs as standard.
- Fitted with door lock as standard.
- Single phasing kit included to be used if required

Description	Rating (A)	Total no. of outgoing ways	Installed meter, characteristics	Eaton list number
Split metered TPN, type B distribution board	200	6+4	Modbus + pulsed output, kWh	**EBMSL642MPMB**
Split metered TPN, type B distribution board	200	8+6	Modbus + pulsed output, kWh	**EBMSL862MPMB**
Split metered TPN, type B distribution board	200	10+8	Modbus + pulsed output, kWh	**EBMSL1082MPMB**
Split metered TPN, type B distribution board	200	14+10	Modbus + pulsed output, kWh	**EBMSL14102MPMB**

EM3SSK3T12



Surge protection device for type B distribution boards

- See page 126 for technical data

Description	Eaton list number
Enclosed surge protection kit for TPN boards – type 1&2	**EM3SSK3T12**
Enclosed surge protection kit for TPN boards – type 2	**EM3SSK3T2**

EMDH104



Outgoing devices – MCBs – 10/15kA, single pole

- Trip types B, C and D
- Dual rated, 10kA to IEC 60898 and 15kA to IEC 60947-2

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	18	10 /15	**EMBH101**	**EMCH101**	**EMDH101**
Miniature circuit breaker	2	18	10 /15	**EMBH102**	**EMCH102**	**EMDH102**
Miniature circuit breaker	4	18	10 /15	**EMBH104**	**EMCH104**	**EMDH104**
Miniature circuit breaker	6	18	10 /15	**EMBH106**	**EMCH106**	**EMDH106**
Miniature circuit breaker	8	18	10 /15	**EMBH108**	**EMCH108**	**EMDH108**
Miniature circuit breaker	10	18	10 /15	**EMBH110**	**EMCH110**	**EMDH110**
Miniature circuit breaker	13	18	10 /15	**EMBH113**	**EMCH113**	**EMDH113**
Miniature circuit breaker	16	18	10 /15	**EMBH116**	**EMCH116**	**EMDH116**
Miniature circuit breaker	20	18	10 /15	**EMBH120**	**EMCH120**	**EMDH120**
Miniature circuit breaker	25	18	10 /15	**EMBH125**	**EMCH125**	**EMDH125**
Miniature circuit breaker	32	18	10 /15	**EMBH132**	**EMCH132**	**EMDH132**
Miniature circuit breaker	40	18	10 /15	**EMBH140**	**EMCH140**	**EMDH140**
Miniature circuit breaker	50	18	10 /15	**EMBH150**	**EMCH150**	**EMDH150**[1)]
Miniature circuit breaker	63	18	10 /15	**EMBH163**	**EMCH163**	**EMDH163**[1)]

[1)] 15kA to IEC60947-2 rating only

EMCH310



Outgoing devices – MCBs – 10/15kA, three pole

- Trip types B, C and D
- Dual rated, 10kA to IEC 60898 and 15kA to IEC 60947-2

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	54	10/15	**EMBH301**	**EMCH301**	**EMDH301**
Miniature circuit breaker	2	54	10/15	**EMBH302**	**EMCH302**	**EMDH302**
Miniature circuit breaker	4	54	10/15	**EMBH304**	**EMCH304**	**EMDH304**
Miniature circuit breaker	6	54	10/15	**EMBH306**	**EMCH306**	**EMDH306**
Miniature circuit breaker	8	54	10/15	**EMBH308**	**EMCH308**	**EMDH308**
Miniature circuit breaker	10	54	10/15	**EMBH310**	**EMCH310**	**EMDH310**
Miniature circuit breaker	13	54	10/15	**EMBH313**	**EMCH313**	**EMDH313**
Miniature circuit breaker	16	54	10/15	**EMBH316**	**EMCH316**	**EMDH316**
Miniature circuit breaker	20	54	10/15	**EMBH320**	**EMCH320**	**EMDH320**
Miniature circuit breaker	25	54	10/15	**EMBH325**	**EMCH325**	**EMDH325**
Miniature circuit breaker	32	54	10/15	**EMBH332**	**EMCH332**	**EMDH332**
Miniature circuit breaker	40	54	10/15	**EMBH340**	**EMCH340**	**EMDH340**
Miniature circuit breaker	50	54	10/15	**EMBH350**	**EMCH350**	**EMDH350**[1)]
Miniature circuit breaker	63	54	10/15	**EMBH363**	**EMCH363**	**EMDH363**[1)]

[1)] 15kA to IEC60947-2 rating only

EMCS1100



Outgoing devices (for 250A high load distribution board only) – MCBs, single pole

Rated current In (A)	Width (mm)	Short circuit rating (IEC/EN 60947-2)	Eaton list number Trip type B	Trip type C	Trip type D
20	27	25kA	**EMBS120**	**EMCS120**	**EMDS120**
32	27	25kA	**EMBS132**	**EMCS132**	**EMDS132**
40	27	25kA	**EMBS140**	**EMCS140**	**EMDS140**
50	27	25kA	**EMBS150**	**EMCS150**	**EMDS150**
63	27	25kA	**EMBS163**	**EMCS163**	**EMDS163**
80	27	20kA	**EMBS180**	**EMCS180**	**EMDS180**
100	27	20kA	**EMBS1100**	**EMCS1100**	**EMDS1100**
125	27	15kA	**EMBS1125**	**EMCS1125**	–

EMCS3125



Outgoing devices (for 250A high load distribution board only) – MCBs, three pole

Rated current In (A)	Width (mm)	Short circuit rating (IEC/EN 60947-2)	Eaton list number Trip type B	Trip type C	Trip type D
20	81	25kA	**EMBS320**	**EMCS320**	**EMDS320**
32	81	25kA	**EMBS332**	**EMCS332**	**EMDS332**
40	81	25kA	**EMBS340**	**EMCS340**	**EMDS340**
50	81	25kA	**EMBS350**	**EMCS350**	**EMDS350**
63	81	25kA	**EMBS363**	**EMCS363**	**EMDS363**
80	81	20kA	**EMBS380**	**EMCS380**	**EMDS380**
100	81	20kA	**EMBS3100**	**EMCS3100**	**EMDS3100**
125	81	15kA	**EMBS3125**	**EMCS3125**	–

EMCH116R30C



Outgoing devices, RCBOs single pole – trip type C – 30mA sensitivity

- Eaton's range of residual current circuit breakers with integral overload protection (RCBOs), are manufactured to IEC/EN 61009 and meet the latest European and international standards.
- For other RCBO sensitivity options refer to full details on page 49.

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type C SP	6	C	30	**EMCH106R30C**
Eaton RCBO 10A 10kA type C SP	10	C	30	**EMCH110R30C**
Eaton RCBO 16A 10kA type C SP	16	C	30	**EMCH116R30C**
Eaton RCBO 20A 10kA type C SP	20	C	30	**EMCH120R30C**
Eaton RCBO 25A 10kA type C SP	25	C	30	**EMCH125R30C**
Eaton RCBO 32A 10kA type C SP	32	C	30	**EMCH132R30C**
Eaton RCBO 40A 6kA type C SP	40	C	30	**EMCH140R30C**
Eaton RCBO 45A 6kA type C SP	45	C	30	**EMCH145R30C**

EMBH116R30C



Outgoing devices, RCBOs single pole – trip type B – 30mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type B SP	6	B	30	**EMBH106R30C**
Eaton RCBO 10A 10kA type B SP	10	B	30	**EMBH110R30C**
Eaton RCBO 16A 10kA type B SP	16	B	30	**EMBH116R30C**
Eaton RCBO 20A 10kA type B SP	20	B	30	**EMBH120R30C**
Eaton RCBO 32A 10kA type B SP	32	B	30	**EMBH132R30C**
Eaton RCBO 40A 10kA type B SP	40	B	30	**EMBH140R30C**
Eaton RCBO 45A 6kA type B SP	45	B	30	**EMBH145R30C**

169639



Outgoing devices, 10kA 3P +N RCBOs

- Conditionally surge current-proof 250A.
- Sensitivity type A, providing protection against AC and pulsating DC earth fault currents.
- Trip types B, C, and D
- Trip sensitivity 30mA, 100mA or 300mA

Description Characteristic B	Rating (A)	Sensitivity (mA)	Type designation	Eaton list number
3P+N RCBO 10A 10kA trip B	10	30	mRBM4-10/3/B/003-A-UK-PT	**169636**
3P+N RCBO 13A 10kA trip B	13	30	mRBM4-13/3/B/003-A-UK-PT	**169637**
3P+N RCBO 16A 10kA trip B	16	30	mRBM4-16/3/B/003-A-UK-PT	**169638**
3P+N RCBO 20A 10kA trip B	20	30	mRBM4-20/3/B/003-A-UK-PT	**169639**
3P+N RCBO 10A 10kA trip B	10	100	mRBM4-10/3/B/01-A-UK-PT	**169670**
3P+N RCBO 13A 10kA trip B	13	100	mRBM4-13/3/B/01-A-UK-PT	**169671**
3P+N RCBO 16A 10kA trip B	16	100	mRBM4-16/3/B/01-A-UK-PT	**169584**
3P+N RCBO 20A 10kA trip B	20	100	mRBM4-20/3/B/01-A-UK-PT	**169585**
3P+N RCBO 10A 10kA trip B	10	300	mRBM4-10/3/B/03-A-UK-PT	**169598**
3P+N RCBO 13A 10kA trip B	13	300	mRBM4-13/3/B/03-A-UK-PT	**169599**
3P+N RCBO 16A 10kA trip B	16	300	mRBM4-16/3/B/03-A-UK-PT	**169600**
3P+N RCBO 20A 10kA trip B	20	300	mRBM4-20/3/B/03-A-UK-PT	**169601**

Description Characteristic C	Rating (A)	Sensitivity (mA)	Type designation	Eaton list number
3P+N RCBO 6A 10kA trip C	6	30	mRBM4-6/3/C/003-A-UK-PT	**169640**
3P+N RCBO 10A 10kA trip C	10	30	mRBM4-10/3/C/003-A-UK-PT	**169641**
3P+N RCBO 13A 10kA trip C	13	30	mRBM4-13/3/C/003-A-UK-PT	**169642**
3P+N RCBO 16A 10kA trip C	16	30	mRBM4-16/3/C/003-A-UK-PT	**169643**
3P+N RCBO20A 10kA trip C	20	30	mRBM4-20/3/C/003-A-UK-PT	**169644**
3P+N RCBO 25A 10kA trip C	25	30	mRBM4-25/3/C/003-A-UK-PT	**169645**
3P+N RCBO 32A 10kA trip C	32	30	mRBM4-32/3/C/003-A-UK-PT	**169646**
3P+N RCBO 6A 10kA trip C	6	100	mRBM4-6/3/C/01-A-UK-PT	**169586**
3P+N RCBO 10A 10kA trip C	10	100	mRBM4-10/3/C/01-A-UK-PT	**169587**
3P+N RCBO 13A 10kA trip C	13	100	mRBM4-13/3/C/01-A-UK-PT	**169588**
3P+N RCBO 16A 10kA trip C	16	100	mRBM4-16/3/C/01-A-UK-PT	**169589**
3P+N RCBO 20A 10kA trip C	20	100	mRBM4-20/3/C/01-A-UK-PT	**169590**
3P+N RCBO 25A 10kA trip C	25	100	mRBM4-25/3/C/01-A-UK-PT	**169591**
3P+N RCBO 32A 10kA trip C	32	100	mRBM4-32/3/C/01-A-UK-PT	**169592**
3P+N RCBO 6A 10kA trip C	6	300	mRBM4-6/3/C/03-A-UK-PT	**169602**
3P+N RCBO 10A 10kA trip C	10	300	mRBM4-10/3/C/03-A-UK-PT	**169603**
3P+N RCBO 13A 10kA trip C	13	300	mRBM4-13/3/C/03-A-UK-PT	**169604**
3P+N RCBO 16A 10kA trip C	16	300	mRBM4-16/3/C/03-A-UK-PT	**169605**
3P+N RCBO 20A 10kA trip C	20	300	mRBM4-20/3/C/03-A-UK-PT	**169606**
3P+N RCBO 25A 10kA trip C	25	300	mRBM4-25/3/C/03-A-UK-PT	**169607**
3P+N RCBO 32A 10kA trip C	32	300	mRBM4-32/3/C/03-A-UK-PT	**169608**

Description Characteristic D	Rating (A)	Sensitivity (mA)	Type designation	Eaton list number
3P+N RCBO 6A 10kA trip D	6	30	mRBM4-6/3/D/003-A-UK-PT	**169647**
3P+N RCBO 10A 10kA trip D	10	30	mRBM4-10/3/D/003-A-UK-PT	**169648**
3P+N RCBO 13A 10kA trip D	13	30	mRBM4-13/3/D/003-A-UK-PT	**169649**
3P+N RCBO 16A 10kA trip D	16	30	mRBM4-16/3/D/003-A-UK-PT	**169650**
3P+N RCBO 20A 10kA trip D	20	30	mRBM4-20/3/D/003-A-UK-PT	**169651**
3P+N RCBO 25A 10kA trip D	25	30	mRBM4-25/3/D/003-A-UK-PT	**169652**
3P+N RCBO 6A 10kA trip D	6	100	mRBM4-6/3/D/01-A-UK-PT	**169593**
3P+N RCBO 10A 10kA trip D	10	100	mRBM4-10/3/D/01-A-UK-PT	**169594**
3P+N RCBO 13A 10kA trip D	13	100	mRBM4-13/3/D/01-A-UK-PT	**169618**
3P+N RCBO 16A 10kA trip D	16	100	mRBM4-16/3/D/01-A-UK-PT	**169619**
3P+N RCBO 20A 10kA trip D	20	100	mRBM4-20/3/D/01-A-UK-PT	**169620**
3P+N RCBO 25A 10kA trip D	25	100	mRBM4-25/3/D/01-A-UK-PT	**169621**
3P+N RCBO 6A 10kA trip D	6	300	mRBM4-6/3/D/03-A-UK-PT	**169609**
3P+N RCBO 10A 10kA trip D	10	300	mRBM4-10/3/D/03-A-UK-PT	**169610**
3P+N RCBO 13A 10kA trip D	13	300	mRBM4-13/3/D/03-A-UK-PT	**169611**
3P+N RCBO 16A 10kA trip D	16	300	mRBM4-16/3/D/03-A-UK-PT	**169612**
3P+N RCBO 20A 10kA trip D	20	300	mRBM4-20/3/D/03-A-UK-PT	**169613**
3P+N RCBO 25A 10kA trip D	25	300	mRBM4-25/3/D/03-A-UK-PT	**169614**

EMBP



General accessories, type B

Description	Eaton list number
MCB blanking module – 18mm	**EMBP**
Half MCB blanking strip – 9mm	**EMABP**
MCB blanking module – 27mm	**EMBPH**
Universal device lockout attachment – fits MCBs, RCCBs and RCBOs	**ASPDL**
Lockout attachment for 27mm MCBs	**ASPDL27**
Lockout attachment for 250A switch/MCCB	**131669**
Shunt trip 230-240V AC for 250A switch/MCCB	**158056**
Undervoltage release 230–240V AC for 250A switch/MCCB	**158053**
Padlock suitable for ASPDL & ASPDL27	**PD2**
Door barrel lock with 2 keys	**EMDL**
Door padlocking kit	**EMPL**
Padlock suitable for EMPL	**PD1**
Top/bottom gland plate	**EBMGP4**
IP42 gland plate kit	**EMGP142**
Cable trunking interface kit	**EBMTK**
Spare way label 12 way – pack of 5	**EBLB1**
Spare way label 18 way – pack of 5	**EBLB2**
Enclosure for NZM1 3-pole MCCB incomer	**EBMMBKIT**

EBMTK



EBMXPC1



Cable extension boxes, type B

Description	Box height	Eaton list number
Cable spreader extension box	180mm	**EBMXPC1**
Cable spreader extension box	250mm	**EBMXPC2**

EBMNE8



High integrity/clean earth kit

Description	No. of ways	Eaton list number
High integrity/clean earth kit for type B Board	8	**EBMNE8**

Note: Up to 4 high integrity earth bars can be fitted to a type B distribution board

EBMXDC9



Modular enclosures

- Modular enclosures will accept MCBs, RCCBs, RCBOs, fuse modules and command control products.
- Modular enclosures **EBMXDC6** to **EBMXDC45** are fitted with earth and neutral bars as standard.
- Modular enclosures **EBMXDC15** and **EBMXDCG15** have same profile width suitable for mounting onto type A, SPN distribution board **EAM13** or any type B, TPN distribution board.

See page 127 for technical data and overall dimensions.

Description	Capactiy in 18mm modules	Glazed door	Eaton list number
Modular enclosure, 15 module din rail – glazed door	15	Yes	**EBMXDCG15**
Modular enclosure, 6 module din rail – unglazed door	6	No	**EBMXDC6**
Modular enclosure, 9 module din rail – unglazed door	9	No	**EBMXDC9**
Modular enclosure, 15 module din rail – unglazed door	15	No	**EBMXDC15**
Modular enclosure, 18 module din rail – unglazed door	18	No	**EBMXDC18**
Modular enclosure, 2 x 15 module din rail – unglazed door	30	No	**EBMXDC30**
Modular enclosure, 3 x 15 module din rail – unglazed door	45	No	**EBMXDC45**
Half MCB blanking strip – 9mm	–	–	**EMABP**

EBMXE15



Enclosure accessories

Description	Eaton list number
Additional earth bar (15 additional holes)	**EBMXE15**
Door barrel lock with 2 keys	**EMDL**
Door padlocking kit	**EMPL**
Padlock suitable for **EMPL**	**PD1**

Distribution boards type A and type B – cable capacities

Cable capacities	Type A	Type B
125A switch disconnector	50mm²	50mm²
100A RCCB (type A = 90A)	35mm²	50mm²
250A switch disconnector	–	120mm² (+ M8 lugs)
160A–250A MCCB incomer	–	250A = 120mm² (+ M8 lugs)
100A direct connection kit	35mm²	–
250A direct connection lugs	–	120mm² (+ M8 lugs)
125A contactor incomer	–	50mm²
250A contactor incomer	–	120mm² (+ M8 lugs)
Enclosure earth stud	M6	M8
Incoming earth terminal	25mm²	125A = 25mm², 250A = 70mm²
Incomming neutral terminal	90/100A = 35mm², 125A = 50mm²	125A = 50mm², 250A = 120mm² (+ M8 lugs)
Outgoing earth terminal	25mm²	25mm²
Outgoing neutral terminal	25mm²	25mm²

2.4 MCB pan assemblies

Interiors & incoming devices for single phase and three phase

Eaton MCB pan assemblies offer a high degree of flexibility for custom applications. SPN types are available with 4, 7, 10, 13, and 16 ways. TPN types are available with 4, 6, 8, 12,18 and 24 ways.

Technical characteristics

- Eaton MCB pan assemblies are suitable for inclusion in other factory built assemblies and as replacements for distribution board interiors.
- MCB pan assemblies feature fully shrouded busbars.

See pages 129 -130 for the technical details of Eaton MCB pan assemblies.

EAMP10



125A SPN type A pan assemblies with earth & neutral bars

Description	Rating (A)	Total no. of outgoing ways	Eaton list number
4 way SPN, type A pan assembly	125	4	**EAMP4**
7 way SPN, type A pan assembly	125	7	**EAMP7**
10 way SPN, type A pan assembly	125	10	**EAMP10**
13 way SPN, type A pan assembly	125	13	**EAMP13**
16 way SPN, type A pan assembly	125	16	**EAMP16**

EAMS1251N



Incoming devices for SPN, type A pan assemblies

- Incoming devices supplied separate to pan assembly

Description	Rating (A)	Poles	Sensitivity (mA)	Eaton list number
Switch-disconnector	125	SPSN	–	**EAMS1251N**
RCCB	100	1P+N	30	**EAMS100HE**
RCCB	100	1P+N	100	**EAMS100ME**
RCCB	100	1P+N	300	**EAMS100LE**
Direct connection kit	100	1P+N	–	**EAMBT1002**

EBMP61



125A/250A TPN type B pan assemblies with earth & neutral bars

Description	Rating (A)	Total no. of outgoing ways	Eaton list number
4 way TPN, type B pan assembly	125	4	**EBMP41**
6 way TPN, type B pan assembly	125	6	**EBMP61**
8 way TPN, type B pan assembly	125	8	**EBMP81**
12 way TPN, type B pan assembly	125	12	**EBMP121**
12 way TPN, type B pan assembly	225	12	**EBMP122**
18 way TPN, type B pan assembly	250	18	**EBMP182**
24 way TPN, type B pan assembly	250	24	**EBMP242**

EBMS1253



125A incomer options for type B pan assemblies

- Incoming devices supplied separate to pan assembly

Description	Rating (A)	Pole configuration	Eaton list number
Switch disconnector	125	TP	**EBMS1253**
Switch disconnector kit (including single phasing link)	125	SPSN	**EBMS1251N**
Switch disconnector	125	TPSN	**EBMS1253N**
Direct connection (lugs connector)	250	TP	**EBMBT2503**
30mA RCCB	100	TPSN	**EBMR30**
100mA RCCB	100	TPSN	**EBMR100**
300mA RCCB	100	TPSN	**EBMR300**
300mA RCCB with time delay	100	TPSN	**EBMR300T**

EBMMB250



250A incomer options for type B pan assemblies

- Incoming devices supplied separate to pan assembly

Description	Rating (A)	Pole configuration	Eaton list number
Switch-disconnector	250	TP	**EBMS2503**
Direct connection (lugs connector)	250	TP	**EBMBT2503**
MCCB incomer kit (includes mCCB)	250	TP	**EBMMB250**
MCCB incomer kit (includes MCCB)	200	TP	**EBMMB200**
MCCB incomer kit (includes mCCB)	160	TP	**EBMMB160**
Single phase conversion kit for 250A rated board only (requires **EBMS2503** to be ordered separately)			**EBMS25**

Distribution board switch and protection devices



Eaton provides a comprehensive range of modular solutions for circuit protection and control. Eaton's 10/15kA MCBs are high performance current limiting devices with the ability to disconnect overloads and short circuits. They are available with trip types B, C and D with many features of benefit to all customers. RCBOs with overload protection combine protection for people and circuits in a single module width device where space is at a premium.

Double pole and four pole RCCBs are available in a range of current ratings and four trip sensitivities, 10, 30, 100 and 300mA.

3.1 MINIATURE CIRCUIT BREAKERS (MCBs) 46

3.2 RESIDUAL CURRENT CIRCUIT BREAKERS (RCCBs) 48

3.3 RESIDUAL CURRENT CIRCUIT BREAKER WITH OVERCURRENT PROTECTION (RCBOs) 49

3.4 ACCESSORIES 51

MCBs are available in current ratings from 1A–63A, with trip types B, C and D, 10kA to IEC 60898 and 15kA to IEC 60947-2

See page 135 for technical data and overall dimensions

EMDH104



Miniature circuit breakers – dual rated 10/15kA, single pole

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	18	10/15	**EMBH101**	**EMCH101**	**EMDH101**
Miniature circuit breaker	2	18	10/15	**EMBH102**	**EMCH102**	**EMDH102**
Miniature circuit breaker	4	18	10/15	**EMBH104**	**EMCH104**	**EMDH104**
Miniature circuit breaker	6	18	10/15	**EMBH106**	**EMCH106**	**EMDH106**
Miniature circuit breaker	8	18	10/15	**EMBH108**	**EMCH108**	**EMDH108**
Miniature circuit breaker	10	18	10/15	**EMBH110**	**EMCH110**	**EMDH110**
Miniature circuit breaker	13	18	10/15	**EMBH113**	**EMCH113**	**EMDH113**
Miniature circuit breaker	16	18	10/15	**EMBH116**	**EMCH116**	**EMDH116**
Miniature circuit breaker	20	18	10/15	**EMBH120**	**EMCH120**	**EMDH120**
Miniature circuit breaker	25	18	10/15	**EMBH125**	**EMCH125**	**EMDH125**
Miniature circuit breaker	32	18	10/15	**EMBH132**	**EMCH132**	**EMDH132**
Miniature circuit breaker	40	18	10/15	**EMBH140**	**EMCH140**	**EMDH140**
Miniature circuit breaker	50	18	10/15	**EMBH150**	**EMCH150**	**EMDH150**[1)]
Miniature circuit breaker	63	18	10/15	**EMBH163**	**EMCH163**	**EMDH163**[1)]

[1)] 15kA to IEC60947-2 rating only

EMBH125N



Miniature circuit breakers – dual rated 10/15kA, single pole + neutral

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	36	10/15	**EMBH101N**	**EMCH101N**	**EMDH101N**
Miniature circuit breaker	2	36	10/15	**EMBH102N**	**EMCH102N**	**EMDH102N**
Miniature circuit breaker	4	36	10/15	**EMBH104N**	**EMCH104N**	**EMDH104N**
Miniature circuit breaker	6	36	10/15	**EMBH106N**	**EMCH106N**	**EMDH106N**
Miniature circuit breaker	8	36	10/15	**EMBH108N**	**EMCH108N**	**EMDH108N**
Miniature circuit breaker	10	36	10/15	**EMBH110N**	**EMCH110N**	**EMDH110N**
Miniature circuit breaker	13	36	10/15	**EMBH113N**	**EMCH113N**	**EMDH113N**
Miniature circuit breaker	16	36	10/15	**EMBH116N**	**EMCH116N**	**EMDH116N**
Miniature circuit breaker	20	36	10/15	**EMBH120N**	**EMCH120N**	**EMDH120N**
Miniature circuit breaker	25	36	10/15	**EMBH125N**	**EMCH125N**	**EMDH125N**
Miniature circuit breaker	32	36	10/15	**EMBH132N**	**EMCH132N**	**EMDH132N**
Miniature circuit breaker	40	36	10/15	**EMBH140N**	**EMCH140N**	**EMDH140N**
Miniature circuit breaker	50	36	10/15	**EMBH150N**	**EMCH150N**	**EMDH150N**[1)]
Miniature circuit breaker	63	36	10/15	**EMBH163N**	**EMCH163N**	**EMDH163N**[1)]

[1)] 15kA to IEC60947-2 rating only

EMCH220



Miniature circuit breakers – dual rated 10/15kA, double pole

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	36	10/15	**EMBH201**	**EMCH201**	**EMDH201**
Miniature circuit breaker	2	36	10/15	**EMBH202**	**EMCH202**	**EMDH202**
Miniature circuit breaker	4	36	10/15	**EMBH204**	**EMCH204**	**EMDH204**
Miniature circuit breaker	6	36	10/15	**EMBH206**	**EMCH206**	**EMDH206**
Miniature circuit breaker	8	36	10/15	**EMBH208**	**EMCH208**	**EMDH208**
Miniature circuit breaker	10	36	10/15	**EMBH210**	**EMCH210**	**EMDH210**
Miniature circuit breaker	13	36	10/15	**EMBH213**	**EMCH213**	**EMDH213**
Miniature circuit breaker	16	36	10/15	**EMBH216**	**EMCH216**	**EMDH216**
Miniature circuit breaker	20	36	10/15	**EMBH220**	**EMCH220**	**EMDH220**
Miniature circuit breaker	25	36	10/15	**EMBH225**	**EMCH225**	**EMDH225**
Miniature circuit breaker	32	36	10/15	**EMBH232**	**EMCH232**	**EMDH232**
Miniature circuit breaker	40	36	10/15	**EMBH240**	**EMCH240**	**EMDH240**
Miniature circuit breaker	50	36	10/15	**EMBH250**	**EMCH250**	**EMDH250**[1)]
Miniature circuit breaker	63	36	10/15	**EMBH263**	**EMCH263**	**EMDH263**[1)]

[1)] 15kA to IEC60947-2 rating only

EMCH363



Miniature circuit breakers – dual rated 10/15kA, three pole

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	54	10/15	**EMBH301**	**EMCH301**	**EMDH301**
Miniature circuit breaker	2	54	10/15	**EMBH302**	**EMCH302**	**EMDH302**
Miniature circuit breaker	4	54	10/15	**EMBH304**	**EMCH304**	**EMDH304**
Miniature circuit breaker	6	54	10/15	**EMBH306**	**EMCH306**	**EMDH306**
Miniature circuit breaker	8	54	10/15	**EMBH308**	**EMCH308**	**EMDH308**
Miniature circuit breaker	10	54	10/15	**EMBH310**	**EMCH310**	**EMDH310**
Miniature circuit breaker	13	54	10/15	**EMBH313**	**EMCH313**	**EMDH313**
Miniature circuit breaker	16	54	10/15	**EMBH316**	**EMCH316**	**EMDH316**
Miniature circuit breaker	20	54	10/15	**EMBH320**	**EMCH320**	**EMDH320**
Miniature circuit breaker	25	54	10/15	**EMBH325**	**EMCH325**	**EMDH325**
Miniature circuit breaker	32	54	10/15	**EMBH332**	**EMCH332**	**EMDH332**
Miniature circuit breaker	40	54	10/15	**EMBH340**	**EMCH340**	**EMDH340**
Miniature circuit breaker	50	54	10/15	**EMBH350**	**EMCH350**	**EMDH350**[1)]
Miniature circuit breaker	63	54	10/15	**EMBH363**	**EMCH363**	**EMDH363**[1)]

[1)] 15kA to IEC60947-2 rating only

EMCH410



Miniature circuit breakers – dual rated 10/15kA, four pole

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	1	72	10/15	**EMBH401**	**EMCH401**	**EMDH401**
Miniature circuit breaker	2	72	10/15	**EMBH402**	**EMCH402**	**EMDH402**
Miniature circuit breaker	4	72	10/15	**EMBH404**	**EMCH404**	**EMDH404**
Miniature circuit breaker	6	72	10/15	**EMBH406**	**EMCH406**	**EMDH406**
Miniature circuit breaker	8	72	10/15	**EMBH408**	**EMCH408**	**EMDH408**
Miniature circuit breaker	10	72	10/15	**EMBH410**	**EMCH410**	**EMDH410**
Miniature circuit breaker	13	72	10/15	**EMBH413**	**EMCH413**	**EMDH413**
Miniature circuit breaker	16	72	10/15	**EMBH416**	**EMCH416**	**EMDH416**
Miniature circuit breaker	20	72	10/15	**EMBH420**	**EMCH420**	**EMDH420**
Miniature circuit breaker	25	72	10/15	**EMBH425**	**EMCH425**	**EMDH425**
Miniature circuit breaker	32	72	10/15	**EMBH432**	**EMCH432**	**EMDH432**
Miniature circuit breaker	40	72	10/15	**EMBH440**	**EMCH440**	**EMDH440**
Miniature circuit breaker	50	72	10/15	**EMBH450**	**EMCH450**	**EMDH450**[1)]
Miniature circuit breaker	63	72	10/15	**EMBH463**	**EMCH463**	**EMDH463**[1)]

[1)] 15kA to IEC60947-2 rating only

Miniature circuit breakers, MCBs, 27mm, 20A-125A

MCBs are available in current ratings from 20A–125A, with trip types B, C and D, 15kA to 25kA to IEC 60947-2

See page 136 for technical data and overall dimensions

Miniature circuit breakers - single pole

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	20	27	25kA	**EMBS120**	**EMCS120**	**EMDS120**
Miniature circuit breaker	32	27	25kA	**EMBS132**	**EMCS132**	**EMDS132**
Miniature circuit breaker	40	27	25kA	**EMBS140**	**EMCS140**	**EMDS140**
Miniature circuit breaker	50	27	25kA	**EMBS150**	**EMCS150**	**EMDS150**
Miniature circuit breaker	63	27	25kA	**EMBS163**	**EMCS163**	**EMDS163**
Miniature circuit breaker	80	27	20kA	**EMBS180**	**EMCS180**	**EMDS180**
Miniature circuit breaker	100	27	20kA	**EMBS1100**	**EMCS1100**	**EMDS1100**
Miniature circuit breaker	125	27	15kA	**EMBS1125**	**EMCS1125**	–

Miniature circuit breakers - three pole

Description	Rated current (A)	Width (mm)	Short circuit rating (kA)	Eaton list number Trip type B	Trip type C	Trip type D
Miniature circuit breaker	20	81	25kA	**EMBS320**	**EMCS320**	**EMDS320**
Miniature circuit breaker	32	81	25kA	**EMBS332**	**EMCS332**	**EMDS332**
Miniature circuit breaker	40	81	25kA	**EMBS340**	**EMCS340**	**EMDS340**
Miniature circuit breaker	50	81	25kA	**EMBS350**	**EMCS350**	**EMDS350**
Miniature circuit breaker	63	81	25kA	**EMBS363**	**EMCS363**	**EMDS363**
Miniature circuit breaker	80	81	20kA	**EMBS380**	**EMCS380**	**EMDS380**
Miniature circuit breaker	100	81	20kA	**EMBS3100**	**EMCS3100**	**EMDS3100**
Miniature circuit breaker	125	81	15kA	**EMBS3125**	**EMCS3125**	–

3.2 Distribution board switch and protection devices

Residual current circuit breakers

See page 137 for technical data and overall dimensions

EAM162H



RCCBs – 2-pole double module – 10mA–30mA sensitivity

Description	Poles	Rating (A)	Sensitivity (mA)	Eaton list number
16A 2-pole RCCB 10mA	2P	16	10	**EAM162V**
16A 2-pole RCCB 30mA	2P	16	30	**EAM162H**
25A 2-pole RCCB 30mA	2P	25	30	**EAM252H**
40A 2-pole RCCB 30mA	2P	40	30	**EAM402H**
63A 2-pole RCCB 30mA	2P	63	30	**EAM632H**
80A 2-pole RCCB 30mA	2P	80	30	**EAM802H**
100A 2-pole RCCB 30mA	2P	100	30	**EAM1002H**

EAM402M



RCCBs – 2-pole double module – 100mA sensitivity

Description	Poles	Rating (A)	Sensitivity (mA)	Eaton list number
25A 2-pole RCCB 100mA	2P	25	100	**EAM252M**
40A 2-pole RCCB 100mA	2P	40	100	**EAM402M**
63A 2-pole RCCB 100mA	2P	63	100	**EAM632M**
80A 2-pole RCCB 100mA	2P	80	100	**EAM802M**
100A 2-pole RCCB 100mA	2P	100	100	**EAM1002M**

EAM802L



RCCBs – 2-pole double module – 300mA sensitivity

Description	Poles	Rating (A)	Sensitivity (mA)	Eaton list number
25A 2-pole RCCB 300mA	2P	25	300	**EAM252L**
40A 2-pole RCCB 300mA	2P	40	300	**EAM402L**
80A 2-pole RCCB 300mA	2P	80	300	**EAM802L**
100A 2-pole RCCB 300mA	2P	100	300	**EAM1002L**

EAM404H



RCCBs – 4-pole – 30mA sensitivity

Description	Poles	Rating (A)	Sensitivity (mA)	Eaton list number
40A 4-pole RCCB 30mA	4P	40	30	**EAM404H**
63A 4-pole RCCB 30mA	4P	63	30	**EAM634H**
80A 4-pole RCCB 30mA	4P	80	30	**EAM804H**
100A 4-pole RCCB 30mA	4P	100	30	**EAM1004H**

EAM404M



RCCBs – 4-pole – 100mA sensitivity

Description	Poles	Rating (A)	Sensitivity (mA)	Eaton list number
40A 4-pole RCCB 100mA	4P	40	100	**EAM404M**
63A 4-pole RCCB 100mA	4P	63	100	**EAM634M**
80A 4-pole RCCB 100mA	4P	80	100	**EAM804M**
100A 4-pole RCCB 100mA	4P	100	100	**EAM1004M**

EAM404L



RCCBs – 4-pole – 300mA sensitivity

Description	Poles	Rating (A)	Sensitivity (mA)	Eaton list number
40A 4-pole RCCB 300mA	4P	40	300	**EAM404L**
63A 4-pole RCCB 300mA	4P	63	300	**EAM634L**
80A 4-pole RCCB 300mA	4P	80	300	**EAM804L**
100A 4-pole RCCB 300mA	4P	100	300	**EAM1004L**
100A 4-pole RCCB 300mA	4P	100	300, trip time delay	**EAM1004LT**

See page 138 for technical data and overall dimensions

EMBH106R10C



RCBOs single pole – trip type B – 10mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type B SP	6	B	10	**EMBH106R10C**
Eaton RCBO 10A 10kA type B SP	10	B	10	**EMBH110R10C**
Eaton RCBO 16A 10kA type B SP	16	B	10	**EMBH116R10C**
Eaton RCBO 20A 10kA type B SP	20	B	10	**EMBH120R10C**
Eaton RCBO 32A 10kA type B SP	32	B	10	**EMBH132R10C**

EMBH110R30C



RCBOs single pole – trip type B – 30mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type B SP	6	B	30	**EMBH106R30C**
Eaton RCBO 10A 10kA type B SP	10	B	30	**EMBH110R30C**
Eaton RCBO 16A 10kA type B SP	16	B	30	**EMBH116R30C**
Eaton RCBO 20A 10kA type B SP	20	B	30	**EMBH120R30C**
Eaton RCBO 32A 10kA type B SP	32	B	30	**EMBH132R30C**
Eaton RCBO 40A 6kA type B SP	40	B	30	**EMBH140R30C**
Eaton RCBO 45A 6kA type B SP	45	B	30	**EMBH145R30C**

EMBH116R100C



RCBOs single pole – trip type B – 100mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type B SP	6	B	100	**EMBH106R100C**
Eaton RCBO 10A 10kA type B SP	10	B	100	**EMBH110R100C**
Eaton RCBO 16A 10kA type B SP	16	B	100	**EMBH116R100C**
Eaton RCBO 20A 10kA type B SP	20	B	100	**EMBH120R100C**
Eaton RCBO 32A 10kA type B SP	32	B	100	**EMBH132R100C**

EMCH120R10C



RCBOs single pole – trip type C – 10mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type C SP	6	C	10	**EMCH106R10C**
Eaton RCBO 10A 10kA type C SP	10	C	10	**EMCH110R10C**
Eaton RCBO 16A 10kA type C SP	16	C	10	**EMCH116R10C**
Eaton RCBO 20A 10kA type C SP	20	C	10	**EMCH120R10C**
Eaton RCBO 32A 10kA type C SP	32	C	10	**EMCH132R10C**

EMCH110R30C



RCBOs single pole – trip type C – 30mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type C SP	6	C	30	**EMCH106R30C**
Eaton RCBO 10A 10kA type C SP	10	C	30	**EMCH110R30C**
Eaton RCBO 16A 10kA type C SP	16	C	30	**EMCH116R30C**
Eaton RCBO 20A 10kA type C SP	20	C	30	**EMCH120R30C**
Eaton RCBO 25A 10kA type C SP	25	C	30	**EMCH125R30C**
Eaton RCBO 32A 10kA type C SP	32	C	30	**EMCH132R30C**
Eaton RCBO 40A 6kA type C SP	40	C	30	**EMCH140R30C**
Eaton RCBO 45A 6kA type C SP	45	C	30	**EMCH145R30C**

EMCH132R100C



RCBOs single pole – trip type C – 100mA sensitivity

Description	Rating (A)	Trip type	Sensitivity (mA)	Eaton list number
Eaton RCBO 6A 10kA type C SP	6	C	100	**EMCH106R100C**
Eaton RCBO 10A 10kA type C SP	10	C	100	**EMCH110R100C**
Eaton RCBO 16A 10kA type C SP	16	C	100	**EMCH116R100C**
Eaton RCBO 20A 10kA type C SP	20	C	100	**EMCH120R100C**
Eaton RCBO 32A 10kA type C SP	32	C	100	**EMCH132R100C**

169608



RCBOs 3P+N 10kA

- Conditionally surge current-proof 250A.
- Sensitivity type A, providing protection against AC and pulsating DC earth fault currents.
- Trip types B, C, and D
- Trip sensitivity 30mA, 100mA or 300mA

Description Characteristic B	Rating (A)	Sensitivity (mA)	Type designation	Eaton list number
3P+N RCBO 10A 10kA trip B	10	30	mRBM4-10/3/B/003-A-UK-PT	**169636**
3P+N RCBO 13A 10kA trip B	13	30	mRBM4-13/3/B/003-A-UK-PT	**169637**
3P+N RCBO 16A 10kA trip B	16	30	mRBM4-16/3/B/003-A-UK-PT	**169638**
3P+N RCBO 20A 10kA trip B	20	30	mRBM4-20/3/B/003-A-UK-PT	**169639**
3P+N RCBO 10A 10kA trip B	10	100	mRBM4-10/3/B/01-A-UK-PT	**169670**
3P+N RCBO 13A 10kA trip B	13	100	mRBM4-13/3/B/01-A-UK-PT	**169671**
3P+N RCBO 16A 10kA trip B	16	100	mRBM4-16/3/B/01-A-UK-PT	**169584**
3P+N RCBO 20A 10kA trip B	20	100	mRBM4-20/3/B/01-A-UK-PT	**169585**
3P+N RCBO 10A 10kA trip B	10	300	mRBM4-10/3/B/03-A-UK-PT	**169598**
3P+N RCBO 13A 10kA trip B	13	300	mRBM4-13/3/B/03-A-UK-PT	**169599**
3P+N RCBO 16A 10kA trip B	16	300	mRBM4-16/3/B/03-A-UK-PT	**169600**
3P+N RCBO 20A 10kA trip B	20	300	mRBM4-20/3/B/03-A-UK-PT	**169601**

Description Characteristic C	Rating (A)	Sensitivity (mA)	Type designation	Eaton list number
3P+N RCBO 6A 10kA trip C	6	30	mRBM4-6/3/C/003-A-UK-PT	**169640**
3P+N RCBO 10A 10kA trip C	10	30	mRBM4-10/3/C/003-A-UK-PT	**169641**
3P+N RCBO 13A 10kA trip C	13	30	mRBM4-13/3/C/003-A-UK-PT	**169642**
3P+N RCBO 16A 10kA trip C	16	30	mRBM4-16/3/C/003-A-UK-PT	**169643**
3P+N RCBO20A 10kA trip C	20	30	mRBM4-20/3/C/003-A-UK-PT	**169644**
3P+N RCBO 25A 10kA trip C	25	30	mRBM4-25/3/C/003-A-UK-PT	**169645**
3P+N RCBO 32A 10kA trip C	32	30	mRBM4-32/3/C/003-A-UK-PT	**169646**
3P+N RCBO 6A 10kA trip C	6	100	mRBM4-6/3/C/01-A-UK-PT	**169586**
3P+N RCBO 10A 10kA trip C	10	100	mRBM4-10/3/C/01-A-UK-PT	**169587**
3P+N RCBO 13A 10kA trip C	13	100	mRBM4-13/3/C/01-A-UK-PT	**169588**
3P+N RCBO 16A 10kA trip C	16	100	mRBM4-16/3/C/01-A-UK-PT	**169589**
3P+N RCBO 20A 10kA trip C	20	100	mRBM4-20/3/C/01-A-UK-PT	**169590**
3P+N RCBO 25A 10kA trip C	25	100	mRBM4-25/3/C/01-A-UK-PT	**169591**
3P+N RCBO 32A 10kA trip C	32	100	mRBM4-32/3/C/01-A-UK-PT	**169592**
3P+N RCBO 6A 10kA trip C	6	300	mRBM4-6/3/C/03-A-UK-PT	**169602**
3P+N RCBO 10A 10kA trip C	10	300	mRBM4-10/3/C/03-A-UK-PT	**169603**
3P+N RCBO 13A 10kA trip C	13	300	mRBM4-13/3/C/03-A-UK-PT	**169604**
3P+N RCBO 16A 10kA trip C	16	300	mRBM4-16/3/C/03-A-UK-PT	**169605**
3P+N RCBO 20A 10kA trip C	20	300	mRBM4-20/3/C/03-A-UK-PT	**169606**
3P+N RCBO 25A 10kA trip C	25	300	mRBM4-25/3/C/03-A-UK-PT	**169607**
3P+N RCBO 32A 10kA trip C	32	300	mRBM4-32/3/C/03-A-UK-PT	**169608**

Description Characteristic D	Rating (A)	Sensitivity (mA)	Type designation	Eaton list number
3P+N RCBO 6A 10kA trip D	6	30	mRBM4-6/3/D/003-A-UK-PT	**169647**
3P+N RCBO 10A 10kA trip D	10	30	mRBM4-10/3/D/003-A-UK-PT	**169648**
3P+N RCBO 13A 10kA trip D	13	30	mRBM4-13/3/D/003-A-UK-PT	**169649**
3P+N RCBO 16A 10kA trip D	16	30	mRBM4-16/3/D/003-A-UK-PT	**169650**
3P+N RCBO 20A 10kA trip D	20	30	mRBM4-20/3/D/003-A-UK-PT	**169651**
3P+N RCBO 25A 10kA trip D	25	30	mRBM4-25/3/D/003-A-UK-PT	**169652**
3P+N RCBO 6A 10kA trip D	6	100	mRBM4-6/3/D/01-A-UK-PT	**169593**
3P+N RCBO 10A 10kA trip D	10	100	mRBM4-10/3/D/01-A-UK-PT	**169594**
3P+N RCBO 13A 10kA trip D	13	100	mRBM4-13/3/D/01-A-UK-PT	**169618**
3P+N RCBO 16A 10kA trip D	16	100	mRBM4-16/3/D/01-A-UK-PT	**169619**
3P+N RCBO 20A 10kA trip D	20	100	mRBM4-20/3/D/01-A-UK-PT	**169620**
3P+N RCBO 25A 10kA trip D	25	100	mRBM4-25/3/D/01-A-UK-PT	**169621**
3P+N RCBO 6A 10kA trip D	6	300	mRBM4-6/3/D/03-A-UK-PT	**169609**
3P+N RCBO 10A 10kA trip D	10	300	mRBM4-10/3/D/03-A-UK-PT	**169610**
3P+N RCBO 13A 10kA trip D	13	300	mRBM4-13/3/D/03-A-UK-PT	**169611**
3P+N RCBO 16A 10kA trip D	16	300	mRBM4-16/3/D/03-A-UK-PT	**169612**
3P+N RCBO 20A 10kA trip D	20	300	mRBM4-20/3/D/03-A-UK-PT	**169613**
3P+N RCBO 25A 10kA trip D	25	300	mRBM4-25/3/D/03-A-UK-PT	**169614**

ASPDL



Padlocking devices

For MCBs, RCCBs, RCBOs & switch disconnectors

- The wide range of Eaton devices are complimented by a range of padlocking devices.
- For MCBs and RCCBs the device mechanism is trip free which allows it to be padlocked 'ON' for security, but in the event of a fault condition the device will still operate to disconnect the fault. The device will move to the tripped position when the lock is removed. These devices can also be padlocked in the 'OFF' position.

Description	Eaton list number
Universal device lockout attachment – fits MCBs, RCCBs and RCBOs	**ASPDL**
Lockout attachment for 27mm MCBs	**ASPDL27**
Padlock	**PD2**

ASALMSN



Auxiliary and alarm contacts including test function

For 18mm MCB & RCBO

Auxiliary and alarm contact devices can be fitted together on one MCB. Each is incorporated in a 1/2 module (9 mm) casing with terminals protected to IP 20 capable of accepting cable up to 2.5 mm^2. These devices are designed and manufactured to IEC 60947-5-1 and incorporate a changeover switch providing remote indication of an MCB which has tripped under fault conditions.

Technical characteristics

- This auxiliary switch allows remote indication of the position of the MCB contacts.
- Auxiliary and Alarm contact ratings:
  - AC14 240 Vac 50Hz, 6A.
  - DC14 125 Vdc, 1A.
- The auxiliary contact will not differentiate between an MCB that is "off" or "tripped".
- The auxiliary contact can be used in conjunction with a remote supply and signal lamps, bells or buzzers.

Description	Quantity per carton	Eaton list number
Auxiliary switch incorporating a test function	1	**ASAUXSN**[1)]
Alarm switch incorporating reset and test function	1	**ASALMSN**[1)]

[1)] Not suitable for use in distribution boards

ASSNTSN415



Shunt trips

For 18mm MCB & RCBO

Technical characteristics

- Suitable for all Eaton MCBs including those with either auxiliary or alarm contacts.
- A shunt trip and undervoltage release can be fitted together on one MCB.
- Each is incorporated in a 1 module (18 mm) casing with terminals protected to IP 20 capable of accepting cable up to 2.5 mm^2.
- The shunt trip and UVR are simply clipped to the left hand side of an MCB and have terminals at one end to allow connection to pan assemblies and comb busbar.
- A shunt release provides remote trippping of an MCB with three voltage options for AC & DC applications.

Description	dc characteristics	ac characteristics	Quantity per carton	Eaton list number
MCB shunt trip	48 V–60 Vdc	48 V–110 Vac	1	**ASSNTSN110**[1)]
MCB shunt trip	110 Vdc	240 Vac	1	**ASSNTSN415**[1)]

[1)] Not suitable for use in distribution boards
Other voltages are available.

ASUVRSC230



Under voltage release

For 18mm MCB & RCBO

- Under voltage release (UVR) for remote tripping of an emergency stop loop.
- The UVR is simply clipped to the left hand side of an MCB and have terminals at one end to allow connection to pan assemblies and comb busbar.

Description	ac characteristics	Quantity per carton	Eaton list number
Under voltage release	240 Vac	1	**ASUVRSC230**[1)]

[1)] Not suitable for use in distribution boards



Eaton's wide range of modular timers and twilight switches are suitable for any residential or commercial application offering automatic lighting control. Contactors are frequently applied for switching of lamp loads, fans or pumps in both utility as well as industrial areas.

4.1 MODULAR SWITCHES / TIMERS AND TWILIGHT SWITCHES

Universal declaration type coding 54

Analogue time switches - 50 Hz mains synchronised 55

Analogue time switches - Quartz controlled 55

Analogue weekly time switches - Quartz controlled 55

Digital weekly time switches, 1 channel 56

Digital weekly time switches, 2 channel 57

Twilight switches for DIN rail mounting 58

Twilight switch for surface mounting 59

Antenna for DCF signal reception 60

Antenna including power supply for GPS signal reception 60

Programming software kit including memory card 60

4.2 CONTACTORS

Contactors, 20A 61

Contactors, 25A 61

Contactors, 40A 61

Contactors, 63A 62

Day/night contactors 62

Auxiliary contacts 62

4.3 TRANSFORMERS AND EARTH LEAKAGE RELAYS

Transformer 8/12v 1.0A 63

Earth leakage relays and current transformers 63

4.1 Modular control and switching devices

Timers and twilight switches

Timers & Twilight Switches are applied in any residential, commercial and industrial buildings wherever automatic control is required on predefined times and/or depending on daylight intensity.

The Eaton range comprises of a wide variety of different products which include analogue Timers, digital Timers, Twilight Switches and Staircase Timers.

These Timers can either be controlled by a 50Hz net-synchronisation, quartz control and time synchronisation or using the DCF signal or GPS antenna,which guarantees 100% accuracy at all times. Except for net-synchronised timers all units do have self power reserve to secure the time setting and program storage in case a power interruption does occur.

Dedicated computer software and memory cards are available to support the programming of our most advanced timers. Automatic summer and winter time, holiday and random switching programs complete the functionality of our range.

Twilight Switches are supplied with a remote light sensor, which can be easily installed on the outside wall where the required light intensity threshold can be simply adjusted on the modular device itself.

Technical characteristics (depending on type)

- Modular design.
- Analogue and digital timers.
- Time adjustment by 50 Hz net, quartz control, DCF1)
- or GPS signal reception 2).
- Manual override switching function.
- Power reserve for all quartz and DCF or GPS driven switches.
- Remote light sensor for twilight switching.

Benefits

- Easily programmable on front of device.
- Computer aided programming software available.
- Compact 18 mm design for restricted space opportunities.
- Separate IP40 covers are available for direct wall mounting.
- High level of accuracy.
- Automatic summer and winter time adjustment.
- Holiday & Random program settings.
- High power reserve up to 10 years.

Notes:

[1] Automatic calculation of sunrise and sunset times throughout the year, including the possibility of astro times + / -2 hour shift.

[2] The DCF-signal can only be received within a 1000 km radius.

Universal declaration type coding

Type coding - analogue switches

TS	Q	D	1NO
TS	S	D	1NO
TS	Q	D	1CO
TS	S	D	1CO
TS	Q	W	1CO

TS = Switch
Q / S = Quartz / 50 Hz net-synchronisation
D / W = Day / week programme
1NO / 1CO = Create / change (contact configuration)

Type coding - digital switches

TS	D	W	1CO	-
TS	D	W	2CO	-
TS	D	W	1CO	A
TS	D	W	1CO	DG
TS	D	W	1CO	MIN

TS = Switch
D = Digital
W = Week programme
1CO / 2CO = Exchange / 2 x changeover (contact configuration)
A = Astroclock
DG = DCF or GPS controlled
MIN = Compact 18mm design version

Type coding - digital switches and accessories

TS	A	DCF
TS	A	GPSKIT
TS	A	MEMKIT
TS	A	MEM

TS = Switch
A = Accessory
DCF = DCF-antenna
GPSKIT = Antenna for GPS signal reception including power supply
MEMKIT = Programming software kit
MEM = Memory

Type coding - twilight switches

SR	S	D	1NO	-
SR	S	W	1NO	-
SR	C	D	1CO	-
SR	S	D	1CO	W

SR = Twilight switch
S / C = With or without sensor
D / W = DIN rail mounting / surface mounting
1NO / 1CO = Create / change (contact configuration)
W = Wide adjustable sensitivity (2 - 50000 lux)

Technical characteristics (dependant of type)

- Supply voltage 230 V / 50 - 60 Hz (50 Hz for just synchronised versions)
- 50 Hz-mains synchronised or Quartz controlled.
- Daily or weekly programme.
- Manual override switching function.
- Compact 18mm design for restricted space opportunities.

See page 60 for accessories
See page 139 for technical data

167391



Analogue time switches - 50 Hz mains synchronised

Standard version

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Day	50 Hz-net	1	CO	-	15 min.	52.5 mm	TSSD1CO	1	**167391**

167389



Analogue time switches - 50 Hz mains synchronised

18 mm compact design

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Day	50 Hz-net	1	NO	-	15 min.	17.5mm	TSSD1NO	1	**167389**

167390



Analogue time switches - Quartz controlled

Standard version

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Day	Quartz	1	CO	200 hrs	15 min.	52.5 mm	TSQD1CO	1	**167390**

167388



Analogue time switches - Quartz controlled

18 mm compact design

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Day	Quartz	1	NO	3 y rs	15 min.	17.5 mm	TSQD1NO	1	**167388**

167392



Analogue weekly timer switches - Quartz controlled

Standard version

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Week	Quartz	1	CO	200 hrs	2 hrs	52.5 mm	TSQW1CO	1	**167392**

Technical characteristics

- Operating voltage 230 V / 50 - 60 Hz.
- 1 or 2 channel.
- Quartz controlled.
- 3 to 10 year power reserve.
- Weekly programme.
- Manual ON (and depending on type OFF) switching.
- Text-oriented user guidance in display.
- Display back light (switchable).
- Compact 18mm design for restricted space.
- Automatic summer and winter adjustment.
- Holiday programme.
- Zero crossing switching relay for longer life.
- Integrated operating hour counter.
- TSDW1CO, TSDW2CO, TSDW1COA, TSDW1CODG:
- Interface for memory.

See page 60 for accessories
See page 141 for technical data

167379



Digital weekly time switches, 1 channel

Standard version

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Week	Quartz	1	CO	10 year	1 min.	56 35.8 mm	TSDW1CO	1	**167379**

167383



Digital weekly time switches, 1 channel

1TE wide version

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Week	Quartz	1	CO	3 year	1 min.	28 17.5 mm	TSDW1COMIN	1	**167383**

167382



Digital weekly time switches, 1 channel

Version with Antenna connection

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Week	Quartz, DCF / GPS	1	CO	10 year	1 sec.	84 35.8 mm	TSDW1CODG	1	**167382**

167381



Digital weekly time switches, 1 channel

Astronomical

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Week	Quartz with astronomical	1	CO	10 year	1 min.	56 35.8 mm	TSDW1COA	1	**167381**

167380



Digital weekly time switches, 2 channels

Standard version

Program range	Type	Channels	Contact configuration	Power reserve	Min. cycling time	Width	Type	QPC	Eaton list number
Week	Quartz	2	2 x CO	10 year	1 min.	56 35.8 mm T	SDW2CO	1	**167380**

Technical characteristics

- Operating voltage 220 - 240 V / 50 - 60 Hz.
- 1 channel.
- Controlled by external light sensor (supplied).
- Built-in time delay included for unwanted switching e.g. due to car lamp influences (adjustable to type SRSD1COW and SRCD1CO).Manual ON (and depending on type OFF) switching.
- Text-oriented user guidance in display.
- Switching status indication.
- Adjustable light intensity level.

SRCD1CO

- Manual ON and OFF switching.
- Back lit display.
- Automatic summer and winter time adjustment.
- Holiday programme.
- Zero crossing switching relay for longer life.
- Integrated operating hour counter.
- Memory interface.
- Test function.

See page 60 for accessories
See page 143 for the technical data

167375



Twilight switches for DIN rail mounting

18 mm compact design

Description	Channels	Adjustable sensitivity	Contact configuration	Width	Type	QPC	Eaton list number
Twilight switch with light sensor	1	2 - 100 lux	NO	17.5 mm	SRSD1NO	1	**167375**

167378



Twilight switches for DIN rail mounting

Advanced version, 1 channel

Description	Channels	Adjustable sensitivity	Contact configuration	Width	Type	QPC	Eaton list number
Twilight switch with light sensor	1	2 - 200 lux	CO	54 mm	SRSD1COW	1	**167378**

167377



Twilight switches for DIN rail mounting

Combined version

Program range	Channels	Adjustable sensitivity	Contact configuration	Width	Type	QPC	Eaton list number
Week	1	2 - 200 lux	CO	72 mm	SRCD1CO	1	**167377**

Technical characteristics

- Operating voltage 220 - 230 V / 50 - 60 Hz.
- 1 channel.
- Integrated light sensor.
- Time delay included for unwanted switching, adjustable (e.g. due to car lamp influences).
- Back or bottom cable entry.
- Adjustable light intensity on the outside.
- Large light level (180 degrees).
- Test button.
- Degree of protection: IP55.

See page 60 for accessories
See page 143 for technical data

167376



Twilight switch for surface mounting

1 channel

Program range	Channels	Adjustable sensitivity	Contact configuration	Width	Type	QPC	Eaton list number
Week	1	2 - 2.000 lux	NO	85 mm	SRSW1NO	1	**167376**

167384



Antenna for DCF signal reception

- By using DCF reception 100% accuracy is obtained. A DCF antenna is required to be mounted on an outside wall. The DCF signal reception is only operable when the timer is connected to the remote DCF antenna and fed by a DCF power supply.
- DCF antenna for digital TSDW1CODG.

Description	Type	QPC	Eaton list number
DCF-antenna 1	TSADCF	1	**167384**

167385



Antenna includes power supply for GPS signal reception

- Antenna includes power supply for TSDW1CODG.

Description	Type	QPC	Eaton list number
Antenna for GPS signal reception, includes power supply	TSAGPSKIT	1	**167385**

167387



Programming software kit

- For SRCD1CO, TSDW1CO, TSDW2CO, TSDW1COA, TSDW1CODG.

Description	Type	QPC	Eaton list number
Programming software kit including adaptor cable, software and memory card	TSAMEMKIT	1	**167386**
Memory card	TSAMEM	1	**167387**

See pages 139-144 for timers and twilight switches technical data and overall dimensions.

- For other coil voltages contact technical support

See pages 145-146 for contactors technical data and overall dimensions.

CR2011230A



Contactors, 20 A – ac coil

When several contactors are mounted it is advisable to fit a blanking module, List number **EMBP**, every two contactors.

Description	Rating (A)	Coil voltage (Vac)	Coil voltage (Vdc)	Width (mm)	Contacts	Eaton list number
Contactor	20	230	–	18	1 NO + 1 NC	**CR2011230A**
Contactor	20	230	–	18	2 NC	**CR2002230A**
Contactor	20	230	–	18	2 NO	**CR2020230A**

CR2020024



Contactors, 20 A – ac/dc coil

When several contactors are mounted it is advisable to fit a blanking module, List number **EMBP**, every two contactors.

Description	Rating (A)	Coil voltage (Vac)	Coil voltage (Vdc)	Width (mm)	Contacts	Eaton list number
Contactor	20	230	220	18	1 NO + 1 NC	**CR2011230**
Contactor	20	230	220	18	2 NC	**CR2002230**
Contactor	20	230	220	18	2 NO	**CR2020230**

CR2540230A



Contactors, 25 A – ac coil

When several contactors are mounted it is advisable to fit a blanking module, List number **EMBP**, every two contactors.

Description	Rating (A)	Coil voltage (Vac)	Coil voltage (Vdc)	Width (mm)	Contacts	Eaton list number
Contactor	25	230	–	36	2 NO + 2 NC	**CR2522230A**
Contactor	25	230	–	36	3 NO	**CR2530230A**
Contactor	25	230	–	36	4 NC	**CR2504230A**
Contactor	25	230	–	36	4 NO	**CR2540230A**

CR2504024



Contactors, 25 A – ac/dc coil

When several contactors are mounted it is advisable to fit a blanking module, List number **EMBP**, every two contactors.

Description	Rating (A)	Coil voltage (Vac)	Coil voltage (Vdc)	Width (mm)	Contacts	Eaton list number
Contactor	25	230	220	36	2 NO + 2 NC	**CR2522230**
Contactor	25	230	220	36	3 NO	**CR2530230**
Contactor	25	230	220	36	4 NC	**CR2504230**
Contactor	25	230	220	36	4 NO	**CR2540230**

CR4030024



Contactors, 40 A – ac/dc coil

When several contactors are mounted it is advisable to fit a blanking module, List number **EMBP**, every two contactors.

Description	Rating (A)	Coil voltage (Vac)	Coil voltage (Vdc)	Width (mm)	Contacts	Eaton list number
Contactor	40	230	220	54	2 NC	**CR4002230**
Contactor	40	230	220	54	2 NO	**CR4020230**
Contactor	40	230	220	54	3 NO	**CR4030230**
Contactor	40	230	220	54	4 NO	**CR4040230**

CR6320230



Contactors, 63 A – ac/dc coil

When several contactors are mounted it is advisable to fit a blanking module, List number **EMBP**, every two contactors.

Description	Rating (A)	Coil voltage (Vac)	Coil voltage (Vdc)	Width (mm)	Contacts	Eaton list number
Contactor	63	230	220	54	2 NO	**CR6320230**
Contactor	63	230	220	54	4 NO	**CR6340230**

CRM2540230A



Day/night contactors, 20–25 A – ac coil

When several contactors are mounted it is advisable to fit a blanking module or spacer every two contactors. Day/night contactors do have a manual override function, which enables the user to bring the contactor in either a forced "ON" or "OFF" position. The contactor can only be brought into the forced "ON" position when it is de-energised. When the contactor is energised the operation will return into the normal/automatic position.

Description	Rating (A)	Coil voltage (Vac)	Width (mm)	Contacts	Eaton list number
Contactor	20	230	18	2 NO	**CRM2020230A**
Contactor	25	230	36	4 NO	**CRM2540230A**

CRA611



Auxiliary contacts

Can be connected at the right-side of the contactor.

Description	Rating (A)	Width (mm)	Contacts	Eaton list number
Auxiliary	6	9	1 NO + 1 NC	**CRA611**
Auxiliary	6	9	2 NO	**CRA620**

TR-G3/8



Transformers

Description	Volts	Amps	Width (mm)	Module	Eaton list number
Bell Transformer 2 module	12	0.6	36	1	**TR-G3/8**
	8	1.0			

Earth leakage relays & CTs

Suitable for use with all Eaton MCCBs & MCBs to provide add-on earth leakage protection functionality. The earth leakage relay is used with an **ELRCT** series current transformer (core balance) and an appropriate MCB/MCCB shunt trip or undervoltage release. Power supply required 220-240V ac, 50/60Hz. Output contacts (volt-free) rated at 250V ac, 6A. Power and system LEDs show status of the relay, CT continuity, level of earth leakage, earth leakage trip. Eaton earth leakage relays are designed & tested in accordance with IEC61008-1.

See page 147 for dimensional details.

PFR-5



Earth leakage relays – adjustable trip

Description	Sensitivity	Time delay	Width	Eaton list number
Earth leakage relay	Adjustable 30mA,100mA, 300mA, 500mA, 1A, 3A, 5A	Adjustable 0.02, 0.1, 0.3, 0.5, 1, 3, 5s	36mm	**PFR-5**

PFR-003



Earth leakage relays – fixed trip

Description	Sensitivity	Time delay	Width	Eaton list number
Earth leakage relay	Fixed 30mA	Instantaneous (0.02s)	36mm	**PFR-003**
Earth leakage relay	Fixed 300mA	Instantaneous (0.02s)	36mm	**PFR-03**

PFR-W-20–
PFR-W-105



Current transformers (core balance)

- One current transformer required per relay.

Description	Inner dimension	Eaton list number
Current Transformer	20mm diameter	**PFR-W-20**
	30mm diameter	**PFR-W-30**
	35mm diameter	**PFR-W-35**
	70mm diameter	**PFR-W-70**
	105mm diameter	**PFR-W-105**
	140mm diameter	**PFR-W-140**
	210mm diameter	**PFR-W-210**

Memshield 3 MCCB panelboards and associated devices



A complete range of MCCB panelboards and pan assemblies providing all the options you need from a straightforward panelboard to a comprehensive panelboard system. The range now offers a variety of incoming devices and a greater choice of outgoing ways to provide more flexibility and choice to the user.

5.1 INCOMING DEVICE RATINGS UP TO 250A – OUTGOING DEVICE RATINGS UP TO 160A 66
5.2 INCOMING DEVICE RATINGS UP TO 400A – OUTGOING DEVICE RATINGS UP TO 160A 70
5.3 INCOMING DEVICE RATINGS UP TO 400A – OUTGOING DEVICE RATINGS UP TO 250A 74
5.4 INCOMING DEVICE RATINGS UP TO 630A – OUTGOING DEVICE RATINGS UP TO 250A 78
5.5 INCOMING DEVICE RATINGS UP TO 800A – OUTGOING DEVICE RATINGS UP TO 400A 82
5.6 PLUG-IN INCOMING METERING 86
5.7 PLUG-IN OUTGOING METERING 88
5.8 LIGHTNING & SURGE SUPPRESSION FOR MCCB PANELBOARDS 90
5.9 MCCB PAN ASSEMBLIES 91

5.1 Memshield 3 MCCB panelboards and associated devices

Incoming device ratings up to 250A – outgoing device ratings up to 160A

Specification

- Panelboards to IEC61439-2. Form 3b Type 2
- Busbar system KEMA certified 50kA Icc, Icw 25kA 1s
- IP3X construction
- MCCBs to IEC60947-2. kA ratings shown are Ics=Icu at 400V ac
- Switch disconnectors to IEC60947-3

Features

- 4, 6, 8, or 12 outgoing TP ways
- Outgoing devices; NZM1 16A–125A SP & 20A–160A TP
- Tin–plated busbars
- Can be configured for incomer device at top of panelboard
- Removable side gland plates as standard
- Wide range of extension boxes, metering, surge protection, and earth leakage incomer options available

See pages 149-151 for dimensions.

EPBN1425



- Minimum ordering requirement: panelboard + incoming device + incomer connection kit + outgoing devices + blanking plates

Description	Associated incoming device	Current rating (A)	No. of ways	Eaton list number
Incoming rating up to 250A, outgoing ratings up to 160A	NZM2 MCCB or N2 switch disconnector or direct lugs connection	250	4	**EPBN1425**
			6	**EPBN1625**
			8	**EPBN1825**
			12	**EPBN11225**

NZMC2-A250KCO



MCCB incoming device

- 36kA or 50kA options
- Select appropriate incomer device from table below
- Maximum cable capacity 185mm²
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, Magnetic trip adjustment 6 to 10 x In

Poles	Incoming device type	Current rating (A)	Eaton list number Short circuit rating 36kA	50kA
3-pole	NZM2 MCCB	160	**NZMC2-A160KCO**	**NZMN2-A160KCO**
		200	**NZMC2-A200KCO**	**NZMN2-A200KCO**
		250	**NZMC2-A250KCO**	**NZMN2-A250KCO**
4-pole (3 phase and switched neutral)	NZM2 MCCB	160	**NZMC2-4-A160KCO**	**NZMN2-4-A160KCO**
		200	**NZMC2-4-A200KCO**	**NZMN2-4-A200KCO**
		250	**NZMC2-4-A250KCO**	**NZMN2-4-A250KCO**

N2-250KCO



Switch disconnector (non-automatic) incoming device

- Select appropriate incomer device from table below
- Maximum cable capacity 185mm²

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	N2 Switch disconnector	250	**N2-250KCO**
4-pole	N2 Switch disconnector	250	**N2-4-250KCO**

EPBKN125L



Incomer connection kit/metering connection kit

- See incoming metering section below to order metering components

Poles	Maximum rating (A)	Eaton list number
3-pole incomer connection kit	250	**EPBKN1253**
3-pole incomer connection kit – includes metering CT and CT to meter cable	250	**EPBKN1253M**
4-pole incomer connection kit	250	**EPBKN1254**
4-pole incomer connection kit – includes metering CT and CT to meter cable	250	**EPBKN1254M**
Direct connection lugs kit	250	**EPBKN125L**
Direct connection lugs kit – includes metering CT and CT to meter cable	250	**EPBKN125LM**
Adapter kit for use when incomer device mounted at top of panelboard	230	**EPBKTFSN2**[1]

[1] Maximum rating of panelboard when top fed is 230A

NZMB1-1-AF63 and NZMB1-A160



Outgoing devices – NZM1 frame MCCBs

- Maximum cable capacity 70mm²
- Single pole fixed trip. Triple pole thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Single pole 25kA	Triple pole 25kA[1] [2]
16	**NZMB1-1-AF16**	–
20	**NZMB1-1-AF20**	**NZMB1-A20**
32	**NZMB1-1-AF32**	**NZMB1-A32**
40	**NZMB1-1-AF40**	**NZMB1-A40**
50	**NZMB1-1-AF50**	**NZMB1-A50**
63	**NZMB1-1-AF63**	**NZMB1-A63**
80	**NZMB1-1-AF80**	**NZMB1-A80**
100	**NZMB1-1-AF100**	**NZMB1-A100**
125	**NZMB1-1-AF125**	**NZMB1-A125**
160	–	**NZMB1-A160**

[1] 36kA triple pole also available, change 'B' to 'C' in list number, ie **NZMC1-A125**

[2] 50kA triple pole also available, change 'B' to 'N' in list number, ie **NZMN1-A125**

EPBN1BP1



Accessories

Description	Eaton list number
SP blanking module NZM1 frame (i.e. order 3 per TP way)	**EPBN1BP1**
Panel door lock with 2 keys (have same key code)	**EPBDLK1**
Terminal shroud for outgoing MCCB type NZM1 1P	**NZM1-1-XKSA**
Terminal shroud for outgoing MCCB type NZM1 3P	**NZM1-XKSA**
Shunt trip 208-250AC/DC for NZM1 (excl. 1P)	**259744**
Shunt trip 208-250AC/DC for NZM2/N2	**259763**
Undervoltage release 208–240AC for NZM1 (excl. 1P)	**259471**
Undervoltage release 208–240AC for NZM2/N2	**259499**
Handle lock for MCCB type NZM1	**260199**
Handle lock for MCCB types NZM2 and NZM3	**260201**

EPBN1425SXB



Cable extension boxes – side mounted

Description	Eaton list number
To fit 4 way panelboard **EPBN1425**	**EPBN1425SXB**
To fit 6 way panelboard **EPBN1625**	**EPBN1625SXB**
To fit 8 way panelboard **EPBN1825**	**EPBN1825SXB**
To fit 12 way panelboard **EPBN11225**	**EPBN11225SXB**

EPBN1EX250



Cable extension boxes – top/bottom mounted

Description	Eaton list number
250mm high	**EPBN1EX250**

EPBN1CX250



Corner filler boxes

Description	Eaton list number
For use where top/bottom/meter boxes are fitted in conjunction with side cable boxes	**EPBN1CX250**

EPBN1EXDIN



Din rail extension boxes

Description	Height	Number 18mm Din modules	Eaton list number
For housing din rail mounted command/control equipment, ie timers/contactors	250mm	15	**EPBN1EXDIN**

Metering components – refer to pages 86-89 for more explanation

(Requires appropriate incomer connection kit with metering option selected from above)

EPBMETER1



Incoming metering – digital

- Includes both Modbus and Pulsed outputs

Description	Eaton list number
Incomer meter enclosure (can be fitted to top or bottom of panelboard). Meter not included	**EPBN1EX250M**
Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individua/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)	**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses). One per panelboard required, irrespective of number of meters	**EPBN1SUPM**

EPBN11225SXM



Outgoing side mounted metering – digital

Description	Number of meter spaces in metering enclosure	Number of meter blanking plates included	Eaton list number
Side mounted metering enclosure to fit 4 way panelboard **EPBN1425**	2	1	**EPBN1425SXM**[1)]
Side mounted metering enclosure to fit 6 way panelboard **EPBN1625**	3	2	**EPBN1625SXM**[1)]
Side mounted metering enclosure to fit 8 way panelboard **EPBN1825**	4	3	**EPBN1825SXM**[1)]
Side mounted metering enclosure to fit 12 way panelboard **EPBN11225**	6	5	**EPBN11225SXM**[1)]
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM1 frame MCCBs. 160A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT160**
Three phase splitter box to allow separate monitoring of a three phase current transformer on individual energy meters			**EPBCTMT3P**
Meter includes both Modbus and Pulsed outputs Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individua/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)			**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses), not required if incoming metering is being used			**EPBN1SUPM**
Extra long (2m) meter to meter voltage supply linking cable with connectors			**EPBN3LKKTM**
Extra long (2.5m) CT to meter plug-in cable			**EPBN3LKRJ45**
CT supporting mount to allow CT to be fitted in side mounted cable extension box if terminal shields being fitted to MCCBs			**EPBSXBCTMT**
Spare blanking plate for unused meter ways in metering enclosure			**EM96BP**

[1)] Suffix 'M' indicates cut-outs for meters and hinged door for outgoing metering suitable for left and right hand applications. Can be used with side mounted cable extension boxes if required

EPBN1SPD123



Transient voltage surge suppression units, externally mounted in own enclosure

- See page 90 for full technical specification
- Includes 63A TP NZM1 MCCB for protection/isolation
- See page 131 for dimensions

Description	Eaton list number
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes III and IV in accordance with IEC 62305	**EPBN1SPD123**
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes I, II, III and IV in accordance with IEC 62305	**EPBN1SPD1234**

EPBKEL250



Earth leakage protection

- Direct bolt-on module used in conjunction with 4-pole incomer device, 250A maximum rating
- Sensitivity adjustable from 0.1A to 3A. Time delay adjustable from 60ms to 450ms

Description	Eaton list number
Earth leakage protection add-on kit for incomer device. 250mm high extension box included	**EPBKEL250**

Cable size summary

Incoming cables	
MCCB or switch disconnector size max/type	185mm^2/tunnel terminals
Direct connection lugs incomer	M8
Neutral	M8
Earth	M10
Outgoing cables	
NZM1 MCCB size max/type	70mm^2/cable clamp (95mm^2 can be fitted depending on cable manufacturer)
Neutral size max/type	50mm^2 tunnel terminals and 2 x M8 bolts
Earth size max/type	50mm^2 tunnel terminals

5.2 Memshield 3 MCCB panelboards and associated devices

Incoming device ratings up to 400A – outgoing device ratings up to 160A

Specification

- Panelboards to IEC61439-2. Form 3b Type 2
- Busbar system KEMA certified 50kA Icc, Icw 30kA 1s
- IP3X construction
- MCCBs to IEC60947-2. kA ratings shown are Ics=Icu at 400V ac
- Switch disconnectors to IEC60947-3

Features

- 6 or 12 outgoing TP ways
- Outgoing devices; NZM1 16A–125A SP & 20A–160A TP
- Tin–plated busbars
- Can be configured for incomer device at top of panelboard
- Removable side gland plates as standard
- Wide range of extension boxes, metering, surge protection, and earth leakage incomer options available

See pages 149 -151 for dimensions.

EPBN1640



- Minimum ordering requirement: panelboard + incoming device + incomer connection kit + outgoing devices + blanking plates

Description	Associated incoming device	Current rating (A)	No. of ways	Eaton list number
Incoming rating up to 400A, outgoing ratings up to 160A	NZM3 MCCB or N3 switch disconnector or direct lugs connection	400	6	**EPBN1640**
			12	**EPBN11240**

NZMN3-A400



MCCB incoming device

- 50kA
- Select appropriate incomer device from table below
- Maximum cable capacity 240mm²
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, Magnetic trip adjustment 6 to 10 x In

Poles	Incoming device type	Current rating (A)	Eaton list number Short circuit rating
3-pole	NZM3 MCCB	250	**NZMN3-A250**
		320	**NZMN3-A320**
		400	**NZMN3-A400**
4-pole (3 phase and switched neutral)	NZM3 MCCB	250	**NZMN3-4-A250**
		320	**NZMN3-4-A320**
		400	**NZMN3-4-A400**

N3-400



Switch disconnector (non-automatic) incoming device

- Select appropriate incomer device from table below
- Maximum cable capacity 240mm²

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	N2 switch disconnector	400	**N3-400**
4-pole	N2 switch disconnector	400	**N3-4-400**

EPBKN2403



Incomer connection kit/metering connection kit

- See incoming metering section below to order metering components

Poles	Maximum rating (A)	Eaton list number
3-pole incomer connection kit	400	**EPBKN2403**
3-pole incomer connection kit – includes metering CT and CT to meter cable	400	**EPBKN2403M**
4-pole incomer connection kit	400	**EPBKN2404**[1]
4-pole incomer connection kit – includes metering CT and CT to meter cable	400	**EPBKN2404M**
Direct connection lugs kit	400	**EPBKN240L**
Direct connection lugs kit – includes metering CT and CT to meter cable	400	**EPBKN240LM**
Adapter kit for use when incomer device mounted at top of panelboard	370	**EPBKTFSN3**[2]

[1] Requires use of cable extension box **EPBN2EX250**

[2] Maximum rating of panelboard when top fed is 370A

NZMB1-1-AF63 and NZMB1-A160



Outgoing devices – NZM1 frame MCCBs

- Maximum cable capacity 70mm²
- Single pole fixed trip. Triple pole thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Single pole 25kA	Triple pole 25kA[1] [2]
16	**NZMB1-1-AF16**	–
20	**NZMB1-1-AF20**	**NZMB1-A20**
32	**NZMB1-1-AF32**	**NZMB1-A32**
40	**NZMB1-1-AF40**	**NZMB1-A40**
50	**NZMB1-1-AF50**	**NZMB1-A50**
63	**NZMB1-1-AF63**	**NZMB1-A63**
80	**NZMB1-1-AF80**	**NZMB1-A80**
100	**NZMB1-1-AF100**	**NZMB1-A100**
125	**NZMB1-1-AF125**	**NZMB1-A125**
160	–	**NZMB1-A160**

[1] 36kA triple pole also available, change 'B' to 'C' in list number, ie **NZMC1-A125**

[2] 50kA triple pole also available, change 'B' to 'N' in list number, ie **NZMN1-A125**

EPBDLK1



Accessories

Description	Eaton list number
SP blanking module NZM1 frame (i.e. order 3 per TP way)	**EPBN1BP1**
Panel door lock with 2 keys (have same key code)	**EPBDLK1**
Terminal shroud for outgoing MCCB type NZM1 1P	**NZM1-1-XKSA**
Terminal shroud for outgoing MCCB type NZM1 3P	**NZM1-XKSA**
Shunt trip 208–250AC/DC for NZM1 (excl. 1P)	**259744**
Shunt trip 208–250AC/DC for NZM3/N3	**259763**
Undervoltage release 208–240AC for NZM1 (excl. 1P)	**259471**
Undervoltage release 208–240AC for NZM3/N3	**259499**
Handle lock for MCCB type NZM1	**260199**
Handle lock for MCCB types NZM2 and NZM3	**260201**

EPBN21240SXB



Cable extension boxes – side mounted

Description	Eaton list number
To fit 6 way panelboard **EPBN1640**	**EPBN2640SXB**
To fit 12 way panelboard **EPBN11240**	**EPBN21240SXB**

EPBN2EX250



Cable extension boxes – top/bottom mounted

Description	Eaton list number
250mm high	**EPBN2EX250**

EPBN2CX250



Corner filler boxes

Description	Eaton list number
For use where top/bottom/meter boxes are fitted in conjunction with side cable boxes	**EPBN2CX250**

EPBN2EXDIN



Din rail extension boxes

Description	Height	Number 18mm Din modules	Eaton list number
For housing din rail mounted command/control equipment, ie timers/contactors	250mm	15	**EPBN2EXDIN**

Metering components – refer to pages 86-89 for more explanation

(Requires appropriate incomer connection kit with metering option selected from above)

EPBN2EX250M



Incoming metering – digital

- Includes both Modbus and Pulsed outputs
- See page 86 for detailed selection guide

Description	Eaton list number
Incomer meter enclosure (can be fitted to top or bottom of panelboard). Meter not included	**EPBN2EX250M**
Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)	**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses). One per panelboard required, irrespective of number of meters	**EPBN3SUPM**

EPBN21240SXM



Outgoing side mounted metering – digital

- See page 88 for detailed selection guide

Description	Number of meter spaces in metering enclosure	Number of meter blanking plates included	Eaton list number
Side mounted metering enclosure to fit 6 way panelboard EPBN1640	3	2	**EPBN2640SXM**[1)]
Side mounted metering enclosure to fit 12 way panelboard EPBN11240	6	5	**EPBN21240SXM**[1)]
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM1 frame MCCBs. 160A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT160**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM1 frame MCCBs. 250A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT250**
Three phase splitter box to allow separate monitoring of a three phase current transformer on individual energy meters			**EPBCTMT3P**
Meter includes both Modbus and Pulsed outputs Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)			**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses), not required if incoming metering is being used			**EPBN3SUPM**
Extra long (2m) meter to meter voltage supply linking cable with connectors			**EPBN3LKKTM**
Extra long (2.5m) CT to meter plug-in cable			**EPBN3LKRJ45**
CT supporting mount to allow CT to be fitted in side mounted cable extension box if terminal shields being fitted to MCCBs			**EPBSXBCTMT**
Spare blanking plate for unused meter ways in metering enclosure			**EM96BP**

[1)] Suffix 'M' indicates cut-outs for meters and hinged door for outgoing metering suitable for left and right hand applications. Can be used with side mounted cable extension boxes if required

EPBN1SPD123



Transient voltage surge suppression units, externally mounted in own enclosure

- See page 90 for full technical specification
- Includes 63A TP NZM1 MCCB for protection/isolation
- See page 131 for dimensions

Description	Eaton list number
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes III and IV in accordance with IEC 62305	**EPBN1SPD123**
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes I, II, III and IV in accordance with IEC 62305	**EPBN1SPD1234**

EPBKEL400



Earth leakage protection

- Kit comprises 350mm high extension box fitted with earth leakage relay, core balance transformer, all cables/terminals/protection fuses, and 230V shunt trip (for tripping of incomer device). Requires 4-pole incomer device. 400A maximum rating
- Sensitivity adjustable from 30mA to 5A. Time delay adjustable from 0.02 to 5 seconds

Description	Eaton list number
Earth leakage protection add-on module for incomer device	**EPBKEL400**

Cable size summary

Incoming cables	
MCCB or switch disconnector size max/type	240mm^2/M12 bolt
Direct connection lugs incomer	M12
Neutral	M8
Earth	M10
Outgoing cables	
NZM1 MCCB size max/type	70mm^2/cable clamp. (95mm^2 can be fitted depending on cable manufacturer)
Neutral size max/type	50mm^2 tunnel terminals and 2 x M8 bolts
Earth size max/type	50mm^2 tunnel terminals

5.3 Memshield 3 MCCB panelboards and associated devices

Incoming device ratings up to 400A – outgoing device ratings up to 250A

Specification

- Panelboards to IEC61439-2. Form 3b Type 2
- Busbar system KEMA certified 50kA Icc, Icw 35kA 1s
- IP3X construction
- MCCBs to IEC60947-2. kA ratings shown are Ics=Icu at 400V ac
- Switch disconnectors to IEC60947-3

Features

- 6, 12 or 18 outgoing TP ways
- Outgoing devices; these panelboards utilise two frame sizes of MCCB: NZM2 125A–250A TP, and NZM1 SP 16A–125A or TP 20A–160A
- Tin–plated busbars
- Can be configured for incomer device at top of panelboard
- Removable side gland plates as standard
- Wide range of extension boxes, metering, surge protection, and earth leakage incomer options available

See pages 149 -151 for dimensions.

EPBN2640



- Minimum ordering requirement: panelboard + incoming device + incomer connection kit + outgoing devices + blanking plates

Description	Associated incoming device	Current rating (A)	No. of outgoing ways	Eaton list number
Incoming rating up to 400A, outgoing ratings up to 250A	NZM3 MCCB or N3 Switch Disconnector or direct lugs connection	400	6 (2 x 250A + 4 x 160A)	**EPBN2640**
			12 (2 x 250A + 10 x 160A)	**EPBN21240**
			18 (2 x 250A + 16 x 160A)	**EPBN21840**

NZMN3-A400



MCCB incoming device

- 50kA
- Select appropriate incomer device from table below
- Maximum cable capacity 240mm²
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, Magnetic trip adjustment 6 to 10 x In

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	NZM3 MCCB	250	**NZMN3-A250**
		320	**NZMN3-A320**
		400	**NZMN3-A400**
4-pole (3 phase and switched neutral)	NZM3 MCCB	250	**NZMN3-4-A250**
		320	**NZMN3-4-A320**
		400	**NZMN3-4-A400**

N3-400



Switch disconnector (non-automatic) incoming device

- Select appropriate incomer device from table below
- Maximum cable capacity 240mm²

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	N2 switch disconnector	400	**N3-400**
4-pole	N2 switch disconnector	400	**N3-4-400**

EPBKN2404



Incomer connection kit/metering connection kit

- See incoming metering section below to order metering components

Poles	Maximum rating (A)	Eaton list number
3-pole incomer connection kit	400	**EPBKN2403**
3-pole incomer connection kit – includes metering CT and CT to meter cable	400	**EPBKN2403M**
4-pole incomer connection kit	400	**EPBKN2404**[1]
4-pole incomer connection kit – includes metering CT and CT to meter cable	400	**EPBKN2404M**
Direct connection lugs kit	400	**EPBKN240L**
Direct connection lugs kit – includes metering CT and CT to meter cable	400	**EPBKN240LM**
Adapter kit for use when incomer device mounted at top of panelboard	370	**EPBKTFSN3**[2]

[1] Requires use of cable extension box **EPBN2EX250**

[2] Maximum rating of panelboard when top fed is 370A

NZMC2-A250-BT



Outgoing devices – NZM2 frame MCCBs

- Maximum cable capacity 185mm²
- Up to 2 can be fitted
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Triple pole 36kA	Triple pole 50kA
125	**NZMC2-A125-BT**	**NZMN2-A125-BT**
160	**NZMC2-A160-BT**	**NZMN2-A160-BT**
200	**NZMC2-A200-BT**	**NZMN2-A200-BT**
250	**NZMC2-A250-BT**	**NZMN2-A250-BT**

NZMB1-1-AF63 and NZMB1-A160



Outgoing devices – NZM1 frame MCCBs

- Maximum cable capacity 70mm²
- Single pole fixed trip. Triple pole thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Single pole 25kA	Triple pole 25kA	Triple pole 36kA[1]
16	**NZMB1-1-AF16**	–	–
20	**NZMB1-1-AF20**	**NZMB1-A20**	**NZMC1-A20**
32	**NZMB1-1-AF32**	**NZMB1-A32**	**NZMC1-A32**
40	**NZMB1-1-AF40**	**NZMB1-A40**	**NZMC1-A40**
50	**NZMB1-1-AF50**	**NZMB1-A50**	**NZMC1-A50**
63	**NZMB1-1-AF63**	**NZMB1-A63**	**NZMC1-A63**
80	**NZMB1-1-AF80**	**NZMB1-A80**	**NZMC1-A80**
100	**NZMB1-1-AF100**	**NZMB1-A100**	**NZMC1-A100**
125	**NZMB1-1-AF125**	**NZMB1-A125**	**NZMC1-A125**
160	–	**NZMB1-A160**	**NZMC1-A160**

[1] 50kA triple pole also available, change 'C' to 'N' in list number, ie **NZMN1-A125**

EPBN1BP1 tunnel terminals



Accessories

Description	Eaton list number
SP blanking module NZM1 frame (i.e. order 3 per TP way)	**EPBN1BP1**
TP blanking module NZM2 frame	**EPBN2BP3**
Panel door lock with 2 keys (have same key code)	**EPBDLK1**
Terminal shroud for outgoing MCCB type NZM1 1P	**NZM1-1-XKSA**
Terminal shroud for outgoing MCCB type NZM1 3P	**NZM1-XKSA**
Terminal shroud for outgoing MCCB type NZM2 3P	**NZM2-XKSA**
Shunt trip 208–250AC/DC for NZM1 (excl. 1P)	**259744**
Shunt trip 208–250AC/DC for NZM2/N2	**259763**
Shunt trip 208–250AC/DC for NZM3/N3	**259763**
Undervoltage release 208–240AC for NZM1 (excl. 1P)	**259471**
Undervoltage release 208–240AC for NZM2/N2	**259499**
Undervoltage release 208–240AC for NZM3/N3	**259499**
Handle lock for MCCB type NZM1	**260199**
Handle lock for MCCB types NZM2 and NZM3	**260201**

5.3 Memshield 3 MCCB panelboards and associated devices

Incoming device ratings up to 400A – outgoing device ratings up to 250A

EPBN2640SXB



Cable extension boxes – side mounted

Description	Eaton list number
To fit 6 way panelboard **EPBN2640**	**EPBN2640SXB**
To fit 12 way panelboard **EPBN21240**	**EPBN21240SXB**
To fit 18 way panelboard **EPBN21840**	**EPBN21840SXB**

EPBN2EX250



Cable extension boxes – top/bottom mounted

Description	Eaton list number
250mm high	**EPBN2EX250**

EPBN2CX250



Corner filler boxes

Description	Eaton list number
For use where top/bottom/meter boxes are fitted in conjunction with side cable boxes	**EPBN2CX250**

EPBN2EXDIN



Din rail extension boxes

Description	Height	Number 18mm Din modules	Eaton list number
For housing din rail mounted command/control equipment, ie timers/contactors	250mm	18	**EPBN2EXDIN**

Metering components – refer to pages 86-89 for more explanation

(Requires appropriate incomer connection kit with metering option selected from above)

EPBN2EX250M



Incoming metering – digital

- Includes both Modbus and Pulsed outputs
- See page 86 for detailed selection guide

Description	Eaton list number
Incomer meter enclosure (can be fitted to top or bottom of panelboard). Meter not included	**EPBN2EX250M**
Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)	**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses). One per panelboard required, irrespective of number of meters	**EPBN3SUPM**

EPBN21240SXM



Outgoing side mounted metering – digital

- See page 88 for detailed selection guide

Description	Number of meter spaces in metering enclosure	Number of meter blanking plates included	Eaton list number
Side mounted metering enclosure to fit 6 way panelboard EPBN2640	3	2	**EPBN2640SXM**[1)]
Side mounted metering enclosure to fit 12 way panelboard EPBN21240	6	5	**EPBN21240SXM**[1)]
Side mounted metering enclosure to fit 18 way panelboard EPBN21840	9	8	**EPBN21840SXM**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM1 frame MCCBs. 160A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT160**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM2 frame MCCBs. 250A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT250**
Three phase splitter box to allow separate monitoring of a three phase current transformer on individual energy meters			**EPBCTMT3P**
Meter includes both Modbus and Pulsed outputs Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)			**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses), not required if incoming metering is being used			**EPBN3SUPM**
Extra long (2m) meter to meter voltage supply linking cable with connectors			**EPBN3LKKTM**
Extra long (2.5m) CT to meter plug-in cable			**EPBN3LKRJ45**
CT supporting mount to allow CT to be fitted in side mounted cable extension box if terminal shields being fitted to MCCBs			**EPBSXBCTMT**
Spare blanking plate for unused meter ways in metering enclosure			**EM96BP**

[1)] Suffix 'M' indicates cut-outs for meters and hinged door for outgoing metering suitable for left and right hand applications. Can be used with side mounted cable extension boxes if required

EPBN1SPD123



Transient voltage surge suppression units, externally mounted in own enclosure

- See page 90 for full technical specification
- Includes 63A TP NZM1 MCCB for protection/isolation
- See page 131 for dimensions

Description	Eaton list number
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes III and IV in accordance with IEC 62305	**EPBN1SPD123**
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes I, II, III and IV in accordance with IEC 62305	**EPBN1SPD1234**

EPBKEL400



Earth leakage protection

- Kit comprises 350mm high extension box fitted with earth leakage relay, core balance transformer, all cables/terminals/protection fuses, and 230V shunt trip (for tripping of incomer device). Requires 4-pole incomer device. 400A maximum rating
- Sensitivity adjustable from 30mA to 5A. Time delay adjustable from 0.02 to 5 seconds

Description	Eaton list number
Earth leakage protection add-on kit for incomer device	**EPBKEL400**

Cable size summary

Incoming cables	
MCCB or switch disconnector size max/type	240mm^2/M12 bolt
Direct connection lugs incomer	M12
Neutral	M8
Earth	M10
Outgoing cables	
NZM2 MCCB size max/type	185mm^2/cable clamp
NZM1 MCCB size max/type	70mm^2/cable clamp. (95mm^2 can be fitted depending on cable manufacturer)
Neutral size max/type	50mm^2 tunnel terminals and 4 x M8 bolts
Earth size max/type	50mm^2 tunnel terminals and 4 x M8 bolts

5.4 Memshield 3 MCCB panelboards and associated devices

Incoming device ratings up to 630A – outgoing device ratings up to 250A

Specification

- Panelboards to IEC61439-2. Form 3b Type 2
- Busbar system KEMA certified 50kA Icc, Icw 50kA 1s
- IP3X construction
- MCCBs to IEC60947-2. kA ratings shown are Ics=Icu at 400V ac
- Switch disconnectors to IEC60947-3

Features

- 6, 12 or 18 outgoing TP ways
- Outgoing devices; these panelboards utilise two frame sizes of MCCB: NZM2 125A–250A TP, and NZM1 SP 16A–125A or TP 20A–160A
- Tin–plated busbars
- Can be configured for incomer device at top of panelboard
- Removable side gland plates as standard
- Wide range of extension boxes, metering, surge protection, and earth leakage incomer options available
- Door lock included

See pages 149-151 for dimensions.

EPBN2863



- Minimum ordering requirement: panelboard + incoming device + incomer connection kit + outgoing devices + blanking plates

Description	Associated incoming device	Current rating (A)	No. of outgoing ways	Eaton list number
Incoming rating 630A, outgoing ratings up to 250A	NZMLW MCCB or NLW CBS or direct lugs connection	630	8 (4 x 250A + 4 x 160A)	**EPBN2863**
			12 (4 x 250A + 8 x 160A)	**EPBN21263**
			18 (4 x 250A + 14 x 160A)	**EPBN21863**

NZMLW-630



MCCB incoming device

- 50kA
- Select appropriate incomer device from table below
- Maximum cable capacity 2 x 300mm²
- Thermal trip fixed at 630A, Magnetic trip adjustment 2 to 8 x In

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	NZMLW MCCB	630	**NZMLW-A630**
4-pole (3 phase and switched neutral)	NZMLW MCCB	630	**NZMLW-4-A630**

NLW-630



Circuit breaker switch incoming device

- 50kA
- Select appropriate incomer device from table below
- Maximum cable capacity 2 x 300mm²

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	NLW Circuit breaker switch	630	**NLW-630**
4-pole	NLW Circuit breaker switch	630	**NLW-4-630**

EPBKN2633



Incomer connection kit/metering connection kit

- See incoming metering section below to order metering components

Poles	Maximum rating (A)	Eaton list number
3-Pole incomer connection kit	630	**EPBKN2633**
3-Pole incomer connection kit – includes metering CT and CT to meter cable	630	**EPBKN2633M**
4-Pole incomer connection kit	630	**EPBKN2634**
4-Pole incomer connection kit – includes metering CT and CT to meter cable	630	**EPBKN2634M**
Direct connection lugs kit	630	**EPBKN263L**
Direct connection lugs kit – includes metering CT and CT to meter cable	630	**EPBKN263LM**
Adapter kit for use when incomer device mounted at top of panelboard	570	**EPBKTFSLW**[1)]

[1)] Maximum rating of panelboard when top fed is 570A

NZMC2-A250-BT



Outgoing devices – NZM2 frame MCCBs

- Maximum cable capacity 185mm²
- Up to 4 can be fitted
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Triple pole 36kA	Triple pole 50kA
125	**NZMC2-A125-BT**	**NZMN2-A125-BT**
160	**NZMC2-A160-BT**	**NZMN2-A160-BT**
200	**NZMC2-A200-BT**	**NZMN2-A200-BT**
250	**NZMC2-A250-BT**	**NZMN2-A250-BT**

NZMB1-1-AF63 and NZMB1-A160



Outgoing devices – NZM1 frame MCCBs

- Maximum cable capacity 70mm²
- Single pole fixed trip. Triple pole thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Single pole 25kA	Triple pole 25kA	Triple pole 36kA[1)]
16	**NZMB1-1-AF16**	–	–
20	**NZMB1-1-AF20**	**NZMB1-A20**	**NZMC1-A20**
32	**NZMB1-1-AF32**	**NZMB1-A32**	**NZMC1-A32**
40	**NZMB1-1-AF40**	**NZMB1-A40**	**NZMC1-A40**
50	**NZMB1-1-AF50**	**NZMB1-A50**	**NZMC1-A50**
63	**NZMB1-1-AF63**	**NZMB1-A63**	**NZMC1-A63**
80	**NZMB1-1-AF80**	**NZMB1-A80**	**NZMC1-A80**
100	**NZMB1-1-AF100**	**NZMB1-A100**	**NZMC1-A100**
125	**NZMB1-1-AF125**	**NZMB1-A125**	**NZMC1-A125**
160	–	**NZMB1-A160**	**NZMC1-A160**

[1)] 50kA triple pole also available, change 'C' to 'N' in list number, ie **NZMN1-A125**

EPBN1BP1



Accessories

Description	Eaton list number
SP blanking module NZM1 frame (i.e. order 3 per TP way)	**EPBN1BP1**
TP blanking module NZM2 frame	**EPBN2BP3**
Terminal shroud for outgoing MCCB type NZM1 1P	**NZM1-1-XKSA**
Terminal shroud for outgoing MCCB type NZM1 3P	**NZM1-XKSA**
Terminal shroud for outgoing MCCB type NZM2 3P	**NZM2-XKSA**
Shunt trip 208–250AC/DC for NZM1 (excl. 1P)	**259744**
Shunt trip 208–250AC/DC for NZM2/N2	**259763**
Shunt trip 110V–240VAC for NZMLW/NLW	**SNT4LP11K**
Undervoltage release 208–240AC for NZM1 (excl. 1P)	**259471**
Undervoltage release 208–240AC for NZM2/N2	**259499**
Undervoltage release 240VAC for NZMLW/NLW	**UVH4LP11K**
Handle lock for MCCB type NZM1	**260199**
Handle lock for MCCB types NZM2 and NZM3	**260201**

EPBN21863SXB



Cable extension boxes – side mounted

Description	Eaton list number
To fit 8 way panelboard **EPBN2863**	**EPBN21263SXB**
To fit 12 way panelboard **EPBN21263**	**EPBN21263SXB**
To fit 18 way panelboard **EPBN21863**	**EPBN21863SXB**

EPBN3EX250



Cable extension boxes – top/bottom mounted

Description	Eaton list number
250mm high	**EPBN3EX250**

EPBNCX250



Corner filler boxes

Description	Eaton list number
For use where top/bottom/meter boxes are fitted in conjunction with side cable boxes	**EPBN2CX250**

EPBN3EXDIN



Din rail extension boxes

Description	Height	Number 18mm Din modules	Eaton list number
For housing din rail mounted command/control equipment, ie timers/contactors	250mm	30	**EPBN3EXDIN**

Metering components – refer to pages 86-89 for more explanation

(Requires appropriate incomer connection kit with metering option selected from above)

EPBN3EX250M



Incoming metering – digital

- Includes both Modbus and Pulsed outputs
- See page 86 for detailed selection guide

Description	Eaton list number
Incomer meter enclosure (can be fitted to top or bottom of panelboard). Meter not included	**EPBN3EX250M**
Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)	**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses). One per panelboard required, irrespective of number of meters	**EPBN3SUPM**

EPBN21263SXM



Outgoing side mounted metering – digital

- See page 88 for detailed selection guide

Description	Number of meter spaces in metering enclosure	Number of meter blanking plates included	Eaton list number
Side mounted metering enclosure to fit 8 way panelboard **EPBN2863**	6	5	**EPBN21263SXM**
Side mounted metering enclosure to fit 12 way panelboard **EPBN21263**	6	5	**EPBN21263SXM**
Side mounted metering enclosure to fit 18 way panelboard **EPBN21863**	9	8	**EPBN21863SXM**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM1 frame MCCBs. 160A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT160**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM2 frame MCCBs. 250A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT250**
Three phase splitter box to allow separate monitoring of a three phase current transformer on individual energy meters			**EPBCTMT3P**
Meter includes both Modbus and Pulsed outputs Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)			**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses), not required if incoming metering is being used			**EPBN3SUPM**
Extra long (2m) meter to meter voltage supply linking cable with connectors			**EPBN3LKKTM**
Extra long (2.5m) CT to meter plug-in cable			**EPBN3LKRJ45**
CT supporting mount to allow CT to be fitted in side mounted cable extension box if terminal shields being fitted to MCCBs			**EPBSXBCTMT**
Spare blanking plate for unused meter ways in metering enclosure			**EM96BP**

[1] Suffix 'M' indicates cut-outs for meters and hinged door for outgoing metering suitable for left and right hand applications. Can be used with side mounted cable extension boxes if required

EPBN1SPD123



Transient voltage surge suppression units, externally mounted in own enclosure

- See page 90 for full technical specification
- Includes 63A TP NZM1 MCCB for protection/isolation
- See page 131 for dimensions

Description	Eaton list number
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes III and IV in accordance with IEC 62305	**EPBN1SPD123**
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes I, II, III and IV in accordance with IEC 62305	**EPBN1SPD1234**

EPBKEL800



Earth leakage protection

- Kit comprises 350mm high extension box fitted with earth leakage relay, core balance transformer, all cables/terminals/protection fuses, and 230V shunt trip (for tripping of incomer device). Requires 4-pole incomer device. 630A maximum rating
- Sensitivity adjustable from 30mA to 5A. Time delay adjustable from 0.02 to 5 seconds

Description	Eaton list number
Earth leakage protection add-on kit for incomer device	**EPBKEL800**

Cable size summary

Incoming cables	
MCCB or switch disconnector size max/type	2 x 300mm^2/M10 bolt
Direct connection lugs incomer	M12
Neutral	M12
Earth	M10
Outgoing cables	
NZM2 MCCB size max/type	185mm^2/cable clamp
NZM1 MCCB size max / type	70mm^2/cable clamp. (95mm^2 can be fitted depending on cable manufacturer)
Neutral size max / type	50mm^2 tunnel terminals and 4 x M8 bolts
Earth size max / type	50mm^2 tunnel terminals and 8 x M8 bolts

5.5 Memshield 3 MCCB panelboards and associated devices

Incoming device ratings up to 800A – outgoing device ratings up to 400A

Specification

- Panelboards to IEC61439-2. Form 3b Type 2
- Busbar system KEMA certified 50kA Icc, Icw 50kA 1s
- IP3X construction
- Outgoing MCCBs to IEC60947-2. kA ratings shown are Ics=Icu at 400V ac
- Incoming MCCB/circuit breaker switch to IEC60947-2 Icu 50kA, Ics 25kA

Features

- 8, or 12 outgoing TP ways
- Outgoing devices; these panelboards utilise three frame sizes of MCCB: NZM3 250A -400A, NZM2 125A–250A TP, and NZM1 SP 16A–125A or TP 20A–160A
- Tin–plated busbars
- Can be configured for incomer device at top of panelboard
- Removable side gland plates as standard
- Wide range of extension boxes, metering, surge protection, and earth leakage incomer options available
- Door lock included

See pages 149-151 for dimensions.

EPBN31280



- Minimum ordering requirement: panelboard + incoming device + incomer connection kit + outgoing devices + blanking plates

Description	Associated incoming device	Current rating (A)	No. of outgoing ways	Eaton list number
Incoming rating 800A, outgoing ratings up to 400A	NZMLW MCCB or NLW CBS	800	8 (2 x 400A + 2 x 250A + 4 x 160A)	**EPBN3880**
			12 (2 x 400A + 4 x 250A + 6 x 160A)	**EPBN31280**

NZMLW-800



MCCB incoming device

- 50kA
- Select appropriate incomer device from table below
- Maximum cable capacity 2 x 300mm^2
- Thermal trip fixed at 800A, Magnetic trip adjustment 2 to 8 x In

Poles	Incoming device type	Current rating (A)	Eaton list number Short circuit rating 50kA
3-pole	NZMLW MCCB	800	**NZMLW-A800**
4-pole (3 phase and switched neutral)	NZMLW MCCB	800	**NZMLW-4-A800**

NLW-800



Circuit breaker switch incoming device

- 50kA
- Select appropriate incomer device from table below
- Maximum cable capacity 2 x 300mm^2

Poles	Incoming device type	Current rating (A)	Eaton list number
3-pole	NLW Circuit breaker switch	800	**NLW-800**
4-pole	NLW Circuit breaker switch	800	**NLW-4-800**

EPBKN3803



Incomer connection kit/metering connection kit

- See incoming metering section below to order metering components

Poles	Maximum rating (A)	Eaton list number
3-Pole incomer connection kit	800	**EPBKN3803**
3-Pole incomer connection kit – includes metering CT and CT to meter cable	800	**EPBKN3803M**
4-Pole incomer connection kit	800	**EPBKN3804**
4-Pole incomer connection kit – includes metering CT and CT to meter cable	800	**EPBKN3804M**
Adapter kit for use when incomer device mounted at top of panelboard	720	**EPBKTFSLW**[1)]

[1)] Maximum rating of panelboard when top fed is 720A

NZMN3-A400-BT



Outgoing devices – NZM3 frame MCCBs.

- Maximum cable capacity 240mm²
- Up to 2 can be fitted
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Triple pole 50kA
250	**NZMN3-A250-BT**
320	**NZMN3-A320-BT**
400	**NZMN3-A400-BT**

NZMC2-A250-BT



Outgoing devices – NZM2 frame MCCBs

- Maximum cable capacity 185mm²
- Up to 4 can be fitted
- Adjustable trip. Thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Triple pole 36kA	Triple pole 50kA
125	**NZMC2-A125-BT**	**NZMN2-A125-BT**
160	**NZMC2-A160-BT**	**NZMN2-A160-BT**
200	**NZMC2-A200-BT**	**NZMN2-A200-BT**
250	**NZMC2-A250-BT**	**NZMN2-A250-BT**

NZMB1-1-AF63 and NZMB1-A160



Outgoing devices – NZM1 frame MCCBs

- Maximum cable capacity 70mm²
- Single pole fixed trip. Triple pole thermal trip adjustment 0.8 to 1 x In, magnetic trip adjustment 6 to 10 x In

Rating (A)	Eaton list number Single pole 25kA	Triple pole 25kA	Triple pole 36kA[1)]
16	**NZMB1-1-AF16**	–	–
20	**NZMB1-1-AF20**	**NZMB1-A20**	**NZMC1-A20**
32	**NZMB1-1-AF32**	**NZMB1-A32**	**NZMC1-A32**
40	**NZMB1-1-AF40**	**NZMB1-A40**	**NZMC1-A40**
50	**NZMB1-1-AF50**	**NZMB1-A50**	**NZMC1-A50**
63	**NZMB1-1-AF63**	**NZMB1-A63**	**NZMC1-A63**
80	**NZMB1-1-AF80**	**NZMB1-A80**	**NZMC1-A80**
100	**NZMB1-1-AF100**	**NZMB1-A100**	**NZMC1-A100**
125	**NZMB1-1-AF125**	**NZMB1-A125**	**NZMC1-A125**
160	–	**NZMB1-A160**	**NZMC1-A160**

[1)] 50kA triple pole also available, change 'C' to 'N' in list number, ie **NZMN1-A125**

EPBN3BP3



Accessories

Description	Eaton list number
SP blanking module NZM1 frame (i.e. order 3 per TP way)	**EPBN1BP1**
TP blanking module NZM2 frame	**EPBN2BP3**
TP blanking module NZM3 frame	**EPBN3BP3**
Terminal shroud for outgoing MCCB type NZM1 1P	**NZM1-1-XKSA**
Terminal shroud for outgoing MCCB type NZM1 3P	**NZM1-XKSA**
Terminal shroud for outgoing MCCB type NZM2 3P	**NZM2-XKSA**
Terminal shroud for outgoing MCCB type NZM3 3P	**NZM3-XKSA**
Shunt trip 208–250AC/DC for NZM1 (excl. 1P)	**259744**
Shunt trip 208–250AC/DC for NZM2/N2	**259763**
Shunt trip 208–250AC/DC for NZM3/N3	**259763**
Shunt trip 110V–240VAC for NZMLW/NLW	**SNT4LP11K**
Undervoltage release 208–240AC for NZM1 (excl. 1P)	**259471**
Undervoltage release 208–240AC for NZM2/N2	**259499**
Undervoltage release 208–240AC for NZM3/N3	**259499**
Undervoltage release 240VAC for NZMLW/NLW	**UVH4LP11K**
Handle lock for MCCB type NZM1	**260199**
Handle lock for MCCB types NZM2 and NZM3	**260201**

EPBN21863SXB



Cable extension boxes – side mounted

Description	Eaton list number
To fit 8 way panelboard **EPBN3880**	**EPBN21263SXB**
To fit 12 way panelboard **EPBN31280**	**EPBN21863SXB**

EPBN3EX250



Cable extension boxes – top/bottom mounted

Description	Eaton list number
250mm high	**EPBN3EX250**

EPBN2CX250



Corner filler boxes

Description	Eaton list number
For use where top/bottom/meter boxes are fitted in conjunction with side cable boxes	**EPBN2CX250**

EPBN3EXDIN



Din rail extension boxes

Description	Height	Number 18mm Din modules	Eaton list number
For housing din rail mounted command/control equipment, ie timers/contactors	250mm	30	**EPBN3EXDIN**

Metering components – refer to pages 86-89 for more explanation

(Requires appropriate incomer connection kit with metering option selected from above)

EPBN3EX250M



Incoming metering – digital

- Includes both Modbus and Pulsed outputs
- See page 86 for detailed selection guide

Description	Eaton list number
Incomer meter enclosure (can be fitted to top or bottom of panelboard). Meter not included	**EPBN3EX250M**
Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)	**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses). One per panelboard required, irrespective of number of meters	**EPBN3SUPM**

EPBN21263SXM



Outgoing side mounted metering – digital

- See page 88 for detailed selection guide

Description	Number of meter spaces in metering enclosure	Number of meter blanking plates included	Eaton list number
Side mounted metering enclosure to fit 8 way panelboard **EPBN3880**	6	5	**EPBN21263SXM**
Side mounted metering enclosure to fit 12 way panelboard **EPBN31280**	9	8	**EPBN21863SXM**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM1 frame MCCBs. 160A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT160**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM2 frame MCCBs. 250A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors			**EPBCTMT250**
Outgoing CT Kit (1 off required per metered outgoing TP way) to suit NZM3 frame MCCBs. 400A maximum rating. Includes CT to meter plug-in cable and meter to meter voltage supply linking cable with connectors.			**EPBCTMT400**
Three phase splitter box to allow separate monitoring of a three phase current transformer on individual energy meters			**EPBCTMT3P**
Meter includes both Modbus and Pulsed outputs Multifunction meter measuring parameters: Voltage (P-P / P/N) (individual/average) Current (I1, I2, I3) (individual/average) Frequency Power factor (individual/average) Active, reactive, apparent power (individual/total) Active, reactive, apparent energy (total)			**EPBMETER1**
Voltage supply to meter tap off kit (includes protection fuses), not required if incoming metering is being used			**EPBN3SUPM**
Extra long (2m) meter to meter voltage supply linking cable with connectors			**EPBN3LKKTM**
Extra long (2.5m) CT to meter plug-in cable			**EPBN3LKRJ45**
CT supporting mount to allow CT to be fitted in side mounted cable extension box if terminal shields being fitted to MCCBs			**EPBSXBCTMT**
Spare blanking plate for unused meter ways in metering enclosure			**EM96BP**

[1] Suffix 'M' indicates cut-outs for meters and hinged door for outgoing metering suitable for left and right hand applications. Can be used with side mounted cable extension boxes if required

EPBN1SPD123



Transient voltage surge suppression units, externally mounted in own enclosure

- See page 90 for full technical specification
- Includes 63A TP NZM1 MCCB for protection/isolation
- See page 131 for dimensions

Description	Eaton list number
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes III and IV in accordance with IEC 62305	**EPBN1SPD123**
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes I, II, III and IV in accordance with IEC 62305	**EPBN1SPD1234**

EPBKEL800



Earth leakage protection

- Kit comprises 350mm high extension box fitted with earth leakage relay, core balance transformer, all cables/terminals/protection fuses, and 230V shunt trip (for tripping of incomer device). Requires 4-pole incomer device. 800A maximum rating
- Sensitivity adjustable from 30mA to 5A. Time delay adjustable from 0.02 to 5 seconds

Description	Eaton list number
Earth leakage protection add-on kit for incomer device	**EPBKEL800**

Cable size summary

Incoming cables	
MCCB or switch disconnector size max/type	2 x 300mm^2/M12 bolt
Neutral	M12
Earth	M10
Outgoing cables	
NZM3 MCCB size max/type	240mm^2/cable clamp
NZM2 MCCB size max /type	185mm^2/cable clamp
NZM1 MCCB size max /type	70mm^2/cable clamp. (95mm^2 can be fitted depending on cable manufacturer)
Neutral size max/type	50mm^2 tunnel terminals and 4 x M8 bolts
Earth size max/type	50mm^2 tunnel terminals and 8 x M8 bolts

5.6 Memshield 3 MCCB panelboards and associated devices

Plug-in incoming metering

When configuring panelboard incoming metering, simply identify panelboard and incomer type, then order the following modules detailed in the selection chart below-

1. Incoming meter connection kit
2. Incoming meter enclosure
3. Meter
4. Voltage supply to meter tap-off kit
5. Top or bottom mounted cable extension box (When necessary see note)

Plug-in connectivity is provided between meter, CT and supply.

Incoming metering can be configured with outgoing metering.

Meter connection arrangement



Incoming metering module selection

Meter module	Panelboard	EPBN1425, EPBN1625, EPBN1825, EPBN11225 250A 3P MCCB/switch	EPBN1425, EPBN1625, EPBN1825, EPBN11225 250A 4P MCCB/switch	EPBN1425, EPBN1625, EPBN1825, EPBN11225 250A 3P lugs	EPBN1640, EPBN11240 400A 3P MCCB/switch	EPBN1640, EPBN11240 400A 4P MCCB/switch	EPBN1640, EPBN11240 400A 3P lugs	EPBN2640, EPBN21240, EPBN21840 400A 3P MCCB/switch	EPBN2640, EPBN21240, EPBN21840 400A 4P MCCB/switch	EPBN2640, EPBN21240, EPBN21840 400A 3P lugs
Incoming metering connection kit	**EPBKN1253M**	✓								
	EPBKN1254M		✓							
	EPBKN125LM			✓						
	EPBKN2403M				✓			✓		
	EPBKN2404M					✓			✓	
	EPBKN240LM						✓			✓
Incoming meter enclosure	**EPBN1EX250M**	✓	✓	✓						
	EPBN2EX250M				✓	✓	✓	✓	✓	✓
Meter	**EPBMETER1**	✓	✓	✓	✓	✓	✓	✓	✓	✓
Voltage supply to meter tap-off kit	**EPBN1SUPM**	✓	✓	✓						
	EPBN3SUPM				✓	✓	✓	✓	✓	✓
Cable extension box[1)]	**EPBN2EX250**				✓	✓		✓	✓	

Meter module	Panelboard	EPBN2863, EPBN21263, EPBN21863 630A 3P MCCB/switch	EPBN2863, EPBN21263, EPBN21863 630A 4P MCCB/switch	EPBN2863, EPBN21263, EPBN21863 630A 3P lugs	EPBN3880, EPBN31280 800A 3P MCCB/switch	EPBN3880, EPBN31280 800A 4P MCCB/switch
Incoming metering connection kit	**EPBKN2633M**	✓				
	EPBKN2634M		✓			
	EPBKN3803M				✓	
	EPBKN3804M					✓
	EPBKN263LM			✓		
Incoming meter enclosure	**EPBN3EX250M**	✓	✓	✓	✓	✓
Meter	**EPBMETER1**	✓	✓	✓	✓	✓
Voltage supply to meter tap-off kit	**EPBN3SUPM**	✓	✓	✓	✓	✓
Cable extension box[1)]	**EPBN3EX250**	✓	✓		✓	✓

[1)] When incoming meter enclosure is fitted at the feed end of the panelboard there is no need for a cable extension box

Meter

Meter is available with pulsed and modbus outputs.

Simply installed with 2 locking screws.



Incoming meter enclosure

250mm high enclosure with hinged front door.

Simply bolted to the top or the bottom of the panelboard.

Supply tap-off

Provision to fit tap-off to either the left and/or right hand side of the pan assembly.
Only 1 per panelboard is required but provision to fit two is an option.



Incoming metering connection kit

This includes all copper connectors, CT, shielding and CT to meter cable. Can be top or bottom fed.

This does not include the incoming device, which has to be ordered separately.





Cable extension box (when necessary)

250mm high enclosure, fitted incoming end.

When incoming meter enclosure is fitted at the feed end of the 400A/630A/800A boards there is no need for a cable extension box.



When configuring panelboard outgoing metering, simply identify panelboard and number of outgoing breaker type, then order the following modules detailed in the selection chart below:

1. Outgoing CT kit
2. Outgoing side mounted meter extension box
3. Meter
4. Voltage supply to meter tap-off kit
5. Extra long meter to meter voltage linking kit to feed to meter extension box on other side of panelboard if necessary
6. Extra long CT to meter linking cable if required
7. Three phase splitter box to allow separate monitoring of a three phase current transformer on individual energy meters if required

Plug-in connectivity is provided between meter, CT and supply.

Outgoing metering can be configured with incoming metering.

Meter connection arrangement



Outgoing metering module selection

Meter module	Panelboard	EPBN1425	EPBN1625	EPBN1825	EPBN11225	EPBN1640	EPBN11240	EPBN2640	EPBN21240	EPBN21840	EPBN2863	EPBN21263	EPBN21863	EPBN3880	EPBN31280
Outgoing CT kit (1 off required per outgoing way)	**EPBCTMT160 (NZM1 160A)**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	EPBCTMT250 (NZM2 250A)							✓	✓	✓	✓	✓	✓	✓	✓
	EPBCTMT400 (NZM3 400A)													✓	✓
Outgoing side mounted meter extension box	**EPBN1425SXM**	✓													
	EPBN1625SXM		✓												
	EPBN1825SXM			✓											
	EPBN11225SXM				✓										
	EPBN2640SXM					✓		✓							
	EPBN21240SXM						✓		✓						
	EPBN21840SXM									✓					
	EPBN21263SXM										✓	✓		✓	
	EPBN21863SXM												✓		✓
Meter	**EPBMETER1**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Voltage supply to meter tap-off kit	**EPBN1SUPM**	✓	✓	✓	✓										
	EPBN3SUPM					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CT mount for outgoing meter cable way [1]	**EPBSXBCTMT**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Extra long meter to meter voltage linking kit	**EPBN3LKKTM**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Extra long CT to meter linking kit	**EPBN3LKRJ45**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Three phase splitter box	**EPBCTMT3P**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

[1] Only required when terminal shields are fitted to outgoing MCCBs. The CT can be fitted in a side-mounted cable extension box. One CT mount per outgoing CT.

Meter

Meter is available with pulsed and modbus outputs.

Simply installed with 2 locking screws.



Outgoing meter kit

One kit per outgoing way, includes CT, CT to meter cable, and meter to meter voltage linking cable.

NZM1 – 160A max
NZM2 – 250A max
NZM3 – 400A max





Outgoing side mounted meter extension box

Can be fitted on the left and right hand side of the panelboard.

All outgoing meter apertures, except one, have removable blanking shields fitted.

Three phase splitter box

Allows for separate monitoring of a three phase current transformer on individual energy meters



Supply tap-off

Provision to fit tap-off to either the left and/or right hand side of the pan assembly. Only 1 per panelboard is required but provision to fit two is an option.



Extra long CT to meter linking cable

Required when CT is fitted on opposite side to meter extension box. 2.5m long.



Extra long meter to meter voltage linking kit

Required when:
Incoming and outgoing metering on one side = 1 off
Outgoing metering on both sides = 2 off
Incoming and outgoing metering on both sides = 3 off

2m long



5.8 Memshield 3 MCCB panelboards and associated devices

Lightning & surge suppression for MCCB panelboards

In order to enable designers, specifiers, and installers to comply with surge protection requirements in BS 7671 - IET Wiring Regulations - 17th Edition (Section 534), these combined lightning arrester and surge suppression devices have been developed specifically for applications with MCCB panelboards ensuring outstanding product performance for all sensitive, mission critical and general purpose loads. Providing protection from direct and indirect lightning strikes, the IEC 61643 tested devices have impressive voltage protection levels (U_p), nominal discharge current (8/20) µs I_n & maximum discharge current I_{max} for transient surge suppression, combined with impulse current I_{imp} (10/350) µs for lightning strike protection. These devices are fully compliant with BS EN 62305.

EPBN1SPD123 technical summary:

- For the protection of low voltage distribution systems against transient overvoltage caused by direct and indirect lightning strike and switching operations.
- Application according to IEC 60364-5-53 Clause 534.
- Test class I, II, III in accordance with IEC 61643-1.
- SPD-type T1, T2, T3 in accordance with EN 61643-11.
- Lightning protection classes III and IV in accordance with IEC 62305.

EPBN1SPD1234 technical summary:

- For the protection of low voltage distribution systems against direct lightning strike into the overhead power supply line or external lightning protection system and against indirect lightning strike and switching operations.
- Application according to IEC 60364-5-53 Clause 534.
- Test class I, II, III in accordance with IEC 61643-1.
- SPD-type T1, T2, T3 in accordance with EN 61643-11.
- No discharge of ionised gases during operation.
- Lightning protection classes I, II, III and IV in accordance with IEC 62305.

EPBN1SPD123



Description	Eaton list number
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes III and IV in accordance with IEC 62305	**EPBN1SPD123**
SPD-type T1, T2, T3 in accordance with EN 61643-11, lightning protection classes I, II, III and IV in accordance with IEC 62305	**EPBN1SPD1234**

MCCB pan assemblies, interiors, three phase, with earth & neutral bars

- Eaton MCCB pan assemblies offer a high degree of flexibility, suitable for inclusion in other factory built assemblies and as replacements for panelboard interiors.
- For incoming and outgoing device compatibility see associated panelboard details.

See pages 153-154 for dimensional drawings

EPBPN31280



Product range

Description	Current rating (A)	Total no of outgoing ways	Eaton list number
Memshield 3 panelboard pan assembly 250A, 4 Way. Outgoing up to 160A	250	4	**EPBPN1425**
Memshield 3 panelboard pan assembly 250A, 6 Way. Outgoing up to 160A	250	6	**EPBPN1625**
Memshield 3 panelboard pan assembly 250A, 8 Way. Outgoing up to 160A	250	8	**EPBPN1825**
Memshield 3 panelboard pan assembly 250A, 12 Way. Outgoing up to 160A	250	12	**EPBPN11225**
Memshield 3 panelboard pan assembly 400A, 6 Way. Outgoing up to 160A	400	6	**EPBPN1640**
Memshield 3 panelboard pan assembly 400A, 12 Way. Outgoing up to 160A	400	12	**EPBPN11240**
Memshield 3 panelboard pan assembly 400A, 6 Way. Outgoing up to 250A	400	6	**EPBPN2640**
Memshield 3 panelboard pan assembly 400A, 12 Way. Outgoing up to 250A	400	12	**EPBPN21240**
Memshield 3 panelboard pan assembly 400A, 18 Way. Outgoing up to 250A	400	18	**EPBPN21840**
Memshield 3 panelboard pan assembly 630A, 8 Way. Outgoing up to 250A	630	8	**EPBPN2863**
Memshield 3 panelboard pan assembly 630A, 12 Way. Outgoing up to 250A	630	12	**EPBPN21263**
Memshield 3 panelboard pan assembly 630A, 18 Way. Outgoing up to 250A	630	18	**EPBPN21863**
Memshield 3 panelboard pan assembly 800A, 8 Way. Outgoing up to 400A	800	8	**EPBPN3880**
Memshield 3 panelboard pan assembly 800A, 12 Way. Outgoing up to 400A	800	12	**EPBPN31280**



Eaton's MEM series products have earned a worldwide reputation for reliable high quality switch and fusegear – and above all market leading status.

Constantly updated and refined to comply with the very latest international standards, the market leading switchgear range, specialist heavy duty items and dedicated distribution and control equipment fulfils the diverse requirements of the contractor, specifier, OEM and distributor alike.

6.1 GLASGOW FUSE-SWITCH-DISCONNECTORS & SWITCH-DISCONNECTORS 94
6.2 GLASGOW BUSBAR CHAMBER SYSTEM 98
6.3 EXEL 2 SWITCH-DISCONNECTORS & SWITCH-DISCONNECTOR FUSES 100
6.4 ROTARY ISOLATORS AND CHANGEOVER SWITCHES 102
6.5 EXEL – DISTRIBUTION FUSEBOARDS 103

See page 155 for technical data and overall dimensions.

103GNL



Glasgow switch-disconnector

- All listed are TPN

Nominal unit	Nominal rating, rating, Ie AC21 (A)	Copper switch links fitted	Motor ratings AC23A Ue 415V kW	HP	Eaton list number
63	125	63MLK	22	30	**63GNL**
100	125	100MLK	22	30	**103GNL**
160 (use 200A switch-disconnector)	–	–	–	–	**–**
200	315	200MLK	90	125	**203GNL**
315 (use 400A switch-disconnector)	–	–	–	–	**–**
400	630	400MLK	110	150	**403GNL**
500 (use 630A switch-disconnector)	–	–	–	–	**–**
630	1000	630MLK	225	300	**603GNL**
800	1000	800MLK	300	400	**803GNL**

Stud size: 63/100A = tunnel terminal, 160/200A = M10, 300/400 = M14, 500/800A = see page 156, "copper terminal plate"

203GNC



Glasgow fuse-switch-disconnector

- Units are fitted with HRC Fuselinks of maximum rating but will accept fuselinks of a lower rating, refer to the Paramount HRC Fuselinks section on page 106.
- SPSN and TPSN indicate switched neutral.
- Neutral makes first and breaks last.

Nominal unit rating, Ie (A)	Eaton 415V fuse(s) fitted	Suitable fuselinks	Suitable copper switch links	Motor ratings AC23A Ue 415V kW	HP	Poles	Eaton list number
63	63SB4	SB3 & SB4	63MLK	22	30	SPSN	**61GNC**
						DP	[1]
						TPN	**63GNC**
						TPSN	**64GC**
100	100SD5	SB3, SB4, SO & SD5	100MLK	22	30	SPSN	**101GNC**
						DP	[1]
						TPN	**103GNC**
						TPSN	**104GC**
160	160SF6	SF3 & SF6	200MLK	90	125	SPSN	**151GNC**
						DP	[1]
						TPN	**153GNC**
						TPSN	**154GC**
200	200SF6	SF3 & SF6	200MLK	90	125	SPSN	**201GNC**
						DP	[1]
						TPN	**203GNC**
						TPSN	**204GC**
315	315SF7	SF3 & SF7	400MLK	110	150	TPN	**303GNC**
						TPSN	**304GC**
400	400SF8	SF3 & SF8	400MLK	110	150	TPN	**403GNC**
						TPSN	**404GC**
500	500SH9	SH8 & SH9	630MLK	225	300	TPN	**503GNC**
630	630SH9	–	630MLK	225	300	TPN	**603GNC**
						TPSN	**604GC**
800	800SH10	SH8 & SH10	800MLK	300	400	TPN	**803GNC**
						TPSN	**804GC**

[1] If DP fuse-switch-disconnectors are required, use SPSN and replace the supplied switch link with a compatible fuselink.
Stud size: 63/100A = tunnel terminal, 160/200A = M10, 300/400 = M14, 500/800A = see page 156, "copper terminal plate"

50CSB



Spreader boxes

- Provide additional space for spreading multi-core PVC insulated cables
- Supplied with fixing bolts and plain bushes
- Adapter plates required for each unit, see page 96

Nominal unit rating, Ie (A)	Eaton list number	
	Straight	45° angled
63	**50CSB**	**50CSBA**
100	**50CSB**	**50CSBA**
160/200	**60CSB**	**60CSBA**
315/400	**70CSB**	**70CSBA**
500/630	**90CSB**	**90CSBA**
800	**90CSB**	**90CSBA**

Extension boxes

- For fitting to Glasgow switch units to provide additional space for spreading multi-core PVC insulated cables with solid aluminium conductors and for some larger cables with stranded copper conductors

Nominal unit rating (A)	Fuse switch-disconnector/switch-disconnector	Eaton list number
63	61GNC	**1PCB**[1]
	63GNC/63GNL	**2PCB**[1]
	64GC	
100	101GNC	**1PCB**[2]
	103GNC/103GNL	**2PCB**[2]
	104GC	
160	151GNC	**2PCB**[3]
	153GNC	**3PCB**[3]
	154GC	
200	201GNC	**2PCB**
	203GNC/203GNL (315A AC21)	**3PCB**
	204GC	
315	303GNC	**4PCB**
	304GC	
400	403GNC/use 403GNL (630A AC21)	
	404GC	
500	503GNC	**5PCB**[4]
	504GC	
630	603GNC/use 603GNL (1000A, AC21)	
	604GC	
800	803GNC/use 803GNL (1000A, AC21)	
	804GC	

[1] Not required for copper cables or al. below 35mm^2

[2] Not required for copper cables or al. below 50mm^2

[3] Not required for copper cables

[4] For parallel cables use 6 PCB + 802 GCC + 2 x 90 CSB or CSBA (see diagram on page 156)

506APL



Adapter plate to fit spreader boxes

- Available for fitting to spreader boxes, tapped to receive Type B compression glands to BS6121-1. Supplied complete with fixing bolts

Nominal unit rating, Ie (A)	Straight spreader box	45° angled spreader box	Cable mm²	PVC SWA stranded cables:		Eaton list number
63	50CSB	50CSBA	16	2-core	4-core	[1]
			25	2-core	4-core	[1]
			35	2-core	4-core	[1]
100	50CSB	50CSBA	25	2-core	4-core	[1]
			35	2-core	4-core	[1]
			50	2-core		[1]
					4-core	**405 APL**
160	50CSB	50CSBA	50	2-core		[1]
					4-core	**405 APL**
			70	2-core		[1]
					4-core	**405 APL**
			95	2-core		**405 APL**
					4-core	**505 APL**
	60CSB	60CSBA	50	2-core		[1]
					4-core	**406 APL**
			70	2-core		[1]
					4-core	**406 APL**
			95	2-core		**406 APL**
					4-core	**506 APL**
200	50CSB	50CSBA	70	2-core		[1]
					4-core	**405 APL**
			95	2-core		**405 APL**
					4-core	**505 APL**
			120	2-core		**405 APL**
					4-core	**505 APL**
	60CSB	60CSBA	70	2-core		[1]
					4-core	**406 APL**
			95	2-core		**406 APL**
					4-core	**506 APL**
			120	2-core		**406 APL**
					4-core	**506 APL**
			150	2-core	4-core	**506 APL**
300/400	70CSB	70CSBA	150	–	4-core	**507 APL**
			185	–	4-core	**637 APL**
			240	–	4-core	**637 APL**
			300	–	4-core	**757 APL**
500/630	90CSB	90CSBA	240	–	4-core	**639 APL**
			300	–	4-core	**759 APL**
			400	–	4-core	**759 APL**
	Parallel cables[2]		2/150	–	4-core	2 x **509 APL**[2]
			2/185	–	4-core	2 x **639 APL**[2]
			2/240	–	4-core	2 x **639 APL**[2]
800	90CSB	90CSBA	2/300	–	4-core	2 x **759 APL**[2]

[1] Sufficient spreading space in switch-disconnector units to mount 'B' gland on to enclosure.

[2] For 500 / 630 & 800A unit applications where parallel cables are used you need to order; **6PCB** + **802GCC** (copper connection piece) + 2x **90CSB** or **90CSBA** see configuration on page 156.

EBK110SP



Glasgow spares

Nominal unit rating, Ie (A)	Eaton list number
Moving contact fuse carrier; 1 per pole	
63	**EBK110SP**
100	**OBK103SP**
160…200	**EBK105SP**
315…400	**EBK113SP**
Fixed contact base complete; 1 per pole	
63…100	**102GCEBSP**
160…200	**202GCEBSP**
315…400 (2 per pole)	**402GCEBSP**

Aerosol spray paint, Light grey to RAL7004. Eaton list number: **2AP**

PD1



Handle locking devices

- Facilities are provided for locking off operating handles

Current rating (A)	Eaton list number
Handle locking 63–800	**PD1**[1)]

[1)] Operating handles of all units can be locked 'ON' or 'OFF' using padlock only.

See page 157 for technical data and overall dimensions.

142BBC



Busbar chambers

Nominal unit rating, Ie (A)	Nominal length, mm	Eaton list number
100	550	**142 BBC**
	900	**143 BBC**
	1350	**144 BBC**
	1800	**146 BBC**
200	550	**242 BBC**
	900	**243 BBC**
	1350	**244 BBC**
	1800	**246 BBC**
400	550	**442 BBC**
	900	**443 BBC**
	1350	**444 BBC**
	1800	**446 BBC**
630	900	**643 BBC**
	1350	**644 BBC**
	1800	**646 BBC**
800	900	**843 BBC**
	1350	**844 BBC**
	1800	**846 BBC**

21BBL



Busbar chamber extension sets

Nominal rating, Ie (A)	Eaton list number
630	**81 BBL**
800	**81 BBL**

For busbar supports, see page 158 for details

400FSCS



Connection sets for Glasgow fuse-switch-disconnectors & switch-disconnectors

Nominal rating, Ie (A)	Eaton list number
160, 200	**200 FSCS**
315, 400	**400 FSCS**
500, 630, 800	**800 FSCS**

62BBSK



Busbar clamps and sockets – 100–200A Busbars

Type	Nominal rating, Ie (A)	Bore diameter mm	Capacity mm^2	Eaton list number
U-Clamps	20–63	–	25	**2 BBCL**
	63–100	–	70	**3 BBCL**
	100–200	–	120	**6 BBCL**

Busbar clamps and lugs connection – 400–800A Busbars

Type	Nominal rating, Ie (A)	Bore diameter mm	Capacity mm2	Eaton list number
U-Clamps	20–63	–	25	**4 BBCL**
	63–100	–	70	**5 BBCL**
	100–200	–	120	**6 BBCL**
Lugs connection	315–400	22.5	240	**82 BBSK**

21BBMS



Switchgear mounting sets

Description	Nominal rating, Ie (A)	Eaton list number
Exel Switch-disconnector-fuses/	20, 32	**11 BBMS**
Switch-disconnectors	63, 100, 125	**21 BBMS**
Glasgow Fuse-switch-disconnectors/	63, 100	**31 BBMS**
Switch-disconnectors	160, 200	**41 BBMS**
	315, 400	**51 BBMS**
	500, 630, 800	**61 BBMS**

See page 159 for technical data and overall dimensions.

15AXTN2



Exel 2 switch-disconnector

Nominal rating, Ie (A)	Utilisation category at Ue 415V to BS EN 60947-3 AC22A (A)	AC23A (A)	250V DC rating to BS5419 DC23 (A)	Blank endplate	Poles	Eaton list number
20	20	–	20[1]	EP 842	SPSN	–
					DP	**15AXD2**
		11	–		TPN	**15AXTN2**
32	32	–	32		SPSN	–
					DP	**30AXD2**
		22	–		TPN	**30AXTN2**
63	63	–	63	EP 539	SPSN	–
					DP	**60AXD2**
	39	–			TPN	**60AXTN2**
100	100	–	100		SPSN	–
					DP	**100AXD2**
		52	–		TPN	**100AXTN2**
125	125	52	–		TPN	**125AXTN2**

SPSN indicates switched neutral. [1] 20A units are DC22.

100KXSC2F



Exel 2 switch-disconnector-fuse

Nominal rating, Ie (A)	Utilisation category at Ue 415V to BS EN 60947-3 AC22A (A)	AC23A (A)	250V DC rating to BS5419 (A)	Blank endplate fitted	Eaton HRC fuses DC23	Poles	Eaton list number
20	20	–	20[1]	EP 842	20SA2	SPSN	**15KXSC2F**[2]
						DP	**15KXDC2F**
		11			–	TPN	**15KXTNC2F**
32	32	–	32	–	32SB3	SPSN	**30KXSC2F**
						DP	**30KXDC2F**
		22		–	–	TPN	**30KXTNC2F**
63	63	–	63	EP 539	63SB4	SPSN	**60KXSC2F**
						DP	**60KXDC2F**
		39		–	–	TPN	**60KXTNC2F**
100	100	–	100	–	100SD5[2]	SPSN	**100KXSC2F**
						DP	**100KXDC2F**
		52		–	–	TPN	**100KXTNC2F**
125	125	52		–	125SD6[2]	TPN	**125KXTNC2F**

SPSN indicates switched neutral. [1] 20A units are DC22.

[2] These units have dual fixings to accept SB3, SB4 and SO fuselinks. 2x M5 screws required

PD4



Handle locking devices

- Facilities are provided for locking off operating handles

Current rating (A)	Eaton list number
Handle locking 20–125	**PD4**

Exel 2 Spares

Description	Rating (A)	Quantity required	Eaton list number
Moving contact assembly	20	1	**OLV727SP**
	32	1	**OLV728SP**
	63	1	**OLV725SP**
	100/125	1	**OLV726SP**
Switch base with arc shroud	32	1 per pole	**230AXEBSP**[1)]
	63	1 per pole	**260AXEBSP**[1)]
	100/125	1 per pole	**2100AXEBSP**[1)]
	100/125	1 per pole	**2100AXDEBSP**
Combined switch/fusebase with arc shroud	32	1 per pole	**230KXEBSP**
	63	1 per pole	**260KXEBSP**
Fusebase only	100/125	1 per pole	**100MBDEBSP**
Arc shroud only	32	1 per pole	**SH265SP**
	63	1 per pole	**SH754SP**
	100/125	1 per pole	**CV1109SP**

[1)] 1 required for switched neutral pole on SPSN switchfuses.

Aerosol spray paint, Light grey to RAL7004. Eaton list number: **2AP**

600MEB



Main earthing terminal bars

- Memform terminal bars are intended for the connection of circuit protective conductors, main bonding conductors and functional earthing conductors, etc., as referred to in IEE Wiring Regulation 542-04 (BS7671)
- A bolted link facilitates testing of earthing resistance
- Manufactured from solid hard drawn copper and mounted on painted steel supports complete with fixing holes and warning labels
- For ease of installation all terminals are captive
- Extra terminals are provided for supplementary bonding

Maximum incomer, Ie (A)	Size and number of terminals Earthing	Protective bonding	Overall length mm	Overall width mm	Copper thickness mm	Eaton list number
600	1 x M10	3 x M10 2 x M6	320	32	31.75 x 6.35	**600MEB**
1000	2 x M12 1 x M8	3 x M12 8 x M8	665	51	50.8 x 6.35	**1000MEB**

See pages 163-164 for technical data and overall dimensions.

207149-GV



Rotary isolators

- 20A to 63 A
- IP65
- Red/yellow handle
- Lockable in the 0 (Off) position
- Surface mounting
- IEC 60947-3

Rated current Iu (A)	Motor rating AC-23A, 400V, 50 - 60 Hz (kW)	Poles	Auxiliary contact	Eaton List Number
20	6.5	3	1 NO	**207149-GV**
20	6.5	3+N		**207151-GV**
20	6.5	3+N	1 NO + 1 NC	**207153-GV**
20	6.5	6	1 NO + 1 NC	**207161-GV**
25	13	3	1 NO + 1 NC	**226902-GV**
25	13	3+N		**227860-GV**
32	13	3+N	1 NO + 1 NC	**207202-GV**
32	13	6	1 NO + 1 NC	**207210-GV**
32	13	8		**207212-GV**
63	30	3	1 NO + 1 NC	**207348-GV**
63	30	3+N		**207349-GV**
63	30	3+N	1 NO + 1 NC	**207350-GV**
63	22	6	1 NO + 1 NC	**207246-GV**
63	22	8		**207248-GV**

Changeover switches

- 20A to 63 A
- IP65
- Black handle
- Surface mounting
- IEC 60947-3

Rated current Iu (A)	Motor rating AC-23A, 400V, 50 - 60 Hz (kW)	Poles	Eaton List Number
20	6.5	4	**207136-GV**
32	13	4	**207191-GV**
63	22	4	**207230-GV**

See page 160 for technical data and overall dimensions.

304XTNC



Exel distribution fuseboards

Nominal rating, Ie (A)	Poles	No. of ways	Max. terminal capacity mm² (copper cables) Main	Outgoing	Outgoing terminal bore diameter, mm	Suitable HRC fuselinks	Spare fuse carrier	Safety carrier	Eaton list number (without fuselinks)
IP4X enclosures									
20	SPN	4	95	6	4	SA2	20 MFH	20 MFS	**204XSNC**
		6	95	6	4	SA2	20 MFH	20 MFS	**206XSNC**
		8	120	6	4	SA2	20 MFH	20 MFS	**208XSNC**
		12	120	6	4	SA2	20 MFH	20 MFS	**212XSNC**
	TPN	4	95	6	4	SA2	20 MFH	20 MFS	**204XTNC**
		6	95	6	4	SA2	20 MFH	20 MFS	**206XTNC**
		8	120	6	4	SA2	20 MFH	20 MFS	**208XTNC**
32	SPN	4	95	16	5.5	SB3	32 MFH	32 MFS	**304XSNC**
		6	95	16	5.5	SB3	32 MFH	32 MFS	**306XSNC**
		8	150	16	5.5	SB3	32 MFH	32 MFS	**308XSNC**
		12	150	16	5.5	SB3	32 MFH	32 MFS	**312XSNC**
	TPN	4	95	16	5.5	SB3	32 MFH	32 MFS	**304XTNC**
		6	95	16	5.5	SB3	32 MFH	32 MFS	**306XTNC**
		8	150	16	5.5	SB3	32 MFH	32 MFS	**308XTNC**
		10	150	16	5.5	SB3	32 MFH	32 MFS	**310XTNC**
		12	150	16	5.5	SB3	32 MFH	32 MFS	**312XTNC**
63	TPN	2	240	35	8	SB3 & SB4	63 MFH	63 MFS	**602XTNC**
		4	240	35	8	SB3 & SB4	63 MFH	63 MFS	**604XTNC**
		6	240	35	8	SB3 & SB4	63 MFH	63 MFS	**606XTNC**
		8	240	35	8	SB3 & SB4	63 MFH	63 MFS	**608XTNC**
100	TPN	4	240	70	12	SD5[1)]	100 MFH	100 MFS	**1004XTNC**
		6	500[2)]	70	12	SD5[1)]	100 MFH	100 MFS	**1006XTNC**
		8	500[2)]	70	12	SD5[1)]	100 MFH	100 MFS	**1008XTNC**
200	TPN	4	630[2)]	150	18	SF6	200 MFH	200 MFS	**2004XTNC**

All units are supplied without fuselinks which must be ordered separately.

[1)] SB3, SB4 and SO fuselinks may be fitted if used with adaptor – Eaton list number **100MFLK**.

[1)] Can be adapted to allow fitment of 2–240mm2 max. cable sockets with suitable copper spacing piece Eaton list number **WA1212** (set of 4).

8LD



Lid locking facilities

- A choice of locking device is available

Description	Eaton list number
Barrel lock for 20A to 100A units	**1CLX**
Padlock bracket for 20A to 100A units	**9LD**
Padlock for use with above	**PD1**

ETM2209SP



Exel distribution fuseboard – spares

Description	Boards	SP outgoing ways number	Eaton list
Earth bars – 20/32A fuseboards	–	up to 12	**ETM2209SP**
	–	up to 18	**ETM2210SP**
	–	up to 24	**ETM2211SP**
	–	up to 36	**ETM2212SP**
Neutral bars – 20/32A fuseboards	–	up to 12	**ETM2223SP**
	–	up to 18	**ETM2224SP**
	–	up to 24	**ETM2225SP**
	–	up to 36	**ETM2226SP**

HRC cartridge fuselinks and fuse units



- Options to suit every application
- Compact 415V fuselinks
- Breaking capacity of 80kA at 415V
- Motor rated fuselinks
- Compact moulded HRC fuse units
- Fully shrouded for safety
- For bolt-in & clip-in fuselinks

7.1 PARAMOUNT 106

7.2 FUSE CARRIERS & BASES 112

See page 161 for overall dimensions.

415V industrial fuselinks – offset bolted contacts

- S-Type compact industrial bolted pattern fuselinks with offset contacts. ASTA 20 Certified BS EN 60269-1 (BS88 – 1) or BS88 – 2 for a breaking capacity of 80 kA at 415V a.c.

10SA2



20SB3



63SB4



100SD5



Fixing centres, mm	BS88 ref	Rating, In Normal (A)	Motor (A)	Dimensional equivalents GEC/Lawson	Brush/Hawker	Bussmann/ Dorman	Eaton list number
44.5	A1	2	–	NIT2	2F21	NITD2	**2SA2**
		4	–	NIT4	4F21	NITD4	**4SA2**
		6	–	NIT6	6F21	NITD6	**6SA2**
		10	–	NIT10	10F21	NITD10	**10SA2**
		16	–	NIT16	16F21	NITD16	**16SA2**
		20	–	NIT20	20F21	NITD20	**20SA2**
			25	NIT20M25	20M25F21	NITD20M25	**20SA2M25**
			32	NIT20M32	20M32F21	NITD20M32	**20SA2M32**
	–	25	–	NIT25	25F21	NITD25	**25SA2**
		32	–	NIT32	32F21	NITD32	**32SA2**
			40	NIT32M40	–	NITD32M40	**32SA2M40**
			50	NIT32M50	–	NITD32M50	**32SA2M50**
			63	NIT32M63	–	NITD32M63	**32SA2M63**
73	A2	2	–	TIA2	2HO7	AAO2	**2SB3**
		4	–	TIA4	4HO7	AAO4	**4SB3**
		6	–	TIA6	6HO7	AAO6	**6SB3**
		10	–	TIA10	10HO7	AAO10	**10SB3**
		16	–	TIA16	16HO7	AAO16	**16SB3**
		20	–	TIA20	20HO7	AAO20	**20SB3**
		25	–	TIA25	25HO7	AAO25	**25SB3**
		32	–	TIA32	32HO7	AAO32	**32SB3**
			40	TIA32M40	32M40HO7	AAO32M40	**32SB3M40**
			50	TIA32M50	32M50HO7	AAO32M50	**32SB3M50**
			63	TIA32M63	32M63HO7	AAO32M63	**32SB3M63**
	A3	35	–	TIS35	–	–	**35SB4**
		40	–	TIS40	40KO7	BAO40	**40SB4**
		50	–	TIS50	50KO7	BAO50	**50SB4**
		63	–	TIS63	63KO7	BAO63	**63SB4**
			80	TIS63M80	63M80KO7	BAO63M80	**63SB4M80**
			100	TIS63M100	63M100KO7	BAO63M100	**63SB4M100**
	–	80	–	OS80/TIS80	80KO7R	OSD80	**80SO**
		100	–	OS100/TIS100	100KO7R	OSD100	**100SO**
			125	OS100M125/ TIS100M125	–	OSD100M125	**100SOM125**
			160	–	–	OSD100M160	**100SOM160**
		125	–	OOT125	–	–	**125SO**
		160	–	OOT160	–	–	**160SO**
		200	–	–	–	–	**200SO**
94	A4	32	–	TCP32	32L14	CEO35	**32SD5**
		40	–	TCP40	40L14	CEO40	**40SD5**
		50	–	TCP50	50L14	CEO50	**50SD5**
		63	–	TCP63	63L14	CEO63	**63SD5**
		80	–	TCP80	80L14	CEO80	**80SD5**
		100	–	TCP100	100L14	CEO100	**100SD5**
			125	TCP100M125	100M125L14	CEO100M125	**100SD5M125**
			160	TCP100M160	100M160L14	CEO100M160	**100SD5M160**
			200	TCP100M200	100M200L14	CEO100M200	**100SD5M200**

415V industrial fuselinks – offset bolted contacts (contd)

Fixing centres, mm	BS88 ref	Rating, In Normal (A)	Motor (A)	Dimensional equivalents GEC/Lawson	Brush/Hawker	Bussmann/ Dorman	Eaton list number
	–	125	–	TFP125	125M14	DEO125	**125SD6**
		160	–	TFP160	160M14	DEO160	**160SD6**
		200	–	TFP200	200M14	DEO200	**200SD6**
			250	TFP200M250	200M250M14	DEO200M250	**200SD6M250**
			315	–	–	–	**200SD6M315**

These industrial bolted pattern fuselinks are of two types – with offset contacts of ratings 2–200A and with centre contacts of ratings 2–1250A.

They are available to BS references A1 to A4, B1 to B4, C1 to C3, D1 and in certain other sizes.

415V industrial fuselinks – centre bolted contacts

20SE3



- S-Type compact industrial bolted pattern fuselinks with centre contacts. ASTA 20 Certified or tested to BS EN 60269-1 (BS88-1) or BS88-2 for a breaking capacity of 80 kA at 415V a.c.

Fixing centres, mm	BS88 ref	Rating In Normal (A)	Motor	Dimensional equivalents GEC/Lawson	Brush/Hawker	Bussmann/Dorman	Eaton list number
97	–	2	–	TB2	2KO8	AC2	**2SE3**
		4	–	TB4	4KO8	AC4	**4SE3**
		6	–	TB6	6KO8	AC6	**6SE3**
		10	–	TB10	10KO8	AC10	**10SE3**
		16	–	TB16	16KO8	AC16	**16SE3**
		20	–	TB20	20KO8	AC20	**20SE3**
		25	–	TB25	25KO8	AC25	**25SE3**
		32	–	TB32	32KO8	AC32	**32SE3**
111	–	2	–	TBC2	2KO9	AD2	**2SF3**
		4	–	TBC4	4KO9	AD4	**4SF3**
		6	–	TBC6	6KO9	AD6	**6SF3**
		10	–	TBC10	10KO9	AD10	**10SF3**
		16	–	TBC16	16KO9	AD16	**16SF3**
		20	–	TBC20	20KO9	AD20	**20SF3**
		25	–	TBC25	25KO9	AD25	**25SF3**

32SF3



		32	–	TBC32	32KO9	AD32	**32SF3**
97	–	40	–	TB40	40KO8	BC40	**40SE4**
		50	–	TB50	50KO8	BC50	**50SE4**
		63	–	TB63	63KO8	BC63	**63SE4**
97	–	63	80	–	–	–	**63SE4M80**
			100	–	–	–	**63SE4M100**
111	B1	40	–	TBC40	40KO9	BD40	**40SF4**
		50	–	TBC50	50KO9	BD50	**50SF4**
		63	–	TBC63	63KO9	BD63	**63SF4**
			80	–	–	–	**63SF4M80**
			100	–	–	–	**63SF4M100**
		80	–	TC80	80LO9	CD80	**80SF5**
		100	–	TC100	100LO9	CD100	**100SF5**
			125	TC100M125	100M125LO9	CD100M125	**100SF5M125**
			160	TC100M160	100M160LO9	CD100M160	**100SF5M160**
			200	TC100M200	100M200LO9	CD100M200	**100SF5M200**
	B2	125	–	TF125	125MO9	DD125	**125SF6**
		160	–	TF160	160MO9	DD160	**160SF6**

200SF6



		200	–	TF200	200MO9	DD200	**200SF6**
			250	TF200M250	200M250M09	DD200M250	**200SF6M250**
			315	–	–	–	**200SF6M315**
	B3	250	–	TKF250	250NO9	ED250	**250SF7**
		315	–	TKF315	315NO9	ED315	**315SF7**
			400	–	–	–	**315SF7M400**
133	–	250	–	TKM250	250N11	EFS250	**250SG7**
		315	–	TKM315	315N11	EFS315	**315SG7**

400SH8



630SY9



1250SJ11



415V industrial fuselinks – centre bolted contacts (contd)

Fixing centres, mm	BS88 ref	Rating In Normal (A)	Motor (A)	Dimensional equivalents GEC/Lawson	Brush/Hawker	Bussmann/Dorman	Eaton list number
111	B4	355	–	TMF355	355PO9	ED355	**355SF8**
		400	–	TMF400	400PO9	ED400	**400SF8**
			500	TMF400M500	–	ED400M500	**400SF8M500**
133/184	C1	355	–	TM355	355P11	EF355	**355SH8**
		400	–	TM400	400P11	EF400	**400SH8**
133/184	C2	450	–	TTM450	450R11	FF450	**450SH9**
		500	–	TTM500	500R11	FF500	**500SH9**
		560	–	TTM560	560R11	FF560	**560SH9**
		630	–	TTM630	630R11	FF630	**630SH9**
165/229	–	450	–	TT450	450R12	FG450	**450SY9**
		500	–	TT500	500R12	FG500	**500SY9**
		630	–	TT630	630R12	GG630	**630SY9**
133/184	C3	710	–	TLM710	700S11	GF710	**710SH10**
		800	–	TLM800	800S11	GF800	**800SH10**
165/229	–	710	–	TLT710	700S12	GG700	**710SY10**
		800	–	TLT800	800S12	GG800	**800SY10**
149	D1	1000	–	TXU1000	1000U44	GH1000	**1000SJ11**
		1250	–	TXU1250	1250U44	GH1250	**1250SJ11**

20SN2



SN type offset blade fuselinks

- ASTA 20 Certified or tested to BS EN 60269-1 (BS88-1) and BS88-6 for a breaking capacity of 80 kA at 415V a.c. For use in industrial and commercial installations.

Overall length, mm	Overall dia. mm	Rating In Normal (A)	Motor (A)	Equivalents GEC/Lawson	Brush/Hawker	Bussmann/Dorman	Eaton list number
60	14	2	–	NS2	2FO6	NSD2	**2SN2**
		4	–	NS4	4FO6	NSD4	**4SN2**
		6	–	NS6	6FO6	NSD6	**6SN2**
		10	–	NS10	10FO6	NSD10	**10SN2**
		16	–	NS16	16FO6	NSD16	**16SN2**
		20	–	NS20	20FO6	NSD20	**20SN2**
			25	NS20M25	20M25FO6	NSD20M25	**20SN2M25**
			32	NS20M32	20M32FO6	NSD20M32	**20SN2M32**
		25	–	NS25	25FO6	NSD25	**25SN2**
		32	–	NS32	32FO6	NSD32	**32SN2**
58	17.5	32	40	NS32M40	–	NSD32M40	**32SN2M40**
			50	NS32M50	–	NSD32M50	**32SN2M50**
			63	NS32M63	–	NSD32M63	**32SN2M63**

63SP



SP type offset blade fuselinks

- ASTA 20 Certified to BS EN 60269-1 (BS88 – 1) and BS88 – 6 for a breaking capacity of 80 kA at 415V a.c. For use in industrial and commercial installations.

Overall length, mm	Overall dia. mm	Rating In (A)	Equivalents GEC/Lawson	Brush/Hawker	Bussmann/Dorman	Eaton list number
68	17	16	–	–	ESD16	**16SP**
		20	–	–	ESD20	**20SP**
		25	–	–	ESD25	**25SP**
		32	–	–	ESD32	**32SP**
		40	40ES	40GO5	ESD40	**40SP**
		50	50ES	50GO5	ESD50	**50SP**
		63	63ES	63GO5	ESD63	**63SP**

604R



R and RL type house service cut-out fuselinks

- Type IIa (R) and IIb (RL) house service cut-out fuselinks. ASTA 20 Certified or tested to BS88-3 for a breaking capacity of 33 kA at 415V a.c. For use in domestic and commercial installations mainly in supply authorities cut-outs.

Overall length, mm	Overall dia. mm	Rating, In Normal (A)	Equivalents GEC/Lawson	Brush/Hawker	Bussmann/Dorman	Eaton list number
57	22.23	15	RHF15	15KR85	–	**154R**
		20	RHF20	20KR85	–	**204R**
		30	RHF30	30KR85	RHD30	**304R**
		40	RHF40	40KR85	RHD40	**404R**
		45	–	45KR85	–	**454R**
		50	RHF50	50KR85	RHD50	**504R**
		60	RHF60	60KR85	RHD60	**604R**
		80	RHF80	80KR85	RHD80	**804R**
		100	–	100KR85	–	**1004R**
57	30	30	RHL30	30LR85	RHLD30	**304RL**
		60	RHL60	60LR85	RHLD60	**604RL**
		80	RHL80	80LR85	RHLD80	**804RL**
		100	RHL100	100LR85	RHLD100	**1004RL**

6LS



LS type street lighting fuselinks

- ASTA 20 Certified to BS EN 60269-1 (BS88-1) for a breaking capacity of 50kA at 240V a.c.
  Also compies with BS7654 for use in street ligting cut-out.

Fixing centres, mm	Overall length, mm	Overall dia. mm	Rating, In (A)	Equivalents[1] GEC	Brush	Dorman/Bussmann	Eaton list number
LS-Type, offset contacts							
38	47	14	2	LST2	2D19L	STD2	**2LS**
			4	LST4	4D19L	STD4	**4LS**
			6	LST6	6D19L	STD6	**6LS**
			10	LST10	10D19L	STD10	**10LS**
			16	LST16	16D19L	STD16	**16LS**
			20	LST20	20D19L	STD20	**20LS**
			25	LST25	25D19L	STD25	**25LS**
			32	LST32	32D19L	STD32	**32LS**

[1]Equivalent columns list fuselinks having similar ratings and fixing centres.

20SS



SS type offset blade fuselinks

- ASTA 20 Certified to BS EN 60269-1 (BS88-1) for a breaking capacity of 50kA at 240V a.c.
  Also compies with BS7654 for use in street ligting cut-out.

Fixing centres, mm	Overall length, mm	Overall dia. mm	Rating, In (A)	Equivalents[1] GEC	Brush	Dorman/Bussmann	Eaton list number
–	51	12	2	SS2	2DO4	SSD2	**2SS**
			4	SS4	4DO4	SSD4	**4SS**
			6	SS6	6DO4	SSD6	**6SS**
			10	SS10	10DO4	SSD10	**10SS**
			16	SS16	16DO4	SSD15	**16SS**
			20	SS20	20DO4	SSD20	**20SS**
			25	SS25	25DO4	SSD25	**25SS**
			32	SS32	32DO4	SSD32	**32SS**

[1]Equivalent columns list fuselinks having similar ratings and fixing centres.

315JCS82



J type feeder pillar fuselinks

- ASTA 20 Certified or tested to BS88 – 2 (formerly BS88: Part 5) for a breaking capacity of 80 kA at 415V a.c.
- Available in standard 82mm and 92mm fixing centres up to 400A and 800A respectively for wedge tightening contacts. Also available in ferrule form up to 250A for pole mounted cut-outs.
- For use by the Electricity Supply Industry in distribution systems.
- Available with silver elements, details on request.

Fixing centres, mm	Equivalents Fluvent	Lawson	SIBA	GEC	EMP	Dorman	Bussmann/ Brush	Rating, In (A)	Eaton list number
82	DL2-2	JPU	5002301	JP	2/EJA	JPD	MJ30	63	**63JCS82**
								80	**80JCS82**
								100	**100JCS82**
								125	**125JCS82**
								160	**160JCS82**
								200	**200JCS82**
								250	**250JCS82**
								315	**315JCS82**
							PJ30	355	**355JCS82**
								400	**400JCS82**

400JCS92



92	DL3-2	JSU	5002601	JS	3/EJB	JSD	MJ31	63	**63JCS92**
								80	**80JCS92**
								100	**100JCS92**
								125	**125JCS92**
								160	**160JCS92**
								200	**200JCS92**
								250	**250JCS92**
								315	**315JSC92**
							PJ31	355	**355JCS92**
								400	**400JCS92**
							RJ31	450	**450JCS92**
								500	**500JCS92**
							SJ31	560	**560JCS92**
								630	**630JCS92**
								710	**710JCS92**
								800	**800JCS92**

7.2 HRC cartridge fuselinks and fuse units

Fuse carriers and bases

See page 162 for overall dimensions.

3SCHF



Fuse carriers

Nominal rating Ie (A)	Fuse type fitted	Eaton list number HRC Fuse Carrier
10	10SA2	**1 SCHF**
20	20SA2	**2 SCHF**
32	32SB3	**3 SCHF**
63	63SB4	**6 SCHF**
100	100SD5	**100SCHF**

20MFA



Complete fuse units (carriers and bases) – bolt-in type A (front/busbar)

Nominal rating, In (A)	Colour	Neutral link	Suitable Eaton HRC fuselinks	Eaton list number
20	Black	20MLK	2-20SA2	**20MFA**
32	Black	32MLK	2-32SB3	**32MFA**
63	Black	63MLK	35-63SB4 or 2-32SB3	**63MFA**
100	Black	100MLK	32-100SD5[1)]	**100MFA**

[1)]SB3, SB4 or SO fuselinks may be fi tted if used with adaptor – Eaton list number: **100MFLK**.

32MFB



Complete fuse units (carriers and bases) – bolt-in type B (front/front)

Nominal rating, In (A)	Colour	Neutral link	Suitable Eaton HRC fuselinks	Eaton list number
20	Black	20MLK	2-20SA2	**20MFB**
32	Black	32MLK	2-32SB3	**32MFB**
63	Black	63MLK	35-63SB4 or 2-32SB3	**63MFB**
100	Black	100MLK	32-100SD5[1)]	**100MFB**
Compact range				
32	Black	20MLK	2-32SA2	**32CMFB**
63	Black	32MLK	35-63SB4 or 2-32SB3	**63CMFB**
100	Black	63MLK	80-100SO or 35-63SB4	**100CMFB**
200	Black	100MLK	125-200SD6 or 32-100SD5	**200CMFB**

[1)]SB3, SB4 or SO fuselinks may be fitted if used with adaptor – Eaton list number: **100MFLK**.

63MFC



Complete fuse units (carriers and bases) – bolt-in type C (back/back)

Nominal rating, In (A)	Colour		Suitable Eaton HRC fuselinks	Eaton list number
20	Black	20MLK	2-20SA2	**20MFC**
63	Black	63MLK	35-63SB4 or 2-32SB3	**63MFC**
100	Black	100MLK	32-100SD5[1)]	**100MFC**
Compact range				
100	Black	63MLK	80-100SO or 35-63SB4	**100CMFC**

[1)]SB3, SB4 or SO fuselinks may be fitted if used with adaptor – Eaton list number: **100MFLK**.

63MFD



Complete fuse units (carriers and bases) – bolt-in type D (front/back)

Nominal rating, In (A)	Colour	Neutral link	Suitable Eaton HRC fuselinks	Eaton list number
32	Black	32MLK	2-32SB3	**32MFD**
63	Black	63MLK	35-63SB4 or 2-32SB3	**63MFD**

32CFF



Complete fuse units (carriers and bases) –clip-in type

Nominal rating, In (A)	Colour	Suitable Eaton HRC fuselinks	Eaton list number
Front/Front			
32	Black	2-32SN2	**32CFF**
	White	2-32SN2	**32CFFW**
63	Black	16-63SP	**63CFF**
	White	16-63SP	**63CFFW**

Enclosed motor, heating and lighting control



Since the late 1920's we have built countless motor starters, fitted and trusted by generations of contractors, while the increasing requirements of our markets have led us to constantly update and expand our ADS range to allow for an increased choice of current ratings and ingress protection.

This wealth of experience and expertise in the design and manufacture of Motor Control Gear is mirrored by our Heating and Lighting range which offers a versatile and comprehensive choice.

8.1 ADS8 AC CONTACTORS, STARTERS AND ASSEMBLIES 116

8.2 PUSHBUTTON CONTROL UNITS – MSU 118

8.3 AUTOLINE HEATING AND LIGHTING CONTACTORS 119

This chapter covers the ADS8 range of DOL, DOL Reversing and Star Delta starters with associated overload relays. Overload relays are supplied separately and enclosures are IP54 metal clad. A higher rated IP65 moulded 9kW DOL starter is also available.

- IEC / EN60947-4

See page 117 for overload relays.
See page 176 for trip and electrical life curves.
See page 166 for dimensional drawings.

28ADSM1X



9kW DOL starter without switch disconnect

- IP 65 moulded surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz Vac	Eaton list number
18	9	220–240	**28ADSM1X**
		380–415	**48ADSM1X**

28ADS2X



11kW DOL starter without switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz Vac	Eaton list number
18	9	220–240	**28ADS1X**
		380–415	**48ADS1X**
25	11	220–240	**28ADS2X**
		380–415	**48ADS2X**

28ADSA1X



11kW DOL starter with switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz Vac	Eaton list number
18	9	220–240	**28ADSA1X**
		380–415	**48ADSA1X**
25	11	220–240	**28ADSA2X**
		380–415	**48ADSA2X**

48ARD1X



11kW DOL Reversing starter without switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz Vac	Eaton list number
18	9	220–240	**28ARD1X**
		380–415	**48ARD1X**
25	11	220–240	**28ARD2X**
		380–415	**48ARD2X**

28SDA2X18



22kW Star Delta starter without switch disconnect

- IP 54 metalclad surface mounting enclosure, less overload relay

Maximum current rating (AC3) A	Maximum kW rating AC3 415v 3ph	Control coil voltage 50Hz Vac	Eaton list number
31	15	220–240	**28SDA2X18**
		380–415	**48SDA2X18**
43	22	220–240	**28SDA3X25**
		380–415	**48SDA3X25**

8TT92



DOL, DOL reversing, line connected thermal overload relays

Full load current A	Motor rating kW	Eaton list number
0.63–1	0.37	**8TT87**
1–1.6	0.55	**8TT88**
1.6–2.5	1.1	**8TT89**
2.5–4	1.5	**8TT90**
4–6	2.2	**8TT91**
5.5–8	3.7	**8TT98**
7–10	4	**8TT92**
10–13	5.5	**8TT93**
13–18	9	**8TT94**
18–25	11	**8TT104**

8TT92SD



Star Delta, phase connected thermal overload relays

Full load current A	Motor rating kW	Eaton list number
4.3–6.9	3	**8TT90SD**
6.9–10.4	5.5	**8TT91SD**
9.5–13.8	7	**8TT98SD**
12.1–17.3	9	**8TT92SD**
17.3–22.5	11	**8TT93SD**
22.5–31	15	**8TT94SD**
31–43	22	**8TT104SD**

This chapter covers the moulded IP66 pushbutton control units – type MSU

- IEC / EN60947-4
- Surface mounting

See page 179 for overall dimensions.

M22MSU



MSU pushbutton control units (moulded IP66)

Number buttons	Description	Contacts	Button Colour	Cover Colour	Eaton List Number
1	Start control	1 N/O, 1 N/C	Green	Light Grey	**M21MSSU**
1	Stop control	1 N/O, 1 N/C	Red	Yellow	**M21MSU**
1	Key selector switch, 2 position, 0/1	1 N/O	Black	Light Grey	**M21MSU2K**
1	Key selector switch, 2 position, 0/1, spring return	1 N/O, 1 N/C	Black	Light Grey	**M21MSU2SK**
1	Mushroom head, push to latch, key release	1 N/C	Red	Light Grey	**M21MSULK**
1	Stop control, mushroom head, push to latch, turn to release	1 N/O, 1 N/C	Red	Yellow	**M21MSUML**
2	2-way, start / stop	1 N/O, 1 N/C (each button)	Green / red	Light Grey	**M22MSU**
2	2-way, start / stop mushroom head, push to latch, turn to release	1 N/O, 1 N/C (each button)	Green / red	Light Grey	**M22MSUL**
3	3-way, up / down / stop mushroom head, push to latch, turn to release	1 N/O, 1 N/C (each button)	Black / black / red	Light Grey	**M23MSUL**[1)]

[1)] M23MSUL units are supplied with 2 sets of button legends, FORWARD, REVERSE, and UP, DOWN to be clipped on the buttons as required.

This chapter covers the range of Autoline heating and lighting contactors, in 1 pole, 2 pole and 4 pole configuration, with ratings at AC1 and AC5a. Metalclad enclosures have an IP55 rating.

- IEC / EN60947-4
- IEC408

See page 174 for overall dimensions.

248ALCFP



Heating and lighting contactors

Description	Cable capacity mm^2	Coil voltage 50 Hz	Heating and general mixed loads, slightly inductive, amps per pole AC1	Lighting load, amps per pole AC5a	Eaton list number
4P enclosed without rectifier	4	220–240	25	12	**228ALCFP**
4P enclosed without rectifier	4	380–415	25	12	**248ALCFP**
4P enclosed without rectifier	10	220–240	40	32	**428ALCFP**
4P enclosed without rectifier	10	380–415	40	32	**448ALCFP**
4P enclosed with rectifier	4	220–240	25	12	**228ALCFPR**
4P enclosed with rectifier	10	220–240	40	32	**428ALCFPR**
2P enclosed without rectifier	16	220–240	40	25	**228ALCDP**
2P enclosed without rectifier	25	220–240	64	40	**428ALCDP**
2P enclosed with rectifier	16	220–240	40	25	**228ALCDPR**
2P enclosed with rectifier	25	220–240	64	40	**428ALCDPR**
1P enclosed without rectifier	50	220–240	70	50	**228ALCSPN**
1P enclosed without rectifier	50	220–240	112	50	**428ALCSPN**
1P enclosed with rectifier	50	220–240	70	50	**228ALCSPNR**
1P enclosed with rectifier	50	220–240	112	50	**428ALCSPNR**



Eaton's power factor correction products are available in three types. The economical non-auto low voltage capacitors are an ideal choice for use in electrical installations where the total load changes very little from hour to hour and day to day. For installations where the load is more variable, Eaton offers 100 standard and 300 standard and de-tuned products, which constantly monitor the power factor of the installation and automatically adjust the correction so that it accurately matches the instantaneous requirements.

9

Eaton capacitors non-auto range 122
Eaton capacitors 100 auto 122
Eaton capacitors 300 – standard 122
Eaton capacitors 300 – detuned 123

Power factor correction capacitors

Non-auto, 100 auto and 300 standard

EP2541E



Eaton capacitors non-auto

KVAR (415V)	Terminal size	Terminal ctr's	Earth stud size	Weight (Kg)	Eaton list number
25	M8	35	M8	6	**EP2541E**
50	M8	35	M8	8	**EP5041E**
75	M10	60	M10	16	**EP7541E**
100	M10	60	M10	18	**EP10041E**

MC25M1



Eaton capacitors 100 auto

KVAR (415V)	Stages	Weight (Kg)	Incoming device	Eaton list number
25	1 x 25	20	Fusebase	**MC25M1**
		21	Fuseswitch	**MC25M1S**
			MCCB	**MC25M1M**
50	2 x 25	25	Fusebase	**MC50M2**
		26	Fuseswitch	**MC50M2S**
			MCCB	**MC50M2M**
75	3 x 25	31	Fusebase	**MC75M3**
		33	Fuseswitch	**MC75M3S**
			MCCB	**MC75M3M**
100	4 x 25	35	Fusebase	**MC100M4**
		37	Fuseswitch	**MC100M4S**
			MCCB	**MC100M4M**

If you require a specific KVAR rating other than the above, please contact Eaton for further details.

MC25M5



Eaton capacitors 300 standard

KVAR (415V)	Stages	Weight (Kg)	Incoming device	Eaton list number
125	5 x 25	210	Direct connection	**MC125M5**
			Fuseswitch	**MC125M5S**
			MCCB	**MC125M5M**
150	3 x 50	235	Direct connection	**MC150M3**
			Fuseswitch	**MC150M3S**
			MCCB	**MC150M3M**
175	3 ×50 + 1 × 25	245	Direct connection	**MC175M4**
			Fuseswitch	**MC175M4S**
			MCCB	**MC175M4M**
200	4 x 50	260	Direct connection	**MC200M4**
			Fuseswitch	**MC200M4S**
			MCCB	**MC200M4M**
225	4 ×50 + 1 × 25	270	Direct connection	**MC225M5**
			Fuseswitch	**MC225M5S**
			MCCB	**MC225M5M**
250	5 x 50	280	Direct connection	**MC250M5**
			Fuseswitch	**MC250M5S**
			MCCB	**MC250M5M**
275	5 ×50 + 1 × 25	290	Direct connection	**MC275M6**
			Fuseswitch	**MC275M6S**
			MCCB	**MC275M6M**
300	6 x 50	300	Direct connection	**MC300M6**
			Fuseswitch	**MC300M6S**
			MCCB	**MC300M6M**

Applications above 300KVAR are also available, please contact Eaton for further details.

MC100M2DT



Eaton capacitors 300 detuned

KVAR (415V)	Stages	Weight (Kg)	Incoming device	Eaton list number
100	2 x 50	230	Direct connection	**MC100M2DT**
			Fuseswitch	**MC100M2SDT**
			MCCB	**MC100M2MDT**
125	2 x 50 + 1 x 25	240	Direct connection	**MC125M3DT**
			Fuseswitch	**MC125M3SDT**
			MCCB	**MC125M3MDT**
150	3 x 50	260	Direct connection	**MC150M3DT**
			Fuseswitch	**MC150M3SDT**
			MCCB	**MC150M3MDT**
175	3 x 50 + 1 x 25	400	Direct connection	**MC175M4DT**
			Fuseswitch	**MC175M4SDT**
			MCCB	**MC175M4MDT**
200	4 x 50	420	Direct connection	**MC200M4DT**
			Fuseswitch	**MC200M4SDT**
			MCCB	**MC200M4MDT**
225	4 x 50 + 1 x 25	430	Direct connection	**MC225M5DT**
			Fuseswitch	**MC225M5SDT**
			MCCB	**MC225M5MDT**
250	5 x 50	440	Direct connection	**MC250M5DT**
			Fuseswitch	**MC250M5SDT**
			MCCB	**MC250M5MDT**
275	5 x 50 + 1 x 25	450	Direct connection	**MC275M6DT**
			Fuseswitch	**MC275M6SDT**
			MCCB	**MC275M6MDT**
300	6 x 50	470	Direct connection	**MC300M6DT**
			Fuseswitch	**MC300M6SDT**
			MCCB	**MC300M6MDT**
325	6 x 50 + 1 x 25	480	Direct connection	**MC325M7DT**
			Fuseswitch	**MC325M7SDT**
			MCCB	**MC325M7MDT**
350	7 x 50	500	Direct connection	**MC350M7DT**
			Fuseswitch	**MC350M7SDT**
			MCCB	**MC350M7MDT**
375	7 x 50 + 1 x 25	510	Direct connection	**MC375M8DT**
			Fuseswitch	**MC375M8SDT**
			MCCB	**MC375M8MDT**
400	8 x 50	530	Direct connection	**MC400M8DT**
			Fuseswitch	**MC400M8SDT**
			MCCB	**MC400M8MDT**
425	8 x 50 + 1 x 25	540	Direct connection	**MC425M9DT**
			MCCB	**MC425M9MDT**
450	9 x 50	560	Direct connection	**MC450M9DT**
			MCCB	**MC450M9MDT**
475	9 x 50 + 1 x 25	700	Direct connection	**MC475M10DT**
			MCCB	**MC475M10MDT**
500	10 x 50	720	Direct connection	**MC500M10DT**
			MCCB	**MC500M10MDT**
525	10 x 50 + 1 x 25	730	Direct connection	**MC525M11DT**
			MCCB	**MC525M11MDT**
550	11 x 50	750	Direct connection	**MC550M11DT**
			MCCB	**MC550M11MDT**
575	11 x 50 + 1 x 25	760	Direct connection	**MC575M12DT**
			MCCB	**MC575M12MDT**
600	12 x 50	780	Direct connection	**MC600M12DT**
			MCCB	**MC600M12MDT**

Applications above 600KVAR are also available. Applications above 400KVAR are also available with an ACB as the protective device
Please contact Eaton for further details.

10.1 **MEMSHIELD 3 TYPE A SPN, TYPE B TPN DISTRIBUTION BOARDS** 126
SPLIT METERED POWER AND LIGHTING BOARD – 200A TPN, MEMSHIELD 3 METER PACK ASSEMBLIES 128
MEMSHIELD 3 TYPE A SPN, TYPE B TPN PAN ASSEMBLIES 129
SURGE PROTECTION DEVICES 131
METER PACK ASSEMBLIES 132
18MM MINIATURE CIRCUIT BREAKERS (MCBS) 134
27MM MINIATURE CIRCUIT BREAKERS (FOR 250A HIGH LOAD DISTRIBUTION BOARDS) 136
RESIDUAL CURRENT CIRCUIT BREAKERS (RCCBS) 137
RESIDUAL CURRENT CIRCUIT BREAKERS – WITH OVERLOAD (RCBOS) 138
CONTROL AND SWITCHING DEVICES DIMENSIONS AND DATA 139
EARTH LEAKAGE RELAYS AND CTS 147
10.2 **MCCBS, MAX ZS (OHMS) FIGURES** 148
PANELBOARD DIMENSIONAL DRAWINGS 149
PANELBOARD MULTIFUNCTION METER, TECHNICAL CHARACTERISTICS AND SPECIFICATION 152
MCCB PAN ASSEMBLIES, DIMENSIONS 153
10.3 **ENCLOSED SWITCH & FUSEGEAR** 155
Glasgow fuse-switch-disconnectors & switch-disconnectors 155
Glasgow busbar chamber system 157
Exel 2 switch-disconnectors & switch-disconnector fuses 159
Exel distribution fuseboards 160
HRC cartridge fuselinks, carriers and bases 161
Rotary isolators 163
ADS8 AND AUTOLINE AC CONTACTORS, STARTERS AND ASSEMBLIES 165
PUSHBUTTON CONTROL UNITS – MSU 179
10.4 **POWER FACTOR CORRECTION CAPACITORS** 180
10.5 **DEGREES OF PROTECTION – IP** 184

Distribution boards type A and type B, technical overview

	Type A	Type B
IP Rating	IP3X	IP4X
Enclosure body type	Steel – welded case end with cable glad plate	Steel – welded case end with cable glad plate
Paint specification	RAL 7004 epoxy polyester	RAL 7004 epoxy polyester
Conditional short circuit rating	15kA to BS EN 61439	25kA to BS EN 61439
Busbar short time withstand (Icw)	5kA 0.1s	10kA 0.5s / 17kA 0.25s
Cable Capacities		
125A switch disconnector	50mm²	50mm²
100A RCCB (type A = 90A)	35mm²	50mm²
250A switch disconnector	–	120mm² (+ M8 lugs)
160A – 250A MCCB incomer	–	250A = 120mm² (+ M8 lugs)
100A direct connection kit	35mm²	–
250A direct connection lugs	–	120mm² (+ M8 lugs)
125A contactor incomer	–	50mm²
250A contactor incomer	–	120mm² (+ M8 lugs)
Enclosure earth stud	M6	M8
Incoming earth terminal	25mm²	125A = 25mm², 250A = 70mm²
Incomming neutral terminal	90/100A = 35mm², 125A = 50mm²	125A = 50mm², 250A = 120mm² (+ M8 lugs)
Outgoing earth terminal	25mm²	25mm²
Outgoing neutral terminal	25mm²	25mm²

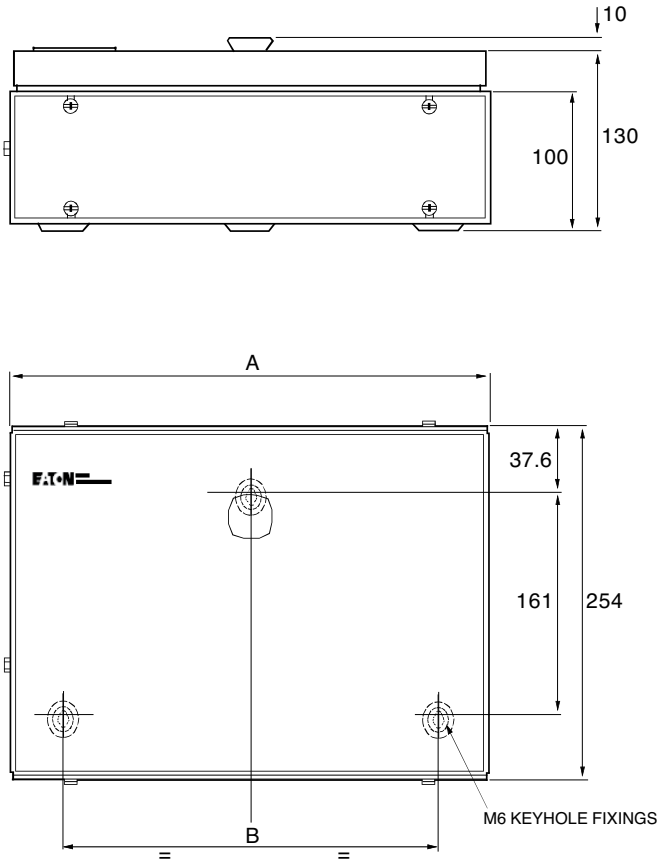
Type 1/type 2 combined lightning/surge arrester, technical data

Electrical		EM3SSK3T12 & EMSSK3T12L	EM3SSK3T12P
Lightning protection system class		III, IV	I, II, III, IV
Responding time (rate of voltage rise 5 kV/µs)	L-N/ N-PE	< 25 ns / < 100 ns	< 25 ns
Voltage protection level U_p	L-N/L-PE / N-PE	< 1.5kV	1.5 kV
Maximum continuous operating voltage U_C	L-N/N-PE	280 VAC/255 VAC	440 VAC / 260 VAC
Temporary overvoltage test value U_T (5 s)	L-N/L-PE	348 VAC/370 VAC	
(200 ms)	N-PE	1200 VAC	200 VAC (200 ms)
Rated frequency		50/60 Hz	50/60 Hz
Discharge current (8/20) µs I_{max}/I_n		–	100 kA
Open circuit voltage U_{oc}		20 kV	–
Nominal discharge current (8/20) µs I_n	L-N/N-PE	3x25 kA/100 kA	–
Maximum discharge current I_{max}	L-N/N-PE	3x50 kA/100 kA	–
Impulse current I_{imp} (10/350) µs:			
Peak current	L-N/N-PE	3x12.5 kA/100 kA	100 kA
Charge Q		50 As	50 As
Specific energy		2500 kJ/Ω	2500 kJ/Ω
Follow current interrupt rating I_{fi}	N-PE	100 $A_{r.m.s}$	–
at 260 V	L-(PE)N/N-PE	–	3kA_{rms}/100A_{rms}
at 440 V	L-(PE)N/N-PE	–	1,5kA_{rms}/–
Short-circuit current strength at max. back-up fuse		–	25kA_{rms}
Maximum back-up fuse		160 AgL/gG	125 AgL
Maximum short-circuit current		50 k$A_{r.m.s}$	–

Type 2 surge arrester technical data

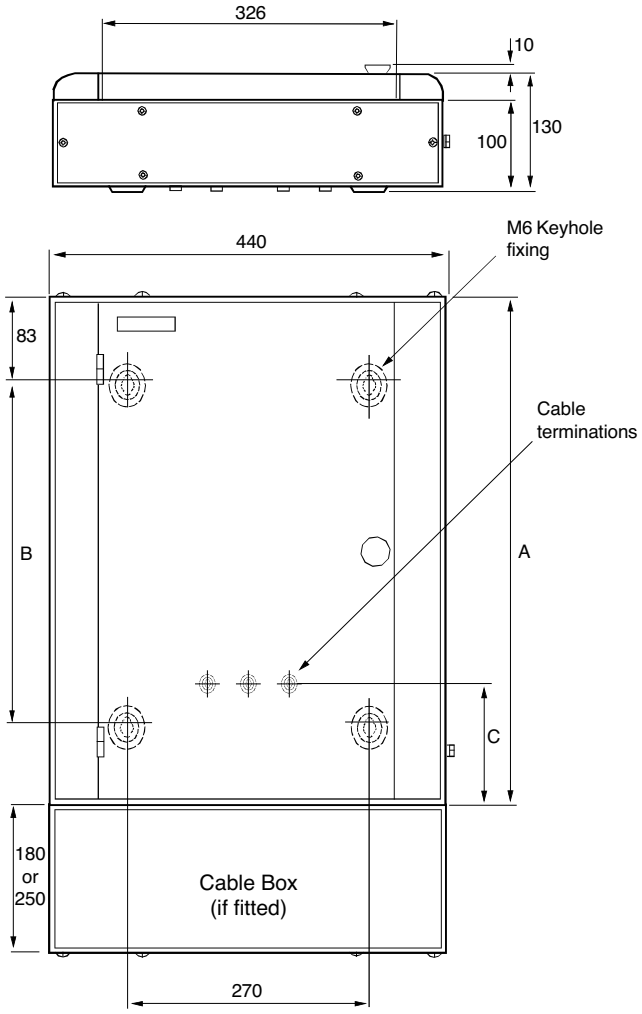
Electrical		EM3SSK1T2	EM3SSK3T2
Responding time (rate of voltage rise 5 kV/µs)	L-N/N-PE/L-PE	< 25ns/< 100ns/< 100ns	< 25ns/< 100ns/< 100ns
Maximum continuous operating voltage U_C	L-N/N-PE	335VAC/260VAC	280VAC/260VAC
Temporary overvoltage test value U_T (5 s)	L-N	415 VAC	350 VAC
(200 ms)	N-PE	1200 VAC	1200 VAC
Rated frequency		50/60 Hz	50/60 Hz
Nominal discharge current I_n	L-N/N-PE/L-PE	20 kA (8/20)µs	20 kA (8/20)µs
Voltage protection level U_p at I_n	L-N/N-PE/L-PE	≤1600V/≤1000V/≤1650V	≤1000V/≤1000V/≤1300V
Maximum discharge current I_{max}	L-N/N-PE/L-PE	40 kA (8/20)µs	40 kA (8/20)µs

Memshield 3 type A SPN Distribution Board, dimensional drawing



List No.	A (mm)	B (mm)
EAM4, EBMXDC6	238	163
EAMMP65	238	163
EAM7, EBMXDC9	292	217
EAM10	346	271
EAM13, EBMXDC15, EBMXDCG15	440	365
EAM9M/MB	440	365
EAM16, EBMXDC18	454	379
EAM12M/MB	454	379
EAMSL66M/MB	454	379
EAMSL93M/MB	454	379

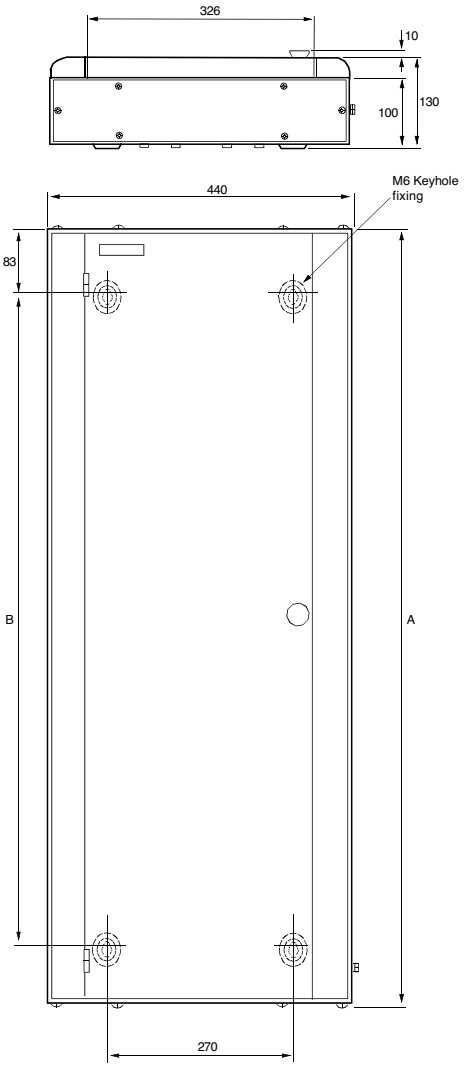
Memshield 3 type B TPN Distribution Board, dimensional drawing



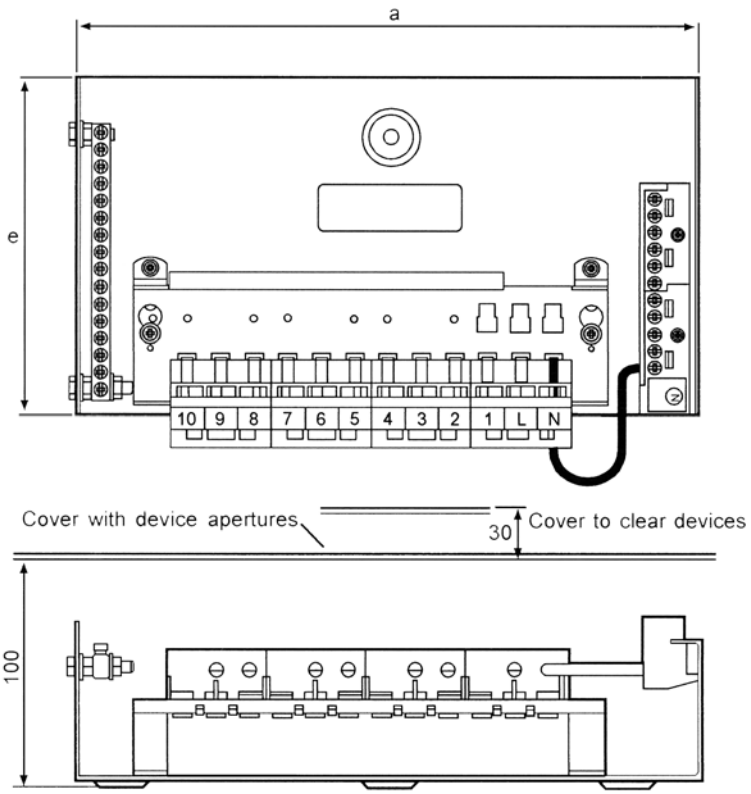
List No.	A (mm)	B (mm)	C (mm) 125A incomer	250A incomer	Lugs incomer
EBM41	429	245	144	–	150
EBM61	482	298	144	–	150
EBM81, EBMXDC30	564	380	173	–	179
EBM121, EBM121D, EBMXDC45	724	540	227	–	233
EBM161	830	540	227	–	233
EBM122	861	677	334	76	340
EBM182	1021	837	334	76	340
EBM242	1180	996	334	76	340
250A high load boards[1)]					
EBM22H	817	633	–	237	500
EBM62H	1020	836	–	296	559
EBM82H	1055	871	–	277	540
EBM122H	1180	996	–	296	559
EBM182H	1342	1158	–	298	561
EBM242H	1501	1317	–	298	561

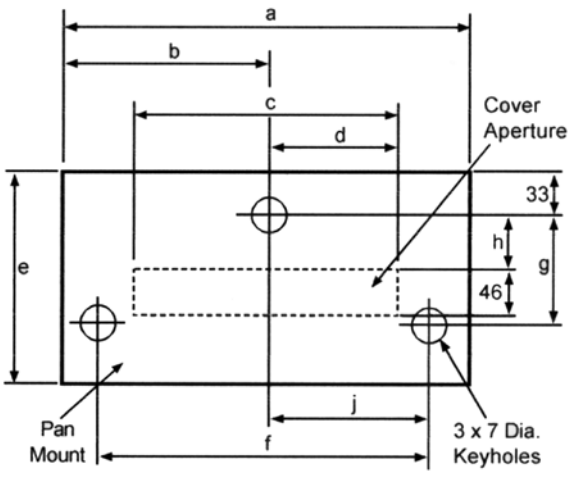
[1)] Cable box not required

Split metered power and lighting board – 200A TPN, dimensional drawing



List No.	A (mm)	B (mm)
EBMSL642MPMB	1130	946
EBMSL862MPMB	1236	1052
EBMSL1082MPMB	1342	1158
EBMSL14102MPMB	1501	1317

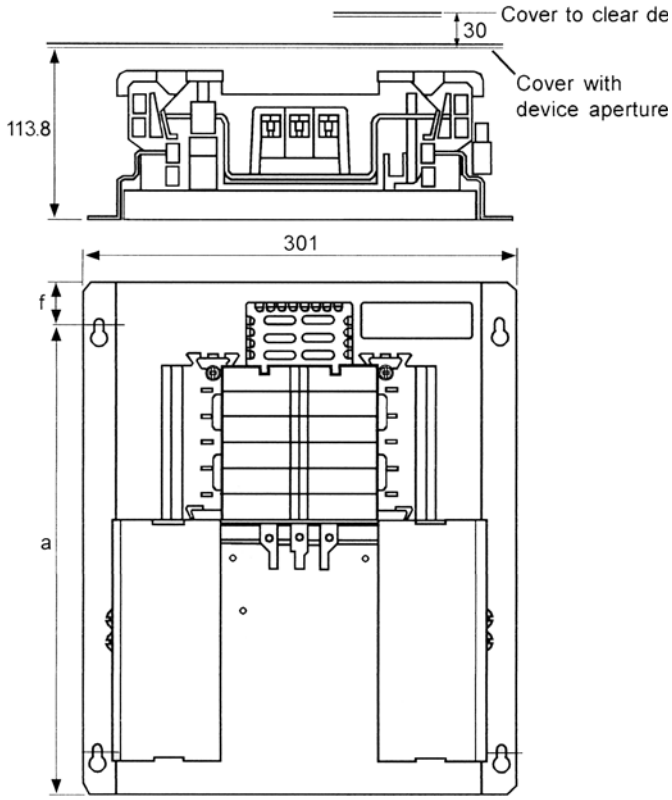


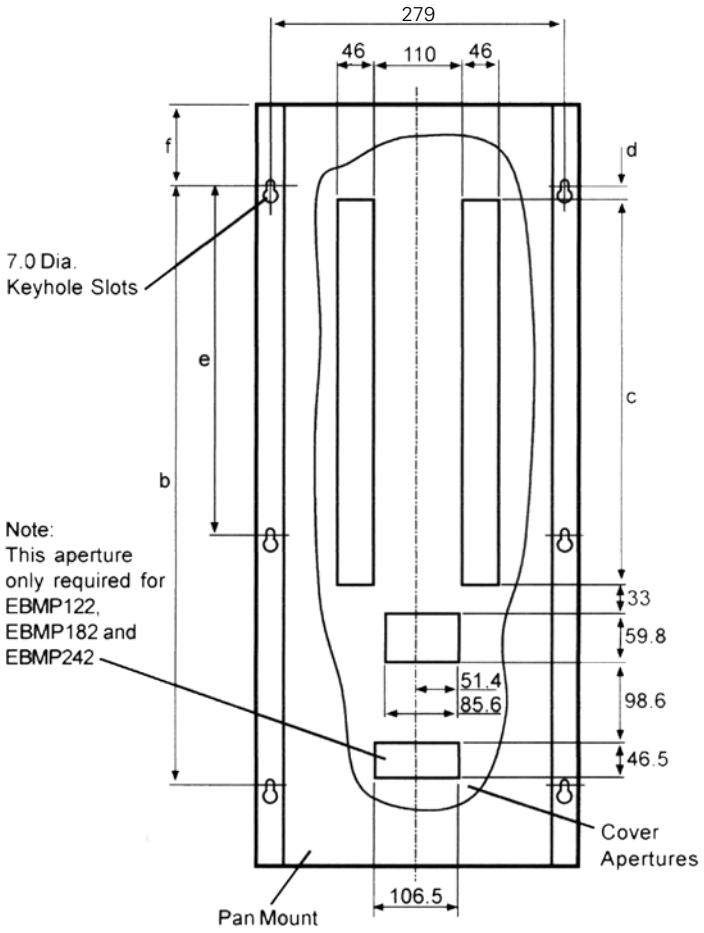


List No.	Dimensions (mm)									Minimum recommended enclosure size (mm)
	a	b	c	d	e	f	g	h	j	
EAMP4	190	105.5	107.7	48.8	180	160	96	70	77	238 (W) x 254 (L)
EAMP7	274	129.5	160.9	79	180	214	96	70	107	292 (W) x 254 (L)
EAMP10	328	164	214.1	127.5	180	266	96	70	127.5	346 (W) x 254 (L)
EAMP13	382	183.5	267.3	131.3	192	319	109	82	161	440 (W) x 260 (L)
EAMP16	435	226.5	320.5	141.5	198	372	105	79	171	495 (W) x 260 (L)

10.1 Technical data

Memshield 3 type B TPN pan assemblies

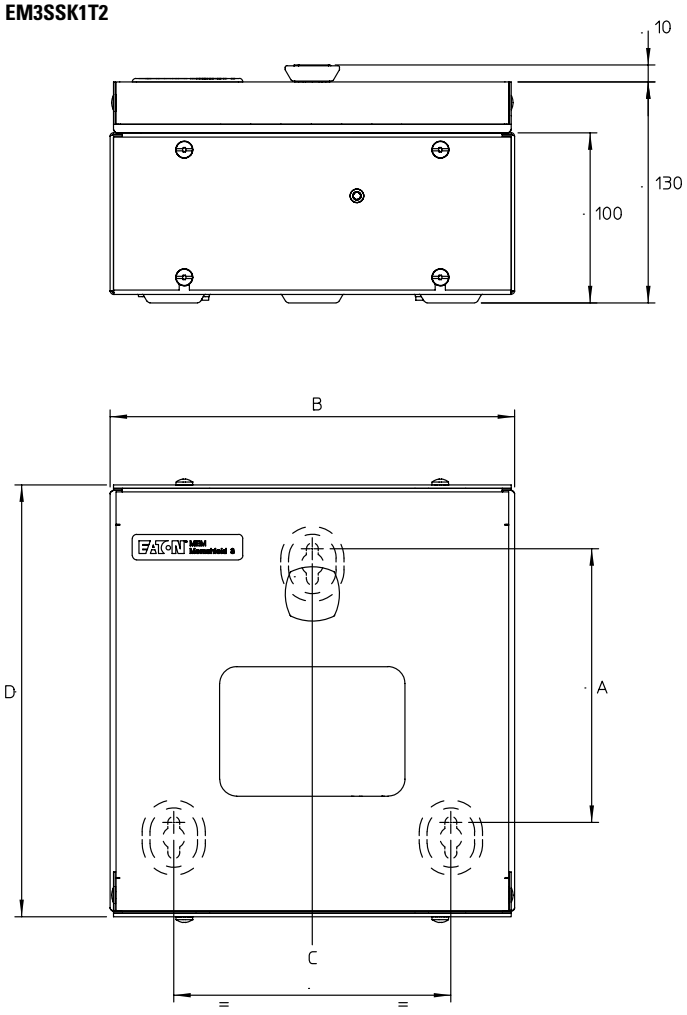




List No.	Dimensions (mm)						Minimum recommended enclosure size (mm)
	a	b	c	d	e	f	
EBMP41	333.6	303.3	107.5	35.7	–	21	440 (W) x 425 (L)
EBMP61	413.7	383.5	160.6	35.7	–	21	440 (W) x 478 (L)
EBMP81	511.5	481.2	213.7	53.2	–	21	440 (W) x 560 (L)
EBMP121	638.1	589.2	319.9	22.2	–	40	440 (W) x 720 (L)
EBMP122	750	710	319.9	16.7	336.5	40	440 (W) x 861 (L)
EBMP182	910	870	479.2	16.7	435	40	440 (W) x 1016 (L)
EBMP242	1070	1030	638.5	16.7	515	40	440 (W) x 1176 (L)

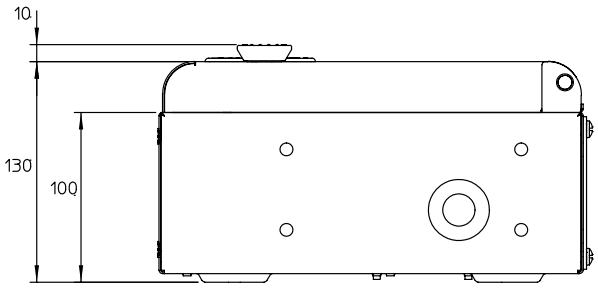
Memshield 3, surge protection devices, dimensional drawings

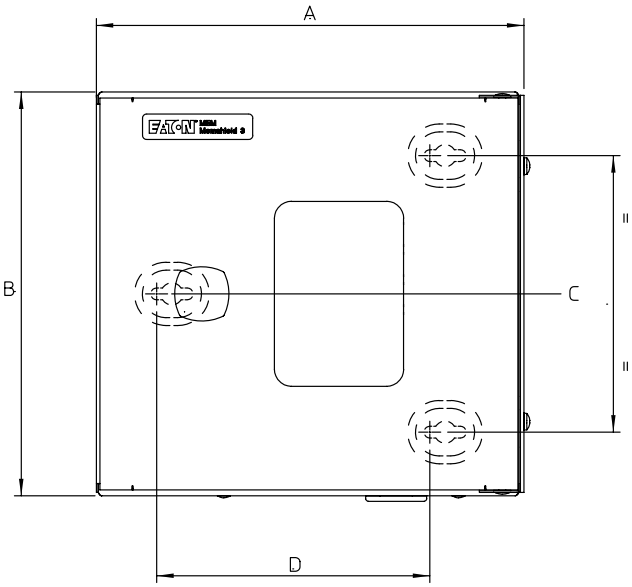
EM3SSK1T2



List No.	A (mm)	B (mm)	C (mm)	D (mm)
EM3SSK1T2	254	238	163	161

EM3SSKT2/EM3SSKT12

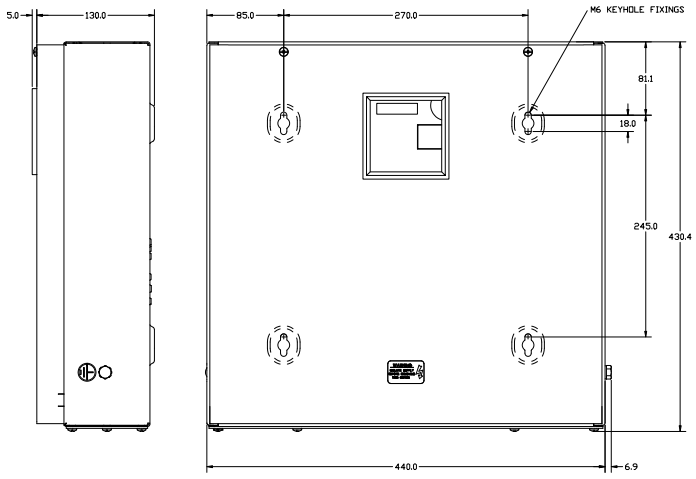




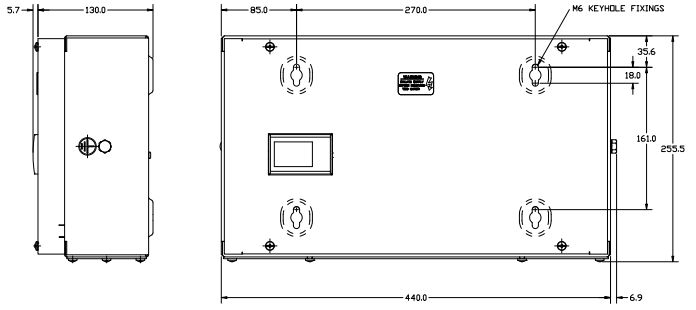
List No.	A (mm)	B (mm)	C (mm)	D (mm)
EM3SSK3T2	254	238	163	161
EM3SSK3T12	254	238	163	161

Memshield 3, Meter pack assemblies, dimensional drawings

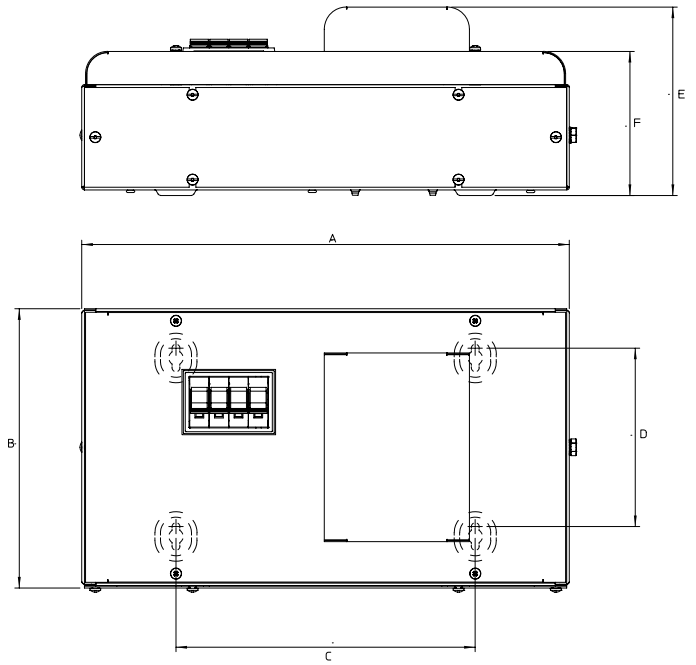
EBMMPCD120



EBMMPCT250/EBMMPCT250M/EBMMPCT250MID



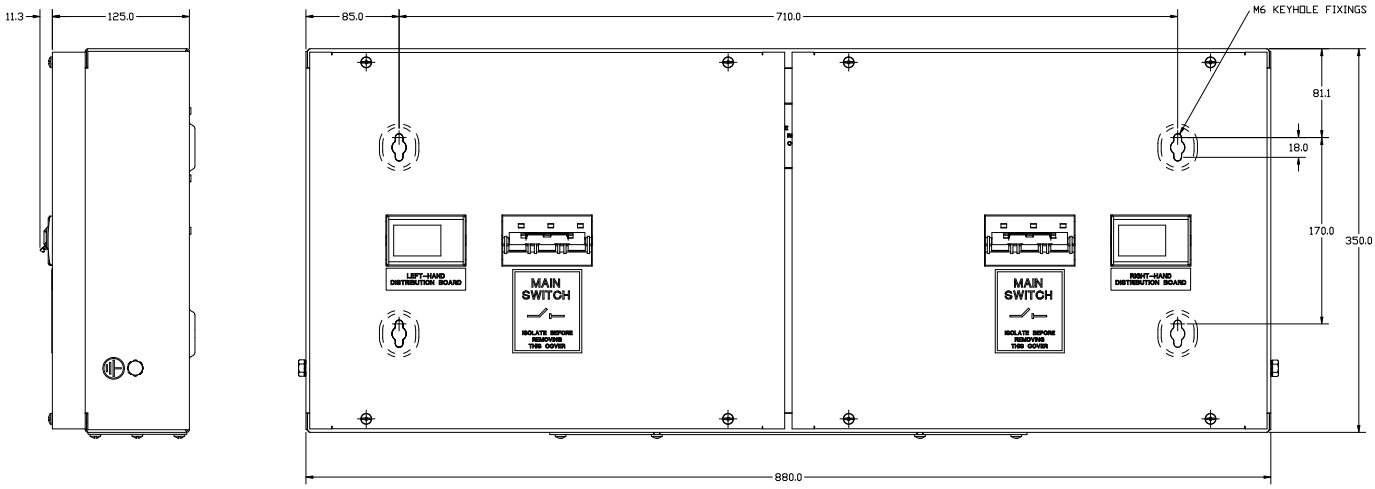
Memshield 3, contactor incomer, dimensional drawings



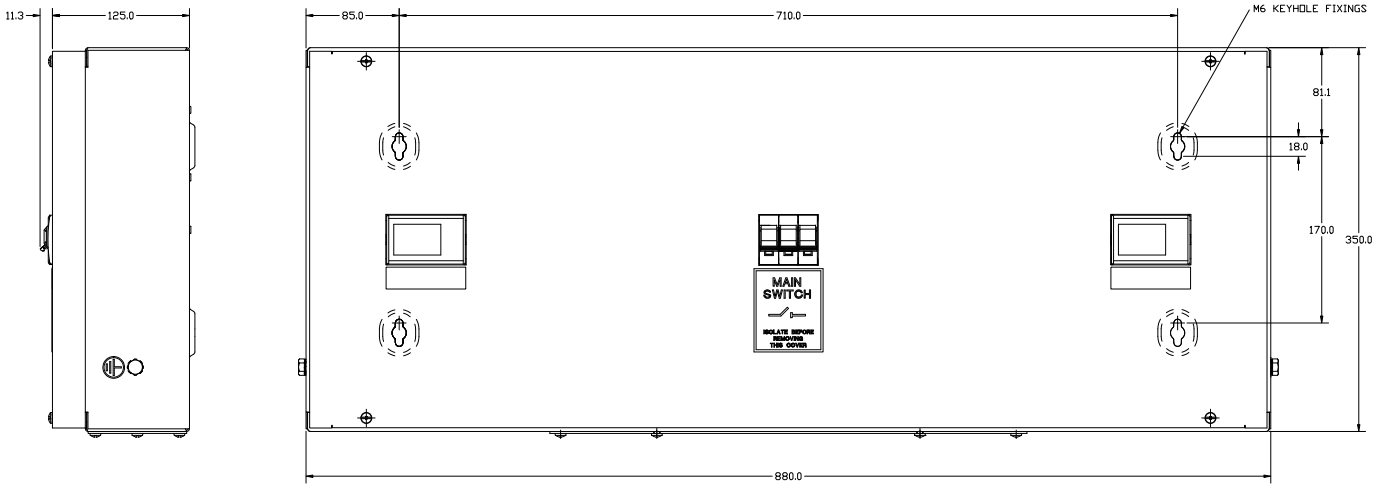
List No.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
EBMCC1253	440	252	270	161	170	130
EBMCC2503	440	595	270	501	130	130

Memshield 3, Meter pack assemblies, dimensional drawings (contd)

EBMMPSL250/EBMMPSL250M



EBMMPSL125/EBMMPSL125M



18mm miniature circuit breakers (MCBs), technical data

Eaton's range of 10/15kA high performance miniature circuit breakers (MCBs) are manufactured and tested to IEC EN 60898, and IEC EN 60947-2, meeting the latest UK, European and international standards, with ratings from 1A to 63A as standard.

DIN rail mountable and suitable for use with both pin and comb type busbar systems, Eaton's MCBs are suitable for use on 230/400 VAC systems and are calibrated for use at 40°C. These devices suite with the other modular devices including RCBOs, RCCBs and isolators, for use within Eaton Memshield 3 Distribution boards and a wide range of other applications.

The Eaton MCBs are fitted with box clamp terminals suitable for use with cables up to 25mm², and have a unique box clamp barrier to prevent incorrect cable insertion.

Eaton miniature circuit breakers are available with B, C and D characteristic curve as standard. Type C MCBs are most commonly used in commercial and general applications where there are lighting or motor loads involving high switching surges that may cause unwanted operation of type B devices. Type D devices are more commonly used on general industrial applications with much higher inrush surges.

IEC/EN 60898 Type	Instantaneous Trip Current (x In)	Typical Application	Eaton 10/15A MCB type
B	3 to 5	General distribution	EMBH
C	5 to 10	Commercial Light industrial	EMCH
D	10 to 20	General Industrial	EMDH

Type B: Suitable for general, domestic and commercial installations having little or no switching surges.

Type C: Suitable for general use in commercial or industrial applications where the greater use of fluorescent lighting and small motors can produce switching surges, which may cause nuisance tripping of type B breakers.

Type D: Suitable for general industrial applications where there are a lot of high inrush switching surges associated with equipment such as transformers, large motors , welding and X ray equipment.

Earth fault loop impedances (Zs) to provide compliance with BS 7671

The wiring regulations BS 7671 makes specific reference to MCB types and the maximum earth loop impedance allowable to meet the required disconnection times.

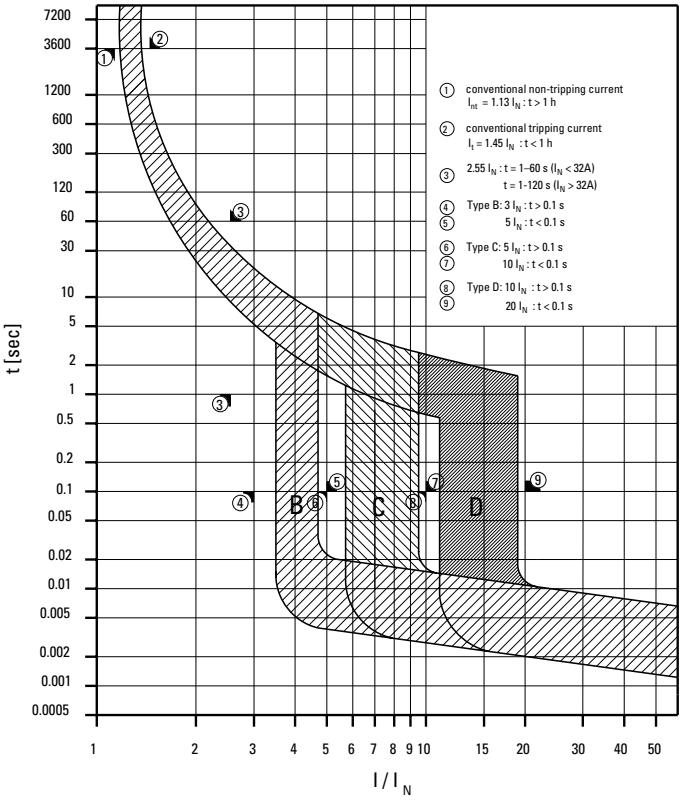
It can be seen that it is much easier to achieve adequate disconnection times with type B devices than it is with types C and indeed type D devices.

Maximum earth fault loop impedance i.e. Zs ohms for final circuits fed from miniature circuit breakers MCBs or RCBOs with Uo of 230V, for instantaneous operation giving compliance with 0.4s disconnection time of Reg 411.3.2.2 and 5s disconnection time of 411.3.2.3

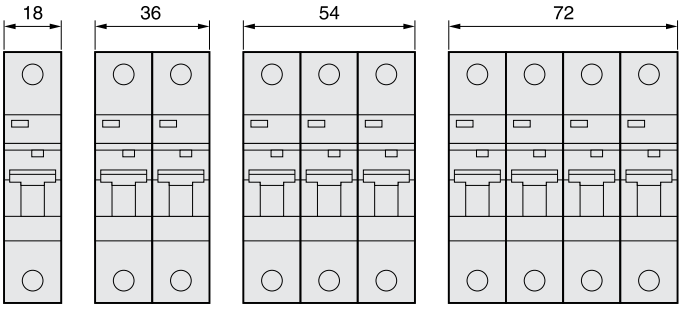
Note: A minimum Voltage factor Cmin = 0.95 has been introduced to take account of variations in supply voltage depending on time, place and transformer settings etc., in accordance with Electricity Safety, Quality and Continuity regulations 2002.

The effect of this is to reduce the previous BS7671 maximum earth loop impedance Zs values by 5%.

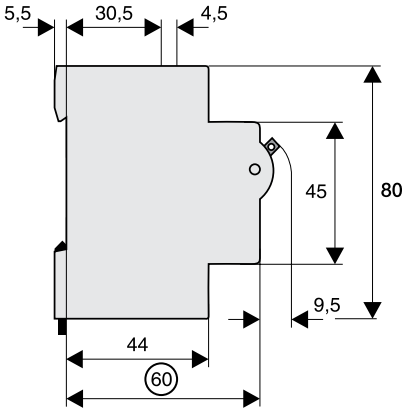
Tripping characteristic type B, C & D



10/15kA MCBs dimensional drawings



1-pole (1P) | 2-pole (2P), 1-pole+N (1P+N) | 3-pole (3P) | 4-pole (4P)



10/15kA MCBs technical data

Product standard	IEC EN 60898 & IEC EN 60947-2
No of poles	1p, 1p&N, 2p, 3p, 4p
Mechanical specification	
Device width (pole)	17.7mm
Terminal type	Box clamp
Terminal capacity	1–25mm2
Terminal Screw	M5 combination
Terminal torque	2.0Nm – 2.4Nm max
Mounting	DIN rail
Degree of protection	IP 20
Positive contact indication	Red/Green flag indicator
Electrical specification	
Rated voltage	230/240 V AC 48V DC (per pole)
Current ratings	1, 2, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63 A
Rated impulse and withstand voltage	4kV (1.2/50) u sec
Rated short circuit capacity	10kA to IEC EN 60898 and 15kA to IEC EN 60947-2
Selectivity class	3 to EN 60898
Tripping characteristic	
Instantaneous tripping current I mt	Type B: 3 In < Imt < 5 In Type C: 5 In < Imt < 10 In Type D: 10In < Imt < 20 In
Conventional non tripping current	I nt = 1.13 In
Conventional tripping current	It = 1.45 In
Ref/Calibration temp	40o C
Number of operating cycles elec	>4000
Number of operating cycles mech	>20000

MCB Max Zs (Ohms) figures (Data in line with BS7671)

Range	In (A)	Disconnection 0.4s	Disconnection 5s
Type B (EMBH Series)	1	43.70	43.70
	2	21.85	21.85
	4	10.93	10.93
	6	7.28	7.28
	8	5.46	5.46
	10	4.37	4.37
	13	3.36	3.36
	16	2.73	2.73
	20	2.19	2.19
	25	1.75	1.75
	32	1.37	1.37
	40	1.09	1.09
	50	0.87	0.87
	63	0.69	0.69
Type C (EMCH Series)	1	21.85	21.85
	2	10.93	10.93
	4	5.46	5.46
	6	3.64	3.64
	8	2.73	2.73
	10	2.19	2.19
	13	1.68	1.68
	16	1.37	1.37
	20	1.09	1.09
	25	0.87	0.87
	32	0.68	0.68
	40	0.55	0.55
	50	0.44	0.44
	63	0.35	0.35
Type D (EMDH Series)	1	10.93	21.85
	2	5.46	10.93
	4	2.73	5.46
	6	1.82	3.64
	8	1.37	2.73
	10	1.09	2.19
	13	0.84	1.68
	16	0.68	1.37
	20	0.55	1.09
	25	0.44	0.87
	32	0.34	0.68
	40	0.27	0.55
	50	0.22	0.44
	63	0.17	0.35

Note : Values take account of minimum voltage factor Cmin - in accordance with BS7671 Amendment 3

27mm style miniature circuit breakers (for 250A distribution boards)

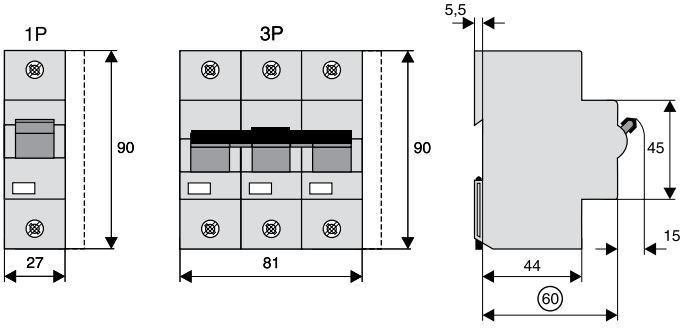
Eaton's 27mm style miniature circuit breakers (MCBs) are manufactured and tested to IEC EN 60947-2, meeting the latest UK, European and international standards, with ratings from 20A to 125A single and triple pole as standard.

Eaton's MCBs are suitable for use on 230/400 VAC systems and are calibrated for use at 40°C. and are available with B, C, and D characteristic curve, with breaking capacities up to 25kA.

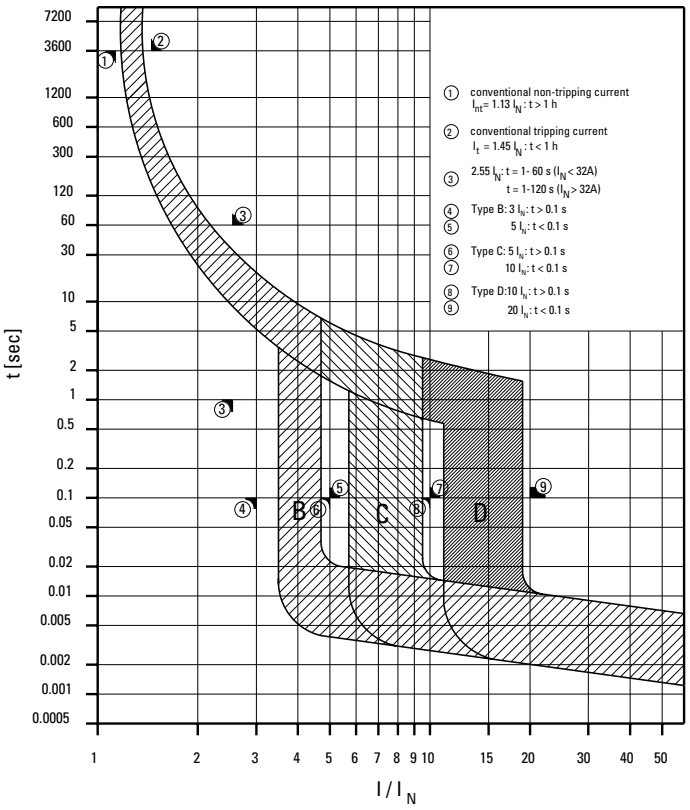
15/25kA MCBs technical data

Product standard		IEC EN 60947-2
No of poles		1p, 3p
Mechanical specification		
Device width (pole)		27mm
Terminal type	Lower Box clamp	Upper Box clamp
Terminal capacity	1 - 25 mm^2	2 - 16 mm^2
Terminal Screw	MS Combination	MS Combination
Terminal torque	2.4Nm max	1.5Nm max
Mounting		DIN rail
Degree of protection		IP 20
Positive contact indication		Red/Green flag indicator
Electrical specification		
Rated voltage		230/400 V AC
		60V DC (per pole)
Current ratings		63, 80, 100, 125 A
Rated impulse and withstand voltage		4kV (1.2/50) u sec
Rated short circuit capacity		
Types B and C		20–63A – 25kA
		80–100A – 20kA
		125A – 15kA
Rated short circuit capacity		
Type D		20–63A – 25kA
		80A – 20kA
		100A – 15kA
Selectivity class		In accordance with class C
Tripping characteristic		
Instantaneous Tripping current I mt		Type B: 3 In < Imt < 5 In Type C: 5 In < Imt < 10 In Type D: 10In < Imt < 20 In
Conventional non tripping current		I nt = 1.13 In
Conventional tripping current		It = 1.45 In
Ref/Calibration temp		40o C
Number of operating cycles elec		>20000

Miniature circuit breakers – dimensional drawings



Tripping characteristic type B, C & D



Eaton Memshield-3 MCB Max Zs (Ohms) Data in line with BS7671

Range	In (A)	Disconnection 0.4s	Disconnection 5s
Type B (EMBS Series)	20	2.19	2.19
	32	1.37	1.37
	40	1.09	1.09
	50	0.87	0.87
	63	0.69	0.69
	80	0.55	0.55
	100	0.44	0.44
	125	0.35	0.35
Type C (EMCS Series)	20	1.09	1.09
	32	0.68	0.68
	40	0.55	0.55
	50	0.44	0.44
	63	0.35	0.35
	80	0.27	0.27
	100	0.22	0.22
	125	0.17	0.17
Type D (EMDS Series)	20	0.55	1.09
	32	0.34	0.68
	40	0.27	0.55
	50	0.22	0.44
	63	0.17	0.35
	80	0.14	0.27
	100	0.11	0.22

Note : Values take account of minimum voltage factor Cmin - in accordance with BS7671 Amendment 3

Residual current circuit breakers (RCCBs) technical data

Eaton's range of residual current circuit breakers without integral Overload protection (RCCBs), are manufactured to IEC EN/61008 and meet the latest European and International standards.

DIN rail mountable in 2 and 4 module widths these RCCBs provide protection solutions to a wide range of applications. With standard thermal ratings of 16A to 100A and trip sensitivities of 10mA, 30mA, 100mA and 300mA, these devices can be equipped with a range of modular accessories.

The Eaton RCCBs suite with the complete range of modular devices, and are for use within Eaton's Memshield 3 distribution boards and other applications.

These devices will accommodate cables up to 35mm^2.

Terminology

RCD – Residual current device:- This is the generic term covering a range of devices that are able to detect residual currents sometimes also referred to as earth leakage current. The residual current is measured by detecting the difference between the current flowing in the live and neutral conductors of a circuit and where the residual current is above a predefined level the RCD will trip. RCDs are available in a range of trip sensitivities for different applications.

RCCB – Residual current circuit breaker is an RCD which will cause disconnection of the electrical supply should it detect a residual current passing through the device, above a specified tripping current limit e.g. 30mA. This device does not provide over current protection and is therefore also referred to as an RCCB without integral over-current protection.

RCBO – Residual current circuit breaker, with overload protection, is an RCCB which will cause disconnection of the electrical supply should it detect a residual current above a specified tripping current limit, combined with integral overload, over-current, and shortcircuit protection associated with a miniature circuit breaker.

The 17th Edition of the IEE wiring regulations BS7671 now places much greater emphasis on the use of 30mA RCDs to provide "additional protection" in many areas covered by the regulations, such as circuits feeding socket outlets and for the protection of concealed wiring.

Trip sensitivities

10mA – Provides the highest degree of RCD protection in hazardous environments where supplementary protection against electric shock is required. This very high sensitivity should only be applied to final circuits where a high degree of risk exists.

30mA – Provides a high degree of protection against electric shock due to direct and indirect contact. A 30mA RCD will trip within 40mS when a fault current of 150mA is detected.

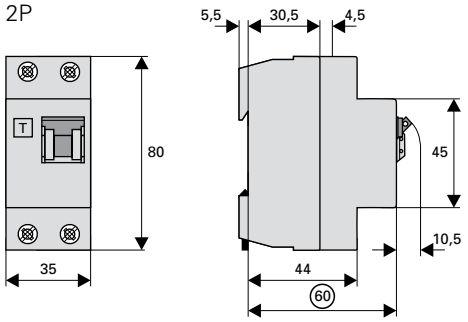
This type of RCD is required to satisfy the requirements for "additional protection" in accordance with BS7671 (IEE wiring regs.)

100mA – Provides a degree of protection against electric shock resulting from indirect contact, and is generally used to protect a group of circuits as well as providing overall protection against Fire risk.

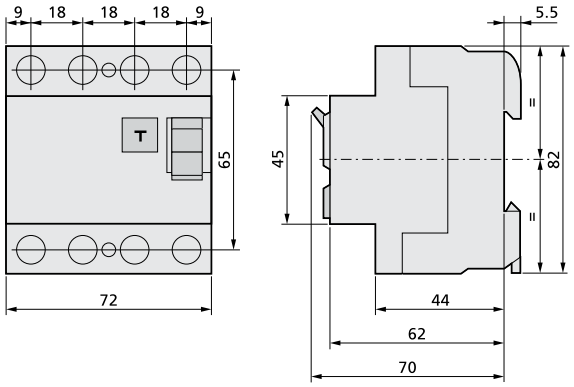
300mA – Provides a lower level of RCD protection in the form of an overall protection against the risk of fire resulting from faults in electrical wiring etc.

RCCB dimensions (mm)

2P



4P



RCCB technical data

Specifications	2-pole RCCB	4-pole RCCB
Product standard	IEC EN 61008	IEC EN 61008
No of poles	2p	4p
Mechanical specification		
Device width	35 mm	70 mm
Terminal type	Box clamp	Box clamp
Terminal capacity	1.5–35mm^2	35mm^2
Terminal Screw	M5 combination	M5 combination
Terminal torque	2.4Nm max	2.4Nm max
Mounting	DIN rail	DIN rail
Degree of protection	IP 20	IP 20
Positive contact indication	Yes (toggle position)	Red/green flag
Electrical specification		
Rated voltage	230/400 V AC	230/400 V AC
Current ratings	16, 40, 63, 80,100 A	16, 40, 63, 80,100 A
Rated impulse and withstand voltage	4kV (1.2/50) u sec	4kV (1.2/50) u sec
Rated short circuit capacity	10kA (with back up)	10kA (with back up)
Sensitivity	AC	AC
Tripping characteristic		
Rated tripping currents	10, 30, 100, 300 mA	10, 30, 100, 300 mA
Tripping type	Instantaneous	Instantaneous
Number of operating cycles elec	>4000	>4000
Number of operating cycles mech	>20000	>20000

Residual current circuit breakers – with overload protection (RCBOs) technical data

Eaton's range of residual current circuit breakers with integral overload protection (RCBOs), are manufactured to IEC EN 61009 and meet the latest European and International standards.

Trip Sensitivity

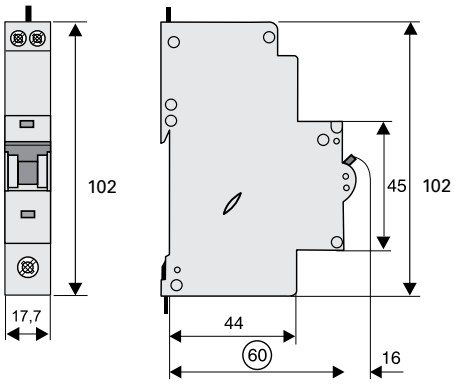
Provides a high degree of protection against electric shock due to direct contact. A 30mA RCD will trip within 40mS when a fault current of 150mA is detected.

This type of RCD is required to satisfy the requirements for "additional protection" in accordance with BS7671 (IET wiring regs.)

Single phase RCBO technical data

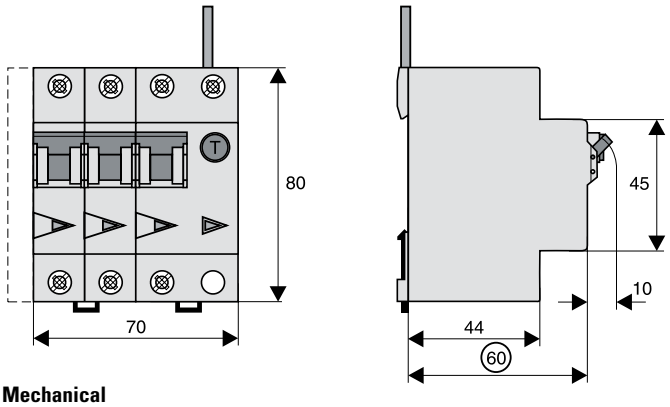
Specifications		
Product standard	IEC EN 61009	
No of poles	1p & solid N	
Mechanical specification		
Device width	17.7 mm	
Terminal type	Lower-Box clamp	Upper-Box clamp
Terminal capacity	1–25mm2	2-16mm2
Terminal Screw	M5 combination	M4 combination
Terminal torque	2.4Nm max	1.5Nm max
Mounting	DIN rail	
Degree of protection	IP 20	
Positive contact indication	Yes (Red/Green flag)	
Electrical specification		
Rated voltage	230/240 V AC	
Current ratings	6, 10, 16, 20, 25, 32, 40, 45A	
Rated impulse and withstand voltage	4kV (1.2/50) u sec	
Rated short circuit capacity	10kA	
Sensitivity	Type A	
Tripping characteristic		
Instantaneous Tripping current I mt	Type B: 3 In < Imt < 5 In Type C: 5 In < Imt < 10 In	
Conventional non tripping current	I nt = 1.13 In	
Conventional tripping current	It = 1.45 In	
Ref/Calibration temp	40o C	
Rated tripping currents	10, 30, 100mA	
Tripping type	Instantaneous	
Number of operating cycles elec	>400	
Number of operating cycles mech	>20000	

RCBOs dimensions (mm)



Three phase RCBO technical data

Electrical		
Design according to	IEC/EN 61009	
Tripping		
line voltage-independent	instantaneous 250A (8/20µs)	
	surge current-proof	
Rated voltage U_e	240/415V; 50Hz	
Rated tripping current I_n	0, 100, 300 mA	
Rated non-tripping current $I\Delta_{no}$	0.5 $I\Delta_n$	
Sensitivity	Type A (AC and pulsating DC)	
Selectivity class	3	
Rated breaking capacity	10 kA	
Rated current	6 - 32 A	
Rated peak withstand voltage U_{imp}	4 kV (1.2/50µs)	
Characteristic	B, C, D	
Maximum back-up fuse (short circuit)	100 A gL (>10 kA)	
Endurance electrical comp.	≥ 4,000 operating cycles	
mechanical comp.	≥ 20,000 operating cycles	



Mechanical	
Frame size	45 mm
Device height	80 mm
Device width	70 mm
Upper and lower terminals	open mouthed/lift terminals
Terminal capacity	1 - 25 mm2
Degree of protection	IP20
Operating temperature	-25°C to +40°C
Resistance to climatic conditions	acc. to IEC/EN 61009

Analogue time switches

	TSSD1CO	TSSD1NO	TSQW1CO	TSQD1CO	TSQD1NO
General					
Operating voltage	230V AC	230 V AC	110 - 230 V AC	110 - 230 V AC	230 - 240 V AC
Frequency	50 Hz	50 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Stand-by power	0.5 W	0.5 W	0.5 W	0.5 W	0.5 W
Time control	Net	Net	Quartz	Quartz	Quartz
Accuracy	acc. Net	acc. Net	± 1 sec. / day	± 1 sec. / day	± 1 sec. / day
Power reserve	-	-	200 hrs / 100 hrs at 110 V	200 hrs/ 100 hrs at 110 V	±3 days
Battery type	-	-	NiMH	NiMH	NiMH
Degree of protection (EN 60529)	IP20	IP20	IP20	IP20	IP20
Ambient temperature	-20 °C...+55 °C	-20 °C...+50 °C	-20 °C...+55 °C	-20 °C...+55 °C	-10 °C...+50 °C
Protection class (EN 60730-1)	II	II	II	II	II
Switching contact(s)					
Type of switching contact	1 x CO	1 x NO	1 x CO	1 x CO	1 x NO
Switching capacity at 250 V~, cos = 1	16 A	16 A	16 A	16 A	16 A
Switching capacity at 250 V~, cos = 0,6	4A	4 A	4 A	4 A	4 A
Programming features					
Period of program	Day	Day	Week	Day	Day
Number of channels	1	1	1	1	1
Minimum cycle time	15 min.	15 min.	2 hrs	15 min.	15 min.
Programmable	every 15 min.	every 15 min.	every 2 hrs	every15 min.	every 15 min.
Program steps	96	96	84	96	96
Manual / Hand / Permanent switching [1])	On, Off, Auto	On, Off, Auto	On, Off, Auto	On, Off, Auto	On, Off, Auto
Switching status indication	x	x	x	x	x
Dimensions and weight					
Number of module width	3	1	3	3	1
Dimensions Width	52.5 mm	17.5 mm	52.5 mm	52.5 mm	17.5 mm
Height	90 mm	90 mm	90 mm	90 mm	90 mm
Depth	65.5 mm	65.5 mm	65.5 mm	65.5 mm	65.5 mm
Mounting	DIN-rail	DIN-rail	DIN-rail	DIN-rail	DIN-rail
Terminals					
Terminal screw size	M3.5	M3.5	M3.5	M3.5	M3.5

[1]) **Remark**

ON = Permanent ON

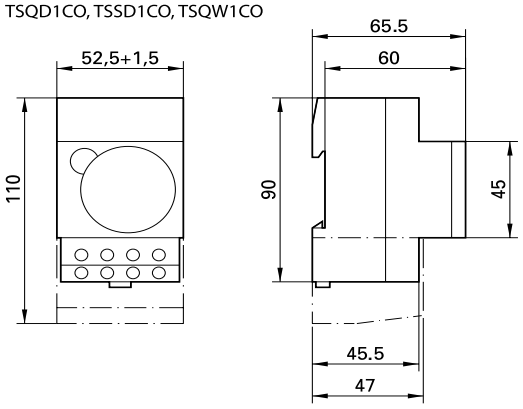
OFF = Permanant OFF

Hands = ON or OFF. valid until next program cycle overrules

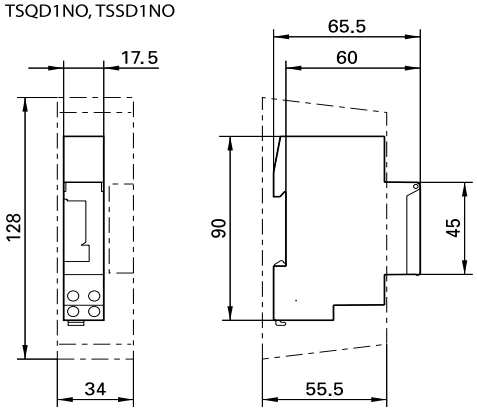
Auto = According program

Analogue daily and weekly timers, dimensional drawings

TSQD1CO, TSSD1CO, TSQW1CO

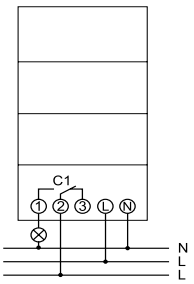


TSQD1NO, TSSD1NO

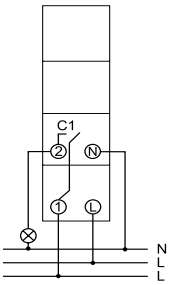


Analogue daily and weekly time switches, wiring diagrams

TSQD1CO, TSSD1CO, TSQW1CO



TSQD1NO, TSSD1NO



Digital timers - week programme

		TSDW1CO	TSDW1COMIN	TSDW2CO	TSDW1COA	TSDW1CODG
General						
Nominal operating voltage		220 - 240 V AC	240 V AC	220 - 240 V AC	230 - 240 V AC	230 - 240 V AC
Frequency		50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Stand-by power		0,8 W	0,4 W	0,8 W	0,8 W	1,4 W
Time base control [1])		Quartz	Quartz	Quartz	Astro	Quartz or DCF / GPS
Accuracy		± 0,5 sec. / day	±0,5 sec. / day	± 0,5 sec. / day	± 0,5 sec. / day	± 0,5 sec. / day
Power reserve		10 year	10 year	10 year	10 year	10 year
Type of battery		Lithium	Lithium (exchangeable)	Lithium	Lithium	Lithium
Protection class (acc. EN 60529)		IP20	IP20	IP20	IP20	IP20
Permissible ambient temperature		-30 ˚C...+55 ˚C	-25 ˚C...+55 ˚C	-30 ˚C...+55 ˚C	-30 ˚C...+55 ˚C	-30 ˚C...+55 ˚C
Protection class at proper installation (acc. EN 60730-1)		II	II	II	II	II
Switching contact(s)						
Type of switching contact		1 x CO	1 x CO	2 x CO	1 x CO	1 x CO
Switching capacity at 250 V~, cosΔ= 1		16 A	16 A	16 A	16 A	16 A
Switching capacity bij 250 V~, cosΔ= 0,6		10 A	6 A	10 A	10 A	10 A
Switching capacity for lighting						
- Incandescent lamp		2600 W	1000 W	2600 W	2600 W	2600 W
- Halogen lamp		2600 W	1000 W	2600 W	2600 W	2600 W
Programming features						
Period of programme		Week	Week	Week	Week	Week
Number of channels		1	1	2	1	1
Minimum switching capacity		10 mA	-	10 mA	10 mA	-
Minimum cycle time		1 min.	1 min.	1 min.	1 min.	1 sec.
Maximum programming steps in memory		56	56	56	56	84
Summer / wintertime automatic (or manual on/off)		Yes	Yes	Yes	Yes	Yes
Random programme		No	No	No	No	Yes (2)
Holiday programme		Yes	Yes	Yes	Yes	Yes
Cycle programme		No	No	No	No	Yes
Astro function		No	No	No	Yes	No
Pulse switching		No	No	No	No	Yes
Manual switching [2])		On, Off, Auto	On, Off, Auto	On, Off, Auto	On, Off, Auto	On, Off, Auto
LCD backlighting		Yes	-	Yes	Yes	Yes
PIN code		Yes	Yes	Yes	Yes	Yes
Dimensions and weight						
Number of module width		2	1	2	2	2
Dimensions	Width	35.8 mm	17.5 mm	35.8 mm	35.8 mm	35.8 mm
	Height	90.1 mm	90 mm	90.1 mm	90.1 mm	90.1 mm
	Depth	69.2 mm	65.5 mm	69.2 mm	69.2 mm	69.2 mm
Mounting		DIN-rail	DIN-rail	DIN-rail	DIN-rail	DIN-rail
Terminals						
Terminal type		Spring	Screw	Spring	Spring	Spring

1) Remark:

Astro function: Automatic calculation of sunrise and sunset times

DCF / GPS: Time synchronization is possible by connecting external antenna (TSADCF of TSAGPSKIT).

[2]) Remark:

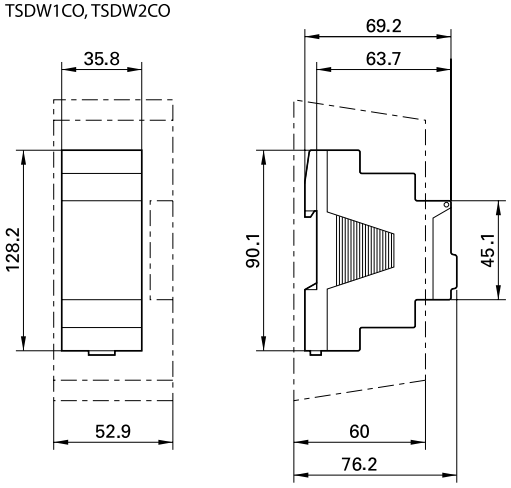
ON = Permanent ON

OFF = Permanent OFF

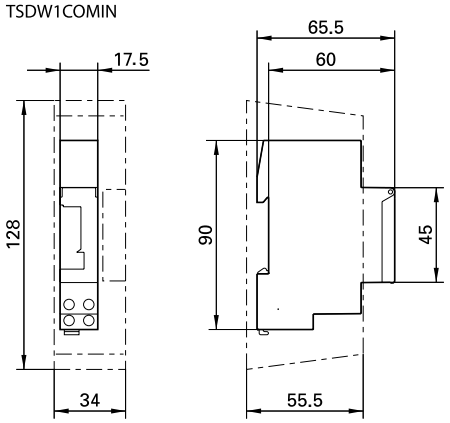
Auto = According Programme

Digital weekly time switches, dimensional drawings

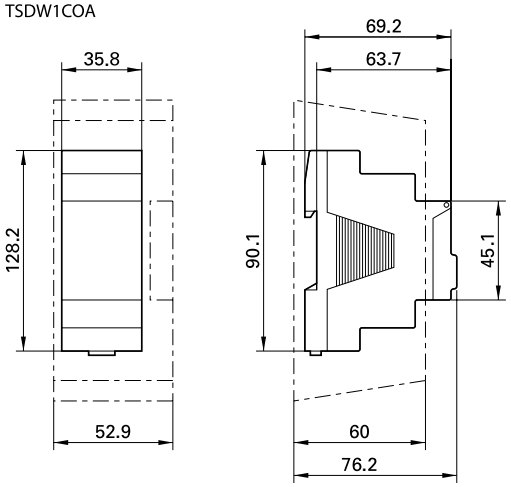
TSDW1CO, TSDW2CO



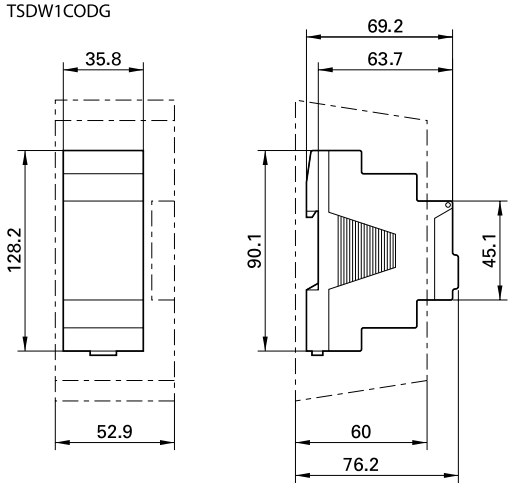
TSDW1COMIN



TSDW1COA

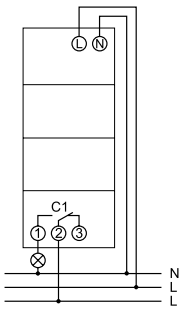


TSDW1CODG

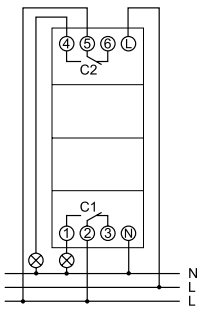


Digital weekly timers, wiring diagrams

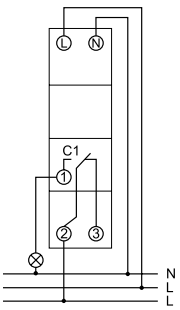
TSDW1CO



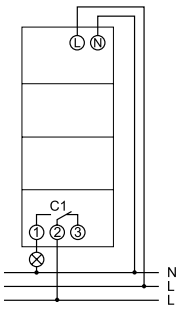
TSDW2CO



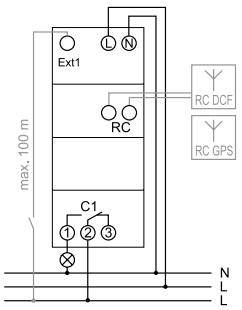
TSDW1COMIN



TSDW1COA



TSDW1CODG

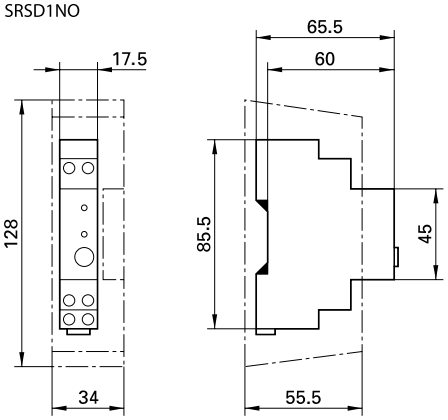


Twilight switches and combination with timer

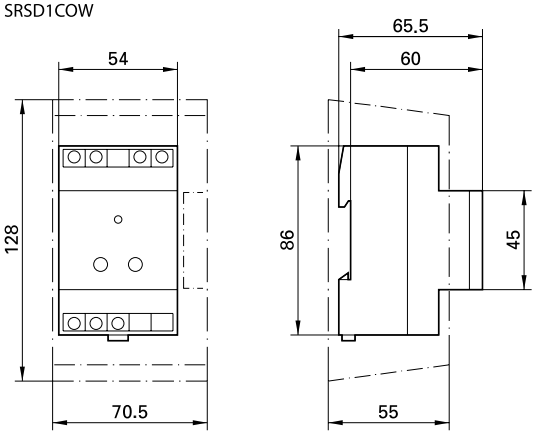
		SRSD1NO	SRSD1COW	SRCD1CO	SRSW1NO
General					
Nominal operating voltage		220 - 240 V AC	220 - 240 V AC	220 - 240 V AC	220 - 230 V AC
Frequency		50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Stand-by power		0,8 W	1,1 W	1,3 W	0,6 W
Photosensitivity		2 - 100 lux	2 - 2000 lux	2 - 2.000 lux	2 - 2.000 lux
Maximum cable length for sensor		25 mtr.	100 mtr.	100 mtr.	-
Maximum cable length for sensor		-25 ˚C...+50 ˚C	-30 ˚C...+55 ˚C	-30 ˚C...+55 ˚C	-35 ˚C...+55 ˚C
Protection class at proper installation - modular device		II	II	II	II
Switching contact(s)					
Type of switching contact		1 x NO	1 x CO	1 x CO	1 x NO
Contact type		Floating	Floating	Floating (not for SELV)	Floating 230 V
Switching capacity at 250 V~,	cos = 1	16 A	16 A	16 A	16 A
Switching capacity at 250 V~,	cos = 0,3	-	-	10 A	10 A
Maximum lamp load:					
- Incandescent lamp		2300 W	2300 W	2600 W	2300 W
- Energy saving lamp		9 x 7 W, 7 x 11 W,	9 x 7 W, 7 x 11 W,	22 x 7 W, 18 x 11 W,	9 x 7 W, 7 x 11 W,
		7x 15 W, 7 x 20W,	7x 15 W, 7 x 20W	16 x 15 W, 16 x 20 W,	7 x 15 W, 7 x 20 W,
		7 x 23 W	7 x 23 W	14 x 23 W	7 x 23 W
- Fluorescent lamp load - single fitting		2300 VA	2300 VA	2300 VA	2300VA
uncompensated (inductive)					
Switching delay off		20 sec.	0 - 20 min.	0 - 59 min.	2 - 100 sec.
Switching status indication (not delayed)		Yes	Yes	-	Yes
Programming features					
Period of programme		-	-	Week	-
Number of channels		-	-	1	-
Programming using software and memory		-	-	Yes	-
Summer / wintertime automatic (or manual on/off)		-	-	Yes	-
Random programme		-	-	No	-
Holiday programme		-	-	Yes	-
Cycle programme		-	-	No	-
LCD backlighting		-	-	Yes	-
Dimensions and weight					
Number of module width		1	2	3	-
Dimensions Width		17.5 mm	54 mm	72 mm	85 mm
Height		85.5 mm	86 mm	86 mm	118.4 mm
Depth		65.5 mm	65.5 mm	65.5 mm	49.4 mm
Terminals					
Terminal type		Screw	Spring	Spring (duo fix)	-

Twilight switches and combinations with timer, dimensional drawings

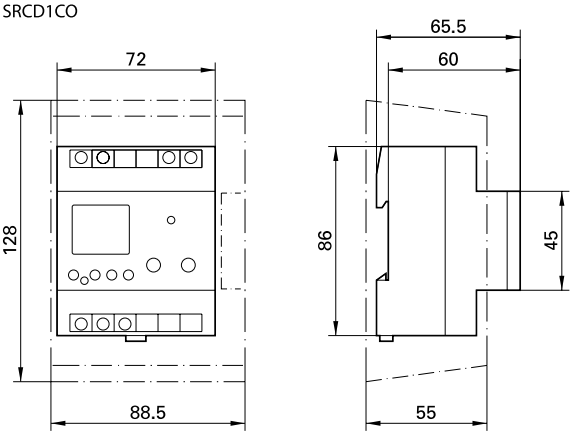
SRSD1NO



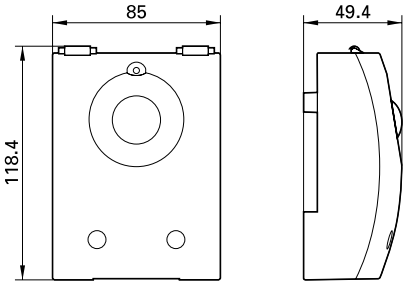
SRSD1COW



SRCD1CO

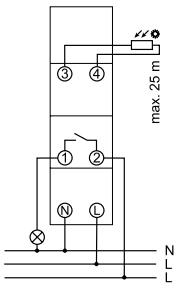


SRSW1NO

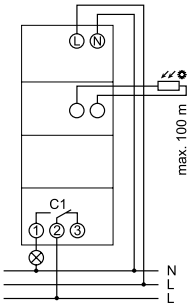


Twilight switches and combinations with timer, wiring diagrams

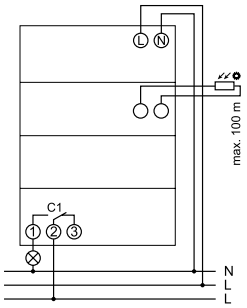
SRSD1NO



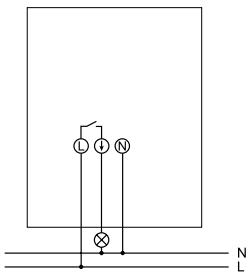
SRSD1COW



SRCD1CO



SRSW1NO



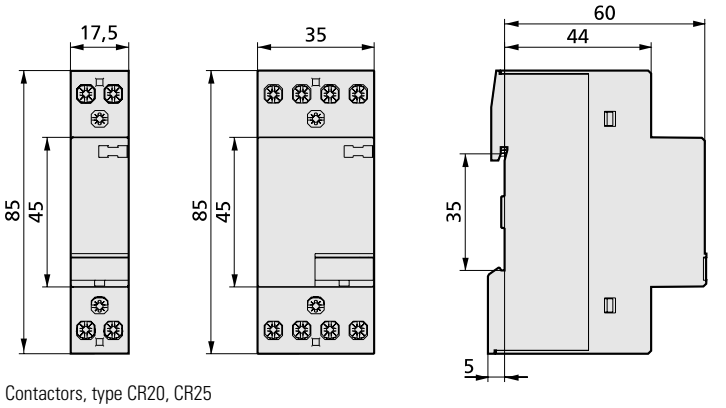
Contactors type CR

Products	Contactors				Aux. contact
Rating	20 A	25 A	40 A	63 A	6A
General					
Standards	IEC 60947-4-1, IEC 61095				IEC 60947-5-1
Nominal operating voltage 1-phase Ue 1-ph.	230 V	230 V	230 V	230 V	230 V
Nominal operating voltage 3-phase Ue 3-ph.	400 V	400 V	400 V	-	-
Overvoltage protection on coil	430 V (*5)	430 V (*5)	430 V	430 V	
Mechanical endurance (switching cycles)	3.000.000	3.000.000	3.000.000	3.000.000	3.000.000
Protection class (acc. DIN 40 050, IEC 529)	IP20	IP20	IP20	IP20	IP20
Permissible ambient temperature	-5…+55 °C	-5…+55 °C	-5…+55 °C	-5…+40 °C	-5…+55 °C
Storage temperature	-30…+80 °C	-30…+80 °C	-30…+80 °C	-30..+80 °C	-30…+80 °C
Contact rating					
Rated insulation voltage Ui	440 V	440 V	500 V	500 V	500 V
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz'	50/60 Hz
Rated impulse withstand voltage Uimp	4 kV	4 kV	4 kV	4 kV	4 kV
Rated thermal current Ith	20 A	25 A	40 A	63 A	6 A
AC1/AC7a Rated operational current Ie	20 A	25 A	40 A	63 A	–
AC1/AC7a Operational power rating at Ue = 230 Vac Pmax	4 kW	9 kW	16 kW	24 kW	–
AC1/AC7a Operational power rating at Ue = 400 Vac Pmax	16 kW	26 kW	40 kW	–	–
AC3/AC7b Operational power rating at Ue = 230 Vac Pmax	1,3 kW (*1)	2,2 kW	5,5 kW	8,5 kW	–
AC3/AC7b Operational power rating at Ue = 400 Vac Pmax	4 kW	11 kW	15 kW	-	–
DC1 Rated thermal current at Ue = 24 Vdc Ie	20 A	25 A	40 A	63 A	–
DC1 Rated thermal current at Ue = 110 Vdc Ie	1A	2A	4A	4A	–
DC1 Rated thermal current at Ue = 220 Vdc Ie	0,5 A	0,5 A	0,8 A	0,8 A	–
DC1 Rated thermal current at Ue = 24 Vdc (2-poles in series) Ie	20 A	25 A	40 A	63 A	–
DC1 Rated thermal current at Ue = 110 Vdc (2-poles in series) Ie	3 A	4 A	10 A	10 A	–
DC1 Rated thermal current at Ue = 220 Vdc (2-poles in series) Ie	1,5 A	1,5 A	6 A	6 A	–
DC1 Rated thermal current at Ue = 24 Vdc (3-poles in series)	–	25 A	40 A	63 A	–
DC1 Rated thermal current at Ue =110 Vdc (3-poles in series)	–	6:00 AM	30 A	35 A	–
DC1 Rated thermal current at Ue = 220 Vdc (3-poles in series)	–	2,5 A	20 A	30 A	–
Electrical endurance					
Maximum operating cycles at AC1/AC7a application	200.000 x	200.000 x	100.000 x	100.000 x	–
Maximum operating cycles at AC3/AC7b application	300.000 x	500.000 x	150.000 x	150.000 x	–
Maximum operating cycles at AC5a application	100.000 x	100.000 x	100.000 x	100.000 x	–
Maximum operating cycles at AC5b application	100.000 x (*2)	100.000 x (*2)	100.000 x (*3)	100.000 x (*4)	–
Maximum operating cycles per hour	600 x	600 x	600 x	600 x	600 x
Power dissipation per contact at In	1,7 W	2,2 W	4 W	8 W	–
Maximum back-up fuse	25 A gL	35 A gL	63 A gL	80 A gL	–
Rating	20 A	25 A	40 A	63 A	6 A
Operating coil (for combined ac/dc types only – CR…)					
Coil inrush power (for all voltage ratings)	2,5 W	3 W	5 W	5 W	–
Coil consumption (for all voltage ratings)	2,5 W	3 W	5 W	5 W	–
Closing delay	15-25 ms	15-30 ms	15-20 ms	15-20 ms	–
Opening delay	35-45 ms	50-80 ms	35-45 ms	35-45 ms	–
Operating coil (for ac types only – CR…A)					
Coil inrush power (for all voltage ratings)	13 W/15 VA	17 W/27 VA			–
Coil consumption (for all voltage ratings)	2 W/5 VA	1 W/2.7 VA	–	–	–
Closing delay	15 ms	15-25 ms	–	–	–
Opening delay	10 ms	35-45 ms	–	–	–

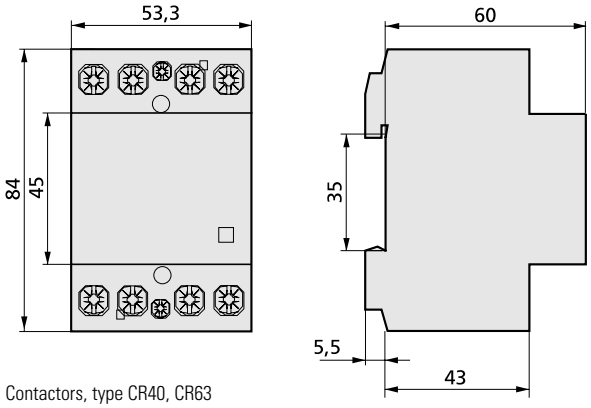
Contactors type CR (continued)

Products	Contactors				Aux. contact
Dimensions					
Width	18 mm	35 mm	54 mm	54 mm	9 mm
Height	85 mm	85 mm	85 mm	85 mm	85 mm
Depth	60 mm	60 mm	60 mm	60 mm	60 mm
Terminals for main & auxiliairy contacts					
Terminal capacity – fine stranded wire	1…6 mm^2	1…6 mm^2	1…16 mm^2	1…16 mm^2	1…2,5 mm^2
Terminal capacity – solid wire	1…10 mm^2	1…10 mm^2	1…25 mm^2	1…25 mm^2	1…2,5 mm^2
Terminal screw size	M3,5	M3,5	M5	M5	M3
Terminal screw head type (Pozidrive)	PZ Size 1	PZ Size 1	PZ Size 2	PZ Size 2	PZ Size 1
Maximum torque	1,2 Nm	1,2 Nm	2,0 Nm	2,0 Nm	0,8 Nm
Terminals for operating coils					
Terminal capacity – fine stranded wire	1…2,5 mm^2	1…2,5 mm^2	1…2,5 mm^2	1…2,5 mm^2	
Terminal capacity – solid wire	1…2,5 mm^2	1…2,5 mm^2	1…2,5 mm^2	1…2,5 mm^2	
Terminal screw size	M3	M3	M3	M3	
Terminal screw head type (Pozidrive)	PZ Size 1	PZ Size 1	PZ Size 1	PZ Size 1	
Maximum torque	0,6 Nm	0,6 Nm	0,6 Nm	0,6 Nm	

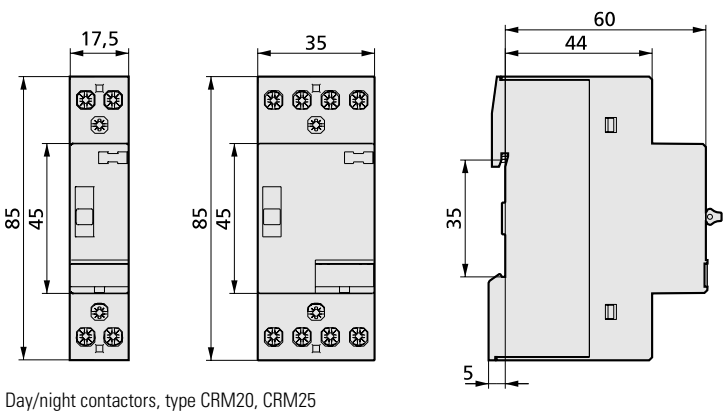
Remarks:
*1) Only applicable for normally open contact(s)
*2) At 1,5 kW
*3) At 3 kW
*4) At 5 kW
*5) For CR… types only (combined ac/dc types), NOT for CR… A types



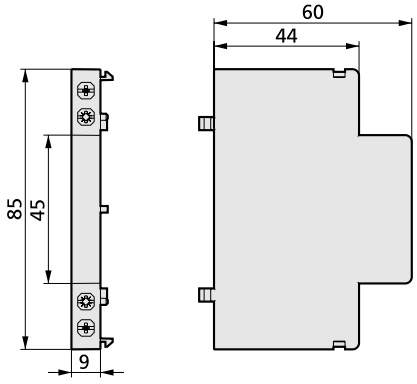
Contactors, type CR20, CR25



Contactors, type CR40, CR63

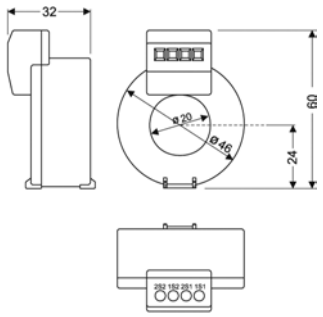


Day/night contactors, type CRM20, CRM25

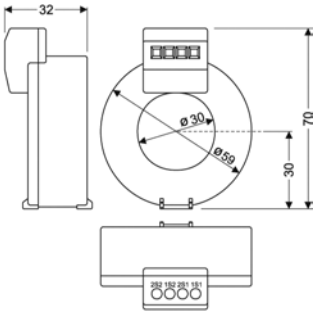


Auxiliairy contact

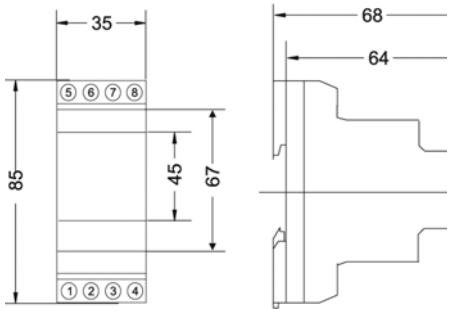
Earth leakage relays and CTs, dimensional drawings



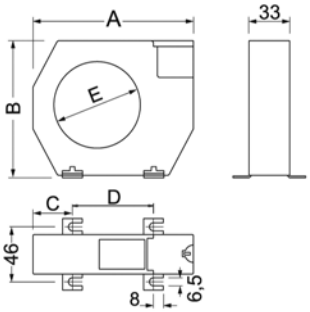
PFR-W-20



PFR-W-30



PFR-W-30



Type	A	B	C	D	E
PFR-W-35	100	79	26	48.5	35
PFR-W-70	130	110	32	66	70
PFR-W-105	170	146	38	94	105
PFR-W-140	220	196	48.5	123	140
PFR-W-210	299	284	69	161	210

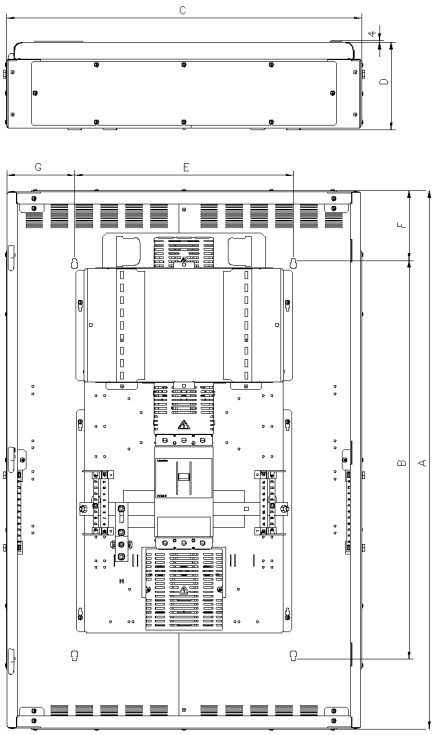
10.2 Technical data

NZM MCCBs, maximum Zs (Ohms) figures to achieve disconnection at 0.4s and 5s

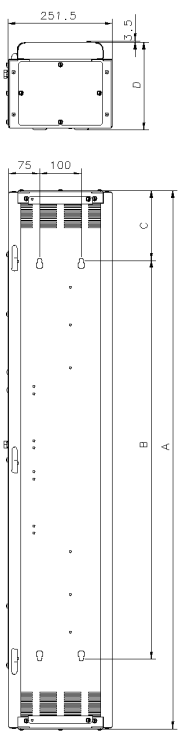
MCCB type	Rating (A)	Disconnection 0.4s		Disconnection 5s	
		Minimum setting	Maximum setting	Minimum setting	Maximum setting
NZM1 range	16	-	1.366	-	1.485
	20	1.821	1.093	1.496	1.188
	32	1.138	0.683	0.936	0.742
	40	0.910	0.546	0.749	0.594
	50	0.729	0.437	0.599	0.475
	63	0.578	0.347	0.475	0.377
	80	0.455	0.274	0.374	0.297
	100	0.364	0.219	0.299	0.238
	125	0.292	0.175	0.239	0.190
	160	0.228	0.137	0.187	0.148
NZM2 range	125	0.292	0.175	0.239	0.190
	160	0.228	0.137	0.187	0.148
	200	0.182	0.109	0.150	0.119
	250	0.145	0.087	0.120	0.095
NZM3 range	250	0.145	0.087	0.120	0.095
	320	0.114	0.068	0.093	0.074
	400	0.091	0.055	0.075	0.060
NZMLW range	630	0.174	0.044	0.174	0.044
	800	0.137	0.034	0.137	0.034

Note : Values take account of minimum voltage factor Cmin - in accordance with BS7671 Amendment 3

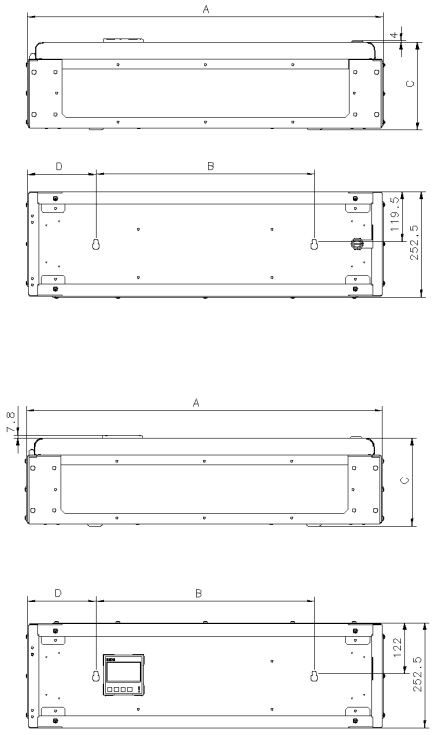
Panelboard dimensional drawings



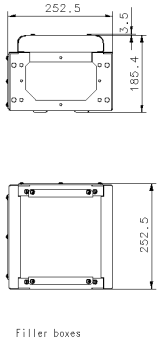
Panelboards



Side extension boxes



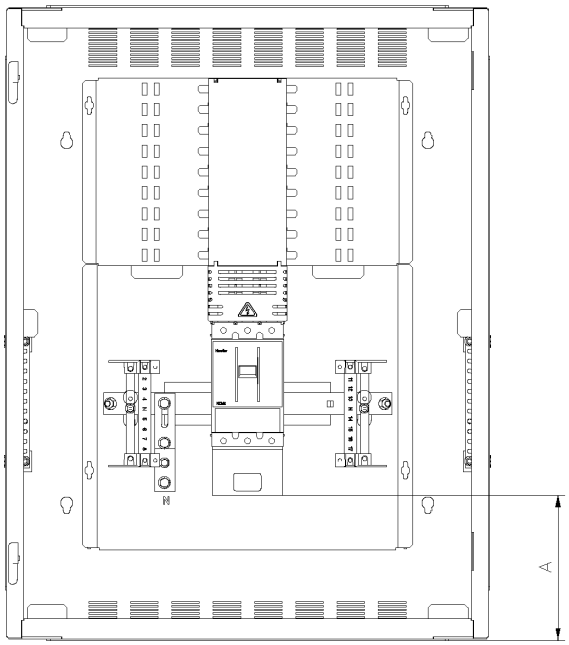
Extension boxes

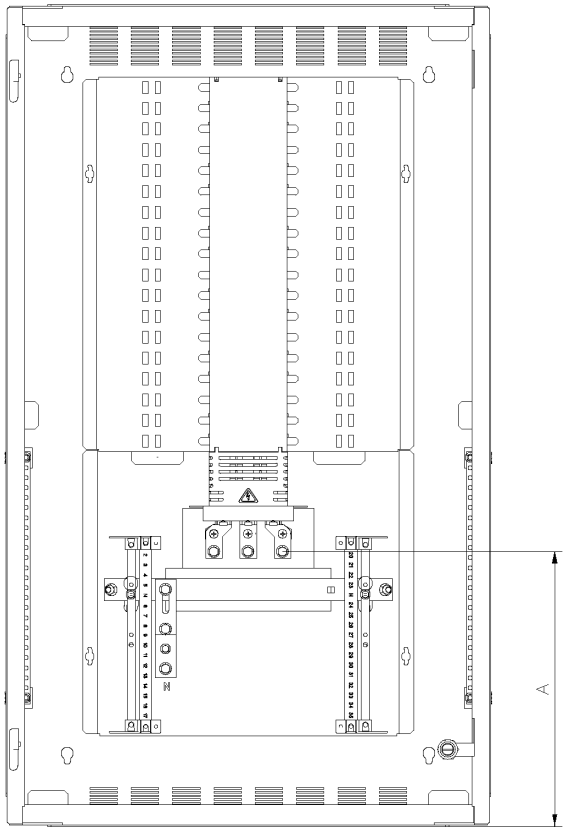


Filler boxes

Panelboard dimensions

Description	Eaton list number	Dimensions (mm) A	B	C	D	E	F	G
Extension boxes	**EPBN1EX250**	705	525	185.5	90	–	–	–
	EPBN2EX250	855	525	210.5	165	–	–	–
	EPBN3EX250	980	625	210.5	177.5	–	–	–
Filler boxes	**EPBN1CX250**	185.5	–	–	–	–	–	–
	EPBN2CX250	210.5	–	–	–	–	–	–
Panelboards	**EPBN1425**	830	544	703	185.5	525	143	89
	EPBN1625	920	544	703	185.5	525	188	89
	EPBN1825	1010.5	837.5	703	185.5	525	86.5	89
	EPBN11225	1191.5	1002	703	185.5	525	94.75	89
	EPBN1640	1291.5	956.5	853	210.5	525	167.5	164
	EPBN11240	1563	1228	853	210.5	525	167.5	164
	EPBN2640	1291.5	956.5	853	210.5	525	167.5	164
	EPBN21240	1563	1228	853	210.5	525	167.5	164
	EPBN21840	1834.5	1499.5	853	210.5	525	167.5	164
	EPBN2863	1650	1315	978	210.5	625	167.5	176.5
	EPBN21263	1650	1315	978	210.5	625	167.5	176.5
	EPBN21863	1915.5	1580.5	978	210.5	625	167.5	176.5
	EPBN3880	1650	1315	978	210.5	625	167.5	176.5
	EPBN31280	1915.5	1580.5	978	210.5	625	167.5	176.5
Side cable box	**EPBN1425SXB**	830	544	143	185.5	–	–	–
	EPBN1525SXB	920	544	188	185.5	–	–	–
	EPBN1825SXB	1010.5	837.5	86.5	185.5	–	–	–
	EPBN11225SXB	1191.5	1002	94.75	185.5	–	–	–
	EPBN2640SXB	1291.5	856.5	167.5	210.5	–	–	–
	EPBN21240SXB	1563	1228	167.5	210.5	–	–	–
	EPBN21840SXB	1834.5	1499.5	167.5	210.5	–	–	–
	EPBN21263SXB	1650	1315	167.5	210.5	–	–	–
	EPBN21863SXB	1915.5	1580.5	167.5	210.5	–	–	–
Meter packs	**EPBN1EX250M**	705	525	185.5	90	–	–	–
	EPBN2EX250M	855	525	210.5	165	–	–	–
	EPBN3EX250M	980	625	210.5	177.5	–	–	–
Side meter box	**EPBN1425SXM**	830	544	143	185.5	–	–	–
	EPBN1525SXM	920	544	188	185.5	–	–	–
	EPBN1825SXM	1010.5	837.5	86.5	185.5	–	–	–
	EPBN11225SXM	1191.5	1002	94.75	185.5	–	–	–
	EPBN2640SXM	1291.5	856.5	167.5	210.5	–	–	–
	EPBN21240SXM	1563	1228	167.5	210.5	–	–	–
	EPBN21840SXM	1834.5	1499.5	167.5	210.5	–	–	–
	EPBN21263SXM	1650	1315	167.5	210.5	–	–	–
	EPBN21863SXM	1915.5	1580.5	167.5	210.5	–	–	–
Din enclosures	**EPBN1EXDIN**	705	525	185.5	90	–	–	–
	EPBN2EXDIN	855	525	210.5	165	–	–	–
	EPBN3EXDIN	980	625	210.5	177.5	–	–	–
Surge suppression box	**EPBN1SPD123**	185.5	–	–	–	–	–	–
	EPBN1SPD1234	210.5	–	–	–	–	–	–





Rating (A)	Panelboard/incomer connection kit combination		Dimensions A (mm)
250	**EPBN1425**	**EPBKN1253**	210
	EPBN1625	**EPBKN1253M**	
	EPBN1825	**EPBKN1254**	
	EPBN11225	**EPBKN1254M**	
	EPBN1425		398
	EPBN1625	**EPBKN125L**	
	EPBN1825	**EPBKN125LM**	
	EPBN11225		
400	**EPBN1640**	**EPBKN2403**	380
	EPBN11240	**EPBKN2403M**	
	EPBN2640	**EPBKN2404**	
	EPBN21240	**EPBKN2404M**	
	EPBN21840		
	EPBN1640		731
	EPBN11240	**EPBKN240L**	
	EPBN2640	**EPBKN240LM**	
	EPBN21240		
	EPBN21840		
630	**EPBN2863**	**EPBKN2633**	705
	EPBN21263	**EPBKN2633M**	
	EPBN21863	**EPBKN2634**	
		EPBKN2634M	
	EPBN2863	**EPBKN263L**	775
	EPBN21263	**EPBKN263LM**	
	EPBN21863		
800	**EPBN3880**	**EPBKN3803**	454
	EPBN31280	**EPBKN3803M**	
		EPBKN3804	
		EPBKN3804M	

10.2 Technical data

Panelboard multifunction meter, technical characteristics and specification

- 3 phase 3 or 4 wire system.
- Liquid crystal display with backlight. 4 lines, 4 digits per line to show electrical parameters. 5th line, 8 digits to show energy. Bar graph for current indication as percentage of CT rating.
- 96 x 96mm panel mount, 55mm rear panel.
- Modbus comms & pulse output.
- Fast installation plug-ib cabling for current and voltage inputs. Feed-through voltage supply capability.
- Phase sequence detection and correction capability.
- Multifunction meter measuring parameters:
  - Voltage (P-P / P/N) (individual/average)
  - Current (I1, I2, I3) (individual/average)
  - Frequency
  - Power factor (individual/average)
  - Active, reactive, apparent power (individual/total)
  - Active, reactive, apparent energy (total)
- Display scrolling selectable for automatic or manual.
- Meter is self-powered from voltage supply. Auxiliary voltage supply not required.
- Front panel indicator when Pulse Output or Comms operates.

The range of meter is a class 1 multi-function, panel mounting meter to measure electrical parameters on LV supplies to The meter is a Class 1 multi-function, panel mounting meter to measure electrical parameters on LV supplies to and from TP&N distribution boards. It is ideal for applications such as:

- Energy monitoring.
- Power factor analysis.
- Supply capacity.
- Building regs part L2.
- Building performance.
- Environmental standards e.g. IS14001, EMAS, ECA.
- Climate change levy.
- Carbon trading.
- Carbon footprints.

The six dedicated buttons are labelled as V, I, VAF, PF, P, E. The parameters available by pressing each key are detailed below:

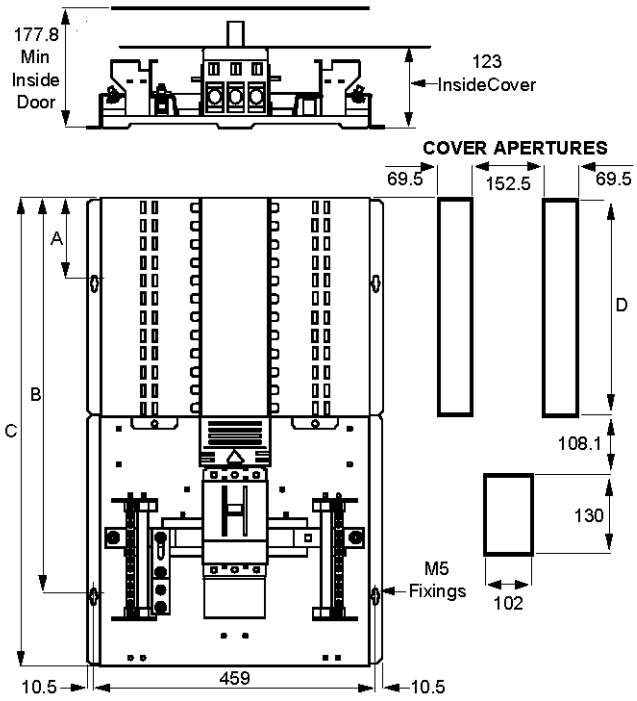
Measurements available via:	
Button 1 (V)	Line to neutral voltage of three phase and average line to line voltage
	Line to line voltage of three phase and average line to line voltage
Button 2 (I)	Phase current of three phase and average phase current.
	Phase current of three phase and maximum phase current.
Button 3 (VAF)	Voltage, current, power factor of first phase and frequency
	Voltage, current, power factor of second phase and frequency
	Voltage, current, power factor of third phase and frequency
	Average value of voltage, current, power factor of three phase and frequency
Button 4 (PF)	Power factor of three phase and average power factor
Button 5 (P)	Active power of three phase and total active power
	Reactive power of three phase and total reactive power
	Apparent power of three phase and total apparent power
	Active, reactive, apparent power and power factor of first phase
	Active, reactive, apparent power and power factor of second phase
	Active, reactive, apparent power and power factor of third phase
	Total active, reactive, apparent power and average power factor of three phase
	Maximum active power demand, reactive power demand, apparent power demand
	Minimum active power demand, reactive power demand
Button 6 (E)	Active energy of three phase
	Apparent energy of three phase
	Reactive energy of three phase

Accuracy

Measurement	Accuracy
Voltage VL-N	± 0.5% of full scale
Voltage VL-L	± 0.5% of full scale
Current	± 0.5% of full scale
Frequency	± 0.1% For voltage >20V L-N For voltage >35V L-N
Active power	Class 1
Apparent power	Class 1
Reactive power	Class 1

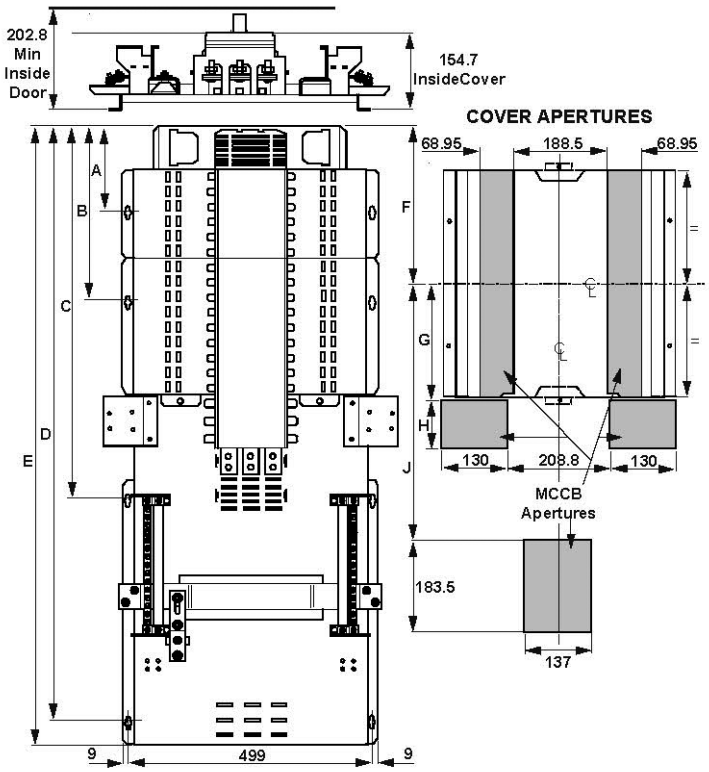
Measurement	Accuracy
Power factor	± 0.01
Active energy	Class 1
Apparent energy	Class 1
Reactive energy	Class 1
MAX / MIN active power	Class 1
MAX / MIN reactive power	Class 1
MAX apparent power	Class 1

250A pan assembly dimensions EPBPN1425–EPBPN11225



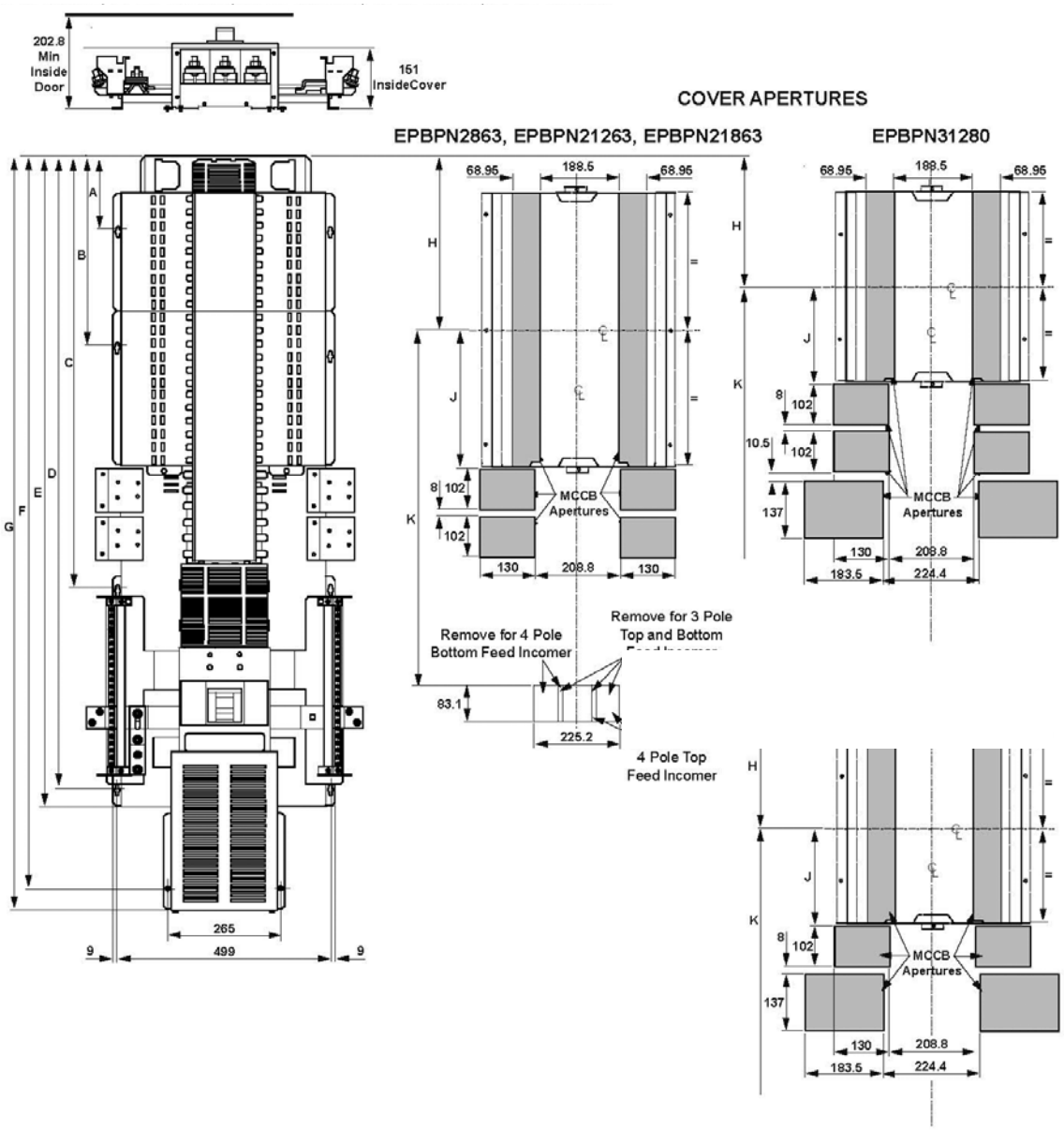
Eaton list number	A	B	C	D
EPBPN1425	29.5	483	592.5	181.5
EPBPN1625	29.5	578.5	683	272
EPBPN1825	131	669	773.5	362.5
EPBPN11225	131	850	954.5	543.5

400A pan assembly dimensions EPBPN1640–EPBPN21840



Eaton list number	A	B	C	D	E	F	G	H	J
EPBPN1640	167	N/A	473.5	923	979.5	222.25	N/A	N/A	318.25
EPBPN11240	167	438.5	725.5	1175	1231.8	358	N/A	N/A	454
EPBPN2640	167	N/A	473.5	923	979.5	177	96.75	102	383
EPBPN21240	167	348	745	1194.5	1251	312.75	232.5	102	518.75
EPBPN21840	167	529	1016.5	1466	1522.5	448.25	368.25	102	654.5

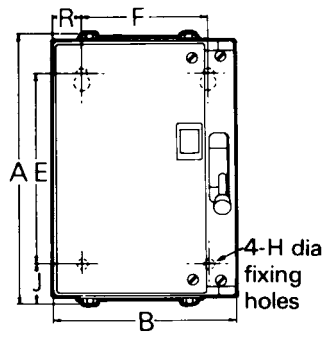
630–800A pan assembly dimensions EPBPN2863, EPBPN21263, EPBPN21863, EPBPN3880, EPBPN31280

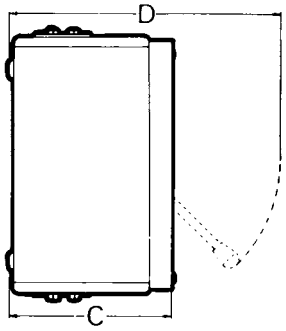


Eaton list number	A	B	C	D	E	F	G	H	J	K
EPBPN2863	167	N/A	543.5	996	1052.5	1240	1291	177	96.75	601.5
EPBPN21263	167	N/A	724.5	1177	1233.5	1421	1472	267.5	187.25	692
EPBPN21863	167	438.5	996	1448.5	1505	1692	1743	403.25	323	828
EPBPN3880	167	N/A	580.5	1033	1089.5	1277	1328	177	96.75	638.5
EPBPN31280	167	N/A	761.5	1214	1270.5	1458	1509	222.25	142	794.5

Glasgow fuse-switch-disconnectors and switch-disconnectors dimensions

Nominal unit rating, In (A)	Poles	Dimensions, mm A	B	C	D	E	F	H	J	R
63	SPSN, DP	289	199	180	283	203	127	7.9	43	36
	TPN, TPSN	289	275	180	283	203	203	7.9	43	36
100	SPSN, DP	327	199	180	283	241	127	7.9	43	35
	TPN, TPSN	327	275	180	283	241	203	7.9	43	35
160, 200	SPSN, DP	431	280	229	383	340	140	7	45	70
	TPN, TPSN	431	340	229	383	340	200	7	45	70
315, 400	TPN, TPSN	501	467	291	545	385	375	10	58	46
500, 630, 800	TPN, TPSN	596	680	381	715	440	550	14	78	65





Units have retractable handles. 'D' dimension indicates fully extended operating position.

Rating to BS EN 60947-3 general performance characteristics

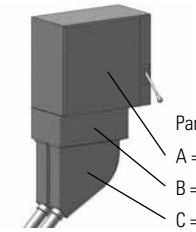
Nominal unit rating, Ie (A)	Utilisation category at Ue 415V to BS EN 60947-3 Switch-disconnectore AC21A Ie	Fuse-switch-disconnector AC22A Ie	AC23A Ie
63	125A	63A	41A
100	125A	100A	41A
160	Use 200A	160A	160A
200	315A	200A	160A
315	Use 400A	315A	200A
400	400A	400A	200A
500	Use 630A	500A	385A
630	630A	630A	385A
800	800A	800A	500A

Operational performance

- In accordance with BS EN 60947-3: "A" categories all ratings have been tested to values specified below:

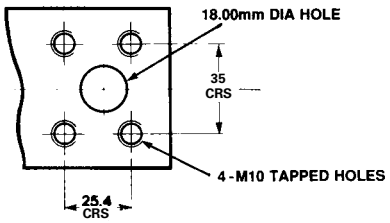
Rated operational current, Ie (A)	Operating cycles Without current	With current	Total
63–100	8,500	1,500	10,000
160–315	7,000	1,000	8,000
400–630	4,000	1,000	5,000
800	2,500	500	3,000

Glasgow parallel cable connection & copper terminal plate



Parallel cable connection
A = **803GNC**
B = **6PCB**
C = **90CSB/A**

An **802GCC** (copper connection piece) is required in addition to switch enclosure for parallel cable connection.

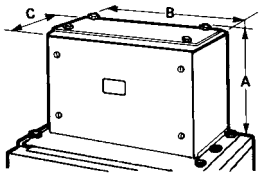


Copper terminal plate

Each copper terminal plate has 1-M16 x 50mm bolt, nut and washers for single hole sockets. 4-M10 tapped holes are also provided for 4 hole sockets or solid copper.

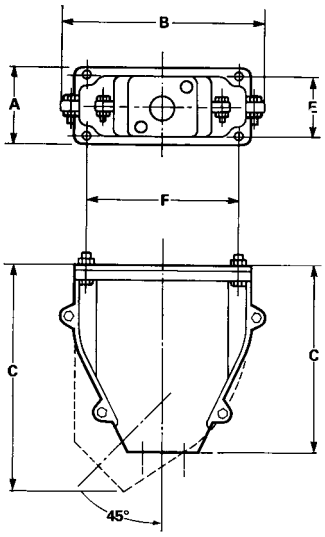
Cable extension boxes dimensions

Eaton list number	Dimensions, mm A	B	C
1PCB	148	133	113
2PCB	148	209	113
3PCB	148	259	132
4PCB	302	347	184
5PCB	213	515	187
6PCB	213	515	327



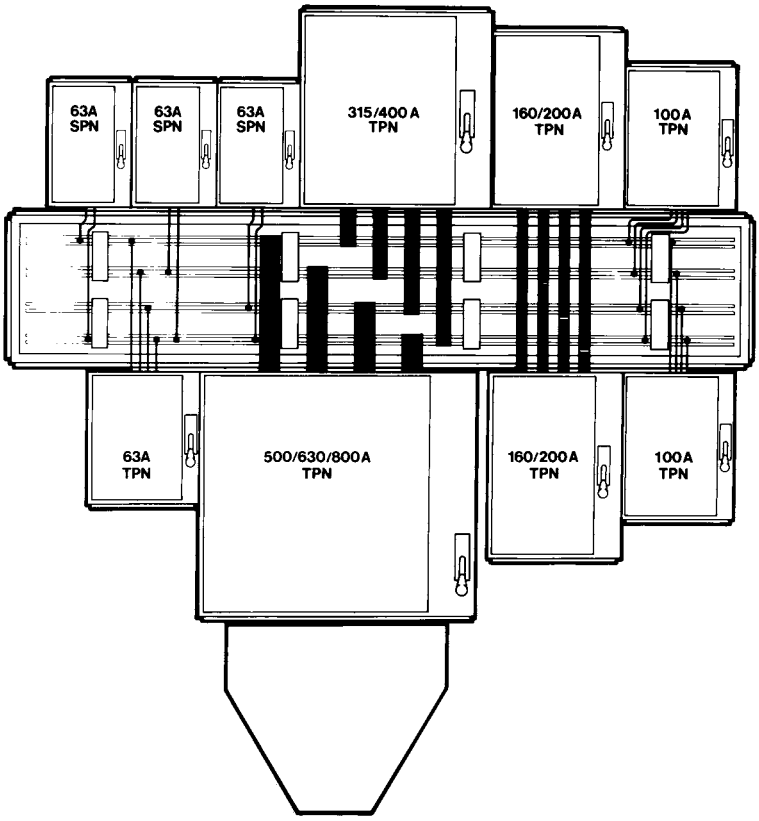
Spreader boxes dimensions

Eaton list number	Dimensions, mm A	B	C	E	F	Fixing bolts No.	Type
Straight entry							
50 CSB	83	232	170	67	171	4	M6
60 CSB	108	283	260	89	216	4	M8
70 CSB	133	384	322	114	318	4	M8
90 CSB	133	530	450	114	457	4	M10
45° Angled entry							
50 CSBA	83	232	250	67	171	4	M6
60 CSBA	108	283	310	89	216	4	M8
70 CSBA	133	384	390	114	318	4	M8
90 CSBA	133	530	510	114	457	4	M10



Busbar chambers

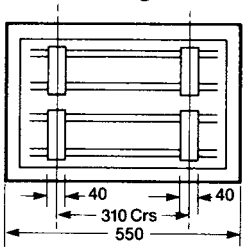
Eaton's busbar chamber system is designed for wall-mounting installations. All units in the range share the same height and depth dimensions. Similarly the twin busbars are located in precisely the same positions throughout the range and vary in size only in their front-to-back dimensions according to rating. Detachable end plates enable all units to be extended by coupling to a second busbar chamber using extension sets.



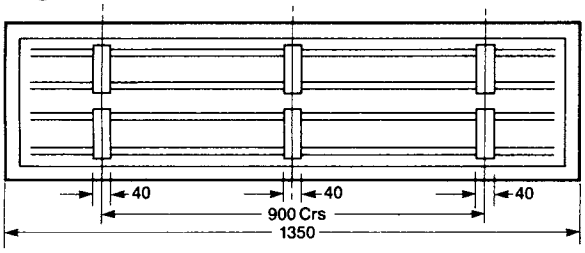
Busbar chamber – dimensions

Nominal length, mm	Dimensions, mm A	B	C	D	E	F	G
550	562	364	222	280	474	–	4
900	912	364	222	280	824	–	4
1350	1362	364	222	280	1274	–	4
1800	1812	364	222	280	1724	862	6

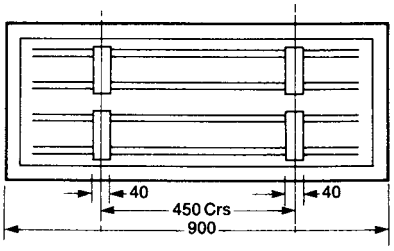
Nominal length chamber 550m



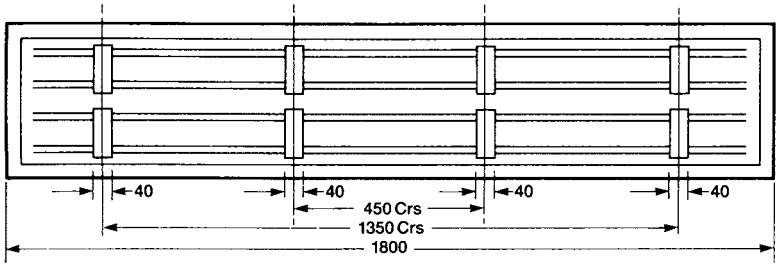
Nominal length chamber 1350mm

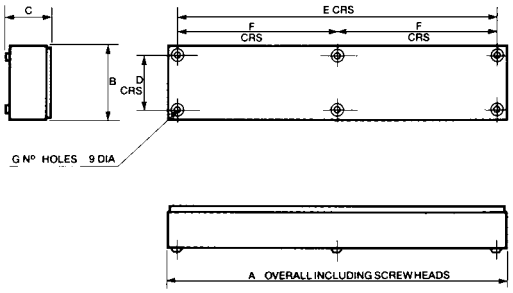


Nominal length chamber 900mm



Nominal length chamber 1800mm





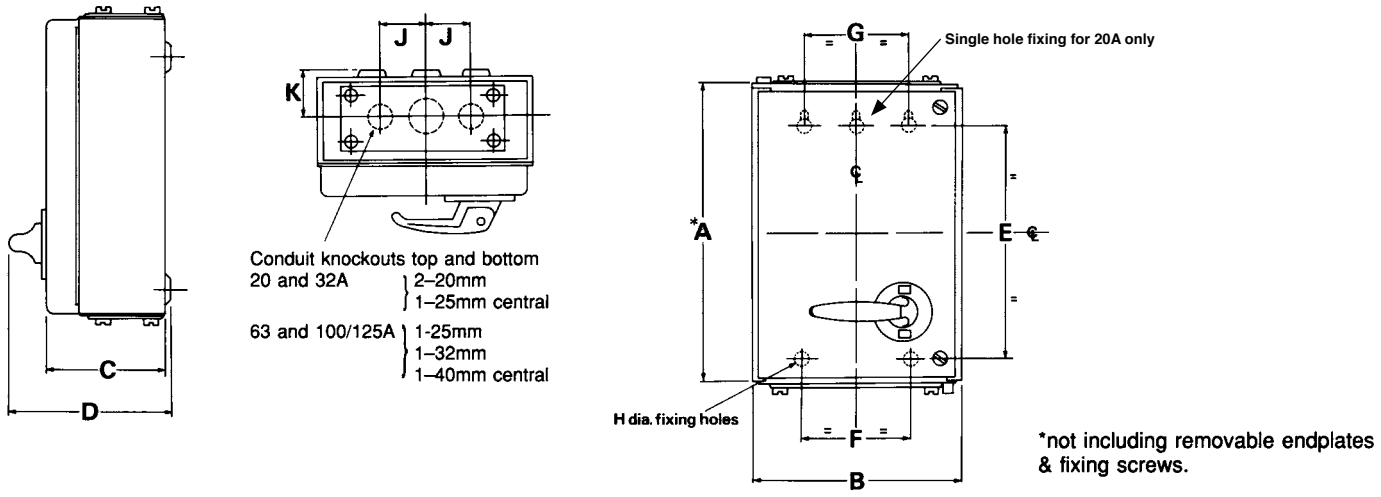
Operational performance

- In accordance with BS EN 60947-3 all ratings have been tested to values specified below:

Description	Cycles
Operating cycles without current	8500
Operating cycles at rated current	1500
	Total 10000

Exel 2 dimensions

Current rating, A	Dimensions, mm A	B	C	D	E	F	G	H	J	K
Switch-disconnectors										
20	159	193	92	127	112	114	–	5.6	38.5	34
32	173	245	101	137	116	114	114	6.4	38.5	34
63	230	310	129	173	152	168	168	6.7	58	54
100/125	329	367	167	210	241	221	221	6.7	58	54
Switch-disconnector-fuses										
20	219	193	92	127	171	114	–	5.6	38.5	34
32	267	245	101	137	209	114	114	6.4	38.5	34
63	351	310	129	173	273	168	168	6.7	58	54
100/125	503	367	167	210	416	221	221	6.7	58	54

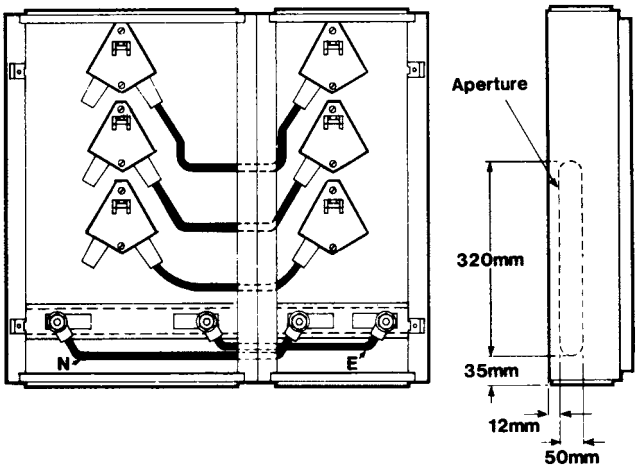


Performance values

Unit	Short time withstand current (r.m.s. amps for 1 second)	Short circuit making capacity (peak amps at 415v ac)	Rated fused short-circuit (prospective r.m.s. amps at 415v ac)
20A	640A	2.96 kA	80 kA
32A	960A	5.12 kA	80 kA
63A	2000A	6.62 kA	80 kA
100/125A	3750A	8.42 kA	80 kA

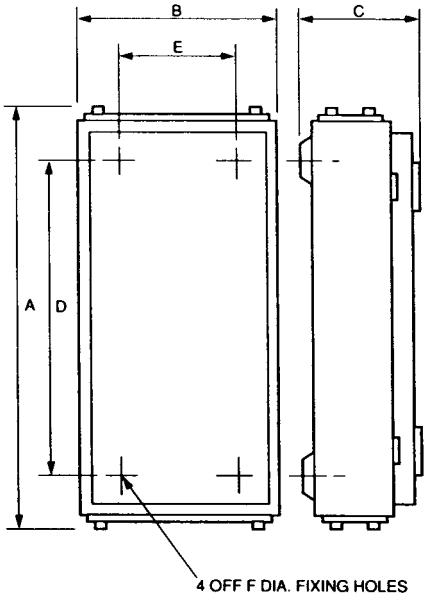
Exel distribution fuseboards – diversity factors

No. of ways	Maximum rated operational current per way, Ie				
	200A	100A	63A	32A	<20A
2	–	1	–	–	–
4	0.8	0.9	0.9	0.9	0.9
6	–	0.8	0.8	0.8	0.8
8	–	0.66	0.8	0.8	0.8
10	–	–	–	0.66	–
12	–	–	–	0.66	–
Therefore, incomer rating =					
2	–	–	126A	–	–
4	640A	360A	227A	115A	72A
6	–	480A	302A	154A	96A
8	–	528A	403A	205A	128A
10	–	–	–	211A	–
12	–	–	–	253A	–



Exel distribution fuseboards – enclosure dimensions IP4X (mm)

Nominal rating, Ie	Poles	Number of ways	A	B	C	D crs	E crs	F dia.
20A	SPN	4	386	304	148	252	191	8
		6	386	304	148	252	191	8
		8	386	368	148	252	255	8
		12	386	448	148	252	335	8
	TPN	4	631	304	148	442	191	8
		6	631	304	148	442	191	8
		8	631	368	148	442	255	8
32A	SPN	4	386	304	148	252	191	8
		6	386	304	148	252	191	8
		8	386	368	148	252	255	8
		12	386	496	148	252	383	8
	TPN	4	710	304	148	576	191	8
		6	710	304	148	576	191	8
		8	710	368	148	576	255	8
		10	710	448	148	576	335	8
		12	710	496	148	576	383	8
63A	TPN	2	546	473	227	458	369	10
		4	972	330	227	884	226	10
		6	972	330	227	884	226	10
		8	972	473	227	884	369	10
100A	TPN	4	1066	330	227	978	226	10
		6	1066	549	227	978	445	10
		8	1066	549	227	978	445	10
200A	TPN	4	1560	529	270	1334	325	10



Exel distribution fuseboards – earth bar terminal capacities

Description	Nominal rating of fuseboard, Ie				
	20A	32A	63A	100A	200A
Main (stud)	M10	M10	M10	M10	M10
Outgoing, mm2	10	10	25	25	70

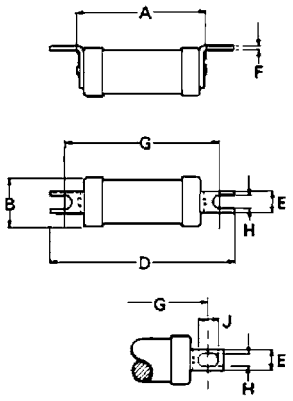
Exel distribution fuseboards – main terminal stud sizes

Description	No. of ways	Nominal rating of fuseboard, Ie 20A	32A	63A	100A	200A
SPN	4	M10	M10	–	–	–
	6	M10	M10	–	–	–
	8	M10	M10	–	–	–
	12	M10	–	–	–	–
TPN	2	–	–	M12	–	–
	3	–	–	M12	–	–
	4	M10	M10	M12	M12	M16
	6	M10	M10	M12	M16	–
	8	M10	M10	M16	M16	–
	10	–	M10	–	–	–
	12	–	M10	–	–	–

[1]Tunnel terminal 35mm² max.

415V industrial fuselinks – offset bolted contacts, dimensions

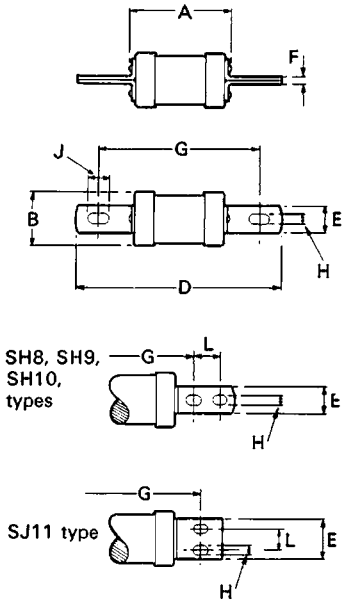
Eaton list number	Dimension, mm A max.	B max.	D max.	E	F	G nom.	H	J
SA2	34	14	54	11	0.8	44.5	4.8	–
SA2M (25–40A)	34	14	54	11	0.8	44.5	4.8	–
SA2M (50–63A)	36	17.5	55	11	1.2	44.5	4.8	–
SB3	35	14	85	9	1.2	73	5.5	8
SB3M	56	22	86	9	1.2	73	5.5	8
SB4	35	17.5	86	9	1.2	73	5.5	8
SB4M	56	22	88	13	1.2	73	5.5	10
SO (80–100A)	55	21	86	13	1.2	73	5.5	10
SOM	55	26	91	13	1.2	73	5.5	10
SO (125–200A)	47	31	90	19	3.2	73	6.1	–
SD5	59	22	110	15	3.2	94	9	–
SD5M (125–160A)	58	26	109	15	3.2	94	9	11
SD5M (200A)	47	31	110	19	3.2	94	9	10
SD6	47	31	110	19	3.2	94	9	10
SD6M	47	31	110	19	3.2	94	9	10



SB3, **SB3M**, **SB4**, **SB4M**, **SD5M**, **SD6**, **SD6M**, **SO** (80–100A) & **SOM** types

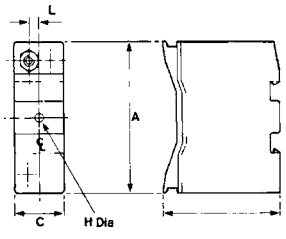
415V industrial fuselinks – centre bolted contacts, dimensions

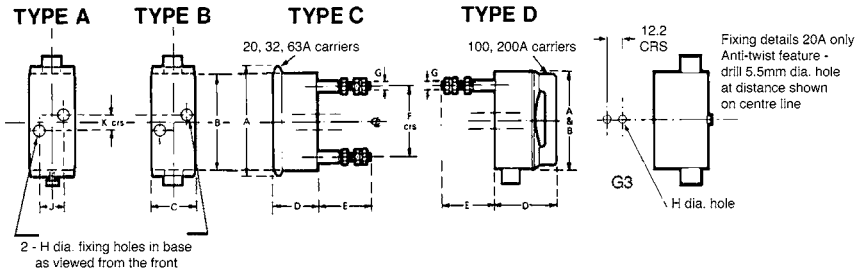
Fuse link type	Dimensions, mm A max.	B max.	D max.	E	F	G nom.	H	J	L
SE3	57	22	114	13	1.6	97	7.1	10	–
SF3	57	22	129	14	1.6	111	8.7	12	–
SE4	57	22	114	13	1.6	97	7.1	10	–
SF4	57	22	129	14	1.6	111	8.7	12	–
SE4M	57	22	114	13	1.6	97	7.1	10	–
SF4M	58	21	126	14	3.2	111	8.7	11	–
SF5	59	22	127	14	3.2	111	8.7	11	–
SF5M (125–160A)	58	26	126	14	3.2	111	8.7	11	–
SF5M200	47	31	136	19	3.2	111	9	12.5	–
SF6	47	31	136	19	3.2	111	9	12.5	–
SF6M	47	31	136	19	3.2	111	9	12.5	–
SF7	47	31	136	19	3.2	111	9	12.5	–
SF7 (315)	50	38	136	25	4.8	111	9	12.5	–
SF7M	50	38	136	25	4.8	111	9	12.5	–
SG7	47	59	158	19	3.2	133	10.5	12.5	–
SG7 (315)	50	38	209	25	4.8	133	10.5	12.5	25
SF8	50	39	136	25	4.8	111	9	12.5	–
SF8M	75	53	135	25	4.8	111	9	12.5	–
SH8	50	40	209	25	4.8	133	10.5	12.5	25.4
SH9	80	74	209	25	6.3	133	10.5	16	25.4
SY9	80	74	261	38	6.3	165	10.5	16	32
SH10	84	83	209	25	9.5	133	10.5	16	25.4
SY10	80	83	261	38	6.3	165	10.5	16	32
SJ11	83	100	198	63.5	9.5	149	14.3	19	32



Complete fuse units – dimensions

Nominal rating, In	Dimensions, mm A	B	C	D	E	F	G	H	J	K	L	Hole dia. (mm min) insulated stud (types C and D)
20A	87	79	27	50	63	56	6	5.5	–	–	–	12
32A	109	101	31	62	60	78	6	5.5	12.7	6.4	–	12
32A clip-in	75	–	25	57.7	–	–	6	5.5	–	–	4.4	–
63A	118	110	35	72	71	79	8	5.5	12.7	6.4	–	14.5
63A clip-in	88.7	–	31.5	66.34	–	–	8	5.5	–	–	4.8	–
100A	154	154	54	108	80	117	10	6.5	19	22	–	18.5
Compact range												
32A	87	79	27	–	–	56	6	5.5	–	–	–	12
63A	109	101	31	–	–	78	6	5.5	12.7	6.4	–	12
100A	118	110	35	72	71	79	8	5.5	12.7	6.4	–	14.5
200A	154	154	54	108	80	117	10	6.5	19	22	–	18.5





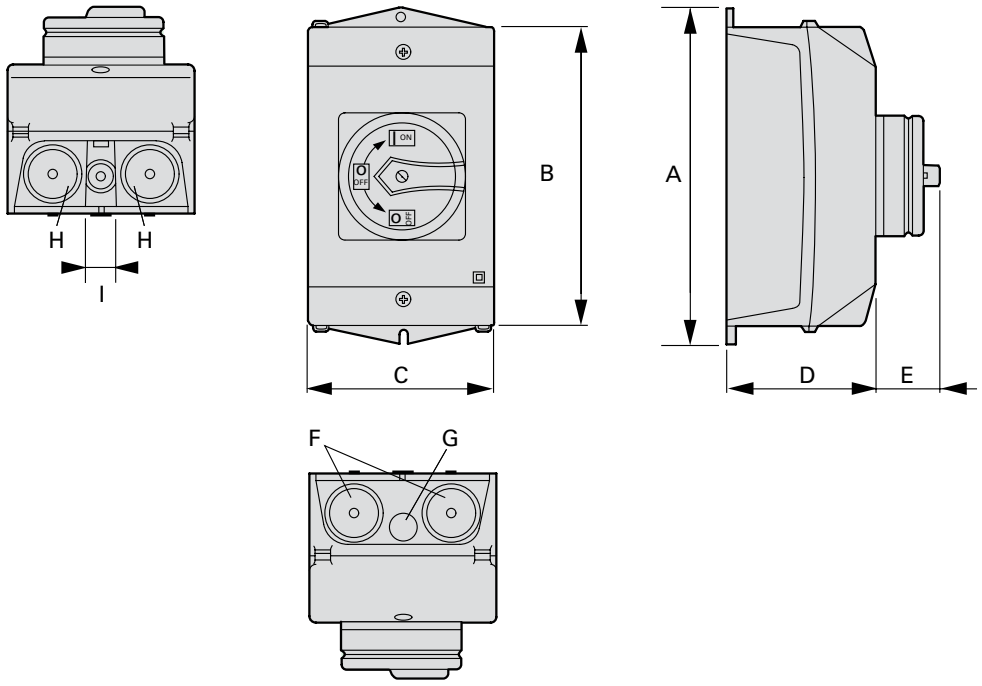
Local switch-disconnectors - rotary isolators, 20–63A, IP65, 3–8 poles

Nominal unit rating Ie (A)	AC-23A Rating (kW) 400V 3ph	AC-23A Rating (kW) 230V 1ph	AC-3 rating, motor load switch (kW) 230V	AC-3 rating, motor load switch (kW) 230V star delta	AC-3 rating, motor load switch (kW) 400V	AC-3 rating, motor load switch (kW) 400V star delta	Rated short-time withstand current Icw 1s (A)	Terminal capacity (flexible with ferules) (mm^2)
20	6.5	3.5	3	4	4	4.5	320	1 x 0.75 - 1.5 2 x 0.75 - 1.5
25	13	7	5.5	5.5	7.5	7.5	640	1 x 1 - 4 2 x 1 - 4
32	13	7.5	6.5	11	12	18.5	650	1 x 0.75 - 4 2 x 0.75 - 4
(3 & 3+N pole)	30	18.5	15	15	30	30	1260	1 x 1.5 - 25 2 x 1.5 - 6
(6 & 8 pole)	22	15	15	22	22	37	1300	1 x 1.5 - 25 2 x 1.5 - 10

Local switch-disconnectors - rotary isolators, 20–63A, IP65, 3–8 poles –dimensions

Eaton List Number	A	B	C	D	E	F	G	H	I
207149-GV	137	120	80	75	35	M20	-	-	-
207151-GV	137	120	80	75	35	M20	-	-	-
207153-GV	137	120	80	95	35	M20	-	-	-
207161-GV	137	120	80	95	35	M20	-	-	-
226902-GV	180	160	100	80	35	M25	-	M25	≤ 8
227860-GV	180	160	100	80	35	M25	-	M25	≤ 8
207202-GV	180	160	100	100	35	M25	-	M25	≤ 8
207210-GV	180	160	100	100	35	M25	-	M25	≤ 8
207212-GV	180	160	100	100	35	M25	-	M25	≤ 8
207348-GV	240	-	160	95	44	M25 / M32	M20	-	-
207349-GV	240	-	160	95	44	M25 / M32	M20	-	-
207350-GV	240	-	160	95	44	M25 / M32	M20	-	-
207246-GV	240	-	160	160	44	-	-	-	-
207248-GV	240	-	160	160	44	-	-	-	-

Dimensions (mm)



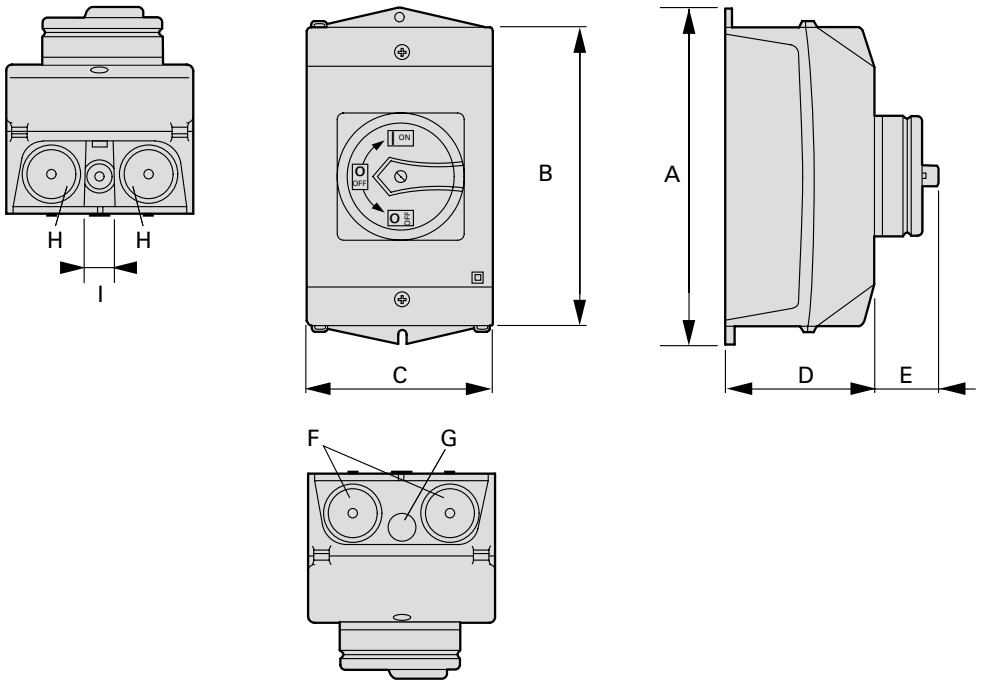
Rotary change over isolators, 20–63A, IP65, 4 poles

Nominal unit rating Ie (A)	AC-23A Rating (kW) 400V 3ph	230V 1ph	230V	AC-3 rating, motor load switch (kW) 230V star delta	400V	400V star delta	Rated short-time withstand current Icw 1s (A)	Terminal capacity (mm^2)
20	6.5	3.5	3	4	4	5.5	320	1 x 1 - 2.5
								2 x 1 - 2.5
32	13	7.5	6.5	11	12	18.5	650	1 x 1- 6
								2 x 1- 6
63	22	15	15	22	22	37	1300	1 x 2.5 - 35
								2 x 2.5 - 16

Local switch-disconnectors - rotary isolators, 20–63A, IP65, 3–8 poles –dimensions

Nominal unit rating Ie (A)	A	B	C	D	E	F	G	H	I
20	137	120	80	95	27	M20	-	-	-
32	180	160	100	100	35	M25	-	M25	≤ 8
63	240	-	160	160	29	M25 / M32	M20	-	-

Dimensions (mm)



AC motors, 3 phase full load current table, 1450rpm approx.

Provided as a guide to the selection of suitable Eaton control gear

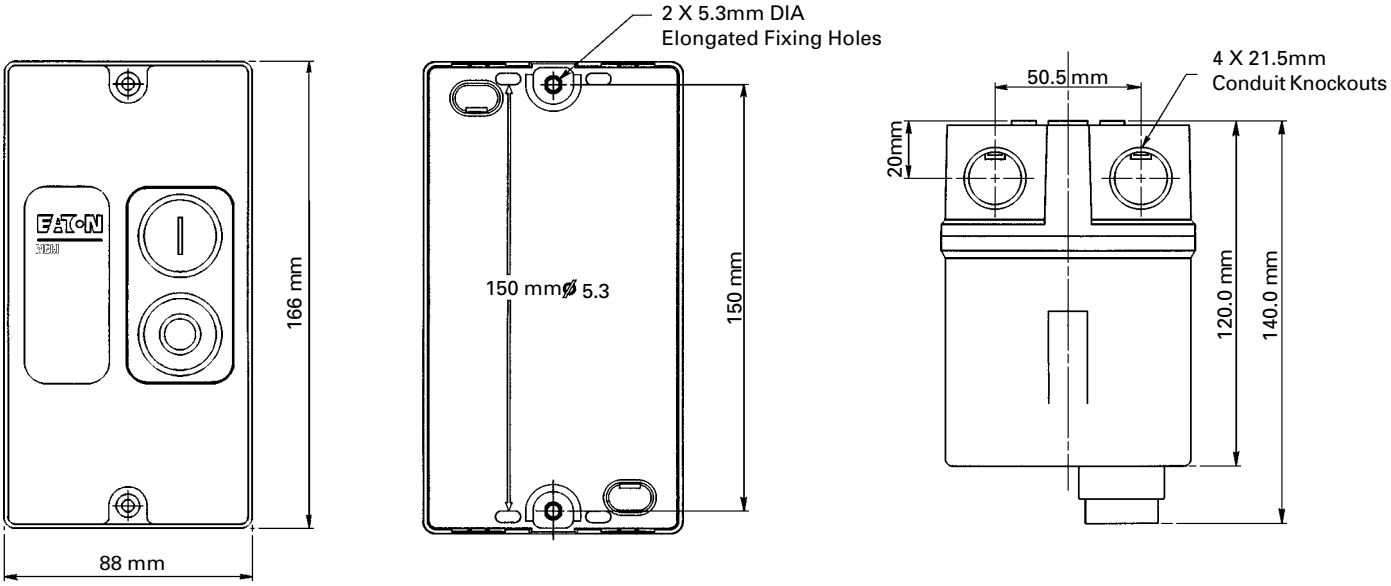
The tables are based on motors of approx, 1450 rpm of average efficiency and power factor. Motors of higher speed than 1450 rpm usually take a lower current than that shown in the table; while motors of lower speed usually take higher current. Wide variations from these figures can arise, especially on single phase motors and engineers should, whenever possible, determine the actual full load current (F.L.C.) from the motor rating plate in each case

Motor rating kW	Approx F.L.C. at line voltage 220V	240V	380V	400–415V	550V
0.07	–	–	–	–	–
0.1	0.7	0.6	0.4	0.4	0.3
0.12	1	0.9	0.5	0.5	0.3
0.18	1.3	1.2	0.8	0.7	0.4
0.25	1.6	1.5	0.9	0.9	0.6
0.37	2.5	2.3	1.4	1.3	0.8
0.56	3.1	2.8	1.8	1.6	1.1
0.75	3.5	3.2	2	1.8	1.4
1.1	5	4.5	2.8	2.6	1.9
1.5	6.4	5.8	3.7	3.4	2.6
2.2	9.5	8.7	5.5	5	3.5
3	12	11	7	6.5	4.7
3.7	15	13	8	8	6
4	16	14	9	8	6
5.5	20	19	12	11	8
7.5	27	25	16	15	11
9.3	34	32	20	18	14
10	37	34	22	20	15
11	41	37	23	22	16
15	64	50	31	28	21
18.5	67	62	39	36	26
22	74	70	43	39	30
30	99	91	57	52	41

AC motors, 1 phase full load current table, 1450rpm approx.

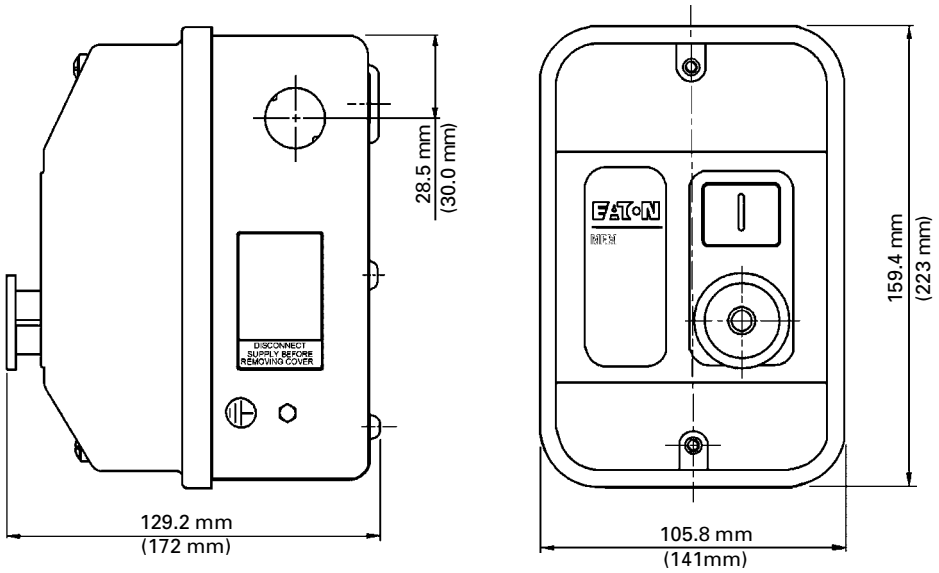
Motor rating (kW)	Approx F.L.C. at line voltage 110V	220V	230–240V
0.07	2.4	1.2	1.1
0.1	3.3	1.6	1.5
0.12	3.8	1.9	1.7
0.18	4.5	2.3	2.1
0.25	5.8	2.9	2.6
0.37	7.9	3.9	3.6
0.56	11	5.5	5
0.75	15	7.3	6.7
1.1	21	10	9
1.5	26	13	12
2.2	37	19	17
3	49	24	22
3.7	54	27	25
4	60	30	27
5.5	85	41	38
7.5	110	55	50

9kW DOL starter without switch disconnect, IP 65 moulded surface mounting enclosure, dimensional drawings

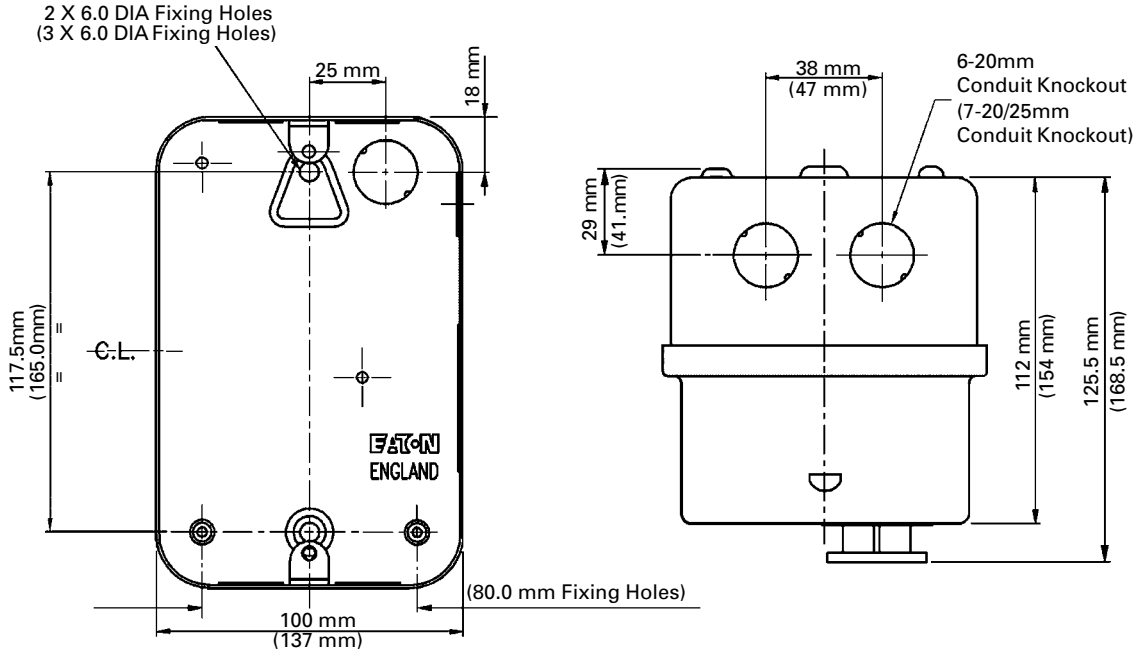


11kW DOL starter without switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings

- Dimensions in brackets refer to type **2528ADS(2X)** size enclosure

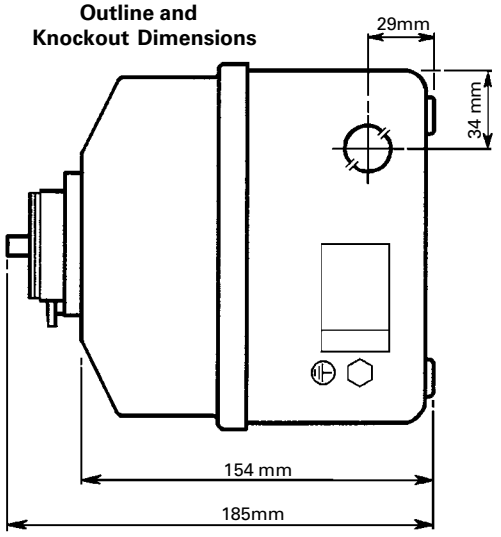


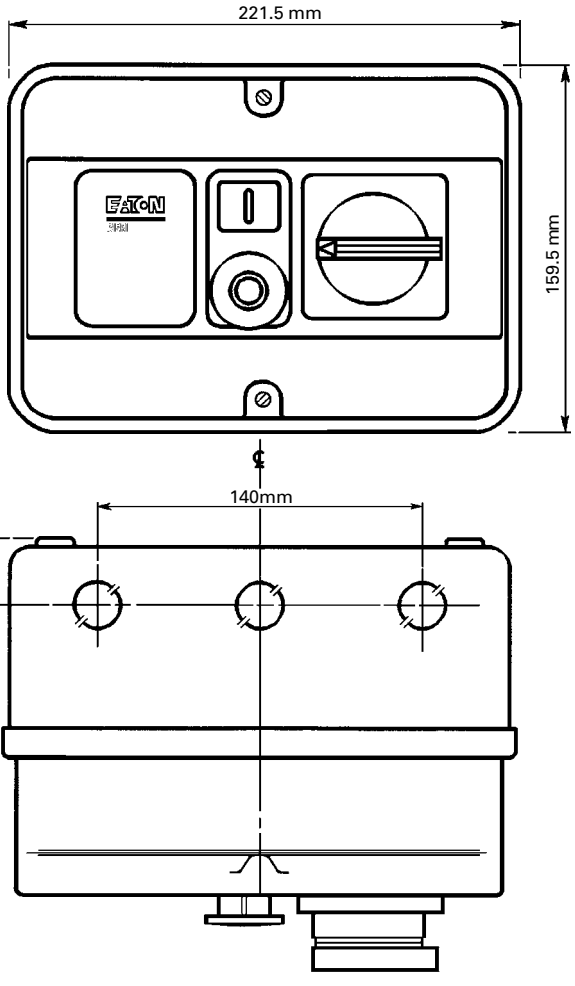
11kW DOL starter without switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings (contd)



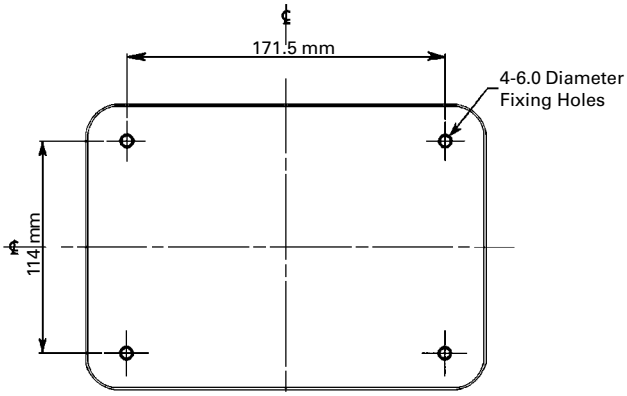
11kW DOL starter with switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings

Outline and Knockout Dimensions





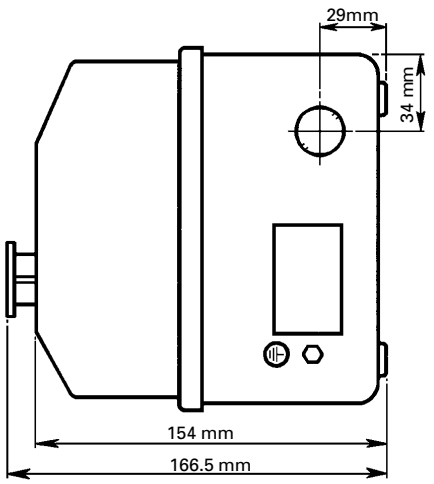
Box Fixing Dimensions

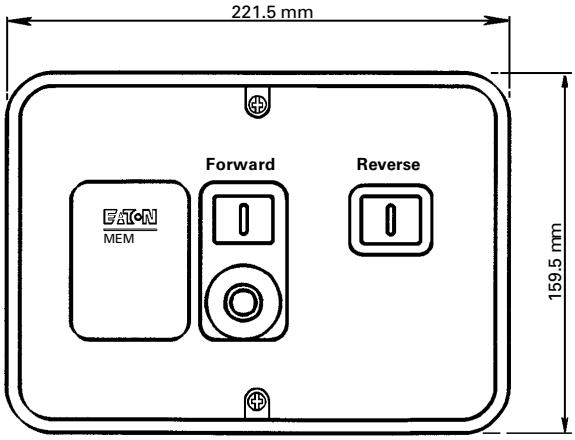


11kW DOL reversing starter without switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings

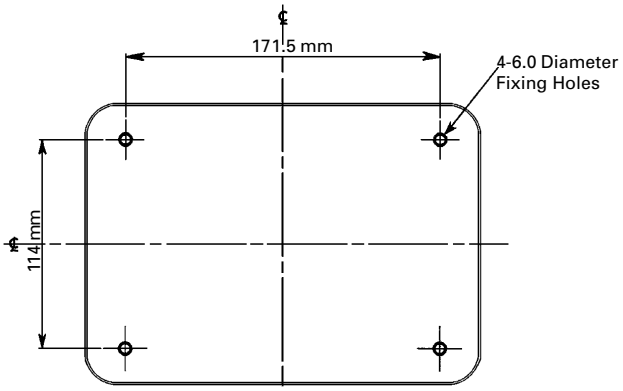
- 8 X 20.9mm (3/4") conduit knockouts are provided for cable entry at top,bottom and side of the enclosure and the earth terminal may be reversed for external connection but the components must be assembled in the same order as supplied.

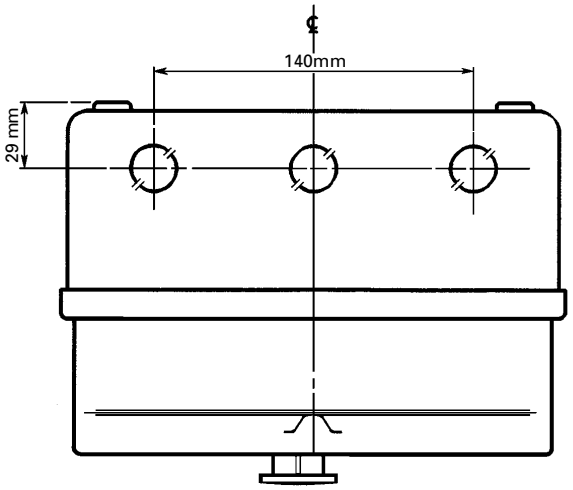
Outline and Knockout Dimensions





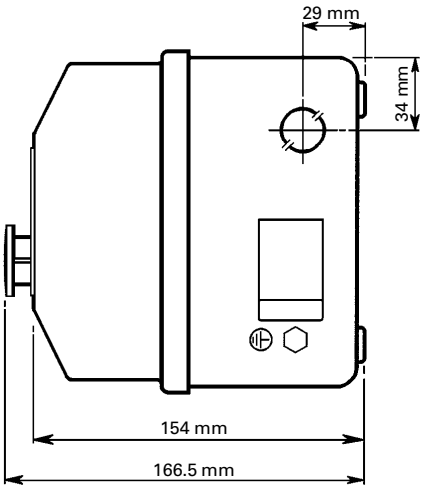
Box Fixing Dimensions

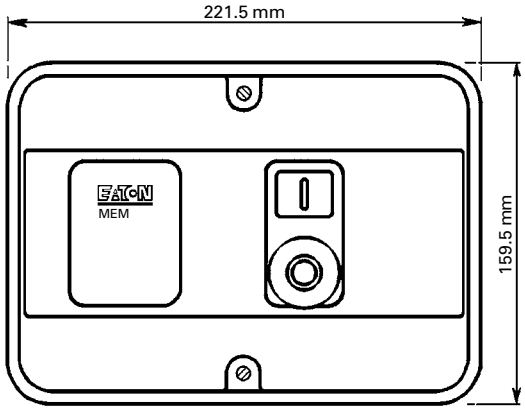


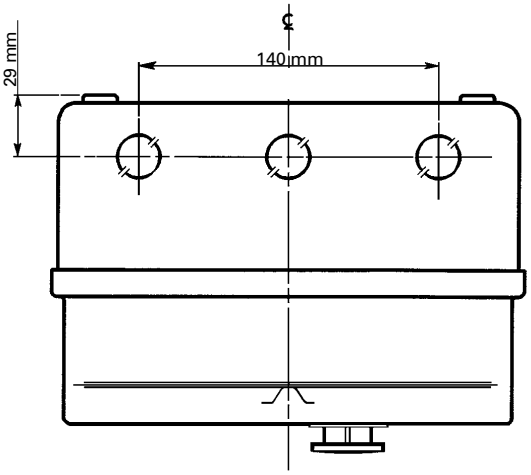


22kW Star Delta starter without switch disconnect, IP 54 metalclad surface mounting enclosure, dimensional drawings

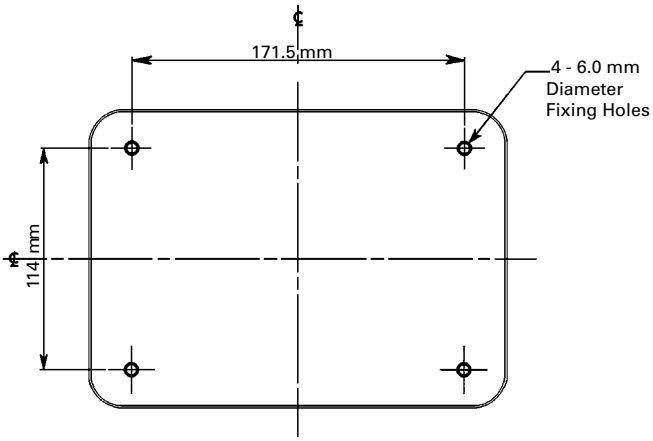
- **Star Delta starter enclosure (IP54 to BSEN60529:1992)** 20.9mm (3/4") conduit knockouts are provided for cable entry at top, bottom and side of the enclosure and the earth terminal may be reversed for external connection, but the components must be assembled in the same order as supplied.





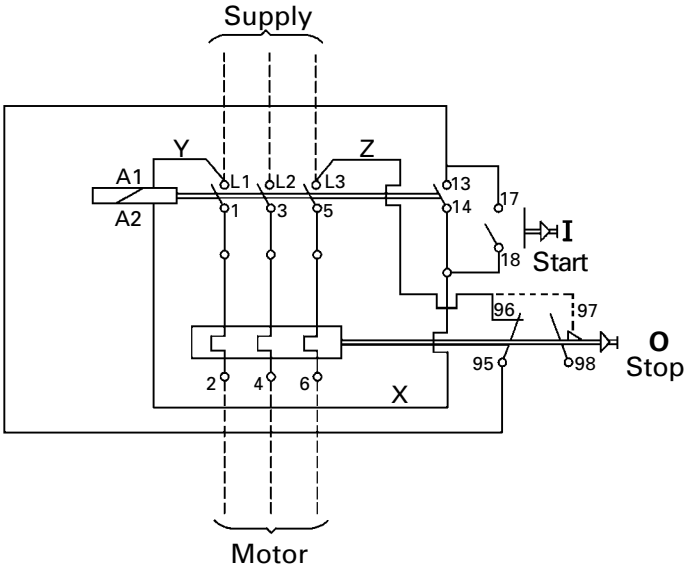


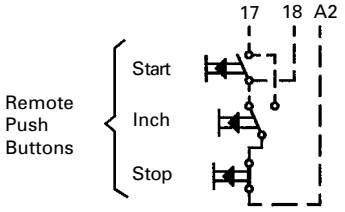
Box Fixing Dimensions



11kW DOL starter without switch disconnect, moulded & metal surface mounting enclosure, wiring diagrams

A. Three phase motors-DOL starter. Local 3-wire (pushbutton) control.

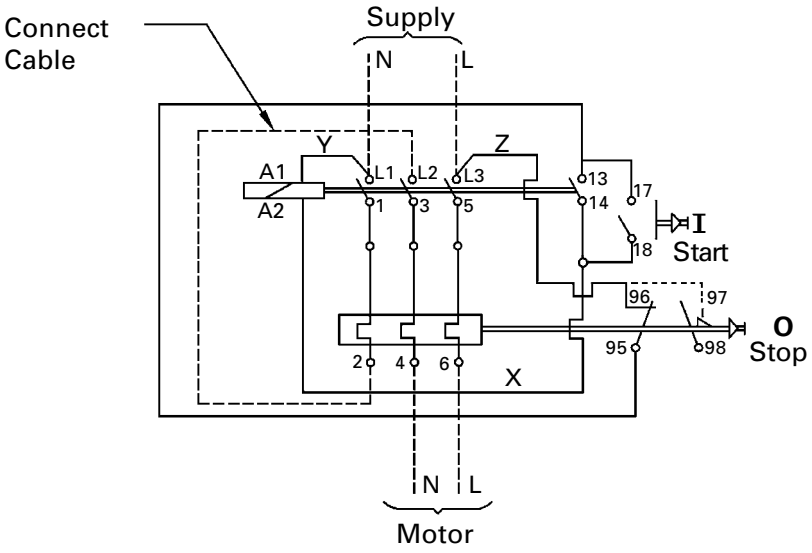


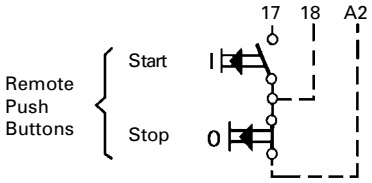


Remote start/inch/stop control

Connect as above except remove lead X and add connections shown.

B. Single phase motors-DOL starter. Local 3-wire (pushbutton) control.





Local & remote 3-wire (pushbutton) control

Connect as above except remove lead X and add connections shown.

Coil phase to neutral: remove connector Y, connect Neutral to A1

Separate coil supply: remove connectors Y and Z, connect coil supply to A1 and 96.

Coil voltage: Ensure correct voltage coil is fitted for separate coil supply and phase to neutral applications.

External interlock: Remove connection Z and insert interlock between 5 and 96.

Alarm circuit: At trip an alarm signal voltage equal to the coil voltage is available between 98 and A1 when a link is added between 96 & 97. The switch is rated at 440VA, 500V maximum.

Control circuit fuses (10A MAX).

Coil connected Phase to neutral (1 fuse): remove connector Z and connect fuse between 5 and 96.

Coil Connected Phase to Phase (2 fuses): remove connector Z and connect fuse between 5 and 96. Remove connector Y and connect fuse between 1 and A1.

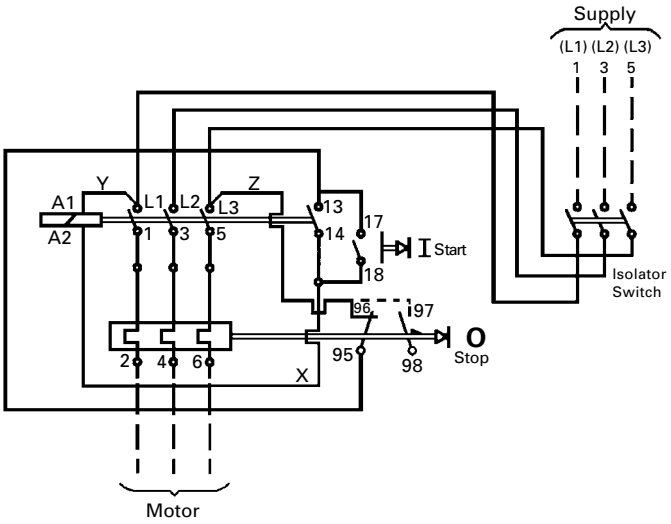
Note: the voltage rating of the fuse(s) must be suitable for the control circuit voltage.

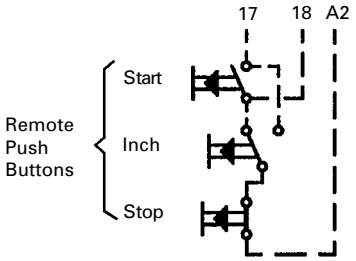
Short circuit protection: Maximum sizes of fuses or MCB's to give short-circuit protection to this starter are tabulated on page 173.

To reverse direction of rotation (3-Phase Motors): Interchange any two supply lines 1, 3 or 5.

11kW DOL starter with switch disconnect, IP 54 metalclad surface mounting enclosure, wiring diagrams

Three phase motors-DOL starter isolator local 3-wire (pushbutton) control



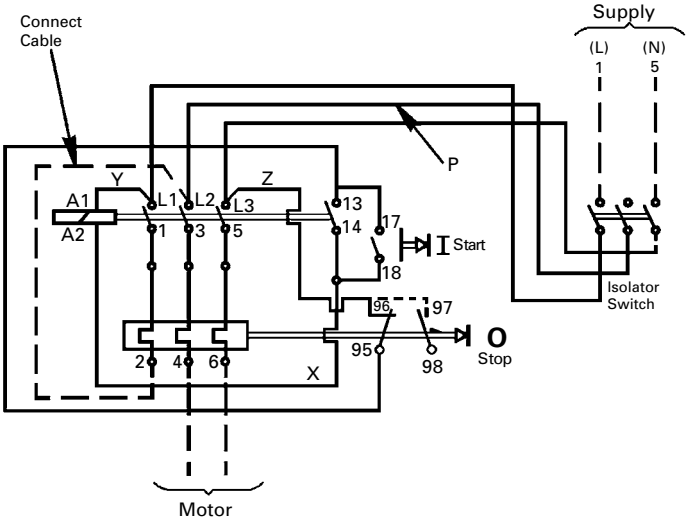


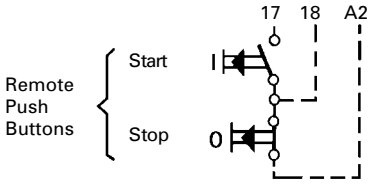
Remote start/inch/stop control

Connect as above except remove lead X and add connections shown

Single phase motors-DOL starter isolator local 3-wire (pushbutton) control

Connect supply to 1 and 5 at the isolator. Connect motor to 4 and 6 at the overload relay. Remove existing cable P and connect a cable of cross-sectional area equal to the supply cable between 2 and 3 as shown.





Local & remote 3-wire (pushbutton) control

Connect as above except remove lead X and add connections shown

Coil phase to neutral: remove connector Y, connect Neutral to A1

Separate coil supply: remove connectors Y and Z, connect coil supply to A1 and 96.

Coil voltage: Ensure correct voltage coil is fitted for separate coil supply and phase to neutral applications.

Control circuit fuses (10A MAX).

Coil connected Phase to neutral (1 fuse): remove connector Z and connect fuse between 5 and 96.

Coil Connected Phase to Phase (2 fuses): remove connector Z and connect fuse between 5 and 96. Remove connector Y and connect fuse between 1 and A1.

Note: the voltage rating of the fuse(s) must be suitable for the control circuit voltage.

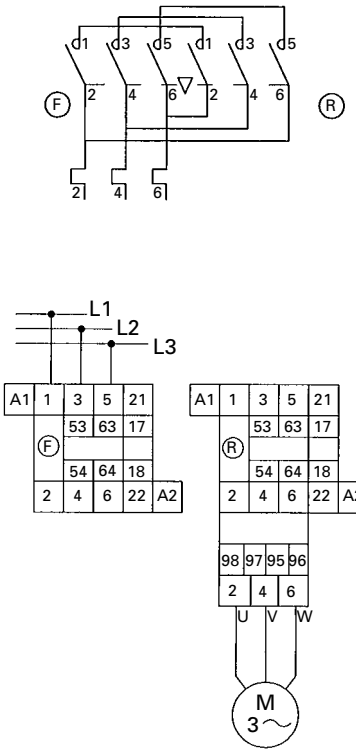
External interlock: Remove connection Z and insert interlock between 5 and 96.

Alarm circuit: At trip an alarm signal voltage equal to the coil voltage is available between 98 and A1 when a link is added between 96 & 97. The switch is rated at 440VA, 500V maximum.

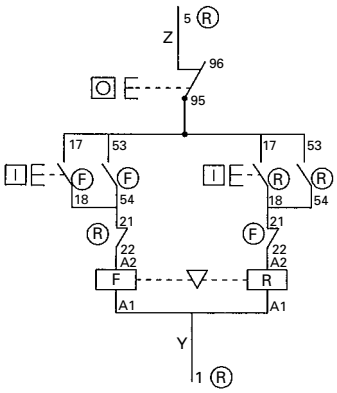
Short circuit protection: Maximum sizes of fuses or MCB's to give short-circuit protection to this starter are tabulated on page 173.

11kW DOL reversing starter without switch disconnect, IP 54 metalclad surface mounting enclosure, wiring diagrams

Circuit Diagrams:- Power

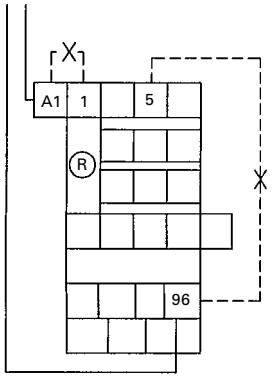


Control

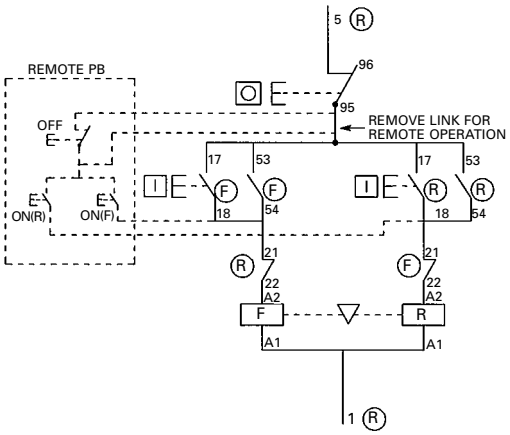


▽ Mechanical Iinterlock

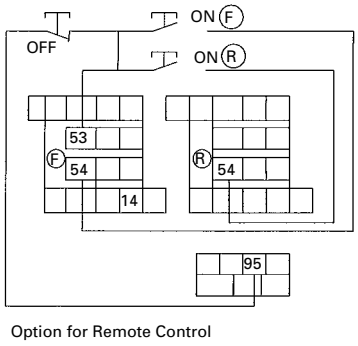
Separate Supply of Control Circuit



Remote Control Option



▽ Mechanical Interlock



Option for Remote Control

Coil phase to neutral: Remove connector Y, connect Neutral to A1 F

Separate coil supply: Remove connectors Y and Z, connect coil supply to A1 R and 96.

Coil voltage: Ensure correct voltage coil is fitted for separate coil supply and phase to neutral applications.

Control circuit fuses (10A MAX).

Coil connected Phase to neutral (1 fuse): remove connector Z and connect fuse between 5 and 96.

Coil Connected Phase to Phase (2 fuses): remove connector Z and connect fuse between 5 and 96. Remove connector Y and connect fuse between 1 and A1 R.

Note: The voltage rating of the fuses must be suitable for the control circuit voltage.

External interlock: Remove connector Z and connect interlock between 5 and 96. When using remote control, connect external interlock in series with remote 2 wire (switch control).

To reverse direction of rotation: (3 Phase Motors) interchange any two supply lines 1, 3 or 5.

Alarm circuit: At trip an alarm signal voltage equal to the coil voltage is available between 98 and A1 when a link is added between 96 and 97. The switch is rated at 400VA, 500V maximum.

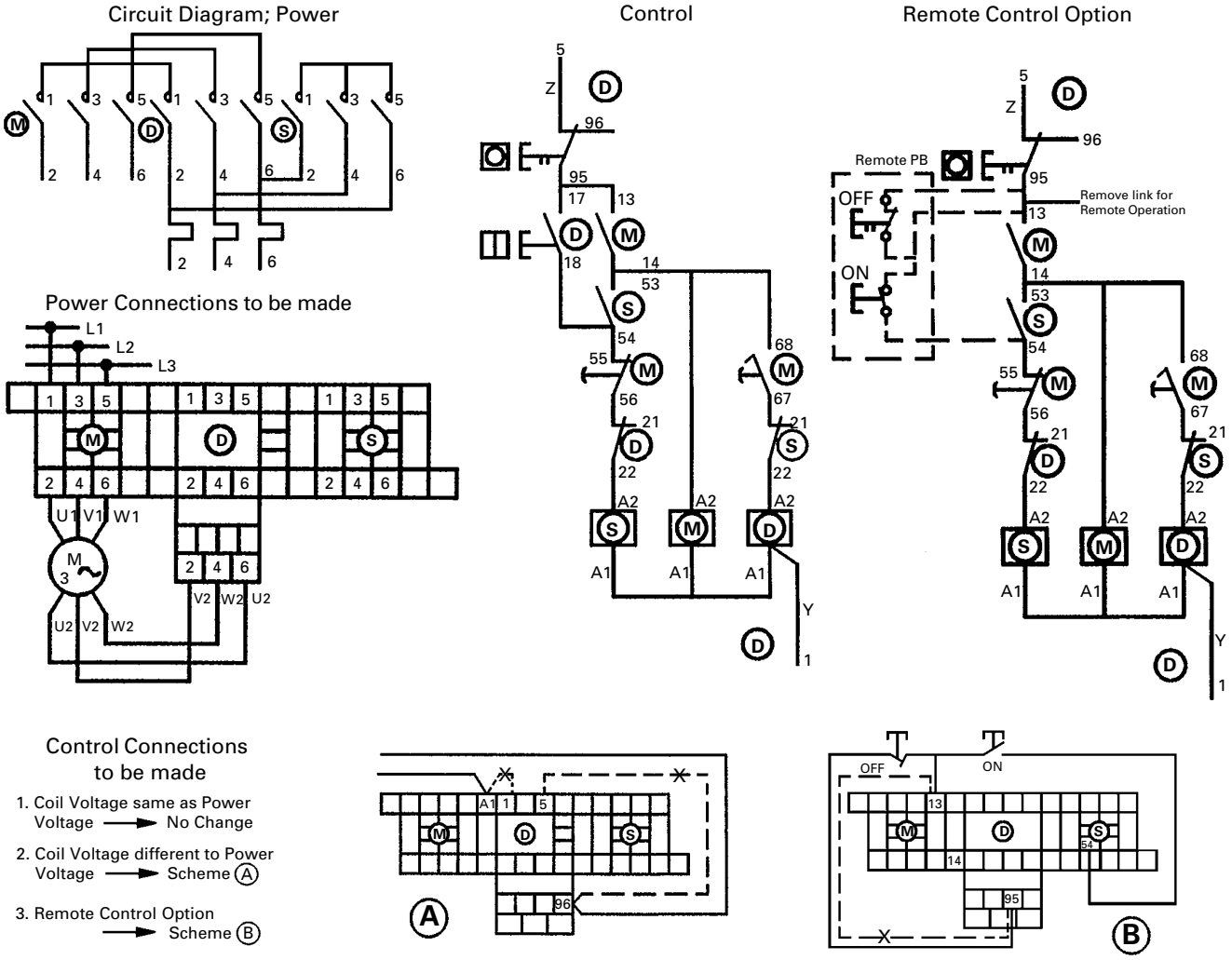
Short circuit protection: Maximum sizes of fuses or MCB's to give short-circuit protection to this starter are tabulated on page 173.

Limit Switch Connections

Forward limit: Remove connection between 54Forward and 21Reverse – connect limit switch between 54F and 21R.

Reverse limit: Remove connection between 54Reverse and 21Forward— connect limit switch between 54R and 21F.

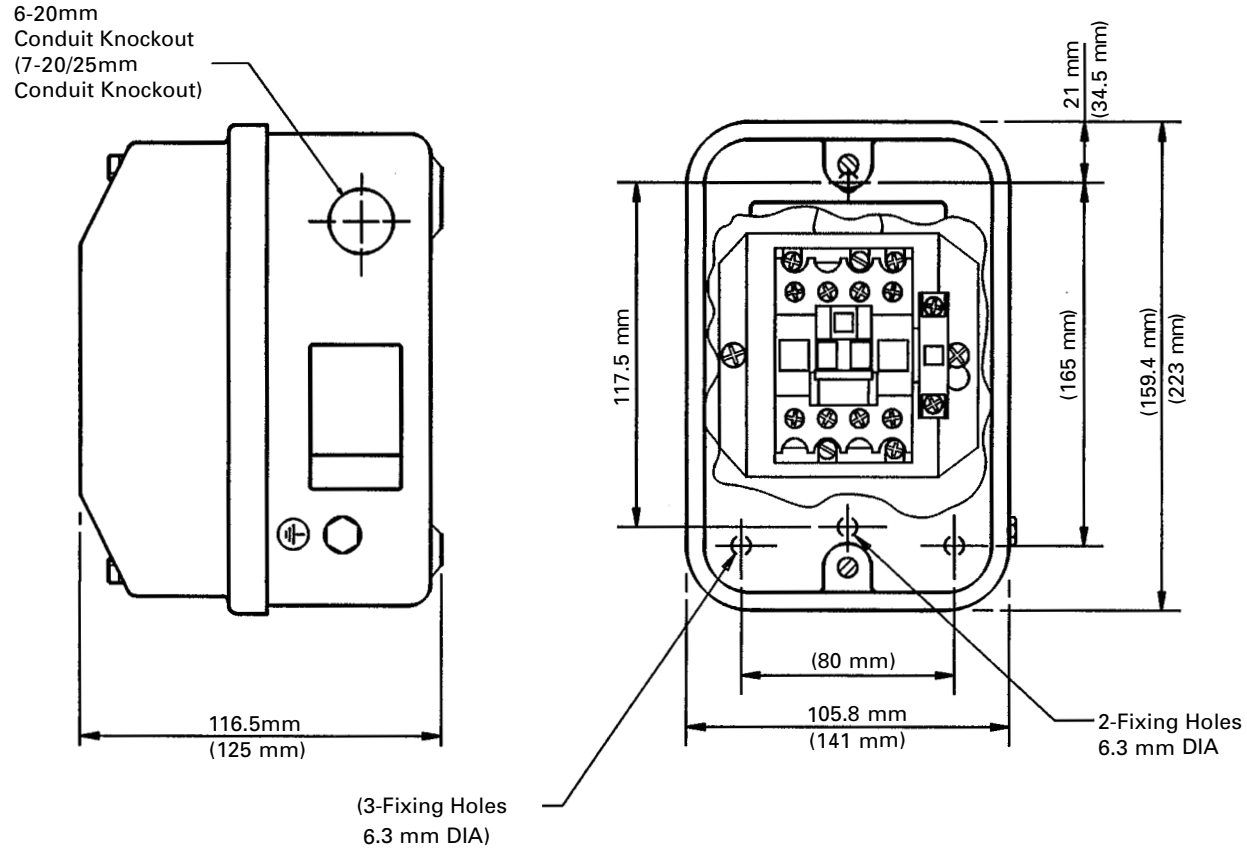
25kW Star Delta starter without switch disconnect, IP 54 metalclad surface mounting enclosure, wiring diagram



Short circuit protection

Overload Relay list number	Motor FLC Ie (A)	SCPD Back-up protection MAX HRC fuse BS88:1 aM (A)	Back-up protection Max MCB Type C
Direct on line			
8TT87	0.63–1	4	**EMCH306**
8TT88	1–1.6	6	**EMCH306**
8TT89	1.6–2.5	10	**EMCH306**
8TT90	2.5–4	16	**EMCH310**
8TT91	4–6	16	**EMCH310**
8TT98	5.5–8.0	20	**EMCH316**
8TT92	7–10	25	**EMCH320**
8TT93	10–13	32	**EMCH320**
8TT94	13–18	40	**EMCH332**
8TT104	18–25	50	**EMCH340**
Star Delta			
8TT90SD	4.3–6.9	16	**EMCH310**
8TT91SD	6.9–10.4	16	**EMCH310**
8TT98SD	9.5–13.8	20	**EMCH316**
8TT92SD	12.1–17.3	25	**EMCH320**
8TT93SD	17.3–22.5	32	**EMCH320**
8TT94SD	22.5–31	40	**EMCH332**
8TT104SD	31–43	50	**EMCH340**

Heating and lighting contactors



Dimensions in brackets ( ) refer to **228ALDPR**, **228ALCSPN/R**, **428ALCFP/R**, **448ALCFP**, **428ALCDP/R**, **428ALCSPN/R**. All others refer to list numbers; **228ALCFP/R**, **248ALCFP** and **228ALCDP**.

Additional side mounting auxilary contacts for DOL, DOL reversing, Star Delta starters and Autoline

- 1 NO, 1NC Ith 10A Ui 600v

Description	Current rating (A)	Coil voltage	Starter list number	Maximum side mount auxilaries	Eaton list number
DOL Starter	25	220–240	**28ADS2X**	2	**8TA8DN11**
DOL Starter	25	380–415	**48ADS2X**	2	**8TA8DN11**
Starter with disconnector	18	220–240	**28ADSA1X**	2	**8TA8DN11**
Starter with disconnector	18	380–415	**48ADSA1X**	2	**8TA8DN11**
Starter with disconnector	25	220–240	**28ADSA2X**	1	**8TA8DN11**
Starter with disconnector	25	380–415	**48ADSA2X**	1	**8TA8DN11**
Reversing starter	18	220–240	**28ARD1X**	1 reverse, 1 forward	**8TA8DN11**
Reversing starter	18	380–415	**48ARD1X**	1 reverse, 1 forward	**8TA8DN11**
Reversing starter	25	220–240	**28ARD2X**	1 reverse, 1 forward	**8TA8DN11**
Reversing starter	25	380–415	**48ARD2X**	1 reverse, 1 forward	**8TA8DN11**
Star Delta starter	18	220–240	**28SDA2X18**	1 main, 1 star	**8TA8DN11**
Star Delta starter	18	380–415	**48SDA2X18**	1 main, 1 star	**8TA8DN11**
Star Delta starter	25	220–240	**28SDA3X25**	1 main, 1 star	**8TA8DN11**
Star Delta starter	25	380–415	**48SDA3X25**	1 main, 1 star	**8TA8DN11**
Autoline 4 pole		230–240	**228ALCFP**	2	**8TA8DN11**
Autoline 4 pole with rectifier		230–240	**228ALCFPR**	1	**8TA8DN11**

Additional side mounting auxilary contacts for DOL, DOL reversing, Star Delta starters and Autoline (contd)

Description	Current rating (A)	Coil voltage	Starter list number	Maximum side mount auxilaries	Eaton list number
Autoline 4 pole		400–415	**248ALCFP**	2	**8TA8DN11**
Autoline 2 pole		230–240	**228ALCDP**	2	**8TA8DN11**
Autoline 2 pole with rectifier		230–240	**228ALCDPR**	1	**8TA8DN11**
Autoline 1 pole and neutral		230–240	**228ALCSPN**	1	**8TA8DN11**
Autoline 1 pole and neutral with rectifier		230–240	**228ALCSPNR**	1	**8TA8DN11**
Autoline 4 pole		230–240	**428ALCFP**	2	**8TA8DN11**
Autoline 4 pole with rectifier		230–240	**428ALCFPR**	1	**8TA8DN11**
Autoline 4 pole		400–415	**448ALCFP**	2	**8TA8DN11**
Autoline 2 pole		230–240	**428ALCDP**	2	**8TA8DN11**
Autoline 2 pole with rectifier		230–240	**428ALCDPR**	1	**8TA8DN11**
Autoline 1 pole and neutral		230–240	**428ALCSPN**	1	**8TA8DN11**
Autoline 1 pole and neutral with rectifier		230–240	**428ALCSPNR**	1	**8TA8DN11**

Replacement front mounting auxiliary contacts for Star Delta

- 1 NO, 1NC Ith 10A Ui 600v

For Star Delta	Front mounting auxilary Eaton list number
28SDA2X18	**8TA1DN11**
28SDA2X25	**8TA1DN11**
28SDA2X32	**8TA1DN11**
48SDA2X18	**8TA1DN11**
48SDA2X25	**8TA1DN11**
48SDA2X32	**8TA1DN11**

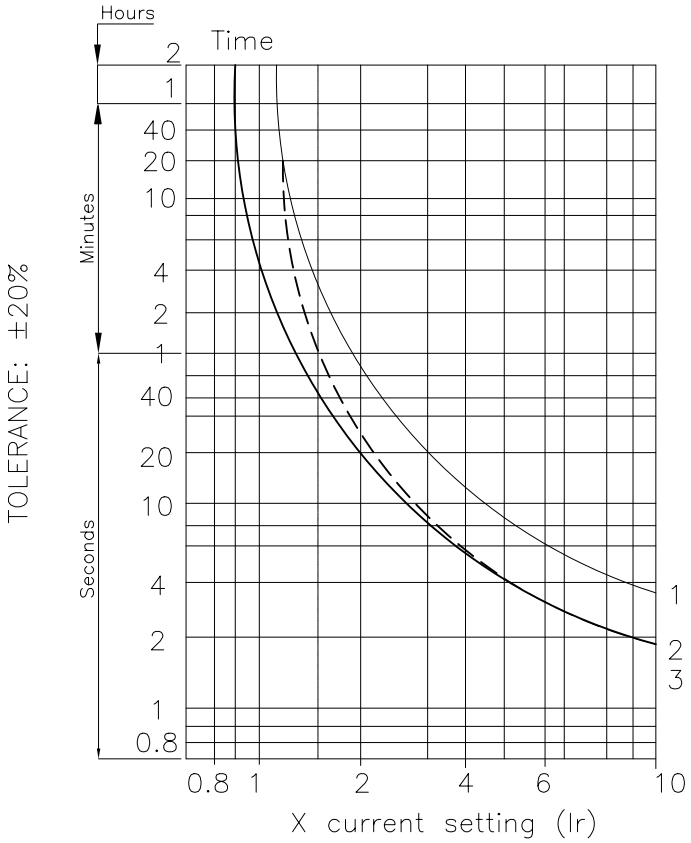
Tightening torques for Star Delta and DOL starters

Starter type (Nm)	Maximum starter	Relay tightening torque (Nm) rating (kW)	Power	Contactor tightening torque Aux	Power	Aux
DOL	9	1.85	1.2	1.7	1.2	
DOL	11	1.85	1.2	1.85	1.85	
DOL	15	2.5	1.2	2.5	1.2	
Star delta	15	1.85	1.2	1.7	1.2	
Star delta	22	1.85	1.2	1.85	1.85	
Star delta	25	2.5	1.2	2.5	1.2	

Tightening torques for Autoline contactors

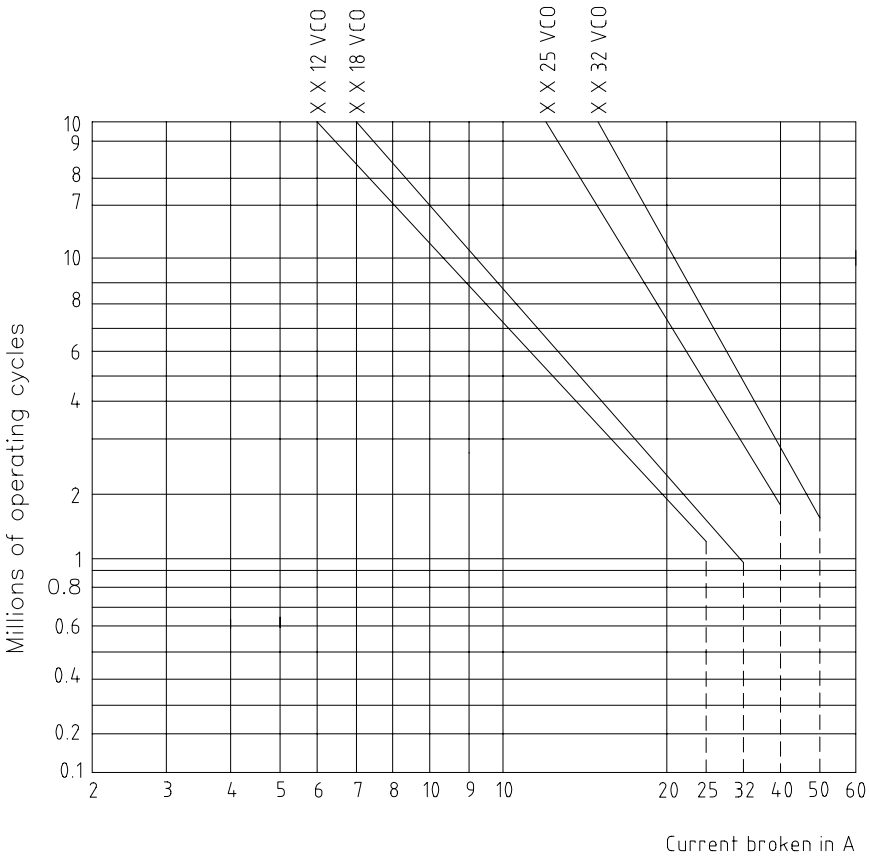
Starter type	Contactor tightening torque (Nm) Power
228ALCFP	1.7
248ALCFP	1.7
428ALCFP	2.5
448ALCFP	2.5
228ALCFPR	1.7
428ALCFPR	2.5
228ALCDP	3.0
428ALCDP	3.5
228ALCDPR	3.0
428ALCDPR	3.0
228ALCSPN	3.5
428ALCSPN	4.0
228ALCSPNR	4.0
428ALCSPNR	4.0

8TT series, overload relay tripping characteristics

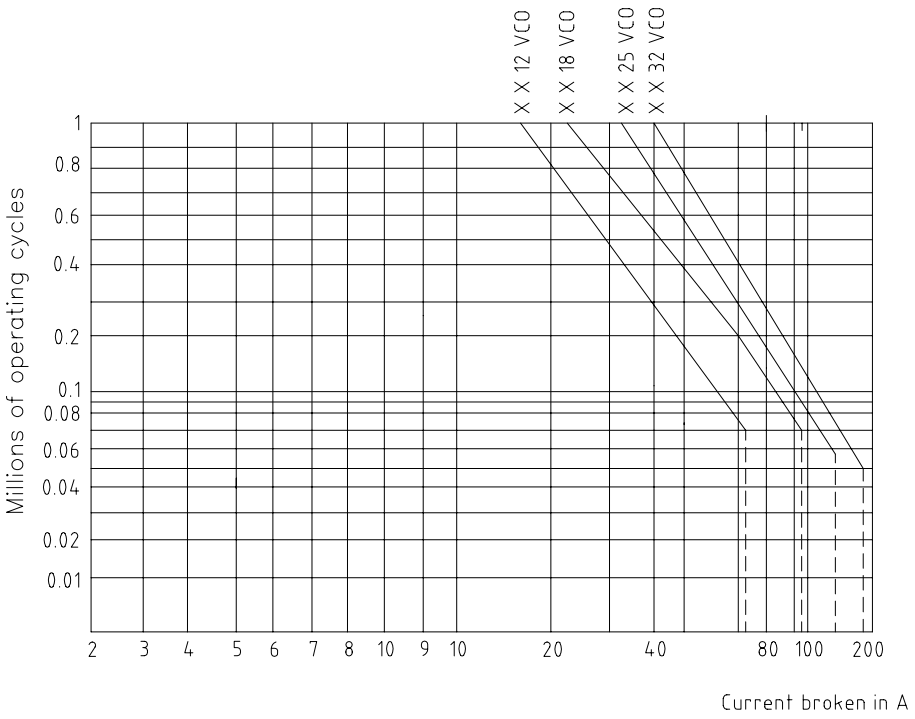


1. ——— Balanced operation, 3–phase, from cold state
2. – – – – – Balanced operation, 3–phase, after a long period at the set current (hot state)
3. ——— Operation following the loss of one phase (single phase tripping) from cold state

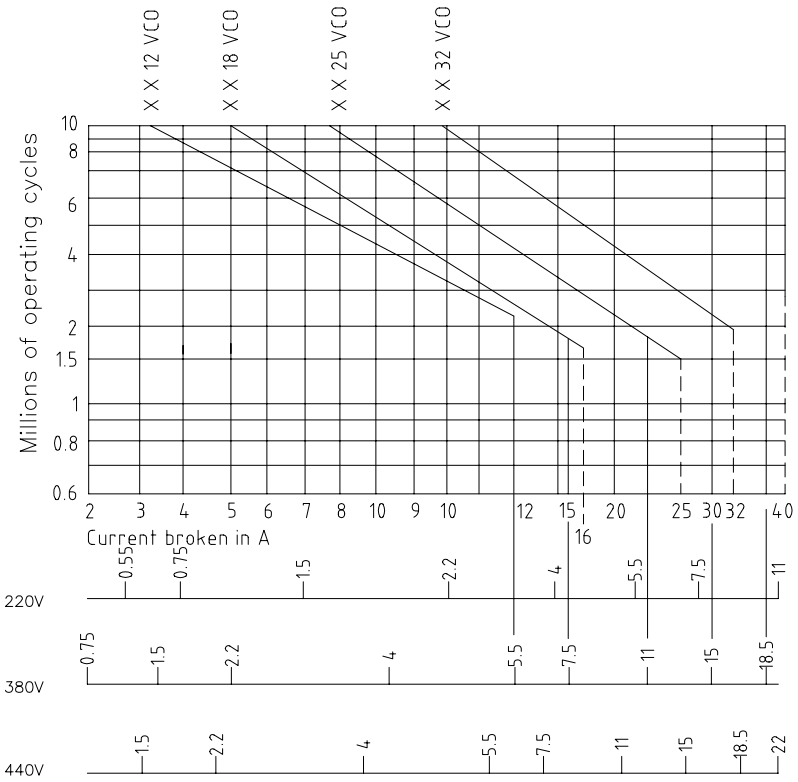
Contactor utilisation category, AC1 (Ue_<440v) electrical life curve



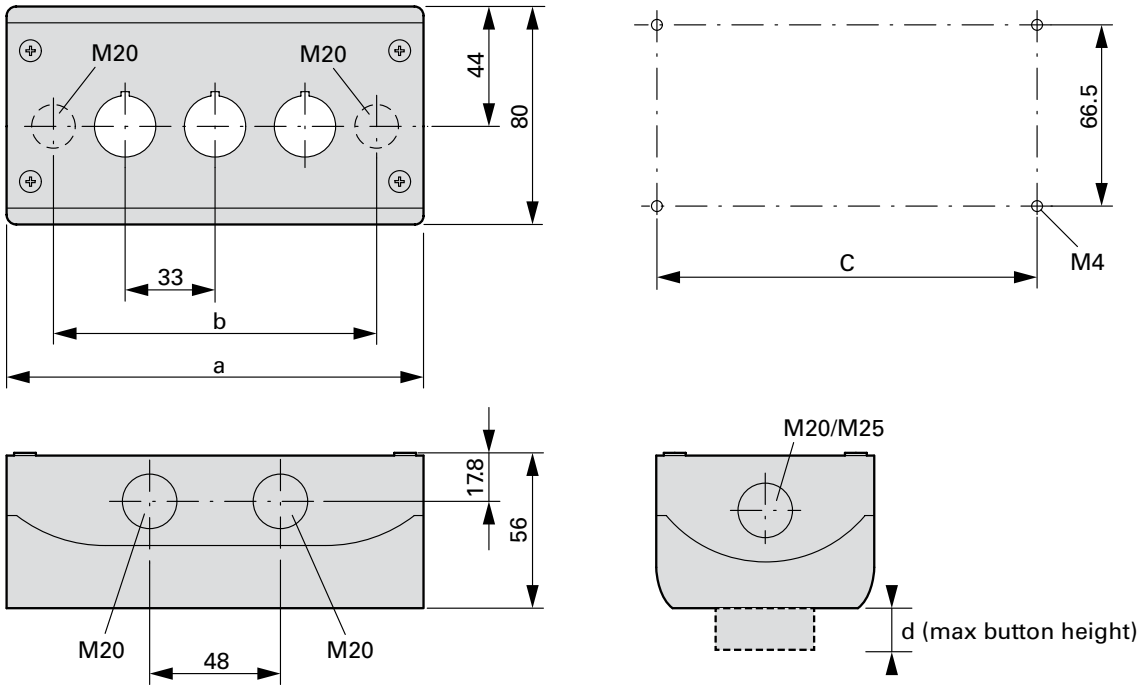
Contactor utilisation category, AC2 (Ue_<440v) electrical life curve



Contactor utilisation category, AC3 (Ue_<440v) electrical life curve

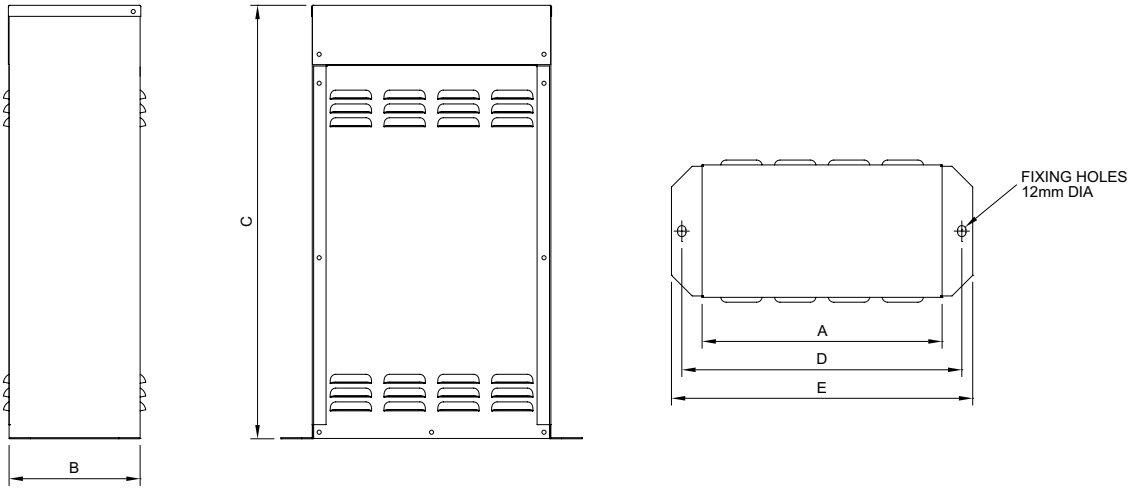


MSU pushbutton control units (moulded IP66) dimensions



Dimensions a (mm)	Dimensions b (mm)	Dimensions c (mm)	Dimensions d (mm)	Cable entries			Eaton list number
72	42.6	58.5	10	2 x M16	3 x M20	2 x M25	**M21MSSU**
72	42.6	58.5	16.4	2 x M16	3 x M20	2 x M25	**M21MSU**
72	42.6	58.5	20.6	2 x M16	3 x M20	2 x M25	**M21MSU2K**
72	42.6	58.5	20.6	2 x M16	3 x M20	2 x M25	**M21MSU2SK**
72	42.6	58.5	48	2 x M16	3 x M20	2 x M25	**M21MSULK**
72	42.6	58.5	48	2 x M16	3 x M20	2 x M25	**M21MSUML**
120	85.6	106.5	16.4	2 x M20	3 x M20	2 x M25	**M22MSU**
120	85.6	106.5	48	2 x M20	3 x M20	2 x M25	**M22MSUL**
153	118.6	139.5	48	2 x M20	2 x M25	4 x M20	**M23MSUL**

Non-auto capacitor dimensions



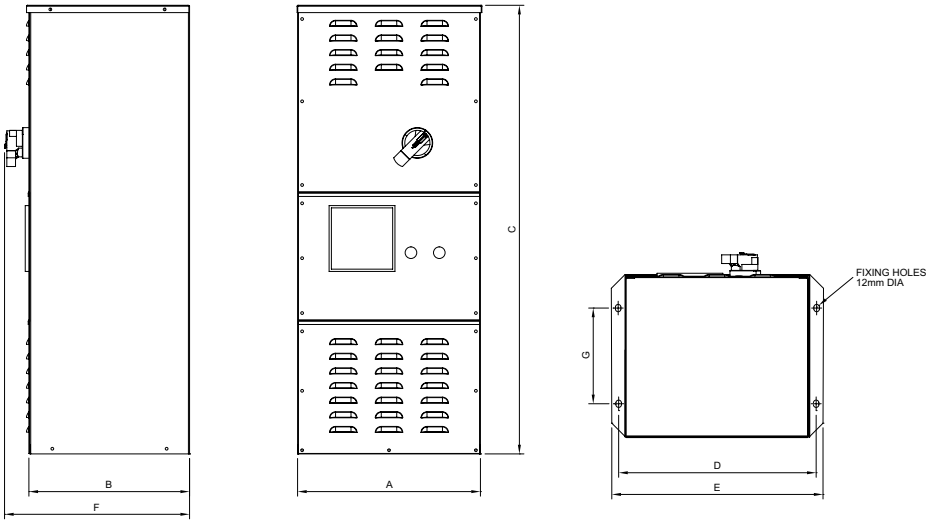
KVAR (415V)	A	B	C	D	E
25	190	190	376	212	245
50	190	190	376	212	245
75	346	190	628	405	435
100	346	190	628	405	435

Non-auto capacitor specification

Manufacturing standards:	IEC 61439-2, IEC 60439-1
Voltage range:	Standard voltage 400V capacitors suitable for use on other voltages (200–660V) supplied on request
Frequency range:	50Hz or 60Hz (dependent on customer specification)
Phases:	3 phase (single phase on request)
Terminals:	3 Terminal standard (2 and 6 on request)
Discharge resistors:	Fitted as standard and permanently connected across the capacitor terminals
Customer connections:	By means of M4, 6, 8, 10, 12 brass set screws. The size of screw dependent on capacitor size
Case material:	Zinc plated steel
Case thickness:	1mm
Location:	Interior (exterior cases are available on request)
Protection:	IP21
Ambient temperature:	–25° +40°C
Losses (including discharge resistors):	Less than 0.5 watts/kvar
Cubicle paint colour:	Light grey RAL 7035

Variations to above specifications available on request.

100 capacitor dimensions



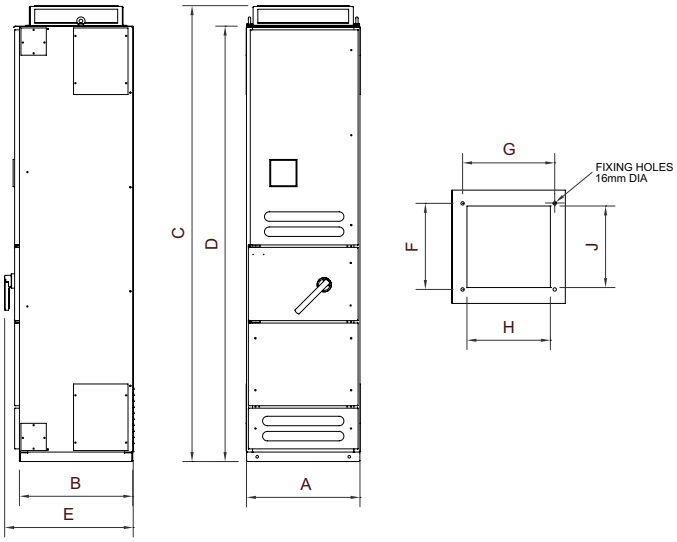
KVAR (415V)	A	B	C	D	E	F	G
25	400	200	905	425	245	253	n/a
50	400	200	905	425	455	253	n/a
75	390	350	980	425	455	403	215
100	390	350	980	425	455	403	215

100 capacitor specification

Manufacturing standards:	IEC 61439-2, IEC 60439-1
Voltage range:	Standard voltage 400V capacitors suitable for use on other voltages (200–660V) supplied on request
Frequency range:	50Hz or 60Hz (dependent on customer specification)
Phases:	3 phase (single phase on request)
Terminals:	3 terminal standard (2 and 6 on request)
Discharge resistors:	Fitted as standard and permanently connected across the capacitor terminals
Customer connections:	By means of M4, 6, 8, 10, 12 brass set screws. The size of screw dependent on capacitor size
Case material:	Zinc plated steel
Case thickness:	1mm
Location:	Interior (exterior cases are available on request)
Protection:	IP21
Ambient temperature:	–25° +40°C
Losses (including discharge resistors):	Less than 0.5 watts/kvar
Cubicle paint colour:	Light grey RAL 7035

Variations to above specifications available on request.

300 standard cubicle dimensions



KVAR (415V)	A	B	C	D	E[1)]	F	G	H	J
125	600	600	2100	2000	680	455	487	440	430
150	600	600	2100	2000	680	455	487	440	430
175	600	600	2100	2000	680	455	487	440	430
200	600	600	2100	2000	680	455	487	440	430
225	600	600	2100	2000	680	455	487	440	430
250	600	600	2100	2000	680	455	487	440	430
275	600	600	2400	2300	680	455	487	440	430
300	600	600	2400	2300	680	455	487	440	430

[1)] Not applicable for direct connection

300 standard cubicle specifications

Manufacturing standards:	IEC 61439-2, IEC 60439-1
Voltage Range:	Standard operating voltages 380/400/415Vac, 3ph
Frequency range:	50Hz (60Hz rating on request)
Cable chamber and customer cable entry arrangements:	Undrilled detachable gland plate. Top or bottom entry as required.
Cubicle material:	2mm mild steel enclosure (1.6mm doors) painted light grey - RAL 7035 (other colours dependant on customer specification)
Earthing:	Internal earth bar linked to framework.
Fixing:	Floor fixing by means of 4 x 16mm diameter holes per cubicle.
Protection:	IP31 indoor. (IP42 on request – Derating may be required)
Ambient temperature:	-25°C +55°C.

Variations to above specifications available on request.

Terminal compartment

A terminal compartment is fitted as standard complete with suitably rated incoming connection points*.

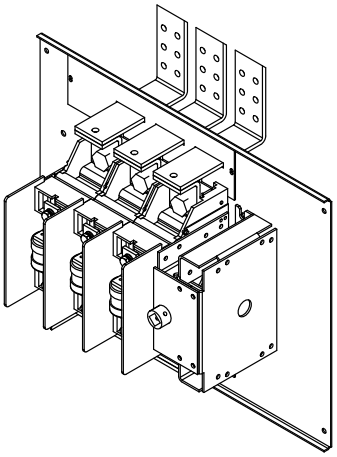
Alternatively, an incoming protective device can be fitted to the incoming section.

The device can be fitted to the top or bottom of the capacitor bank.

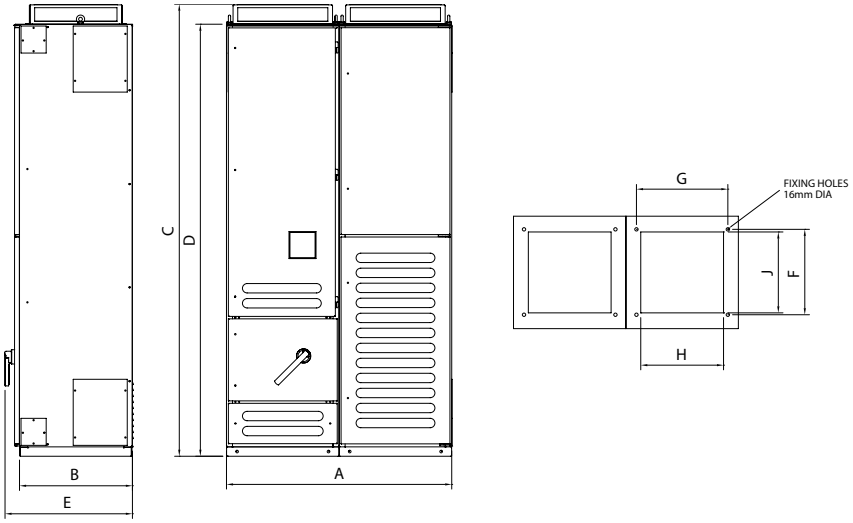
A detachable undrilled gland plate is fitted as standard.

To accept top or bottom cable entry. Cable entry will be bottom, unless otherwise specified.

** Accomodation of oversized cables is available, if specified.*



300 detuned cubicle dimensions



KVAR (415V)	A	B	C	D	E[1)]	F	G	H	J
100	600	600	2400	2300	680	455	487	440	430
125	600	600	2400	2300	680	455	487	440	430
150	600	600	2400	2300	680	455	487	440	430
175	1200	600	2400	2300	680	455	487	440	430
200	1200	600	2400	2300	680	455	487	440	430
225	1200	600	2400	2300	680	455	487	440	430
250	1200	600	2400	2300	680	455	487	440	430
275	1200	600	2400	2300	680	455	487	440	430
300	1200	600	2400	2300	680	455	487	440	430
325	1200	600	2400	2300	680	455	487	440	430
350	1200	600	2400	2300	680	455	487	440	430
375	1200	600	2400	2300	680	455	487	440	430
400	1200	600	2400	2300	680	455	487	440	430
425	1800	600	2400	2300	680	455	487	440	430
450	1800	600	2400	2300	680	455	487	440	430
475	1800	600	2400	2300	680	455	487	440	430
500	1800	600	2400	2300	680	455	487	440	430
525	1800	600	2400	2300	680	455	487	440	430
550	1800	600	2400	2300	680	455	487	440	430
575	1800	600	2400	2300	680	455	487	440	430
600	1800	600	2400	2300	680	455	487	440	430

[1)] Not applicable for direct connection

300 detuned cubicle specifications

Manufacturing standards:	IEC 61439-2, IEC 60439-1
Voltage range:	Standard operating voltages 380/400/415Vac, 3ph
Frequency range:	50Hz (60Hz rating on request)
Cable chamber and customer cable entry arrangements:	Undrilled detachable gland plate. Top or bottom entry as required
Cubicle material:	2mm mild steel enclosure (1.6mm doors) painted light grey - RAL 7035 (other colours dependant on customer specification)
Earthing:	Internal earth bar linked to framework
Fixing:	Floor fixing by means of 4 x 16mm diameter holes per cubicle
Protection:	IP31 indoor. (IP42 on request – derating may be required)
Ambient temperature:	-25°C +55°C

Variations to above specifications available on request.

10.5 Technical data
Degrees of protection – IP

The degrees of protection against ingress of foreign bodies and liquids are indicated by the first two characteristic numerals as detailed in tables 1 and 2. For switch and control gear the classification is recognised internationally and is described in detail in BS EN 60529.

First number

Protection against solid foreign objects IP	Requirements	Meaning protection of persons against access to hazardous parts with:
0	No protection	non-protected
1	Full penetration of 50mm diameter sphere not allowed. Contact with hazardous parts not permitted	back of hand
2	Full penetration of 12.5mm diameter sphere not allowed The jointed test finger shall have adequate clearance from hazardous parts	finger
3	The access probe of 2.5mm diameter shall not penetrate	tool
4	The access probe of 1.0mm diameter shall not penetrate	wire
5	Limited ingress of dust permitted (no harmful deposit)	wire
6	Totally protected against ingress of dust	wire

Second number

Protection against harmful ingress of water IP	Requirements	Meaning protection from water
0	No protection.	non-protected
1	Protected against vertically falling drops of water – limited ingress permitted	vertically dripping
2	Protected against vertically falling drops of water with enclosure tilted 15° from the vertical – limited ingress permitted	dripping up to 15° from the vertical
3	Protected against sprays to 60° from the vertical – limited ingress permitted	limited spraying
4	Protected against water splashed from all directions – limited ingress permitted	splashing from all directions
5	Protected against low pressure jets of water from all directions – limited ingress permitted	hosing jets from all directions
6	Protected against strong jets of water – limited ingress permitted	strong hosing jets from all directions.
7	Protected against the effects of immersion between 15cm and 1m	temporary immersion
8	Protected against long periods of immersion under pressure	continuous immersion

Additional letter

(Optional) IP	Requirements	Meaning protection of persons against access to hazardous parts with:
A for use with 0	Penetration of 50mm diameter sphere up to guard face must not contact hazardous parts.	back of hand
B for use with 0 & 1	Test finger penetration to a maximum of 80mm must not contact hazardous parts.	finger
C for use with 1 & 2	Wire of 2.5mm diameter x 100mm long must not contact hazardous parts when spherical stop face is partially entered.	tool
D for use with 1, 2 & 3	Wire of 1.0mm diameter x 100mm long must not contact hazardous parts when spherical stop face is partially entered.	wire

Note: limited penetration allowed with all four additional letters.

131669....40
158053....40
158056....40
167375....58
167376....59
167377....58
167378....58
167379....56
167380....57
167381....56
167382....56
167383....56
167384....60
167385....60
167386....60
167387....60
167389....55
167390....55
167391....55
167392....55
167398....55
169584....39, 50
169585....39, 50
169586....39, 50
169587....39, 50
169588....39, 50
169589....39, 50
169590....39, 50
169591....39, 50
169592....39, 50
169593....39, 50
169594....39,50
169598....39, 50
169599....39, 50
169600....39, 50
169601....39, 50
169602....39, 50
169603....39, 50
169604....39, 50
169605....39, 50
169606....39, 50
169607....39, 50
169608....39,50
169609....39, 50
169610....39, 50
169611....39, 50
169612....39, 50
169613....39, 50
169614....39, 50
169618....39, 50
169619....39, 50
169620....39, 50
169621....39, 50
169636....39, 50
169637....39, 50
169638....39, 50
169639....39, 50
169640....39, 50
169641....39, 50
169642....39, 50
169643....39, 50
169644....39, 50
169645....39, 50
169646....39, 50
169647....39, 50
169648....39, 50
169649....39, 50
169650....39, 50
169651....39, 50
169652....39, 50
169670....39, 50
169671....39, 50
259471....67, 71, 75, 79, 83
259499....75, 79, 83
259744....67, 71, 75, 79, 83
259763....67, 71, 75, 79, 83
260199....67, 71, 75, 79, 83
260201....67, 71, 75, 79, 83
1 SCHF....112
100 SCHF....112
1000MEB....101
1000SJ11....108
1004R....108
1004RL....108
1004XTNC....103
1006XTNC....103
1008XTNC....103
100AXD2....100
100AXTN2....100
100CMFB....112
100CMFC....112
100JCS82....111
100JCS92....111
100KXDC2F....100
100KXSC2F....100
100KXTNC2F....100
100MBDEBSP....101
100MFA....112
100MFB....112
100MFC....112
100MFLK....103, 112
100SD5....106
100SD5M125....106
100SD5M160....106
100SD5M200....106
100SF5....107
100SF5M125....107
100SF5M160....107
100SF5M200....107
100SO....106
100SOM125....106
100SOM160....106
101GNC....94
102GCEBSP....97
103GNC....94
103GNL....94
104GC....94
10LS....110
10SA2....106
10SB3....106
10SE3....107
10SF3....107
10SN2....108
10SS....110
11 BBMS....99
1250SJ11....108
125AXTN2....100
125JCS82....111
125JCS92....111
125KXTNC2F....100
125SD6....107
125SF6....107
125SO....106
142 BBC....98
143 BBC....98
144 BBC....98
146 BBC....98
151GNC....94
153GNC....94
154GC....94
154R....108
15AXD2....100
15AXTN2....100
15KXDC2F....100
15KXSC2F....100
15KXTNC2F....100
160JCS82....111
160JCS92....111
160SD6....107
160SF6....107
160SO....106
16LS....110
16SA2....106
16SB3....106
16SE3....107
16SF3....107
16SN2....108
16SP....108
16SS....110
1CLX....103
1PCB....95
2 BBCL....99
2 SCHF....112
200 FSCS....98
2004XTNC....103
200CMFB....112
200JCS82....111
200JCS92....111
200SD6....107
200SD6M250....107
200SD6M315....107
200SF6....107
200SF6M250....107
200SF6M315....107
200SO....106
201GNC....94
202GCEBSP....97
203GNC....94
203GNL....94
204GC....94
204R....108
204XSNC....103
204XTNC....103
206XSNC....103
206XTNC....103
207136-GV....102
207149-GV....102
207151-GV....102
207153-GV....102
207161-GV....102
207191-GV....102
207202-GV....102
207210-GV....102
207212-GV....102
207230-GV....102
207246-GV....102
207248-GV....102
207348-GV....102
207349-GV....102
207350-GV....102
208XSNC....103
208XTNC....103
20LS....110
20MFA....112
20MFB....112
20MFC....112
20SA2....106
20SA2M25....106
20SA2M32....106
20SB3....106
20SE3....107
20SF3....107
20SN2....108
20SN2M25....108
20SN2M32....108
20SP....108
20SS....110
21 BBMS....99
2100AXEBSP....101
212XSNC....103
226902-GV....102
227860-GV....102
228ALCDP....119
228ALCDPR....119
228ALCFP....119
228ALCFPR....119
228ALCSPN....119
228ALCSPNR....119
230AXEBSP....101
230KXEBSP....101
242 BBC....98
243 BBC....98
244 BBC....98
246 BBC....98

Indices

Eaton list number index

248ALCFP 119
250JCS82 111
250JCS92 111
250SF7 107
250SG7 107
25LS 110
25SA2 106
25SB3 106
25SE3 107
25SF3 107
25SN2 108
25SP 108
25SS 110
60AXEBSP 101
260KXEBSP 101
28ADS1X 116
28ADS2X 116
28ADSA1X 116
28ADSA2X 116
28ADSM1X 116
28ARD1X 116
28ARD2X 116
28SDA2X18 117
28SDA3X25 117
2LS 110
2PCB 95
2SA2 106
2SB3 106
2SE3 107
2SF3 107
2SN2 108
2SS 110
3 BBCL 99
3 SCHF 112
303GNC 94
304GC 94
304R 108
304RL 108
304XSNC 103
304XTNC 103
306XSNC 103
306XTNC 103
308XSNC 103
308XTNC 103
30AXD2 100
30AXTN2 100
30KXDC2F 100
30KXSC2F 100
30KXTNC2F 100
31 BBMS 99
310XTNC 103
312XSNC 103
312XTNC 103
315JCS82 111
315SF7 107
315SF7M400 107
315SG7 107
32CFF 113
32CFFW 113
32CMFB 112
32LS 110
32MFA 112
32MFB 112
32MFD 113
32SA2 106
32SA2M40 106
32SA2M50 106
32SA2M63 106
32SB3 106
32SB3M40 106
32SB3M50 106
32SB3M63 106
32SD5 106
32SE3 107
32SF3 107
32SN2 108
32SN2M40 108
32SN2M50 108
32SN2M63 108
32SP 108
32SS 110
355JCS82 111
355JCS92 111
355SF8 108
355SH8 108
35SB4 106
3PCB 95
4 BBCL 99
400 FSCS 98
400JCS82 111
400JCS92 111
400SF8 108
400SF8M500 108
400SH8 108
402GCEBSP 97
403GNC 94
403GNL 94
404GC 94
404R 108
405 APL 96
406 APL 96
40SB4 106
40SD5 106
40SE4 107
40SF4 107
40SP 108
41 BBMS 99
428ALCDP 119
428ALCDPR 119
428ALCFP 119
428ALCFPR 119
428ALCSPN 119
428ALCSPNR 119
442 BBC 98
443 BBC 98
444 BBC 98
446 BBC 98
448ALCFP 119
450JCS92 111
450SH9 108
450SY9 108
454R 108
48ADS1X 116
48ADS2X 116
48ADSA1X 116
48ADSA2X 116
48ADSM1X 116
48ARD1X 116
48ARD2X 116
48SDA2X18 117
48SDA3X25 117
4LS 110
4PCB 95
4SA2 106
4SB3 106
4SE3 107
4SF3 107
4SN2 108
4SS 110
5 BBCL 99
50 CSB 95
50 CSBA 95
500JCS92 111
500SH9 108
500SY9 108
503GNC 94
504GC 94
504R 108
505 APL 96
506 APL 96
507 APL 96
509 APL 96
50CSBA 95
50SB4 106
50SD5 106
50SE4 107
50SF4 107
50SP 108
51 BBMS 99
560JCS92 111
560SH9 108
5PCB 95
6 BBCL 99
6 SCHF 112
60 CSB 95
60 CSBA 95
600MEB 101
602XTNC 103
603GNC 94
603GNL 94
604GC 94
604R 108
604RL 108
604XTNC 103
606XTNC 103
608XTNC 103
60AXD2 100
60AXTN2 100
60CSBA 95
60KXDC2F 100
60KXSC2F 100
60KXTNC2F 100
61 BBMS 99
61GNC 94
630JCS92 111
630SH9 108
630SY9 108
637 APL 96
639 APL 96
63CFF 113
63CFFW 113
63CMFB 112
63GNC 94
63GNL 94
63JCS82 111
63JCS92 111
63MFA 112
63MFB 112
63MFC 112
63MFD 113
63SB4 106
63SB4M100 106
63SB4M80 106
63SD5 106
63SE4 107
63SE4M100 107
63SE4M80 107
63SF4 107
63SF4M100 107
63SF4M80 107
63SP 108
643 BBC 98
644 BBC 98
646 BBC 98
64GC 94
6LS 110
6SA2 106
6SB3 106
6SE3 107
6SF3 107
6SN2 108
6SS 110
70CSB 95
70CSBA 95
710JCS92 111
710SH10 108
710SY10 108
757 APL 96
759 APL 96
800 FSCS 98
800JCS92 111
800SH10 108
800SY10 108
802GCC 96

803GNC....94
803GNL....94
804GC....94
804R....108
804RL....108
80JCS82....111
80JCS92....111
80SD5....106
80SF5....107
80SO....106
81 BBL....98
82 BBSK....99
843 BBC....98
844 BBC....98
846 BBC....98
8TT104....117
8TT104SD....117
8TT87....117
8TT88....117
8TT89....117
8TT90....117
8TT90SD....117
8TT91....117
8TT91SD....117
8TT92....117
8TT92SD....117
8TT93....117
8TT93SD....117
8TT94....117
8TT94SD....117
8TT98....117
8TT98SD....117
90 CSB....95
90 CSBA....95
90CSBA....96
9LD....103
ASALMSN....51
ASAUXSN....51
ASPDL....34, 40, 51
ASPDL27....40, 51
ASSNTSN110....51
ASSNTSN415....51
ASUVRSC230....51
CR2002230....61
CR2002230A....61
CR2011230....61
CR2011230A....61
CR2020230....61
CR2020230A....61
CR2504230....61
CR2504230A....61
CR2522230....61
CR2522230A....61
CR2530230....61
CR2530230A....61
CR2540230....61
CR2540230A....61
CR4002230....61
CR4020230....61
CR4030230....61
CR4040230....61
CR6320230....62
CR6340230....62
CRA611....62
CRA620....62
CRM2020230A....62
CRM2540230A....62
CV1109SP....101
EAM10....32
EAM1002H....48
EAM1002L....48
EAM1002M....48
EAM1004H....48
EAM1004L....48
EAM1004LT....48
EAM1004M....48
EAM12M....32
EAM12MB....32
EAM13....32
EAM16....32
EAM162H....48
EAM162V....48
EAM252H....48
EAM252L....48
EAM252M....48
EAM4....32
EAM402H....48
EAM402L....48
EAM402M....48
EAM404H....48
EAM404L....48
EAM404M....48
EAM632H....48
EAM632M....48
EAM634H....48
EAM634L....48
EAM634M....48
EAM7....32
EAM802H....48
EAM802L....48
EAM802M....48
EAM804H....48
EAM804L....48
EAM804M....48
EAM9M....32
EAM9MB....32
EAMBT1002....32, 42
EAMCK....34
EAME11....34
EAME5....34
EAMMP65....32
EAMP10....42
EAMP13....42
EAMP16....42
EAMP4....42
EAMP7....42
EAMS100HE....32, 42
EAMS100LE....32, 42
EAMS100ME....32, 42
EAMS1251N....32, 42
EAMSL66M....32
EAMSL66MB....32
EAMSL93M....32
EAMSL93MB....32
EBK105SP....97
EBK110SP....97
EBK113SP....97
EBLB1....40
EBLB2....40
EBM121....35
EBM121D....35
EBM122....35
EBM122H....35
EBM161....35
EBM182....35
EBM182H....35
EBM22H....35
EBM242....35
EBM242H....35
EBM41....35
EBM61....35
EBM62H....35
EBM81....35
EBM82H....35
EBMBT2503....35, 36, 42, 43
EBMCC1253....35
EBMGP4....40
EBMMB160....36, 43
EBMMB200....36, 43
EBMMB250....36, 43
EBMMPCT250....36
EBMMPCT250M....36
EBMMPCT250MID....36
EBMMPDC120....36
EBMMPSL125....36
EBMMPSL125M....36
EBMMPSL250....36
EBMMPSL250M....36
EBMNE8....40
EBMP121....42
EBMP122....42
EBMP182....42
EBMP242....42
EBMP41....42
EBMP61....42
EBMP81....42
EBMR100....35, 42
EBMR30....35, 42
EBMR300....35, 42
EBMR300T....35, 42
EBMS1251N....35, 42
EBMS1253....35, 42
EBMS1253N....35, 42
EBMS25....36, 43
EBMS2503....36
EBMSL1082MPMB....36
EBMSL14102MPMB....36
EBMSL642MPMB....36
EBMSL862MPMB....36
EBMTK....40
EBMXDC15....41
EBMXDC18....41
EBMXDC30....41
EBMXDC45....41
EBMXDC6....41
EBMXDC9....41
EBMXDCG15....41
EBMXE15....41
EBMXPC1....40
EBMXPC2....40
EM3SSK1T2....32
EM3SSK3T12....36
EM3SSK3T2....36
EM96BP....69, 73, 77, 81, 85
EMABP....34, 40, 41
EMBH101....33, 37, 46
EMBH101N....46
EMBH102....33, 37, 46
EMBH102N....46
EMBH104....33, 37, 46
EMBH104N....46
EMBH106....33, 37, 46
EMBH106N....46
EMBH106R100C....49
EMBH106R10C....49
EMBH106R30C....33, 38, 49
EMBH108....33, 37, 46
EMBH108N....46
EMBH110....33, 37, 46
EMBH110N....46
EMBH110R100C....49
EMBH110R10C....49
EMBH110R30C....33, 38, 49
EMBH113....33, 37, 46
EMBH113N....46
EMBH116....33, 37, 46
EMBH116N....46
EMBH116R100C....49
EMBH116R10C....49
EMBH116R30C....33, 38, 49
EMBH120....33, 37, 46
EMBH120N....46
EMBH120R100C....49
EMBH120R10C....49
EMBH120R30C....33, 38, 49
EMBH125....33, 37, 46
EMBH125N....46
EMBH132....33, 37, 46
EMBH132N....46
EMBH132R100C....49
EMBH132R10C....49
EMBH132R30C....33, 38, 49
EMBH140....33, 37, 46
EMBH140N....46

Indices

Eaton list number index

EMBH140R30C....33, 38, 49
EMBH145R30C....33, 38, 49
EMBH150....33, 37, 46
EMBH150N....46
EMBH163....33, 37, 46
EMBH163N....46
EMBH201....46
EMBH202....46
EMBH204....46
EMBH206....46
EMBH208....46
EMBH210....46
EMBH213....46
EMBH216....46
EMBH220....46
EMBH225....46
EMBH232....46
EMBH240....46
EMBH250....46
EMBH263....46
EMBH301....37, 47
EMBH302....37, 47
EMBH304....37, 47
EMBH306....37, 47
EMBH308....37, 47
EMBH310....37, 47
EMBH313....37, 47
EMBH316....37, 47
EMBH320....37, 47
EMBH325....37, 47
EMBH332....37, 47
EMBH340....37, 47
EMBH350....37, 47
EMBH363....37, 47
EMBH401....47
EMBH402....47
EMBH404....47
EMBH406....47
EMBH408....47
EMBH410....47
EMBH413....47
EMBH416....47
EMBH420....47
EMBH425....47
EMBH432....47
EMBH440....47
EMBH450....47
EMBH463....47
EMBP....34, 40
EMBPH....40
EMBS1100....37, 47
EMBS1125....37, 47
EMBS120....37, 47
EMBS132....37, 47
EMBS140....37, 47
EMBS150....37, 47
EMBS163....37, 47
EMBS180....37, 47
EMBS3100....38, 47
EMBS3125....38, 47
EMBS320....38, 47
EMBS332....38, 47
EMBS340....38, 47
EMBS350....38, 47
EMBS363....38, 47
EMBS380....38, 47
EMCH101....33, 37, 46
EMCH101N....46
EMCH102....33, 37, 46
EMCH102N....46
EMCH104....33, 37, 46
EMCH104N....46
EMCH106....33, 37, 46
EMCH106N....46
EMCH106R100C....49
EMCH106R10C....49
EMCH106R30C....33, 38, 49
EMCH108....33, 37, 46
EMCH108N....46
EMCH110....33, 37, 46
EMCH110N....46
EMCH110R100C....49
EMCH110R10C....49
EMCH110R30C....33, 38, 49
EMCH113....33, 37, 46
EMCH113N....46
EMCH116....33, 37, 46
EMCH116N....46
EMCH116R100C....49
EMCH116R10C....49
EMCH116R30C....33, 38, 49
EMCH120....33, 37, 46
EMCH120N....46
EMCH120R100C....49
EMCH120R10C....49
EMCH120R30C....33, 38, 49
EMCH125....33, 37, 46
EMCH125N....46
EMCH125R30C....33, 38, 49
EMCH132....33, 37, 46
EMCH132N....46
EMCH132R100C....49
EMCH132R10C....49
EMCH132R30C....33, 38, 49
EMCH140....33, 37, 46
EMCH140N....46
EMCH140R30C....33, 38, 49
EMCH145R30C....33, 38, 49
EMCH150....33, 37, 46
EMCH150N....46
EMCH163....33, 37, 46
EMCH163N....46
EMCH201....46
EMCH202....46
EMCH204....46
EMCH206....46
EMCH208....46
EMCH210....46
EMCH213....46
EMCH216....46
EMCH220....46
EMCH225....46
EMCH232....46
EMCH240....46
EMCH250....46
EMCH263....46
EMCH301....37, 47
EMCH302....37, 47
EMCH304....37, 47
EMCH306....37, 47
EMCH308....37, 47
EMCH310....37, 47
EMCH313....37, 47
EMCH316....37, 47
EMCH320....37, 47
EMCH325....37, 47
EMCH332....37, 47
EMCH340....37, 47
EMCH350....37, 47
EMCH363....37, 47
EMCH401....47
EMCH402....47
EMCH404....47
EMCH406....47
EMCH408....47
EMCH410....47
EMCH413....47
EMCH416....47
EMCH420....47
EMCH425....47
EMCH432....47
EMCH440....47
EMCH450....47
EMCH463....47
EMCS1100....37, 47
EMCS1125....37, 47
EMCS120....37, 47
EMCS132....37, 47
EMCS140....37, 47
EMCS150....37, 47
EMCS163....37, 47
EMCS180....37, 47
EMCS3100....38, 47
EMCS3125....38, 47
EMCS320....38, 47
EMCS332....38, 47
EMCS340....38, 47
EMCS350....38, 47
EMCS363....38, 47
EMCS380....38, 47
EMDH101....33, 37, 46
EMDH101N....46
EMDH102....33, 37, 46
EMDH102N....46
EMDH104....33, 37, 46
EMDH104N....46
EMDH106....33, 37, 46
EMDH106N....46
EMDH108....33, 37, 46
EMDH108N....46
EMDH110....33, 37, 46
EMDH110N....46
EMDH113....33, 37, 46
EMDH113N....46
EMDH116....33, 37, 46
EMDH116N....46
EMDH120....33, 37, 46
EMDH120N....46
EMDH125....33, 37, 46
EMDH125N....46
EMDH132....33, 37, 46
EMDH132N....46
EMDH140....33, 37, 46
EMDH140N....46
EMDH150....33, 37, 46
EMDH150N....46
EMDH163....33, 37, 46
EMDH163N....46
EMDH201....46
EMDH202....46
EMDH204....46
EMDH206....46
EMDH208....46
EMDH210....46
EMDH213....46
EMDH216....46
EMDH220....46
EMDH225....46
EMDH232....46
EMDH240....46
EMDH250....46
EMDH263....46
EMDH301....37, 47
EMDH302....37, 47
EMDH304....37, 47
EMDH306....37, 47
EMDH308....37, 47
EMDH310....37, 47
EMDH313....37, 47
EMDH316....37, 47
EMDH320....37, 47
EMDH325....37, 47
EMDH332....37, 47
EMDH340....37, 47
EMDH350....37, 47
EMDH363....37, 47
EMDH401....47
EMDH402....47
EMDH404....47
EMDH406....47
EMDH408....47
EMDH410....47
EMDH413....47
EMDH416....47

EMDH420 47
EMDH425 47
EMDH432 47
EMDH440 47
EMDH450 47
EMDH463 47
EMDL 34, 40, 41
EMDS1100 ..... 37, 47
EMDS120 ..... 37, 47
EMDS132 ..... 37, 47
EMDS140 ..... 37, 47
EMDS150 ..... 37, 47
EMDS163 ..... 37, 47
EMDS180 ..... 37, 47
EMDS3100 ..... 38, 47
EMDS320 ..... 38, 47
EMDS332 ..... 38, 47
EMDS340 ..... 38, 47
EMDS350 ..... 38, 47
EMDS363 ..... 38, 47
EMDS380 ..... 38, 47
EMGP142 40
EMPL 34, 40, 41
EPBCTMT160 ..... 69, 73, 77, 81, 85
EPBCTMT250 ..... 73, 77, 81, 85
EPBCTMT3P 69, 73, 77, 81, 85
EPBCTMT400 85
EPBDLK1 ..... 71, 75
EPBKEL250 69
EPBKEL400 ..... 73, 77
EPBKEL800 ..... 81, 85
EPBKN1253 67
EPBKN1253M 67
EPBKN1254 67
EPBKN1254M 67
EPBKN125L 67
EPBKN125LM 67
EPBKN2403 ..... 71, 75
EPBKN2403M 71, 75
EPBKN2404 ..... 71, 75
EPBKN2404M 71, 75
EPBKN240L 71, 75
EPBKN240LM 71, 75
EPBKN2633 78
EPBKN2633M 78
EPBKN2634 78
EPBKN2634M 78
EPBKN263L 78
EPBKN263LM 78
EPBKN3803 82
EPBKN3803M 82
EPBKN3804 82
EPBKN3804M 82
EPBKTFSLW 78, 82
EPBKTFSN2 67
EPBKTFSN3 71
EPBMETER1 ..... 68, 69, 72, 73, 76, 77, 80, 81, 84, 85
EPBN11225 66
EPBN11225SXB 67
EPBN11225SXM 69
EPBN11240 70
EPBN1425 66
EPBN1425SXB 67
EPBN1425SXM 69
EPBN1625 66
EPBN1625SXB 67
EPBN1625SXM 69
EPBN1640 70
EPBN1825 66
EPBN1825SXB 67
EPBN1825SXM 69
EPBN1BP1 ..... 67, 71, 75, 79, 83
EPBN1CX250 68
EPBN1EX250 68
EPBN1EX250M 68
EPBN1EXDIN 68
EPBN1SPD123 ..... 69, 73, 77, 81, 85
EPBN1SPD1234 ..... 69, 73, 77, 81, 85
EPBN1SUPM 68, 69
EPBN21240 74
EPBN21240SXB 76
EPBN21240SXM 73, 77
EPBN21263 78
EPBN21263SXB 79, 84
EPBN21263SXM 81, 85
EPBN21840 74
EPBN21840SXB 76
EPBN21840SXM 77
EPBN21863 78
EPBN21863SXB 79, 84
EPBN21863SXM 81, 85
EPBN2640 74
EPBN2640SXB 71, 76
EPBN2640SXM 73, 77
EPBN2863 78
EPBN2BP3 ..... 75, 79, 83
EPBN2CX250 ..... 72, 76, 80, 84
EPBN2EX250 ..... 72, 76
EPBN2EX250M 72, 76
EPBN2EXDIN 72, 76, 84
EPBN31280 82
EPBN3880 82
EPBN3BP3 83
EPBN3EX250 ..... 80, 84
EPBN3EX250M 80, 84
EPBN3EXDIN 80
EPBN3LKKTM 69, 73, 77, 81, 85
EPBN3LKRJ45 ..... 69, 73, 77, 81, 85
EPBN3SUPM 72, 73, 76, 77, 80, 81, 84, 85
EPBPN11225 91
EPBPN11240 91
EPBPN1425 91
EPBPN1625 91
EPBPN1640 91
EPBPN1825 91
EPBPN21240 91
EPBPN21263 91
EPBPN21840 91
EPBPN21863 91
EPBPN2640 91
EPBPN2863 91
EPBPN31280 91
EPBPN3880 91
EPBSXBCTMT 69, 73, 77, 81, 85
ETM2209SP 104
ETM2210SP 104
ETM2211SP 104
ETM2212SP 104
ETM2223SP 104
ETM2224SP 104
ETM2225SP 104
ETM2226SP 104
M21MSSU 118
M21MSU 118
M21MSU2K 118
M21MSU2SK 118
M21MSULK 118
M21MSUML 118
M22MSU 118
M22MSUL 118
M23MSUL 118
MC100M2DT 123
MC100M2MDT 123
MC100M2SDT 123
MC100M4 122
MC100M4M 122
MC100M4S 122
MC125M3DT 123
MC125M3MDT 123
MC125M3SDT 123
MC125M5 122
MC125M5M 122
MC125M5S 122
MC150M3 122
MC150M3DT 123
MC150M3M 122
MC150M3MDT 123
MC150M3S 122
MC150M3SDT 123
MC175M4 122
MC175M4DT 123
MC175M4M 122
MC175M4MDT 123
MC175M4S 122
MC175M4SDT 123
MC200M4 122
MC200M4DT 123
MC200M4M 122
MC200M4MDT 123
MC200M4S 122
MC200M4SDT 123
MC225M5 122
MC225M5DT 123
MC225M5M 122
MC225M5MDT 123
MC225M5S 122
MC225M5SDT 123
MC250M5 122
MC250M5DT 123
MC250M5M 122
MC250M5MDT 123
MC250M5S 122
MC250M5SDT 123
MC25M1 122
MC25M1M 122
MC25M1S 122
MC275M6 122
MC275M6DT 123
MC275M6M 122
MC275M6MDT 123
MC275M6S 122
MC275M6SDT 123
MC300M6 122
MC300M6DT 123
MC300M6M 122
MC300M6MDT 123
MC300M6S 122
MC300M6SDT 123
MC325M7DT 123
MC325M7MDT 123
MC325M7SDT 123
MC350M7DT 123
MC350M7MDT 123
MC350M7SDT 123
MC375M8DT 123
MC375M8MDT 123
MC375M8SDT 123
MC400M8DT 123
MC400M8MDT 123
MC400M8SDT 123
MC425M9DT 123
MC425M9MDT 123
MC450M9DT 123
MC450M9MDT 123
MC475M10DT 123
MC475M10MDT 123
MC500M10DT 123
MC500M10MDT 123
MC50M2 122
MC50M2M 122
MC50M2S 122
MC525M11DT 123
MC525M11MDT 123
MC550M11DT 123
MC550M11MDT 123
MC575M12DT 123
MC575M12MDT 123
MC600M12DT 123
MC600M12MDT 123
MC75M3 122
MC75M3M 122
MC75M3S 122
N2-250KCO 66
N2-4-250KCO 66

Indices

Eaton list number index

N3-400 ... 70
N3-4-400 ... 70
NLW-4-630 ... 78
NLW-4-800 ... 82
NLW-630 ... 78
NLW-800 ... 82
NZM1-1-XKSA ... 67, 71, 75, 79, 83
NZM1-XKSA ... 67, 71, 75, 79, 83
NZM2-XKSA ... 75, 79, 83
NZMB1-1-AF100 ... 67, 71, 75, 79, 83
NZMB1-1-AF125 ... 67, 71, 75, 79, 83
NZMB1-1-AF16 ... 67, 71, 75, 79, 83
NZMB1-1-AF20 ... 67, 71, 75, 79, 83
NZMB1-1-AF32 ... 67, 71, 75, 79, 83
NZMB1-1-AF40 ... 67, 71, 75, 79, 83
NZMB1-1-AF50 ... 67, 71, 75, 79, 83
NZMB1-1-AF63 ... 67, 71, 75, 79, 83
NZMB1-1-AF80 ... 67, 71, 75, 79, 83
NZMB1-A100 ... 67, 71, 75, 79, 83
NZMB1-A125 ... 67, 71, 75, 79, 83
NZMB1-A160 ... 67, 71, 75, 79, 83
NZMB1-A20 ... 67, 71, 75, 79, 83
NZMB1-A32 ... 67, 71, 75, 79, 83
NZMB1-A40 ... 67, 71, 75, 79, 83
NZMB1-A50 ... 67, 71, 75, 79, 83
NZMB1-A63 ... 67, 71, 75, 79, 83
NZMB1-A80 ... 67, 71, 75, 79, 83
NZMC1-A100 ... 75, 79, 83
NZMC1-A125 ... 75, 79, 83
NZMC1-A160 ... 75, 79, 83
NZMC1-A20 ... 75, 79, 83
NZMC1-A32 ... 75, 79, 83
NZMC1-A40 ... 75, 79, 83
NZMC1-A50 ... 75, 79, 83
NZMC1-A63 ... 75, 79, 83
NZMC1-A80 ... 75, 79, 83
NZMC2-4-A160KCO ... 66
NZMC2-4-A200KCO ... 66
NZMC2-4-A250KCO ... 66
NZMC2-A125-BT ... 75, 79, 83
NZMC2-A160-BT ... 75, 79, 83
NZMC2-A160KCO ... 66
NZMC2-A200-BT ... 75, 79, 83
NZMC2-A200KCO ... 66
NZMC2-A250-BT ... 75, 79, 83
NZMC2-A250KCO ... 66
NZMLW-4-A630 ... 78
NZMLW-4-A800 ... 82
NZMLW-A630 ... 78
NZMLW-A800 ... 82
NZMN2-4-A160KCO ... 66
NZMN2-4-A200KCO ... 66
NZMN2-4-A250KCO ... 66
NZMN2-A125-BT ... 75, 79, 83
NZMN2-A160-BT ... 75, 79, 83
NZMN2-A160KCO ... 66
NZMN2-A200-BT ... 75, 79, 83
NZMN2-A200KCO ... 66
NZMN2-A250-BT ... 75, 79, 83
NZMN2-A250KCO ... 66
NZMN3-4-A250 ... 70, 74
NZMN3-4-A320 ... 70, 74
NZMN3-4-A400 ... 70, 74
NZMN3-A250 ... 70, 74
NZMN3-A250BT ... 83
NZMN3-A320 ... 70, 74
NZMN3-A320BT ... 83
NZMN3-A400 ... 70, 74
NZMN3-A400BT ... 83
OBK103SP ... 97
OLV725SP ... 101
OLV726SP ... 101
OLV727SP ... 101
OLV728SP ... 101
PD1 ... 34, 40, 41, 97, 103
PD2 ... 34, 40, 51
PD4 ... 101
PFR-003 ... 63
PFR-03 ... 63
PFR-5 ... 63
PFR-W-105 ... 63
PFR-W-140 ... 63
PFR-W-20 ... 63
PFR-W-210 ... 63
PFR-W-30 ... 63
PFR-W-35 ... 63
PFR-W-70 ... 63
SH265SP ... 101
SH754SP ... 101
SNT4LP11K ... 79, 83
TR-G3/8 ... 63
UVH4LP11K ... 79, 83
WA1212 ... 103

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Printed in UK
Form No. PG01414001U
March 2015

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