
L1
L2
L3

LOADSTAR

MCBS AND DISTRIBUTION BOARDS

Devices

- 6kA and 10kA Ranges
- 6A to 63A
- Single, Double and Triple Pole
- Type B, C & D
- Single and Double module RCBOs
- 35mm^2 Cable Terminals
- BS EN 60898

System

- 125A and 250A TP Boards
- Incoming Switch Disconnectors up to 250A
  MCCBs up to 200A
  RCCBs up to 100A
- IP31 and IP66 Metal Enclosures for TP Boards
- IP31 Metal and IP65 Insulated Enclosures for SP Boards
- DIN Rail/Service Centres available 'Built in' or 'Add on'
- Paint Finish, Epoxy Powder, Light Grey RAL 7035
- Custom Built 'Specials' Service


18LS08

LOADSTAR STANDARD 'L' BOARD 125A MAX INCOMER

No of Ways	Surface	Flush
4	**18LS04**	**18LF04**
6	**18LS06**	**18LF06**
8	**18LS08**	**18LF08**
12	**18LS12**	**18LF12**
16	**18LS16**	**18LF16**
20	**18LS20**	**18LF20**
24	**18LS24**	**18LF24**

- Incoming options - **order separately**:
  125A Switch Disconnector TP/4P - 50mm²
  100A RCCB 4P - 50mm²
  Direct Cable - 50/70mm²
- Busbars rated 200A
- Full compliment of Neutral and Earth terminals plus spares:
  Incoming maximum 70mm²
  Outgoing maximum 25mm²
- Facility included to allow fixture of Double Earth bars - High Integrity Earth to regulation 607 section 543
- Clean Earth kit available
- All boards supplied as standard with hinged outer door and catch - lock extra - and removable top/bottom gland plates


18LF08

ADD-ON 12 WAY LOADSTAR 'L' BOARD

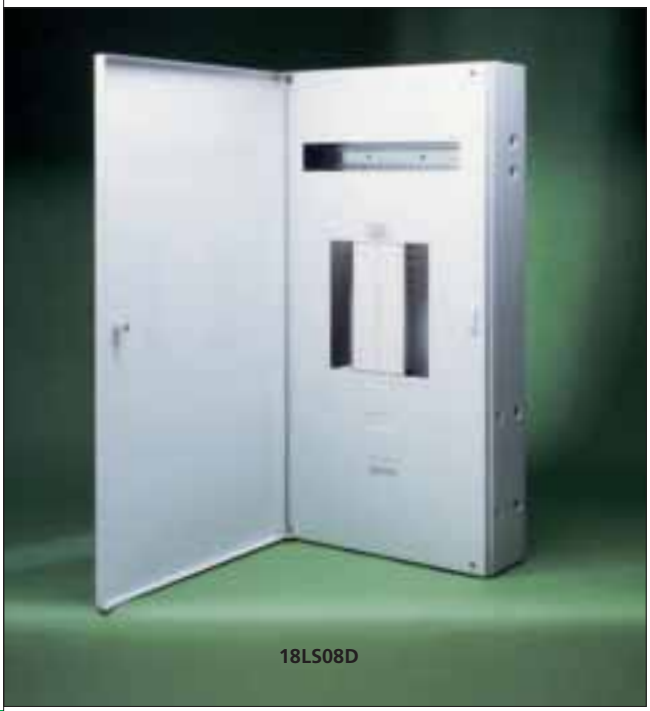
No of Ways	Surface
12	**18LS12A**
Vertical Connection Kit (Inc. conns.)	**18LK12V**

- 18LS12A 'Add-on' Board is designed to fit above 16, 20 & 24 way 'L' Boards, to create 28, 32 & 36 way TP Boards
- 18LK12V kit connects 18LS12A to 16, 20 & 24 way Boards

LOADSTAR 'L' BOARD METER PACK

An 'Add-on' Assembly, 245mm high, to be fitted below an 'L' Board, comprising Enclosure with slotted front plate and hinged door,
Digital meter, pulsed output, offering Amps, Volts and Kwh readout,
3 off current transformers, 125A with associated fuses and wiring.

	LIST No
125A CTs	**18ML125**


18LS08D

LOADSTAR BOARD 125A WITH INTEGRAL DIN RAIL

No of Ways	Surface
4	**18LS04D**
8	**18LS08D**
12	**18LS12D**
16	**18LS16D**
20	**18LS20D**

All the facilities of the Standard board above, plus:
- DIN rail to accommodate up to 18 modules of control devices - Contactor, Timer etc.
- DIN Rail easily removed to assist cabling.
- All devices - incomer, MCBs & Control equipment - behind common front plate and outer door.

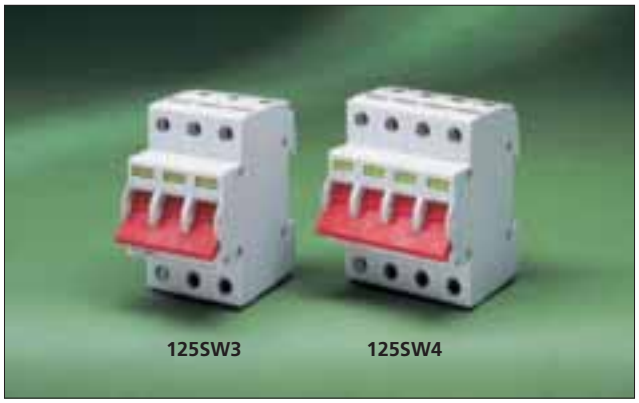
LOADSTAR IP66 125A BOARD

No of Ways	H	W	D	Surface
4	800	500	215	**IP18LS04**
6	800	500	215	**IP18LS06**
8	800	500	215	**IP18LS08**
12	1000	500	215	**IP18LS12**
16	1000	500	215	**IP18LS16**

Boards consist of IP66 steel enclosure door, with 'L' Board interior.
Incomer, kit and MCB extra as for 'L' Boards above.


18AS2


18DIN18


125SW3 125SW4


18LKD50 18R100/30/4


18LK125


18LKD70 (fitted)

DINRAIL, ROWBOARD, SERVICE CENTRES

Rowboard:

- Suitable for 'Stand-Alone' use or 'Add-On' above Standard 'L' type board.
- Each row will accommodate 18 off 18mm module wide DIN Rail mounted devices.
- Main Neutral and Earth Bars included, along with provision for additional 'Mini' Neutral and Earth bars.

No of Rows	Surface	Flush
1	**18AS1**	**18AF1**
2	**18AS2**	**18AF2**
3	**18AS3**	**18AF3**
4	**18AS4**	**18AF4**
5	**18AS5**	**18AF5**

Service Centre/DIN Rail Board:

- Suitable **only** for fixture above or below Standard 'L' Type board.
- Equipped with easily removed DIN Rail to accommodate 18 or 36, 18mm module wide DIN Rail mounted devices.

See page 114 for DIN Rail Control Devices

18 Module	**18DIN18**
36 Module (2 Rows of 18)	**18DIN36**

Cable Spreader Box	
Add on Enclosure, 243mm high, Blank front cover plate	**18SB**

LOADSTAR STANDARD 'L' BOARD: INCOMING OPTIONS

Order Device and Kit (where required) separately.

Switch Disconnector, modular (50mm²)	Device	Kit
40A TP	**40SW3**	
63A TP	**63 SW3**	None
100A TP	**100SW3**	Required
125A TP	**125SW3**	
100A DP	**100SW2**	**18LKTPSP**
125A DP	**125SW2**	**18LKTPSP**
40A 4P	**40SW4**	**18LK125**
63A 4P	**63SW4**	**18LK125**
100A 4P	**100SW4**	**18LK125**
125A 4P	**125SW4**	**18LK125**

RCCB (50mm²)		Device	Kit
40A 4P	30mA	**18R40/30/4**	**18LK125**
	100mA	**18R40/100/4**	**18LK125**
	300mA	**18R40/300/4**	**18LK125**
63A 4P	30mA	**18R63/30/4**	**18LK125**
	100mA	**18R63/100/4**	**18LK125**
	300mA	**18R63/300/4**	**18LK125**
100A 4P	30mA	**18R100/30/4**	**18LK125**
	100mA	**18R100/100/4**	**18LK125**
	300mA	**18R100/300/4**	**18LK125**
100A 2P	100mA Time Delay	**221/100TD**	**18LK125**
100A 4P	100mA Time Delay	**241/100TD**	**18LK125**

Special oversize Incoming Cable connection kit for use with TP Sw Disc above. Accomodate up to 120mm² TP Sw Disc only.	**18LKD120**

Direct Connection	Device	Kit
Incoming Cable Connection (50mm²)	**18LKD50**	None Required
Outgoing Cable Connection Kit/Shroud (50mm²) (Set of 3 Cable Clamps + Shroud)	**18LKD70**	

125A TP to SP conversion

	Device	Kit
DP Switch Disconnector (See above)	-	**18LKTPSP**
or RCCB (See above & Page 120)	-	**18LKTPSP**


18HS04
(as supplied)


18HS04
(with front plate/door fitted)


IP18LS08

LOADSTAR STANDARD 'H' BOARD 250A MAX INCOMER

No of Ways	Surface (250A)	Flush (200A)
4	**18HS04**	**18HF04**
6	**18HS06**	**18HF06**
8	**18HS08**	**18HF08**
12	**18HS12**	**18HF12**
16	**18HS16**	**18HF16**
20	**18HS20**	**18HF20**
24	**18HS24**	**18HF24**

Boards are supplied, as standard, as shown. The Front plate and door to cover the lower half of the board are supplied as part of the 'Incoming Kit' - page 127.

- Incoming options - order separately:
  200A Switch Disconnector TP - 120mm² (Cable Clamps)
  250A Switch Disconnector TP - 185mm² (Cable Sockets)
  200A MCCB TP/4P - 150mm² (Cable Clamps)
  Direct Cable - 150mm² (Cable Clamps)
- Busbars rated 250A
- Full compliment of Neutral and Earth terminals plus spares:
  Incoming maximum 120mm²
  Outgoing maximum 25mm²
- Facility included to allow fixture of Double Earth bars - High Integrity Earth to regulation 607 section 543
- Clean Earth kit available
- All boards supplied as standard with hinged outer door and catch - lock extra - and removable top/bottom gland plates

ADD-ON 12 WAY LOADSTAR 'H' BOARD

No of Ways	Surface
12	**18HS12A**
Vertical Connection Kit (Inc. conns.)	**18HK12V**

- 18HS12A 'Add-on' Board is designed to fit above 16, 20 & 24 way 'H' Boards, to create up to 28, 32 & 36 way TP Boards
- 18HK12V kit connects 18HS12A to 16, 20 & 24 way Boards

LOADSTAR 'H' BOARD METER PACK

An 'Add-on' Assembly, 245mm high, to be fitted below an 'H' Board, comprising
Enclosure with slotted front plate and hinged door,
Digital meter, pulsed output, offering Amps, Volts and Kwh readout,
3 off current transformers, 250A with associated fuses and wiring.

	LIST No
250A CTs	**18MH250**

LOADSTAR IP66 125A BOARD

No of Ways	H	W	D	Surface
4	800	500	215	**IP18LS04**
6	800	500	215	**IP18LS06**
8	800	500	215	**IP18LS08**
12	1000	500	215	**IP18LS12**
16	1000	500	215	**IP18LS16**

Boards exclude Incomers & MCBs - See Pages 125 & 129
Paint finish, shade 697 to BS 381C.

LOADSTAR IP66 200A BOARD

Please Contact Crabtree Technical Sales for Details.


18DIN18
(fitted above
'H' Board)


18HSKS


200/22B 250/22B


7PDJN3200


18HP04

DINRAIL, ROWBOARD, SERVICE CENTRES

Rowboard:

- Suitable for 'Stand-Alone' use or 'Add-On' above Standard 'H' type board.
- Each row will accept 18 off 18mm module wide DIN Rail mounted devices.
- Main Neutral and Earth Bars included, along with provision for additional 'Mini' Neutral and Earth bars.

No of Rows	Surface	Flush
1	**18AS1**	**18AF1**
2	**18AS2**	**18AF2**
3	**18AS3**	**18AF3**
4	**18AS4**	**18AF4**
5	**18AS5**	**18AF5**

Service Centre/DIN Rail Board:

- Suitable only for fixture above Standard 'H' Type board.
- Equipped with easily removed DIN Rail to accommodate 18 or 36, 18mm module wide DIN Rail mounted devices.

See page 114 for DIN Rail Control Devices

18 Module	**18DIN18**
36 Module (2 Rows of 18)	**18DIN36**

Cable Spreader Box	
Add on Enclosure, 243mm high, Blank front cover plate	**18SB**

LOADSTAR STANDARD 'H' BOARD: INCOMING OPTIONS

Order Device and Surface/Flush Kit separately.

Switch Disconnector	Device	Surface Kit
200A, TP, 120mm² max via clamps	**200/22B**	**18HSKS**
250A, TP, 185mm² max via sockets	**250/22B**	**18HSKS**
MCCB		
'J' Frame, 200A, TP, MCCB	**7PBJN3200**	**18HSKJ**
'J' Frame, 200A, TP, Sw Disc.	**7PDJ3200**	**18HSKJ**
'J' Frame, 200A, 4P, MCCB	**7PBJN3N200**	**18HSKJ**
'J' Frame, 200A, 4P, Sw Disc.	**7PDJ3N200**	**18HSKJ**
Direct Connection		
150mm² Incoming Cable - Direct	N/A	**18HSKD**

	Device	Flush Kit
200/250A, TP, Sw Disc.	As Above	**18HFKS**
200A, 'J' Frame MCCB/Sw Disc.	As Above	**18HFKJ**
150mm² Direct Cable	N/A	

'H' Board Incomer. Kits include appropriate mounting plate, connections, shrouds, Front Plate and Door, as required.

Flush Kits Alternative	
Switch Disconnector	**18HFKS**
MCCB	**18HFKJ**
Direct	**18HFKD**

PAN ASSEMBLIES 250A TP

No of TP ways	List No		List No
4	**18HP04**	16	**18HP16**
8	**18HP08**	20	**18HP20**
12	**18HP12**	24	**18HP24**

- 250A TP Busbar with half DIN Rail fixings for MCBs.
- Add Incoming Kit required to accommodate Incoming supply - see below.

Cable Connection Kits	Kit
50mm² cable, 3 Clamps & Shroud	**18LKD70**


18SN14

SP MCB DISTRIBUTION BOARDS STEEL IP31

Board supplied with 125A DP Switch Disconnector.
MCBs to be specified and ordered separately.

No of outgoing MCB Ways	Surface	Flush
5	**18SN05**	**18FN05**
8	**18SN08**	**18FN08**
11	**18SN11**	**18FN11**
14	**18SN14**	**18FN14**
19	**18SN19**	**18FN19**

- Board supplied with hinged metal door and catch. Lock extra.
- Board supplied with integral Neutral and Earth bars.
- 125A Single Pole fixed busbar with integral shield .


IP1810EL

SP MCB DISTRIBUTION BOARDS INSULATED IP65

Board supplied with DP Switch Disconnector, or 30mA DP RCD.
MCBs to be specified and ordered separately.

No of outgoing MCB Ways	Inc. Isol.	Inc. RCD
3 (125mmw) c/w 63A Isol or 63A RCD	**IP1803SW**	**IP1803EL**
7 (200mmw) c/w 100A Isol or 80A RCD	**IP1807SW**	**IP1807EL**
10 (250mmw) c/w 100A Isol or 80A RCD	**IP1810SW**	**IP1810EL**

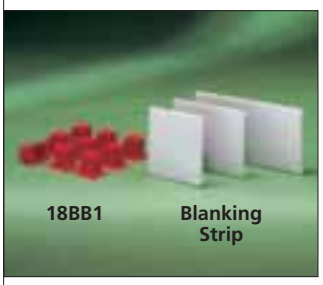
- Pre Assembled IP65 sealing membranes.
- Transparent hinged covers - sealable.
- 200mm high, 120mm deep.
- Flame/Impact resistant polystyrene, colour RAL 7035.
- Integral Neutral and Earth Bars.
- Busbar can be cut to length to suit either total number of SP Ways as MCBs only or MCBs and 18mm module wide DIN rail devices.


18GP2S


18GP4M

INDIVIDUAL MCB ENCLOSURES IP31

	Insulated	Metalclad
2 Modules wide	**18GP2S**	**18GP2M**
4 Modules wide	**18GP4S**	**18GP4M**


18BB1 Blanking Strip


CSBC CSB1

GENERAL LOADSTAR ACCESSORIES TP & SP

	List No
Cylinder Lock & Key (TP+SP Metal IP31 Boards)	**16CL**
MCB Locking device (excl. lock)	**MCBLD**
Padlock & Key for use with MCBLD	**748**
Padlockable Cylinder Lock & Key (TP Boards)	**16PL**
Clean Earth Bar Kit 'L' & 'H' Boards only. (4 to 12 way=1 kit, 16 to 24 way=2 kits).	**18CEBK**
Blanking Strip - 2 lengths each 12 modules wide	**18CB12**
Blanking Strip - 4 lengths each 3 modules wide	**18CB3**
Blanking Strip - 12 Individual 1 module wide pieces	**18CB2**
Blanking Strip - 6 Individual 1 module wide pieces	**18CB1**
Busbar cross connector insulator - pack of 9	**18BB1**
Clip In Blank SP Moulding	**CSBC**
SP MCB size Blank (shields MCB & Busbar Terminal)	**CSB1**
Cable clamp assembly (70mm²) - pack of 3	**17CC**
Spare TP DB Gland Plate	**18GP**

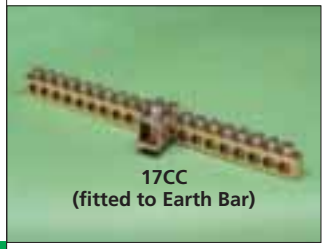

MCBLD

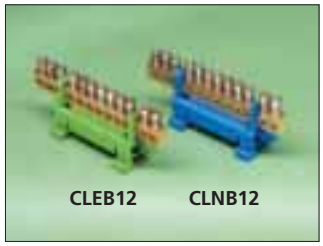

16CL fitted

ADDITIONAL EARTH BAR KITS

Additional Earth Bars to fit Standard 'L' and 'H' boards

No of Ways	List No	No of Ways	List No
4	**18EB04**	16	**18EB16**
6	**18EB06**	20	**18EB20**
8	**18EB08**	24	**18EB24**
12	**18EB12**		


17CC (fitted to Earth Bar)


CLEB12 CLNB12

Earth and Neutral bar, 10mm² cable max, for use with DIN Rail

	NEUTRAL	EARTH
7 Terminals	**CLNB07**	**CLEB07**
12 Terminals	**CLNB12**	**CLEB12**
15 Terminals	**CLNB15**	**CLEB15**

6FS06C 6FS10C 6FS32C

SINGLE POLE MCBs

RATING AMPS	6kA			10kA		
	B TYPE	CTYPE	D TYPE	B TYPE	CTYPE	D TYPE
6A	**6FS06B**	**6FS06C**	**6FS06D**	**6HS06B**	**6HS06C**	**6HS06D**
10A	**6FS10B**	**6FS10C**	**6FS10D**	**6HS10B**	**6HS10C**	**6HS10D**
16A	**6FS16B**	**6FS16C**	**6FS16D**	**6HS16B**	**6HS16C**	**6HS16D**
20A	**6FS20B**	**6FS20C**	**6FS20D**	**6HS20B**	**6HS20C**	**6HS20D**
25A	**6FS25B**	**6FS25C**	**6FS25D**	**6HS25B**	**6HS25C**	**6HS25D**
32A	**6FS32B**	**6FS32C**	**6FS32D**	**6HS32B**	**6HS32C**	**6HS32D**
40A	**6FS40B**	**6FS40C**	**6FS40D**	**6HS40B**	**6HS40C**	**6HS40D**
50A	**6FS50B**	**6FS50C**	**6FS50D**	**6HS50B**	**6HS50C**	**6HS50D**
63A	**6FS63B**	**6FS63C**	**6FS63D**	**6HS63B**	**6HS63C**	**6HS63D**

6FD32B 6FD32C

DOUBLE POLE MCBs

RATING AMPS	6kA			10kA		
	B TYPE	CTYPE	D TYPE	B TYPE	CTYPE	D TYPE
6A	**6FD06B**	**6FD06C**	**6FD06D**	**6HD06B**	**6HD06C**	**6HD06D**
10A	**6FD10B**	**6FD10C**	**6FD10D**	**6HD10B**	**6HD10C**	**6HD10D**
16A	**6FD16B**	**6FD16C**	**6FD16D**	**6HD16B**	**6HD16C**	**6HD16D**
20A	**6FD20B**	**6FD20C**	**6FD20D**	**6HD20B**	**6HD20C**	**6HD20D**
25A	**6FD25B**	**6FD25C**	**6FD25D**	**6HD25B**	**6HD25C**	**6HD25D**
32A	**6FD32B**	**6FD32C**	**6FD32D**	**6HD32B**	**6HD32C**	**6HD32D**
40A	**6FD40B**	**6FD40C**	**6FD40D**	**6HD40B**	**6HD40C**	**6HD40D**
50A	**6FD50B**	**6FD50C**	**6FD50D**	**6HD50B**	**6HD50C**	**6HD50D**
63A	**6FD63B**	**6FD63C**	**6FD63D**	**6HD63B**	**6HD63C**	**6HD63D**

6FT32B 6FT32C

TRIPLE POLE MCBs

RATING AMPS	6kA			10kA		
	B TYPE	CTYPE	D TYPE	B TYPE	CTYPE	D TYPE
6A	**6FT06B**	**6FT06C**	**6FT06D**	**6HT06B**	**6HT06C**	**6HT06D**
10A	**6FT10B**	**6FT10C**	**6FT10D**	**6HT10B**	**6HT10C**	**6HT10D**
16A	**6FT16B**	**6FT16C**	**6FT16D**	**6HT16B**	**6HT16C**	**6HT16D**
20A	**6FT20B**	**6FT20C**	**6FT20D**	**6HT20B**	**6HT20C**	**6HT20D**
25A	**6FT25B**	**6FT25C**	**6FT25D**	**6HT25B**	**6HT25C**	**6HT25D**
32A	**6FT32B**	**6FT32C**	**6FT32D**	**6HT32B**	**6HT32C**	**6HT32D**
40A	**6FT40B**	**6FT40C**	**6FT40D**	**6HT40B**	**6HT40C**	**6HT40D**
50A	**6FT50B**	**6FT50C**	**6FT50D**	**6HT50B**	**6HT50C**	**6HT50D**
63A	**6FT63B**	**6FT63C**	**6FT63D**	**6HT63B**	**6HT63C**	**6HT63D**

6FSR32/30C Single Module 6FDR32/30C Double Module

RCBOs SINGLE MODULE

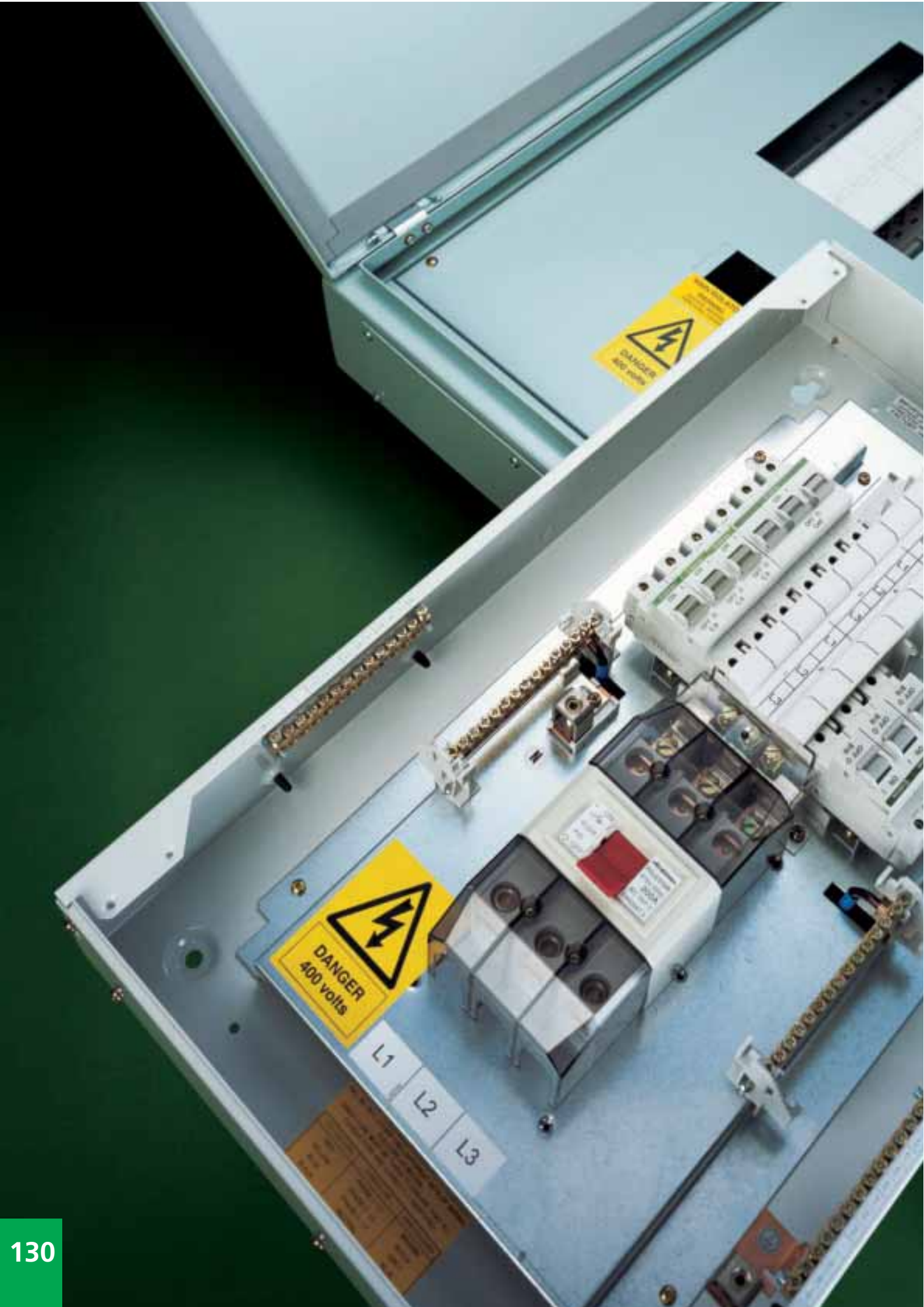
RATING	6KA	10KA
6A	**6FSR06/30C**	**6HSR06/30C**
10A	**6FSR10/30C**	**6HSR10/30C**
16A	**6FSR16/30C**	**6HSR16/30C**
20A	**6FSR20/30C**	**6HSR20/30C**
32A	**6FSR32/30C**	**6HSR32/30C**
40A	**6FSR40/30C**	**6HSR40/30C**

18mm wide, suitable for use in Loadstar Distribution Boards 30mA sensitivity, 'C' characteristic, unswitched Neutral.

RCBOs DOUBLE MODULE

RATING	6KA	10KA
6A	**6FDR06/30C**	**6HDR06/30C**
10A	**6FDR10/30C**	**6HDR10/30C**
16A	**6FDR16/30C**	**6HDR16/30C**
20A	**6FDR20/30C**	**6HDR20/30C**
32A	**6FDR32/30C**	**6HDR32/30C**
40A	**6FDR40/30C**	**6HDR40/30C**

36mm wide, NOT suitable for use in Loadstar Distribution Boards 30mA sensitivity, 'C' characteristic, Switched Neutral.


DANGER
400 volts
L1
L2
L3

POLESTAR

MCBS AND DISTRIBUTION BOARDS

- 16kA, 6A to 63A
- Single, Double and Triple Pole
- Type B, C and D
- Switched Neutral RCBO
- 25mm wide module
- BS EN 60898

System

- IP31 and IP66 Enclosures
- TP Boards rated 200A
- SP Boards rated 100A
- Paint Finish, Epoxy Powder, Light Grey RAL 7035 for standard boards and shade 697 to BS381C for IP66
- Custom Built 'Specials' Service


1806 Enclosure


1806/21A


1806/33A


1818/21A

MAIN SWITCH DISCONNECTOR

MCB ways	LIST No
6	**1806/21A**
9	**1809/21A**
13	**1813/21A**
18	**1818/21A**
26	**1826/21A**

- 100A double pole main switch control for all MCB ways.
- 100A Busbar.
- 18 and 26 way distribution boards supplied in 2 bank format.

MAIN INCOMING RCCB

MCB ways	RCCB rating	type	LIST No
6	80A 30mA	AC	**1806/33A**
9	80A 30mA	AC	**1809/33A**
13	80A 30mA	AC	**1813/33A**
6	80A 100mA	AC	**1806/31A**
9	80A 100mA	AC	**1809/31A**
13	80A 100mA	AC	**1813/31A**

- 80A double pole RCCB control for all MCB ways.
- 100A Busbar.

SINGLE RCCB SPLIT-LOAD

Total MCB ways	RCCB ways	RCCB rating	RCCB type	LIST No
11	7	80A 30mA	AC	**1811/S43A**
11	6	80A 30mA	AC	**1811/S53A**
11	4	80A 30mA	AC	**1811/S73A**
11	7	80A 100mA	AC	**1811/S41A**
11	6	80A 100mA	AC	**1811/S51A**
11	4	80A 100mA	AC	**1811/S71A**

- 100A double pole main switch control for all MCB ways.
- 100A Busbar.

DUAL RCCB SPLIT-LOAD

Total MCB ways	RCCB ways	RCCB rating	RCCB type	LIST No
8	3+5	63A 100mA & 80A 30mA	AC	**1808/S313A**
8	4+4	63A 100mA & 63A 30mA	AC	**1808/S413A**
8	5+3	80A 100mA & 63A 30mA	AC	**1808/S513A**

- 100A double pole main switch control for all MCB ways.

DIRECT CABLE CONNECTION

MCB ways	LIST No
6	**1806/1A**
9	**1809/1A**
13	**1813/1A**

- Supplied as a busbar connected unit where isolation is provided outside of board.
- Distribution board rating 100A.

CONTROL MODULE

	LIST No
13 x 18mm spaces with DIN Rail. Inc. Neutral & Earth	**1813/MSE**

- This Unit fits above 1813 Ref. enclosures.


1812/0B


IP1806/0B


18DIN18 fitted above 1812/0B


125/21BA


200/22B

PRIMARY DISTRIBUTION BOARDS

Triple Pole MCB ways	Surface **IP31**	Surface **IP66**
4	**1804/0B**	**IP1804/OB**
6	**1806/0B**	**IP1806/OB**
8	**1808/0B**	**IP1808/OB**
10	**1810/0B**	**n/a**
12	**1812/0B**	**IP1812/OB**
16	**1816/0B**	**IP1816/OB**
20	**1820/0B**	**n/a**
24	**1824/0B**	**n/a**

- Both boards readily accept incoming devices below.
- All distribution boards rated at 200A.
- Includes all phase, neutral and earth busbars.
- Facility included to allow fixture of Double Earth Bars, High Integrity Earth to Regulation 607, Section 543.
- All boards supplied as standard with hinged outer door & catch, (lock extra), and removable top/bottom gland plates.
- For Flush board add suffix F, IP31 only.

IMPORTANT

Under no circumstances should cable connections be made direct to the phase busbars. A suitable main incoming device must be fitted to ensure adequate busbar support ie: Isolator or1600/1B.

Spreader box	LIST No
for use where larger incoming cables are required	**18SB**
Control Module	
18 - off 18mm wide modules	**18DIN18**

POLESTAR METER PACK

An 'Add-on' Assembly, 210mm high, to fit below a board, comprising:
Enclosure with slotted front plate and door.
Digital Meter, pulsed output, offering Amps, Volts and Kwh readout.
3 off 125A or 250A Current Transformers, with associated fuses and wiring.

	LIST No
125A CTs	**18ML125**
200A CTs	**18MH200**

INCOMERS:

SWITCH DISCONNECTORS

Single Phase & Switched Neutral	LIST No
125A single phase & neutral switch disconnector	**125/21BDP**
200A single phase & neutral switch disconnector	**200/22BDP**

Triple Pole	LIST No
125A Modular triple pole switch disconnector	**125/21BA**
125A Heavy duty triple pole switch disconnector	**125/21B**
200A Heavy duty triple pole switch disconnector	**200/22B**

- 125A Modular has 50mm² capacity
- 125A Heavy Duty has 70mm² capacity
- 200A Heavy Duty has 120mm² capacity

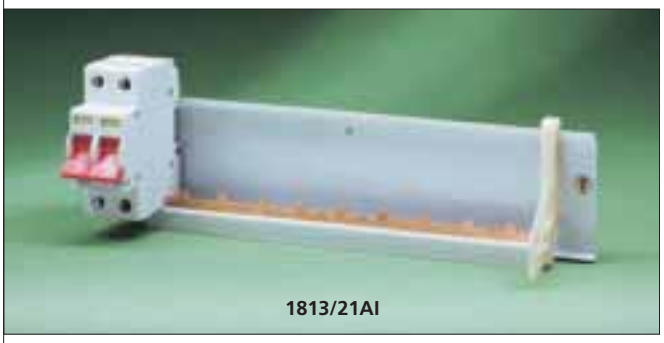
100A TRIPLE POLE & NEUTRAL RCCBs

Sensitivity (mA)	Rating (A)	LIST No
100	100	**641/100B**
30	100	**641/030B**

- Type AC.
- Complete with supply and load side terminal shrouds.
- Terminals accept up to 50mm² cable.

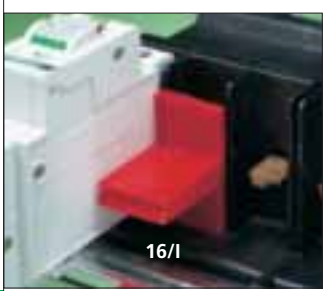

1806/0BIS 1810/0BI

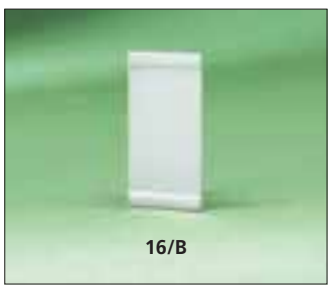

1600/1B


1813/21AI


16CL fitted


MCBLD fitted


16/I


16/B

BACKPLATES

PRIMARY BACKPLATE ASSEMBLIES TRIPLE POLE

		LIST No
Triple Pole MCB ways	Standard	Short
4	**1804/0BI**	**1804/0BIS**
6	**1806/0BI**	**1806/0BIS**
8	**1808/0BI**	**1808/0BIS**
10	**1810/0BI**	**1810/0BIS**
12	**1812/0BI**	**1812/0BIS**
16	**1816/0BI**	**1816/0BIS**

- For use in customers own enclosures.
- Complete with 200A rated three phase busbars.
- Neutral and earth busbar assemblies included for OBI units only

Important

Under no circumstances should cable connections be made direct to the phase busbars. A suitable mains incoming device must be fitted to ensure adequate busbar support (Isolator on Standard, 1600/1B on Short).

	LIST No
Incoming Busbar connecting assembly	**1600/1B**

- Direct cable termination assembly for TP Boards & Backplates.
- Busbar connecting assembly terminals accept up to 120mm^2 cable.
- Complete with terminal shroud.

PRIMARY BACKPLATE ASSEMBLIES SINGLE POLE

Single pole MCB ways	Main Switch Disconnector	Direct Cable Connection
6	**1806/21AI**	**1806/1AI**
9	**1809/21AI**	**1809/1AI**
13	**1813/21AI**	**1813/1AI**

ACCESSORIES

LIST No		
Busbar paralleling assembly	Converts TP & N board to SP & N operation	**16/P**
Door locking assembly	For Metal IP31 SP & TP Boards	**16CL**
Universal MCB locking device	Suitable for all Crabtree MCBs	**MCBLD**
Padlock & 2 keys	For use with MCB handle locking device	**748**
Way blanking plate	Covers one (SP) MCB way	**16/B**
Insulating tag	Insulates spare (SP) MCB way on line busbar	**16/I**
Neutral link	Affords disconnection of neutral for testing	**16/N**
Spare TP DB Gland Plate		**18GP**

ENCLOSURES

	LIST No
General purpose (3 x 18mm module) enclosure	**1603/MSE**

ADDITIONAL EARTH BAR KITS

No. of Ways	LIST No	No. of Ways	LIST No
4	**18EB04**	10	**18EB10**
6	**18EB06**	12	**18EB12**
8	**18EB08**	16	**18EB16**

CLEAN EARTH BAR KITS

	LIST No
(4 to 12 Way 1 Kit, 16 Way 2 Kits)	**18CEBK**

60B/32 60B/40

62B/10

63C/16 63C/32

602C/323

MINIATURE CIRCUIT BREAKERS (MCB)

Current Rating (A)	Type B LIST No	Type C LIST No	Type D LIST No
		Single Pole	
6	**60B/06**	**60C/06**	**60D/06**
10	**60B/10**	**60C/10**	**60D/10**
16	**60B/16**	**60C/16**	**60D/16**
20	**60B/20**	**60C/20**	**60D/20**
32	**60B/32**	**60C/32**	**60D/32**
40	**60B/40**	**60C/40**	**60D/40**
50	**60B/50**	**60C/50**	**60D/50**
63	**60B/63**	**60C/63**	**60D/63**
		Double Pole	
6	**62B/06**	**62C/06**	**62D/06**
10	**62B/10**	**62C/10**	**62D/10**
16	**62B/16**	**62C/16**	**62D/16**
20	**62B/20**	**62C/20**	**62D/20**
32	**62B/32**	**62C/32**	**62D/32**
40	**62B/40**	**62C/40**	**62D/40**
50	**62B/50**	**62C/50**	**62D/50**
63	**62B/63**	**62C/63**	**62D/63**
		Triple Pole	
6	**63B/06**	**63C/06**	**63D/06**
10	**63B/10**	**63C/10**	**63D/10**
16	**63B/16**	**63C/16**	**63D/16**
20	**63B/20**	**63C/20**	**63D/20**
32	**63B/32**	**63C/32**	**63D/32**
40	**63B/40**	**63C/40**	**63D/40**
50	**63B/50**	**63C/50**	**63D/50**
63	**63B/63**	**63C/63**	**63D/63**

- BS EN 60 898.
- Type B (3–5In), C (5–10In), D (10–20In) classification.
- Short circuit duty rating: Type B/C 16000A 240V/415V 50Hz.
  Type D 10000A 240V/415V 50Hz.
- Terminal capacity up to 25mm² cable.
- 25mm modular width.

RESIDUAL CURRENT CIRCUIT BREAKERS WITH OVERCURRENT PROTECTION (RCBO)

Double Pole
MCB Type C

Type AC ~
normal ac sensitivity

Current rating (A)	LIST No
6	**602C/063**
10	**602C/103**
16	**602C/163**
20	**602C/203**
32	**602C/323**
40	**602C/403**

- Standard compliance BS EN 61009; IEC 1009.
- Short circuit duty rating 10000A 240V 50Hz.
- Electromechanical RCD, 30mA. Double pole operation.
- Terminal capacity up to 25mm² cable.

INDIVIDUAL SWITCH DISCONNECTORS

	LIST No
125A TP Switch disconnector	**125SW3**
125A TP Switch disconnector heavy duty	**125/3MS**
200A TP Switch disconnector	**200/3MS**

- BS EN60947-3.
- Switch disconnectors suitable for individual and panel mounting applications.
- Complete with terminal shrouds.
- Maximum cable capacities 125A – 50mm².
  200A – 120mm².
- 200A fitted with Allen headed terminals enabling incoming cable to be more effectively secured (Allen key supplied).


FUSESTAR
100A
FUSESTAR

FUSESTAR

SWITCH DISCONNECTORS AND FUSE SWITCHES

Fuse Switch Range

- 20A to 800A
- SP & N TP & N and 4 P
- Modular Range of Enclosures with built in Cable spreading room
- Removable door, opens through 180° for all round access
- Neutrals, fully rated
- Includes HRC fuses, up to 125A rating
- BS EN 60947-3
- Paint finish Epoxy Powder, Light Grey RAL 7035

Switch Disconnector Range

- 20A to 125A
- SP & N TP & N and 4 P
- Metal Enclosures with hinged door, IP4X
- Insulated Enclosures, IP65


20/32


63/100


125/160/200


315/400

FUSE COMBINATION UNIT 20A–32A

20A	SP&N TP&N 4P	supplied with 20A fuses	**190201NF** **190203NF** **190204F**
32A	SP&N TP&N 4P	supplied with 32A fuses	**190321NF** **190323NF** **190324F**
Accessories	Cable Spreader Box Copper Isolator Link Each		**19032CSB** **19LK32**
Modular width			4
Terminals	20A–32A	16mm² Max	Cable Clamp
Spreading room		up to 10mm² 4 Core *	

FUSE COMBINATION UNIT 63A–100A

63A	SP&N TP&N 4P	supplied with 63A fuses	**190631NF** **190633NF** **190634F**
100A	SP&N TP&N 4P	supplied with 100A fuses	**191001NF** **191003NF** **191004F**
Accessories	Cable Spreader Box Copper Isolator Link Each 63A Copper Isolator Link Each 100A Castell Lock (factory fitted)		**19100CSB** **19LK63** **19LK200** Suffix **CLK**
Modular width			5
Terminals	63A–100A	63A-Cable Clamp 25mm² 100A- M8 Hole	
Spreading room		up to 70mm² 4 Core *	
Cable lug palm copper size		20mm wide Maximum	

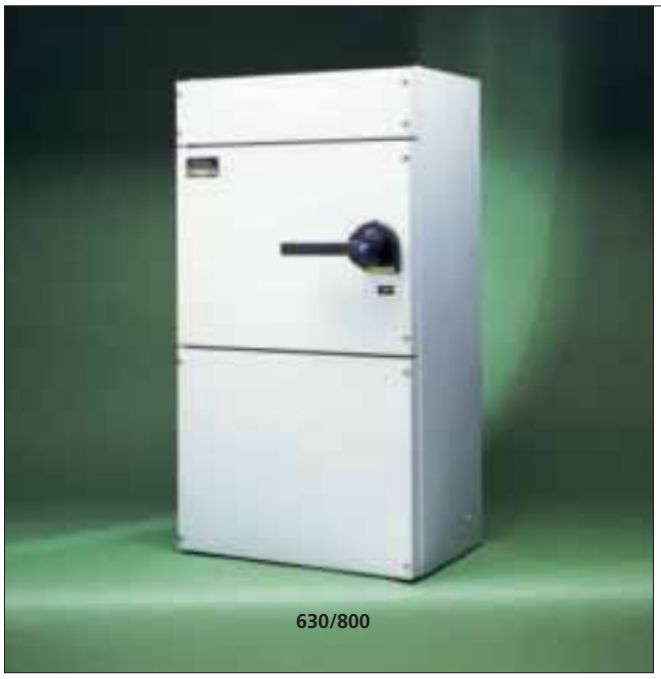
FUSE COMBINATION UNIT 125A–200A

125A	SP&N TP&N 4P	supplied with 125A fuses	**191251NF** **191253NF** **191254F**
160A	SP&N TP&N 4P	no fuses supplied	**191601N** **191603N** **191604**
200A	SP&N TP&N 4P	no fuses supplied	**192001N** **192003N** **192004**
Accessories	Cable Spreader Box Copper Isolator Link Each Castell Lock (factory fitted)		**19200CSB** **19LK200** Suffix **CLK**
Modular width			6
Terminals	125A–200A		M8
Spreading room		up to 150mm² 4 Core *	
Cable lug palm copper size		20mm wide Maximum	

FUSE COMBINATION UNIT 315A–400A

315A	TP&N 4P	no fuses supplied	**193153N** **193154**
400A	TP&N 4P	no fuses supplied	**194003N** **194004**
Accessories	Cable Spreader Box Copper Isolator Link Each Castell Lock (factory fitted)		**19400CSB** **19LK400** Suffix **CLK**
Modular width			8
Terminals	315A–400A		M10
Spreading room		up to 300mm² 4 Core *	
Cable lug palm copper size	45mm wide Maximum		

* *Spreading Room is allowed for at one end only. To fit a 4 core cable at both ends an additional Cable spreader box will be required. 1 Module = 52.5mm*


630/800


Cable Spreader Boxes


1949BB

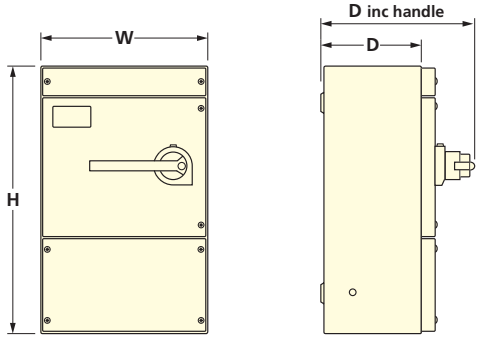

250A Terminals


400A Terminals

FUSE COMBINATION UNIT 630A–800A

630A	TP&N 4P	no fuses supplied	**196303N** **196304**
800A	TP&N 4P	no fuses supplied	**198003N** **198004**
Accessories	Cable Spreader Box Copper Isolator Link Each Brass Gland Plate Castell Lock (factory fitted)		**19800CSB** **19LK800** **19800BGP** Suffix **CLK**
Modular width			12
Terminals	630A–800A		M12
Spreading room		up to 630mm^2 4 Core *	
Cable lug palm copper size		63mm wide Maximum	

FUSESTAR DIMENSION DETAILS



	D	H	W	D inc. handle
20-32A	220	210	136	200
63A	420	263	188	263
100A	420	263	188	263
125-200A	525	315	241	305
315-400A	735	420	241	305
630-800A	850	620	293	355

BUS BAR CHAMBER

400A	TP&N	16 Mod.		**1949BB**
Dimensions	H 368	W 840	D 190	
Terminals Pre fitted	4 x 250A & 400A Supplied			M8
Fault rated				31.5kA 1Sec

SWITCH MOUNTING & BLANK FILLER PLATES

20A–32A	4 MOD	**1932MTG**
63A–100A	5 MOD	**19125MTG**
125A–200A	6 MOD	**19200MTG**
315A–400A	8 MOD	**19400MTG**
1 Mod	Blank Filler Plate	**191BL**
2 Mod	Blank Filler Plate	**192BL**
4 Mod	Blank Filler Plate	**194BL**
8 Mod	Blank Filler Plate	**198BL**

Note: Bus Bar chamber supplied with 2 x 4 Mod, 2 x 2 Mod & 2 x 1 Mod Blank Filler Plates 1 – Mod = 52.5

250A	Bus Bar Terminal Each	**19TMBB**


Steel Enclosure Hinged Door

SWITCH DISCONNECTOR STEEL ENCLOSURE

Rating (A)	Box Size	TP&N/SP&N	TP&SWN
20	1	**190203NSW1**	**190204SW1**
32	1	**190323NSW1**	**190324SW1**
40	1	**190403NSW1**	**190404SW1**
63	1	**190633NSW1**	**190634SW1**
63	2	**190633NSW2**	**190634SW2**
100	2	**191003NSW2**	**191004SW2**
125	2	**191253NSW2**	**191254SW2**

• Hinged Door


Insulated enclosure Yellow/Red Handle

SWITCH DISCONNECTOR INSULATED ENCLOSURE

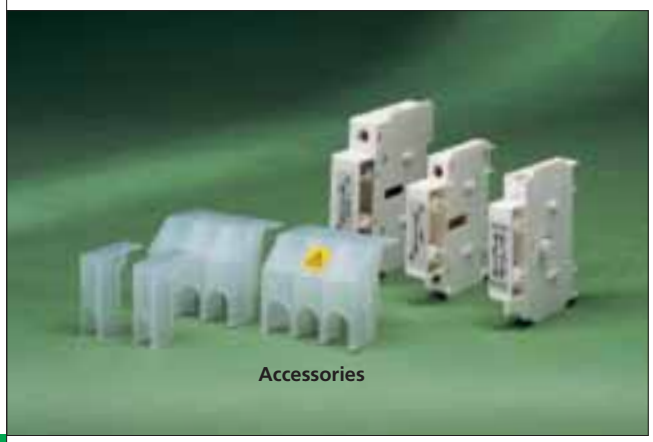
Rating (A)	Box Size	Yellow/Red Handle	Black/Grey Handle
16	A	**15416/11**	**15416/12**
25	A	**15425/11**	**15425/12**
32	B	**15432/11**	**15432/12**
40	B	**15440/11**	**15440/12**
63	C	**15463/11**	**15463/12**
80	D	**15480/11**	**15480/12**
100	D	**154100/11**	**154100/12**
125	E	**154125/11**	**154125/12**

• Gland Fixings are Metric sizes
• Optional Switched Neutral
15416/11 & 15416/12 have Non-interlocked handles.

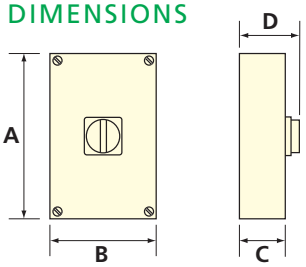

Insulated enclosure Black/Grey Handle

ACCESSORIES

Description		LIST No.
Neutral Link	63amp	**19963**
	125amp	**199125**
Auxiliary Switch	10amp	**19701**
Terminal Shrouds		
SP	16-63amps (set of 2)	**19811**
TP	16-63amps (set of 2)	**19813**
SP	63-125amps (set of 2)	**19821**
TP	63-125amps (set of 2)	**19823**
Switched 4th Pole		
16A		**198164**
32A		**198324**
40A		**198404**
63A		**198634**
80A		**198804**
100A		**1981004**
125A		**1981254**

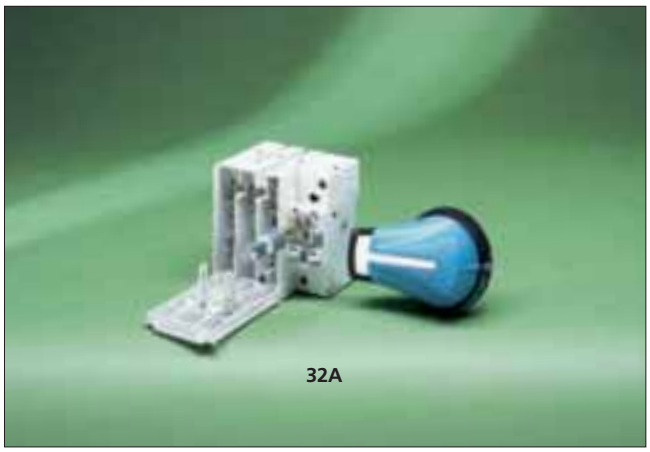

Accessories

DIMENSIONS



BOX	A	B	C	D
A	130	85	75	105
B	175	125	100	137
C	250	175	100	135
D	310	200	135	170
E	410	200	135	170
1	220	158	136	172.5
2	325	158	136	172.5

63A-200A TP&N
Panel Board Switch



32A

315A-400A

630A-800A

SKELETON FUSE SWITCH ASSEMBLIES FOR USE WITH SYSTEM POWERSTAR

FOR USE IN FUSE SWITCH PANEL BOARD ONLY.

Triple Pole and Integrated Neutral link Fuse Switch, complete with shaft, handle and terminal shroud for outgoing cables.

Rating	Format	LIST No
63A	TP & N	**19KP0633N**
100A	TP & N	**19KP1003N**
160A	TP & N	**19KP1603N**
200A	TP & N	**19KP2003N**

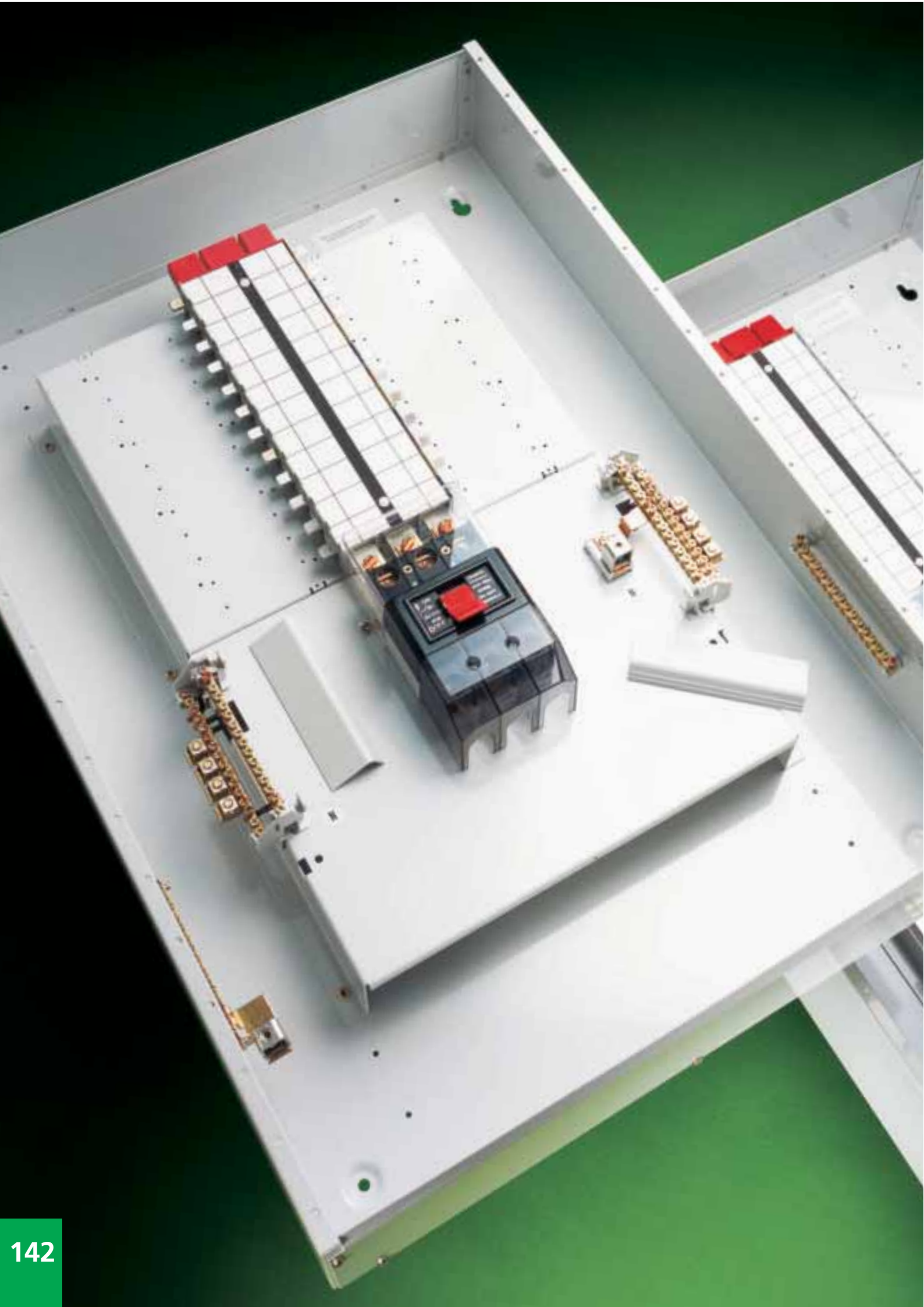
FOR USE IN ELEMENTS OF SYSTEM POWERSTAR, OTHER THAN PANEL BOARDS.

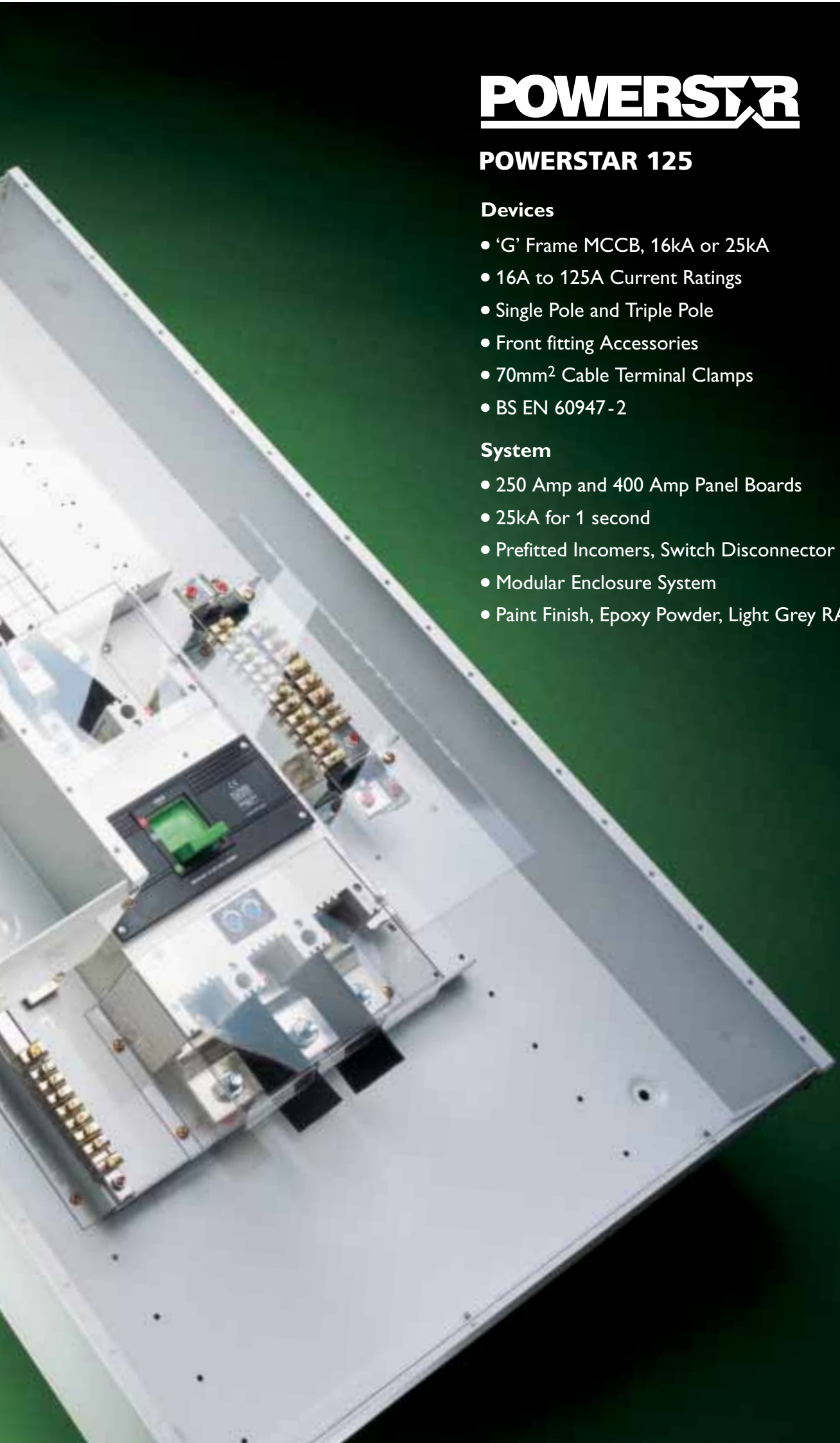
For use in Fuse Switches complete with shaft, handle and terminal shroud for outgoing cables.

Rating	Format	LIST No
32A	TP & N	**19K0323N**
63A	TP & N	**19K0633N**
100A	TP & N	**19K1003N**
160A	TP & N	**19K1603N**
200A	TP & N	**19K2003N**
315A	TP & N	**19K3153N**
400A	TP & N	**19K4003N**
630A	TP & N	**19K6303N**
800A	TP & N	**19K8003N**

Rating	Format	LIST No
32A	4P	**19K0324**
63A	4P	**19K0634**
100A	4P	**19K1004**
160A	4P	**19K1604**
200A	4P	**19K2004**
315A	4P	**19K3154**
400A	4P	**19K4004**
630A	4P	**19K6304**
800A	4P	**19K8004**

- 63A to 200A 4P Fuse Switch Cannot be used in System Powerstar Form 4 Panel Boards





POWERSTAR

POWERSTAR 125

Devices

- 'G' Frame MCCB, 16kA or 25kA
- 16A to 125A Current Ratings
- Single Pole and Triple Pole
- Front fitting Accessories
- 70mm^2 Cable Terminal Clamps
- BS EN 60947-2

System

- 250 Amp and 400 Amp Panel Boards
- 25kA for 1 second
- Prefitted Incomers, Switch Disconnector or MCCB
- Modular Enclosure System
- Paint Finish, Epoxy Powder, Light Grey RAL 7035


17G2508SW


17G2008MB


17G2508DC

250A SWITCH-DISCONNECTOR CONTROLLED

Incomer Fitted	Outgoing ways	Modular Height	Height (mm)	LIST No
250A	6	17	896	**17G2506SW**
	8	17	896	**17G2508SW**
	12	20	1054	**17G2512SW**
	16	23	1211	**17G2516SW**

- 250A TP Switch Disconnector fitted
- Conforms to BS EN 60439
- 250A Busbars
- Busbar fault rated 25kA–1 sec
- IP31 (41 with door) Ingress Protection
- Earth and neutral terminals for each SP way
- 630mm wide x 165mm deep
- 120 mm^2 4 Core Max on Incoming Terminals
- 70 mm^2 4 Core Max on Outgoing Terminals

200A MCCB CONTROLLED

Incomer Fitted	Outgoing ways	Modular Height	Height (mm)	LIST No
200A	6	17	896	**17G2006MB**
	8	17	896	**17G2008MB**
	12	20	1054	**17G2012MB**
	16	23	1211	**17G2016MB**

- 200A TP MCCB fitted
- Conforms to BS EN 60439
- 250A Busbars
- Busbar fault rated 25kA–1 sec
- IP31 (41 with door) Ingress Protection
- Earth and neutral terminals for each SP way
- 630mm wide x 165mm deep
- 120 mm^2 4 Core Max on Incoming Terminals
- 70 mm^2 4 Core Max on Outgoing Terminals

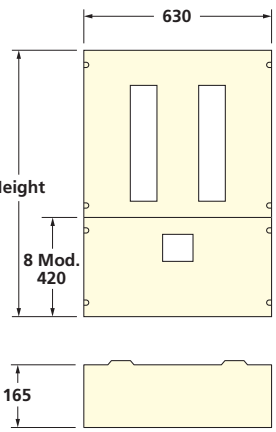
250A DIRECT CONNECTION

Inc. Terminals only	Outgoing ways	Modular Height	Height (mm)	LIST No
250A	6	17	896	**17G2506DC**
	8	17	896	**17G2508DC**
	12	20	1054	**17G2512DC**
	16	23	1211	**17G2516DC**

(Cable socket not supplied)
- Conforms to BS EN 60439
- 250A Busbars
- Busbar fault rated 25kA–1 sec
- IP31 (41 with door) Ingress Protection
- Earth and neutral terminals for each SP way
- 630mm wide x 165mm deep
- 120 mm^2 4 Core Max on Incoming Terminals
- 70 mm^2 4 Core Max on Outgoing Terminals

DIMENSIONS 200/250A BOARDS

LIST No	Total Mod. Height	Mod Height Outgoing ways only	Total Height (mm)
17G2506SW	17	9	896
17G2508SW	17	9	896
17G2512SW	20	12	1054
17G2516SW	23	15	1211
17G2006MB	17	9	896
17G2008MB	17	9	896
17G2012MB	20	12	1054
17G2016MB	23	15	1211
17G2506DC	17	9	896
17G2508DC	17	9	896
17G2512DC	20	12	1054



17G4008SW

17G4008MB

17G4008DC

400A SWITCH-DISCONNECTOR CONTROLLED

Incomer Fitted	Outgoing ways	Modular Height	Height (mm)	LIST No
400A	6	20	1054	**17G4006SW**
	8	20	1054	**17G4008SW**
	12	23	1211	**17G4012SW**
	16	26	1369	**17G4016SW**

- 400A TP Switch Disconnector fitted
- Conforms to BS EN 60439
- 400A Busbars
- Busbar fault rated 25kA–1 sec
- IP31 (41 with door) Ingress Protection
- Earth and neutral terminals for each SP way
- 630mm wide x 165mm deep
- 240mm^2 4 Core Max on Incoming Terminals
- 70 mm^2 4 Core Max on Outgoing Terminals.

400A MCCB CONTROLLED

Incomer Fitted	Outgoing ways	Modular Height	Height (mm)	LIST No
400A	6	20	1054	**17G4006MB**
	8	20	1054	**17G4008MB**
	12	23	1211	**17G4012MB**
	16	26	1369	**17G4016MB**

- 400A TP MCCB fitted
- Conforms to BS EN 60439
- 400A Busbars
- Busbar fault rated 25kA–1 sec
- IP31 (41 with door) Ingress Protection
- Earth and neutral terminals for each SP way
- 630mm wide x 165mm deep
- 240mm^2 4 Core Max on Incoming Terminals
- 70 mm^2 4 Core Max on Outgoing Terminals.

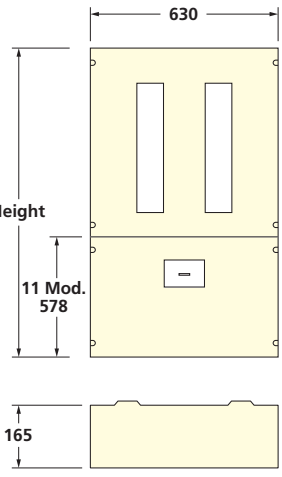
400A DIRECT CONNECTION

Inc. Terminals only	Outgoing ways	Modular Height	Height (mm)	LIST No
400A	6	20	1054	**17G4006DC**
	8	20	1054	**17G4008DC**
	12	23	1211	**17G4012DC**
	16	26	1369	**17G4016DC**

(Cable sockets not supplied)
- Conforms to BS EN 60439
- 400A Busbars
- Busbar fault rated 25kA–1 sec
- IP31 (41 with door) Ingress Protection
- Earth and neutral terminals for each SP way
- 630mm wide x 165mm deep
- 240mm^2 4 Core Max on Incoming Terminals
- 70 mm^2 4 Core Max on Outgoing Terminals.

DIMENSIONS 400A BOARDS

LIST No	Total Mod. Height	Mod Height Outgoing ways only	Total Height (mm)
17G4006SW	20	9	1054
17G4008SW	20	9	1054
17G4012SW	23	12	1211
17G4016SW	26	15	1369
17G4006MB	20	9	1054
17G4008MB	20	9	1054
17G4012MB	23	12	1211
17G4016MB	26	15	1369
17G4006DC	20	9	1054
17G4008DC	20	9	1054
17G4012DC	23	12	1211
17G4016DC	26	15	1369




17G200MB1


17G24SS


17GCSB


17G17DR
(Fitted)

ADD-ON 160/200A MCCB OUTGOING HOUSING

Rating (A)	Height	(mm)	LIST No
1 off 'J' MCCB	8	420	**17G200MB1**

NB: MCCB to be ordered separately

- Includes all interconnections
- Accepts J/JM Frame TP MCCBs up to 200A
- Fits above 400A Panel Boards Only
- 630mm wide x 165mm deep

J FRAME MCCB (for use in the above)

Rating (A)	'J'3 Pole LIST No	'J' 3 Pole LIST No
160	**7PBJN3160**	**7PBJN3M160**
200	**7PBJN3200**	**7PBJN3M200**

POWERSTAR 125 METER PACK

An 'Add-on' Assembly, 210mm high, to fit below a board, comprising:
Enclosure with slotted front plate and door.
Digital Meter, pulsed output, offering Amps, Volts and Kwh readout.
3 off 250A or 400A Current Transformers, with associated fuses and wiring.

	LIST No
200/250A	**17GM250**
400A	**17GM400**

SINGLE POLE DISTRIBUTION BOARD

Outgoing 1P ways	Modular Height	Height (mm)	LIST No
19	4	210	**17G19DB**

- 125A Busbar
- Accepts Loadstar MCBs
- 630mm wide x 165mm deep

CONTROL MODULE ENCLOSURE

18mm wide modules	Modular Height	Height (mm)	LIST No
24 mod. DIN Rail	4	210	**17G24SS**

- Accepts all DIN rail mounted devices

CABLE SPREADER BOX

	Modular Height	Height (mm)	LIST No
Empty enclosure c/w Blank Front Plate	4	210	**17GCSB**

POWERSTAR 125 ACCESSORIES

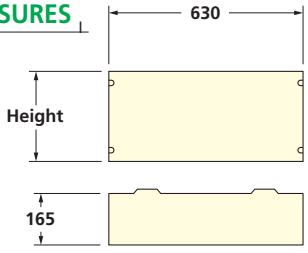
Description	LIST No		LIST No
Door kits with catch			
4 mod	**17G04DR**	12 mod	**17G12DR**
8 mod	**17G08DR**	15 mod	**17G15DR**
9 mod	**17G09DR**	17 mod	**17G17DR**
11 mod	**17G11DR**	20 mod	**17G20DR**

Overall doors available up to 20 mod.
2 doors can be used for 23 and 26 mod units.
200A/250A Inc. = 8 Mod, 400A = 11 Mod.
6/8 way = 9 Mod, 12 way = 12 Mod, 16 way = 15 Mod.

Door Cylinder lock	**16CL**
Door Padlock device	**16PL**
Blanking piece single pole 'G' Frame	**KPXBG**
70mm² Cable Clamp Assembly for Neutral bar in 200/250A Boards - Set of 3	**17CC**

DIMENSIONS 'ADD-ON' ENCLOSURES

LIST No	Height (mm)	Mod. Height
17G19DB	210	4
17G24SS	210	4
17GCSB	210	4
17GM250/400	210	4
17G200MB1	420	8



1 Pole 'G' MCCB

1 POLE G FRAME MCCBs

Rating (A)	16kA LIST No
16	**7PBGB116**
20	**7PBGB120**
25	**7PBGB125**
32	**7PBGB132**
40	**7PBGB140**
50	**7PBGB150**
63	**7PBGB163**
80	**7PBGB180**
100	**7PBGB1100**
125	**7PBGB1125**

- Conforms to BS EN 60947-2
- 16kA Icu at 240V ac
- Fixed magnetic
- Fixed thermal
- Double insulated
- Terminal Capacity 70mm^2

3 Pole 'G' MCCB

3 POLE G FRAME MCCBs

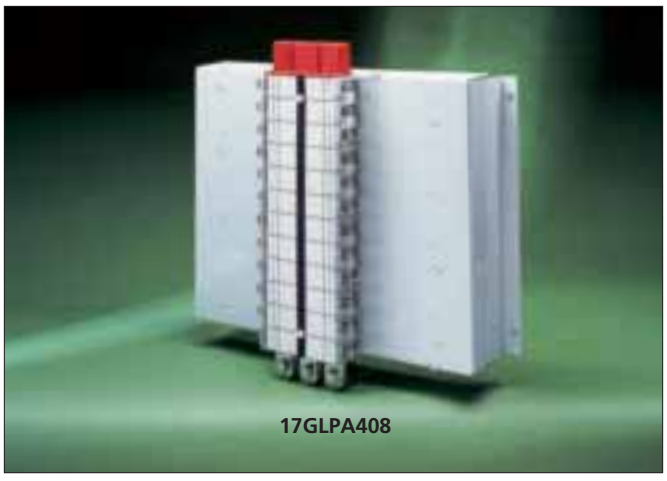
Rating (A)	16kA LIST No	25kA LIST No
16	**7PBGB316**	**7PBGN316**
25	**7PBGB320**	**7PBGN320**
25	**7PBGB325**	**7PBGN325**
32	**7PBGB332**	**7PBGN332**
40	**7PBGB340**	**7PBGN340**
50	**7PBGB350**	**7PBGN350**
63	**7PBGB363**	**7PBGN363**
80	**7PBGB380**	**7PBGN380**
100	**7PBGB3100**	**7PBGN3100**
125	**7PBGB3125**	**7PBGN3125**

- Conforms to BS EN 60947-2
- 16/25kA Icu at 415V ac
- Fixed magnetic
- Fixed thermal
- Double insulated
- Large range of accessories
- Terminal Capacity 70mm^2

KPXBG

POWERSTAR G FRAME MCCBs ACCESSORIES

Description	LIST No
Dolly padlocking facility	**7PAGDLD**
Padlock to fit	**748**
Set of 2 interphase barriers	**7PAG1B**
1P Terminal Shroud	**7PAGS1**
3P Terminal Shroud	**7PAGS3**
1P Blanking piece 'G' frame	**KPXBG**
AUXILIARY EQUIPMENT*	
Auxiliary Contacts	
1 x 1 n.o./n.c. Volt Free	**7PAGA1**
2 x 1 n.o./n.c. Volt Free	**7PAGA2**
Shunt Release and Auxiliary Contact	
12-36V dc. 18-30V ac	**7PAGT030**
110-120V ac	**7PAGT110**
220-240V ac	**7PAGT240**



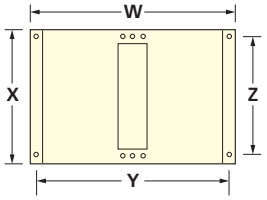
17GLPA408

POWERSTAR 125 PAN ASSEMBLIES

6 Way 400A	**17GLPA406**
8 Way 400A	**17GLPA408**
12 Way 400A	**17GLPA412**
16 Way 400A	**17GLPA416**

- Busbar only c/w pre-drilled MCCB mounting plate
- Excluding Neutral and Earth
- M8 threaded inserts at both ends of Busbar

Busbar	W	X	Y	Z
6 Way	440	237	420	184
8 Way	440	315	420	263
12 Way	440	473	420	420
16 Way	440	630	420	578



POWERSTAR

SYSTEM POWERSTAR

A modular, wall and floor standing Panel Board System offering:

- Form 2 MCCB, max 200A outgoer
- Form 4 MCCB, max 250A outgoer
- Form 4 Fuse Switch max 200A outgoer
- Incoming units MCCB and Fuse Switch up to 800A
- 400A and 800A Panel Board Busbars
- 800A Horizontal Busbars
- 35kA and 50kA for 1 second
- Paint finish Epoxy Powder, Light Grey RAL 7035

Form 2

SYSTEM POWERSTAR FORM 2 FEATURES

Enclosures

- Modular range of Enclosures, 768mm wide, 265mm deep
- Complementary 'Add on' Cableways, 288mm wide.

Incomers

Complete assemblies, comprising Enclosure, Form 2 shielding, Connections, Front Plate/Door, to accommodate:

- Single 'N' MCCB 800A
- Single 'L' MCCB 630A
- Double 'L' MCCB 630A c/w horizontal Busbars
- Single 'F' or 'J' MCCB 200/250A
- Single 400A Fuse Switch
- Single 200A Fuse Switch

F Frame MCCBs

- 25A-250A
- 3 Pole
- 35/50 kA Icu at 415 V ac
- Fixed Magnetic
- Fixed Thermal
- 3x M8 Studs
- 3x 150m² Cable Clamps

J Frame MCCBs

- 16A-200A
- 25 kA Icu at 415 V ac
- 1 and 3 Pole
- Fixed Magnetic
- Adjustable Thermal
- 6x 150m² Cable Clamps

Panel Board Range

- 'J' or 'F' frame MCCB
- 4, 8, 12 or 16 way TP
- IP 3X

Busbars

- 400A or 800A TP
- 35kA-1 second
- Fully enclosed
- Unused ways fully shrouded

Neutral/Earth

- 'Wrap Round' style Neutral allows cable termination adjacent to appropriate phase
- Socket head screw terminal clamps 16mm² to 120mm²

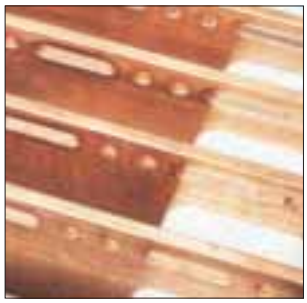
A typical Form 2 MCCB Panel Board, to BS EN 60439-1

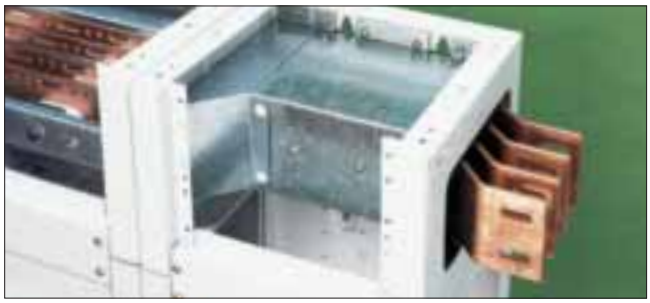
Doors

- Doors fit to Enclosure frame to ensure integrity when closed
- Full range of 'twin' doors, lockable if required to enclose all Panel Boards and MCCB Incomers

Horizontal Busbars

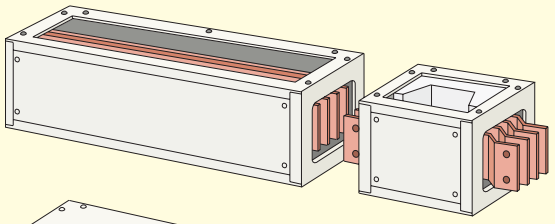
- 800A, 4 Pole, 50kA-1 Second
- 192mm, high Enclosure (1 mod) integrates with all system enclosures
- Cableway version has compartmented busbars to allow 'Through' cable access
- Pre-punched profile accommodates all sets of connections





Horizontal Busbar System

- 800A, 4 Pole, 50kA - 1 second
- 768mm wide, 4 Mod.
- 192mm high, 1 Mod.
- Pre-Punched Busbar accommodates all connections

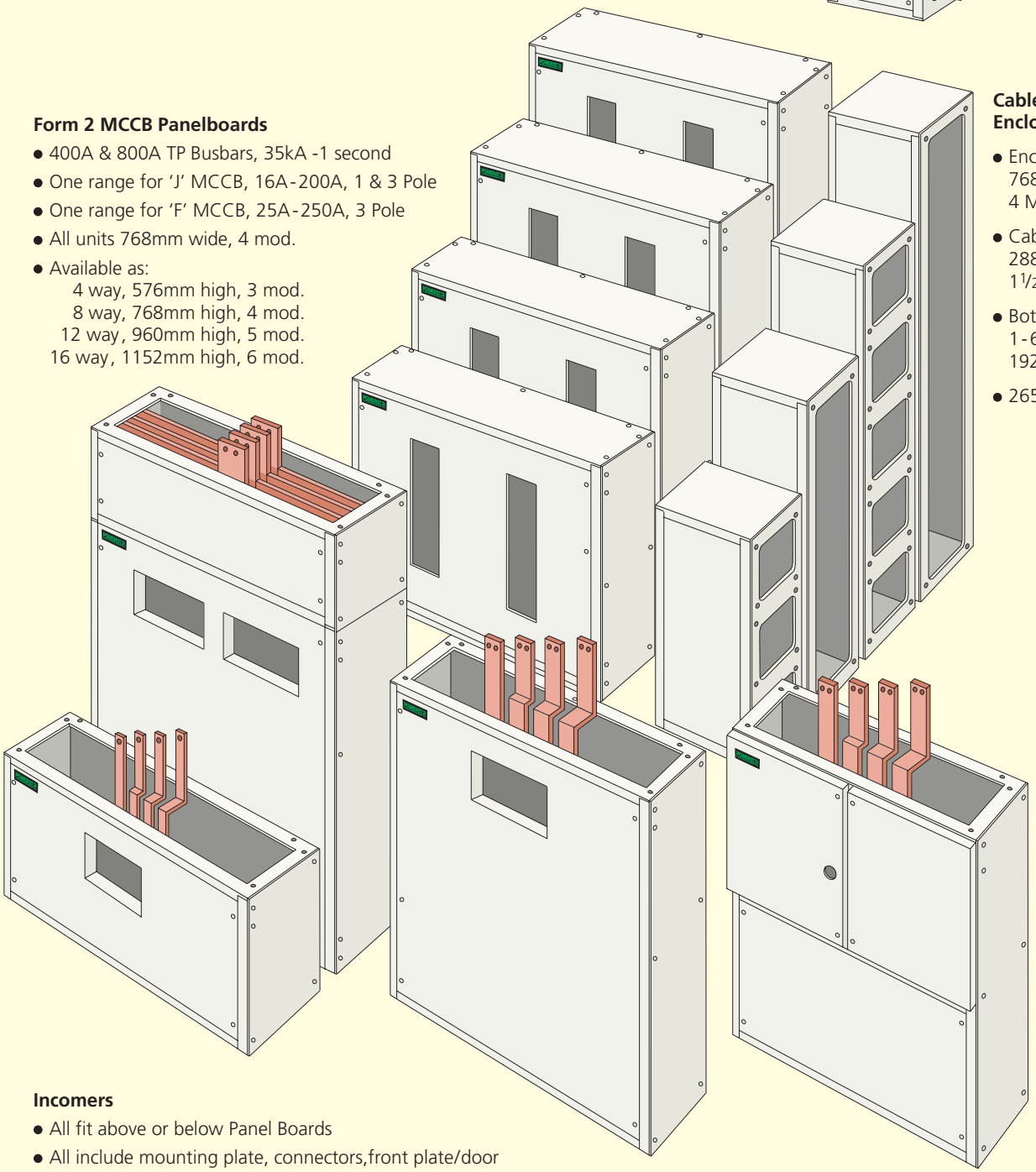


Form 2 MCCB Panelboards

- 400A & 800A TP Busbars, 35kA - 1 second
- One range for 'J' MCCB, 16A - 200A, 1 & 3 Pole
- One range for 'F' MCCB, 25A - 250A, 3 Pole
- All units 768mm wide, 4 mod.
- Available as:
  4 way, 576mm high, 3 mod.
  8 way, 768mm high, 4 mod.
  12 way, 960mm high, 5 mod.
  16 way, 1152mm high, 6 mod.

Cableways & Enclosures

- Enclosures 768mm wide, 4 Mod.
- Cableways 288mm wide, 1 1/2 Mod.
- Both Available 1 - 6 mod. 192mm - 1152mm
- 265mm deep

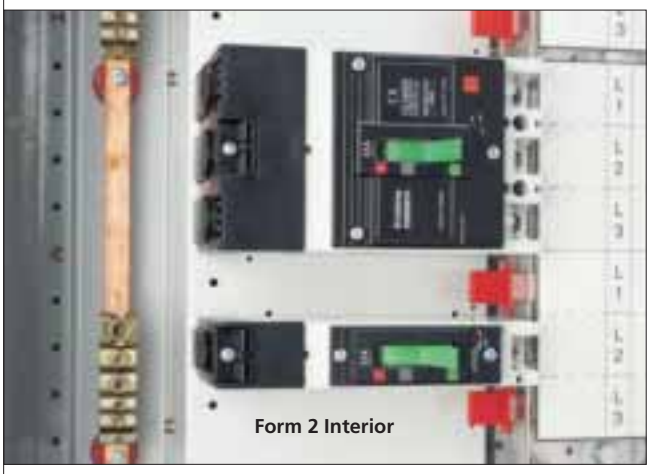


Incomers

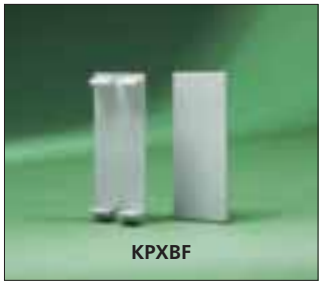
- All fit above or below Panel Boards
- All include mounting plate, connectors,front plate/door
- All suitable for - but exclude - appropriate MCCB/Fuse Switch
- All 768mm wide, 4 Mod.

- 1 - 'J' or 'F' MCCB, 576mm high, 3 Mod.
- 1 - 'L' MCCB - 630A max, 768mm high, 4 Mod.
- 1 - 'N' MCCB - 800A max, 960mm high, 5 Mod.
- 2 - 'L' MCCB - 630A max, c/w 800A busbar & Connections, 960mm high, 5 Mod.
- 1 - 200A Fs Sw, 576mm high, 3 mod.
- 1 - 400A Fs Sw, 768mm high, 4 mod.

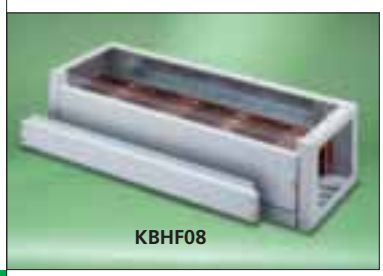

KP2J808


Form 2 Interior


KPXBJ


KPXBF


KPXD04 fitted to KP2J808


KBHF08


KBHC08

SYSTEM POWERSTAR
FORM 2 MCCB 'J' & 'F' FRAME PANEL BOARDS

'J' Frame 16A to 200A SP and TP MCCB 25kA
See page 161 for 'J' MCCB details

Triple Pole Ways	Modular Height	Height mm	400A Busbars	800A Busbars
4	3	576	**KP2J404**	**KP2J804**
8	4	768	**KP2J408**	**KP2J808**
12	5	960	**KP2J412**	**KP2J812**
16	6	1152	**KP2J416**	**KP2J816**

'F' Frame 25A to 250A TP only MCCB 35 or 50kA
See page 162 for 'F' MCCB details

Triple Pole Ways	Modular Height	Height mm	400A Busbars	800A Busbars
4	3	576	**KP2F404**	**KP2F804**
8	4	768	**KP2F408**	**KP2F808**
12	5	960	**KP2F412**	**KP2F812**
16	6	1152	**KP2F416**	**KP2F816**

- Fully enclosed Busbars, 35kA 1 second ASTA Certification.
- See page 226 for Cabling information.
- All Panel Boards supplied with 2 Gland/End Plates and 2-side Plates, prefitted.

FORM 2 PANEL BOARD ACCESSORIES

Door Kit c/w Catch, for 4W Panel Board, 3 Mod Encl.	**KPXD03**
Door Kit c/w Catch, for 8W Panel Board, 4 Mod Encl.	**KPXD04**
Door Kit c/w Catch, for 12W Panel Board, 5 Mod Encl.	**KPXD05**
Door Kit c/w Catch, for 16W Panel Board, 6 Mod Encl.	**KPXD06**
Cylinder Lock & Key - in lieu of catch	**16CL**
Blanking Piece for 'J' MCCB - Single Pole Space	**KPXBJ**
Blanking Piece for 'F' MCCB - Single Pole Space	**KPXBF**
Add on 'Flag' Busbar extension & Shield - 400A Board	**KPXEX4***
Add on 'Flag' Busbar extension & Shield - 800A Board	**KPXEX8***
Gland/End Plate, Steel (standard), Enclosure width	**KXEEPS**
Gland/End Plate, Brass, Enclosure width	**KXEEPB**
Gland/End Plate, Aluminium (4mm), Enclosure width	**KXEEPA**
Gland/End Plate, Steel Standard, Cableway width	**KXCEPS**
Gland/End Plate, Brass, Cableway width	**KXCEPB**
Gland/End Plate, Aluminium (4mm), Cableway width	**KXCEPA**
Cross Strap, Standard, Enclosure width	**KXECSS**
Cross Strap, Standard, Cableway width	**KXCCSS**

***** Required if connecting to both ends of Panelboard's Busbar system.

HORIZONTAL BUSBAR SYSTEM & CONNECTIONS

An 800A 4 Pole, Busbar system that uses enclosures the same width and depth as Form 2 Panel Boards. The Busbars are pre-punched to accommodate various sets of copper conections allowing horizontal as well as vertical extension of Panel Board units.
Fault rated, 50kA for 1 second - ASTA.

Horizontal 800A 4 Pole Main Busbar	**KBHF08**
Cableway Busbar (allows cables to pass through)	**KBHC08**
800A Horizontal Busbar connecting links	**KBHL08**
Connections from J/F Frame Form 2 400A Panel Board to 800A Horizontal Busbar	**KCP2408**
Connections from J/F Frame Form 2 800A Panel Board to 800A Horizontal Busbar	**KCP2808**
Vertical connection kit to couple 2 Form 2 Boards, 400A	**KPXC24**
Vertical connection kit to couple 2 Form 2 Boards, 800A	**KPXC28**

Busbar supplied with 1-Gland/End Plate, 2-Side Plates and 1-Cross Strap.


KI2L1


KI2L2


KI2J1


KEC2 KEE2

INCOMING UNITS, FORM 2 MCCB PANEL BOARDS

These units use the same modular enclosures as the Form 2 Panel Boards. Incoming assemblies include appropriate Form 2 shielding, preformed copper interconnections, front plate/door, but NOT the device itself.

MCCB Neutral Links supplied with Incoming Housing, whilst Fuse Switch Neutral Links are supplied with the Switch itself.

Suitable for fixture below or above the Form 2 Panel Boards.	Mod Height	Height mm	
Assembly to accommodate 1- 'N' Frame, TP MCCB, Max rating 800A. Front Flat Terminal MCCB only. See page 164 for MCCB details	5	960	**KI2N1**
Assembly to accommodate 1- 'L' Frame, TP/4P MCCB, Max rating 630A. See page 163 for MCCB details	4	768	**KI2L1**
Assembly to accommodate 2- 'L' Frame, TP/4P MCCB, Max rating 630A Includes horizontal Busbar and all connections. See page 163 for MCCB details	5	960	**KI2L2**
Assembly to accommodate 1- 'J' Frame, TP/4P MCCB, Max rating 200A. See page 161 for MCCB details	3	576	**KI2J1**
Assembly to accommodate 1- 'F' Frame, TP MCCB, Max rating 250A. See page 162 for MCCB details	3	576	**KI2F1**
Assembly to accommodate 1- 315/400 Amp, TP&N/4P Fuse Switch See page 141 for Fuse Switch details	4	768	**KI2S4**
Assembly to accommodate 1- 63, 100, 200 Amp, TP&N/4P Fuse Switch See page 141 for Fuse Switch details	3	576	**KI2S2**

- All Incoming Units supplied with 1-Gland/End Plate, 2-Side Plates and 1-Cross Strap.
- To accommodate 4 Pole MCCBs the prefitted Neutral Link must be removed.
- Fuse Switches supplied with Neutral Link, Handle & Terminal Shroud.
- See page 226 for cabling information.

INDIVIDUAL ENCLOSURES AND CABLEWAYS

Enclosures are 768mm wide (4 mod). Cableways are 288mm wide (1½ mod). Both units are 265mm deep and have slotted sides to allow horizontal access to any adjacent unit. Both are supplied with screw fixed front cover plates.

Modular Height	Height mm	Cableway 288mm W	Enclosure 768mm W	Side Plate
1	192	**KEC1**	**KEE1**	**KXESP1**
2	384	**KEC2**	**KEE2**	**KXESP2**
3	576	**KEC3**	**KEE3**	**KXESP3**
4	768	**KEC4**	**KEE4**	**KXESP4**
5	960	**KEC5**	**KEE5**	**KXESP5**
6	1152	**KEC6**	**KEE6**	**KXESP6**

- Enclosures supplied with 1-Gland/End Plate, 2 Side Plates and 1-Cross Strap.
- Cableways supplied with 1-Gland/End Plate and 1-Cross Strap.

Form 4

SYSTEM POWERSTAR FORM 4 FEATURES

Enclosures

- Modular range of Enclosures, 768mm wide, 260mm deep
- Complementary 'Add on' Cableways, 288mm wide.

Incomers

Complete assemblies, comprising Enclosure, Form 4 shielding, Connections, Front Plate/Door, to accommodate:

- Single 'N' MCCB 800A
- Single 'L' MCCB 630A
- Single 'F' or 'J' MCCB 200/250A
- Single 800A Fuse Switch
- Single 400A Fuse Switch
- Single 200A Fuse Switch

Fuse Switch

- 63A, 100A, 160A & 200A
- TP & N only
- Neutral Link supplied with Fuse Switch Assembly
- Door Interlock Handle supplied with Fuse Switch Assembly

'J' MCCB

- 16A-200A
- 25kA Icu at 415V ac
- Neutral Link prefitted in Panel Board
- Door Interlock Handle to be ordered separately
- 4 Pole or Switched Neutral option available

'F' MCCB

- 25A-250A
- 35/50kA Icu at 415V ac
- Neutral Link prefitted in Panel Board
- Door Interlock Handle to be ordered separately

Panel Board Range

- Fuse Switch or MCCB
- 6 or 10 way TPN
- IP 4X

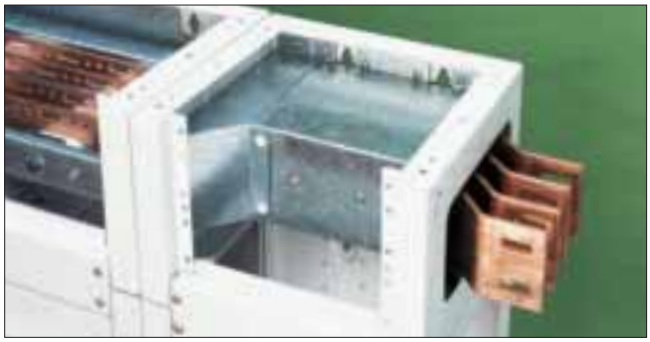
Busbars

- 800A 4 Pole
- 50kA-1 second
- Fully enclosed
- Unused ways fully shrouded

Each device on a System Powerstar Form 4 Panel, MCCB or Fuse Switch:

- Occupies its own compartment
- Is Housed behind its own Hinged Door
- Is operated via a Door mounted Interlocked Handle
- Has fully shrouded Busbar Terminals

In other words...
it is a Genuine Form 4, Type 2,
to BS EN 60439-1

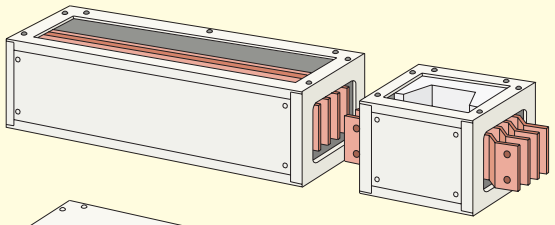


Horizontal Busbars

- 800A, 4 Pole, 50kA-1 Second
- 192mm, high Enclosure (1 mod) integrates with all system enclosures
- Cableway version has compartmented busbars to allow 'Through' cable access
- Pre-punched profile accommodates all sets of connections

Horizontal Busbar System

- 800A, 4 Pole, 50kA - 1 second
- 768mm wide, 4 Mod.
- 192mm high, 1 Mod.
- Pre-Punched Busbar accommodates all connections

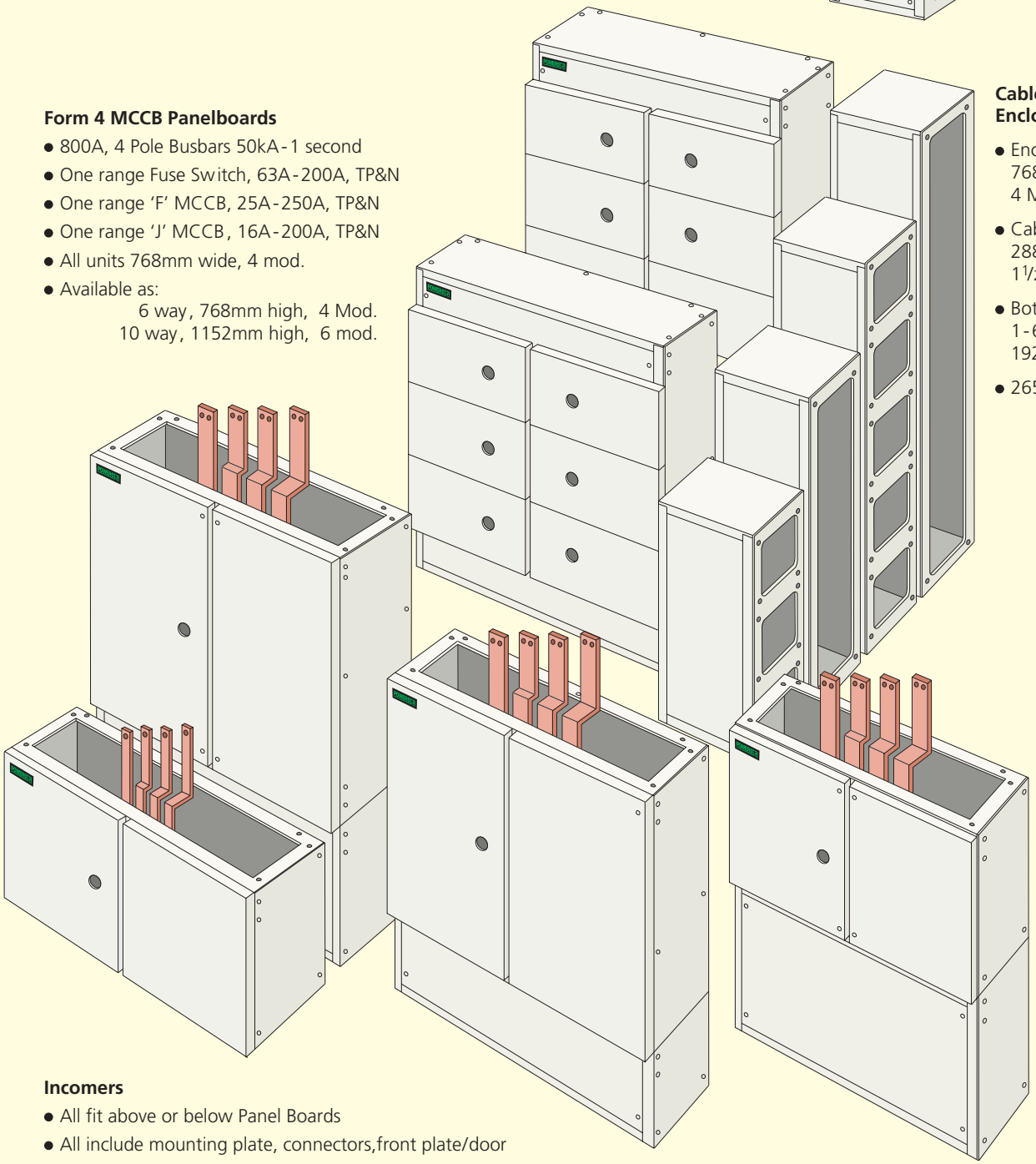


Form 4 MCCB Panelboards

- 800A, 4 Pole Busbars 50kA - 1 second
- One range Fuse Switch, 63A - 200A, TP&N
- One range 'F' MCCB, 25A - 250A, TP&N
- One range 'J' MCCB, 16A - 200A, TP&N
- All units 768mm wide, 4 mod.
- Available as:
  6 way, 768mm high, 4 Mod.
  10 way, 1152mm high, 6 mod.

Cableways & Enclosures

- Enclosures 768mm wide, 4 Mod.
- Cableways 288mm wide, 1½ Mod.
- Both Available 1 - 6 mod. 192mm - 1152mm
- 265mm deep



Incomers

- All fit above or below Panel Boards
- All include mounting plate, connectors,front plate/door
- All suitable for - but exclude - appropriate MCCB/Fuse Switch
- All 768mm wide, 4 Mod.

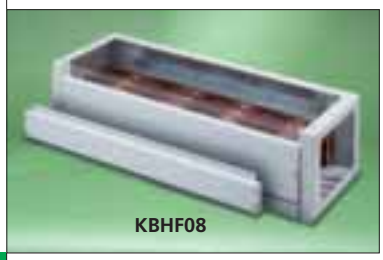
- 1 - 'J' or 'F' MCCB, 576mm high, 3 Mod.
- 1 - 'L' MCCB - 630A max, 768mm high, 4 Mod.
- 1 - 'N' MCCB - 800A max, 960mm high, 5 Mod.
- 1 - 200A Fs Sw, 576mm high, 3 Mod.
- 1 - 400A Fs Sw, 768mm high, 4 Mod.
- 1 - 800A Fs Sw, 960mm high, 5 Mod.


KP4F810


KP4S806


MCCB compartment (as supplied)


Fuse Switch compartment (as supplied)


KBHF08


KBHC08

FORM 4 MCCB & FUSE SWITCH PANEL BOARDS

'F' Frame MCCBs 25A to 250A TP 35 or 50kA

Number of Ways	Modular Height	Height mm	
6	4	768	**KP4F806**
10	6	1152	**KP4F810**

See page 162 for 'F' MCCB details
Order door interlocked handle with MCCB

'J' Frame MCCBs 16A to 200A TP or 4P 25kA

Number of Ways	Modular Height	Height mm	
6	4	768	**KP4J806**
10	6	1152	**KP4J810**

See page 161 for 'J' MCCB details
Order door interlocked handle with MCCB

Fuse Switch 63A to 200A TP&N

Number of Ways	Modular Height	Height mm	
6	4	768	**KP4S806**
10	6	1152	**KP4S810**

See page 141 for Fuse Switch details
Door interlocked handle and neutral link are supplied with the Fuse Switch

- Fully enclosed 4 Pole 800A Busbars, 50kA for 1 second - ASTA.
- Each device (MCCB or Fuse Switch) within its own compartment, is operated by door interlocked handle. Form 4 Type 2, BSEN 60439-1
- MCCB Panel Boards include Neutral link assembly pre-fitted to each outgoing way. On 'J' Frame boards this link can be removed to accommodate 4P MCCBs.
- See page 226 for Cabling information.
- All Panel Boards supplied with 2 Gland/End Plates and 2-Side Plates, prefitted.

CABLING ACCESSORIES, SPARES

Add on 'Flag' Busbar extension kit	**KPXEF4***
Gland/End Plate, Steel (standard), Enclosure width	**KXEEPS**
Gland/End Plate, Brass, Enclosure width	**KXEEPB**
Gland/End Plate, Aluminium (4mm), Enclosure width	**KXEEPA**

***Required if connecting to both ends of Panel Board's Busbar system.

Gland/End Plate, Steel (Standard), Cableway width	**KXCEPS**
Gland/End Plate, Brass, Cableway width	**KXCEPB**
Gland/End Plate, Aluminium (4mm), Cableway width	**KXCEPA**
Cross Strap, Standard, Enclosure width	**KXECSS**
Cross Strap, Standard, Cableway width	**KXCCSS**

HORIZONTAL BUSBAR SYSTEM & CONNECTIONS

An 800A 4 Pole, Busbar system that uses enclosures the same width and depth as Form 2 Panel Boards. The Busbars are pre-punched to accommodate various sets of copper conections allowing horizontal as well as vertical extension of Panel Board units.
Fault rated, 50kA for 1 second - ASTA.

Horizontal 800A 4 Pole Main Busbar	**KBHF08**
Cableway Busbar (allows cables to pass through)	**KBHC08**
800A Horizontal Busbar connecting links	**KBHL08**

Connections from all Form 4 Panel Boards to 800A Horizontal Busbar	**KCP4808**

Busbar supplied with 1-Gland/End Plate, 2-Side Plates and 1 Cross Strap.


KI4N1


KI4S4


KBHF08 fitted above
KP4FB06 using KCP4808


KEC2 KEE2

INCOMING UNITS, FORM 4 MCCB & FUSE SWITCH PANEL BOARDS

These units use the same modular enclosures as the Form 4 Panel Boards. The Incoming MCCB assemblies include Neutral link, Form 4 shielding and all preformed interconnections. Incoming Fuse Switch assemblies include Form 4 shielding and all preformed interconnections. They do Not, however, include the incoming device - this must be ordered separately. As with the Panel Board, the incoming device is housed within its own compartment, behind a hinged door and is operated by a door mounted interlocked operating handle.

Incoming assemblies are suitable for fixture above or below Form 4 Panel Boards.

	Mod Height	Height mm	
Assembly to accommodate 1- 'N' Frame, TP MCCB, Max rating 800A Front Flat Terminal MCCB only See page 164 for MCCB details Order Door Interlocked handle with MCCB	5	960	**KI4N1**
Assembly to accommodate 1- 'L' Frame, TP/4P MCCB, Max rating 630A See page 163 for MCCB details Order Door Interlocked handle with MCCB	4	768	**KI4L1**
Assembly to accommodate 1- 'F' Frame, TP MCCB, Max rating 250A See page 162 for MCCB details Order Door Interlocked handle with MCCB	3	576	**KI4F1**
Assembly to accommodate 1- 'J' Frame, TP/4P MCCB, Max rating 200A See page 161 for MCCB details Order Door Interlocked handle with MCCB	3	576	**KI4J1**
Assembly to accommodate 1- 800 Amp, TPN/4P Fuse Switch See page 141 for Fuse Switch details Door Interlocked handle supplied with Fuse Switch	5	960	**KI4S8**
Assembly to accommodate 1- 400A, TPN/4P Fuse Switch See page 141 for Fuse Switch details Door Interlocked handle supplied with Fuse Switch	4	768	**KI4S4**
Assembly to accommodate 1- 200A, TPN/4P Fuse Switch See page 141 for Fuse Switch details Door Interlocked handle supplied with Fuse Switch	3	576	**KI4S2**

- To accommodate 4 Pole MCCBs the prefitted Neutral Link must be removed.
- Fuse Switches supplied with Neutral Link, Handle & Terminal Shroud.
- All Incoming Units supplied with 1-Gland/End Plate, 2-Side Plates and 1-Cross Strap.
- See page 226 for Cabling information

INDIVIDUAL ENCLOSURES AND CABLEWAYS

Enclosures are 768mm wide (4 mod). Cableways are 288mm wide (1½ mod). Both units are 265mm deep and have slotted sides to allow horizontal access to any adjacent unit. Both are supplied with screw fixed front cover plates.

Modular Height	Height mm	Cableway 288mm W	Enclosure 768mm W	Side Plate
1	192	**KEC1**	**KEE1**	**KXESP1**
2	384	**KEC2**	**KEE2**	**KXESP2**
3	576	**KEC3**	**KEE3**	**KXESP3**
4	768	**KEC4**	**KEE4**	**KXESP4**
5	960	**KEC5**	**KEE5**	**KXESP5**
6	1152	**KEC6**	**KEE6**	**KXESP6**

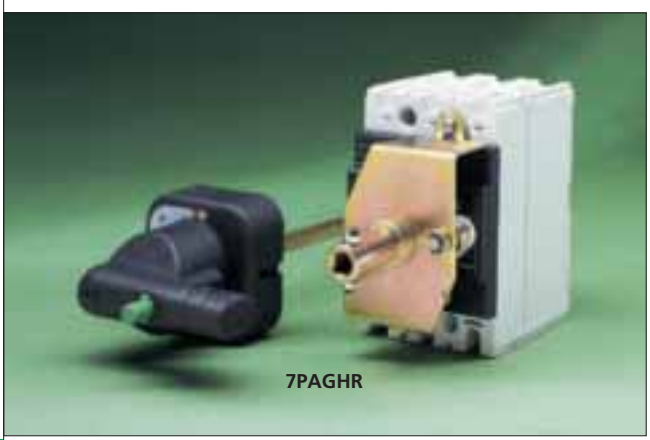
- Enclosures supplied with 1-Gland/End Plate, 2 Side Plates and 1-Cross Strap.
- Cableways supplied with 1-Gland/End Plate and 1-Cross Strap.

POWERSTAR

MOULDED CASE CIRCUIT BREAKERS

Five Frame sizes, 16A to 1600A with a full range of Accessories and Enclosures

- 'G': 16-125A, 16/25kA, 1, 3 & 4 Pole
- 'J': 16-200A, 25kA, 1, 3 & 4 Pole
- 'F': 25-250A, 35/50kA, 3 Pole
- 'L': 250-800A, 32/50kA, 3 & 4 Pole
- 'N': 800-1600A, 50kA, 3 Pole



G FRAME MCCBs

16kA Rating	1 Pole LIST No
16	**7PBGB116**
20	**7PBGB120**
25	**7PBGB125**
32	**7PBGB132**
40	**7PBGB140**
50	**7PBGB150**
63	**7PBGB163**
80	**7PBGB180**
100	**7PBGB1100**
125	**7PBGB1125**

16kA Rating	3 Pole LIST No	4 Pole LIST No
16	**7PBGB316**	**N/A**
20	**7PBGB320**	**N/A**
25	**7PBGB325**	**7PBGB3N25**
32	**7PBGB332**	**7PBGB3N32**
40	**7PBGB340**	**7PBGB3N40**
50	**7PBGB350**	**7PBGB3N50**
63	**7PBGB363**	**7PBGB3N63**
80	**7PBGB380**	**7PBGB3N80**
100	**7PBGB3100**	**7PBGB3N100**
125	**7PBGB3125**	**7PBGB3N125**

25kA Rating	3 Pole LIST No	4 Pole LIST No
16	**7PBGN316**	**N/A**
20	**7PBGN320**	**N/A**
25	**7PBGN325**	**7PBGN3N25**
32	**7PBGN332**	**7PBGN3N32**
40	**7PBGN340**	**7PBGN3N40**
50	**7PBGN350**	**7PBGN3N50**
63	**7PBGN363**	**7PBGN3N63**
80	**7PBGN380**	**7PBGN3N80**
100	**7PBGN3100**	**7PBGN3N100**
125	**7PBGN3125**	**7PBGN3N125**

- Fixed Magnetic and Thermal elements
- MCCB supplied with cage type cable clamps
- 70mm^2 max cable size
- Front fitting electrical accessories
- Dual size escutcheon cutout 46mm or 79mm high

G FRAME MCCB ACCESSORIES ELECTRICAL

Shunt Trip Assembly (Inc. Aux Sw)	LIST No
18-30V ac: 12-36 V dc	**7PAGT030**
110-120V ac:	**7PAGT110**
220-240V ac:	**7PAGT240**
380-415V ac:	**7PAGT415**

Auxilliary Contacts (Changeover)	
1-N/O 1-N/C	**7PAGA1**
2-N/O 2-N/C	**7PAGA2**

G FRAME MCCB ACCESSORIES GENERAL

	LIST No
Terminal Shrouds 1 Pole	**7PAGS1**
Terminal Shrouds 3 Pole	**7PAGS3**
Interphase Barrier (2)	**7PAGIB**
Dolly Locking Device	**7PAGDLD**
Padlock for above	**748**
Door Interlock Rotary Handle	**7PAGHR**

J FRAME MCCBs

Current Rating (A)	Minimum Setting (A)	1 Pole LIST No	3 Pole LIST No	3 P SwN LIST No
16	13	**7PBJN116**	**7PBJN316**	**N/A**
20	16	**7PBJN120**	**7PBJN320**	**N/A**
25	17.5	**7PBJN125**	**7PBJN325**	**7PBJN3N25**
32	22.5	**7PBJN132**	**7PBJN332**	**7PBJN3N32**
40	28	**7PBJN140**	**7PBJN340**	**7PBJN3N40**
50	35	**7PBJN150**	**7PBJN350**	**7PBJN3N50**
63	44	**7PBJN163**	**7PBJN363**	**7PBJN3N63**
80	56	**7PBJN180**	**7PBJN380**	**7PBJN3N80**
100	70	**7PBJN1100**	**7PBJN3100**	**7PBJN3N100**
125	88	**7PBJN1125**	**7PBJN3125**	**7PBJN3N125**
160	112	**7PBJN1160**	**7PBJN3160**	**7PBJN3N160**
200	140	**7PBJN1200**	**7PBJN3200**	**7PBJN3N200**
Switch Disconnector		**7PDJ1200**	**7PDJ3200**	**7PDJ3N200**

JM FRAME MOTOR DUTY MCCBs

'JM' Frame MCCBs have higher magnetic settings than standard 'J' Frame

Current Rating (A)	MInimum Setting (A)	3 Pole LIST No
50	35	**7PBJN3M50**
63	44	**7PBJN3M63**
80	56	**7PBJN3M80**
100	70	**7PBJN3M100**
125	88	**7PBJN3M125**
160	112	**7PBJN3M160**
200	140	**7PBJN3M200**

- 25kA Icu at 415V ac
- Fixed Magnetic elements
- 70 – 100% adjustable thermal elements (25A-200A)
- 80 – 100% adjustable thermal elements (16A-20A)
- Cable clamps at both ends, 150mm^2 max
- Switched neutral on LHS

J FRAME MCCB ACCESSORIES ELECTRICAL

Shunt Trip Assembly (Inc. Aux Sw)*	LIST No
18-30V ac: 12-36 V dc	**7PAJT030**
110-120V ac:	**7PAJT110**
220-240V ac:	**7PAJT240**
380-415V ac:	**7PAJT415**
Under Voltage Release (Inc. Power Pack)*	
110-120V ac (Inc. transformer)	**7PAJU110**
220-240V ac	**7PAJU240**
380-440V ac (Inc. transformer)	**7PAJU440**
Auxilliary Contacts (Changeover)	
1-N/O 1-N/C	**7PAJA1**
2-N/O 2-N/C	**7PAJA2**

* Shunt trip or UVR can be fitted - not both

J FRAME MCCB ACCESSORIES GENERAL

	LIST No
Terminal Shroud 1 Pole	**7PAJS1**
Terminal Shroud 3 Pole	**7PAJS3**
Terminal Shroud 4 Pole	**7PAJS4**
Interphase Barrier (2)	**7PAJIB**
Cable Clamps-Set of 3	**7PAJCC**
Cable Extension Set (to accomodate 185/240mm cable sockets)	**7PAJEC**
Neutral Link Assembly	**7PAJN**
Dolly Locking Device	**7PAJDLD**
Padlock for above	**7PAFJP**
Door Interlock Rotary Handle	**7PAJHR**

'J' MCCBs used with System Powerstar

Form 2:
- 1P and 3P MCCBs only
- Terminal Shrouds if required, outgoing side only

Form 4:
- 3P and 4P MCCBs only
- Door Interlock handle must be ordered for each MCCB used
- Terminal Shrouds, if required outgoing side only

F FRAME MCCBs

Current Rating (A)	3 Pole LIST No 35 kA	3 Pole LIST No 50 kA
25	**7PBFS325**	**7PBFH325**
32	**7PBFS332**	**7PBFH332**
40	**7PBFS340**	**7PBFH340**
50	**7PBFS350**	**7PBFH350**
63	**7PBFS363**	**7PBFH363**
80	**7PBFS380**	**7PBFH380**
100	**7PBFS3100**	**7PBFH3100**
125	**7PBFS3125**	**7PBFH3125**
160	**7PBFS3160**	**7PBFH3160**
200	**7PBFS3200**	**7PBFH3200**
250	**7PBFS3250**	**7PBFH3250**
Switch Disconnector		
250		**7PDFH3250**

- Conforms to BS EN 60947-2
- 35/50 kA Icu at 415 V ac
- Fixed Magnetic
- Fixed Thermal
- Double Insulated
- Terminal capacity 150mm²
- Standard supply, 3x cable clamps - 150mm² 3x M8 studs
- Front fitting electrical accessories

F FRAME MCCB ACCESSORIES ELECTRICAL

Shunt Trip Assembly (Inc. Aux Sw)*	LIST No
18-30V ac: 12-36 V dc	**7PAFT030**
110-120V ac:	**7PAFT110**
220-240V ac:	**7PAFT240**
380-415V ac:	**7PAFT415**
Under Voltage Release (Inc. Power Pack)*	
110-120V ac (Inc. transformer)	**7PAFU110**
220-240V ac	**7PAFU240**
380-440V ac (Inc. transformer)	**7PAFU440**
* Shunt trip or UVR can be fitted - Not both	
Auxilliary Contacts (Changeover)	
1-N/O 1-N/C	**7PAFA1**
2-N/O 2-N/C	**7PAFA2**

F FRAME MCCB ACCESSORIES GENERAL

	LIST No
Terminal Shroud 3 Pole	**7PAFS3**
Interphase Barrier (2)	**7PAFIB**
Cable Clamps-Set of 3	**7PAFCC**
Cable Extension Set (to accomodate 185/240mm cable sockets)	**7PAJEC**
Neutral Link Assembly	**7PAFN**
Dolly Locking Device	**7PAFDLD**
Padlock for above	**7PAFJP**
Door Interlock Rotary Handle	**7PAFHR**

'F' MCCBs used with System Powerstar

Form 2: • Terminal Shrouds if required, outgoing side only

Form 4: • Door Interlock handle must be ordered for each MCCB used
• Terminal Shrouds, if required outgoing side only


7PBLS3N400


7PDLH3400


7PALNDLD


7PALIB


7PALN4


7PALHR

LS FRAME MCCBs

Current Rating (A)	Minimum Setting (A)	3 Pole LIST No	3 P SwN LIST No
250	175	**7PBLS3250**	**7PBLS3N250**
315	220	**7PBLS3315**	**7PBLS3N315**
400	280	**7PBLS3400**	**7PBLS3N400**
500	350	**7PBLS3500**	**7PBLS3N500**
630	440	**7PBLS3630**	**7PBLS3N630**
800	560	**7PBLS3800**	**7PBLS3N800**

- Conforms to BS EN 60947-2
- 32kA Icu at 415V ac
- Magnetic adjustable 5 – 10 rated current 250A – 315A
- Magnetic adjustable 4 – 10 rated current 400A – 800A
- Thermal adjustable 70 – 100% rated current 250A – 800A

Each MCCB supplied with a set of cranked copper extension terminals,

LH FRAME MCCBs

Current Rating (A)	Minimum Setting (A)	3 Pole LIST No	3 P SwN LIST No
250	175	**7PBLH3250**	**7PBLH3N250**
315	220	**7PBLH3315**	**7PBLH3N315**
400	280	**7PBLH3400**	**7PBLH3N400**
500	350	**7PBLH3500**	**7PBLH3N500**
630	440	**7PBLH3630**	**7PBLH3N630**
800	560	**7PBLH3800**	**7PBLH3N800**
LH Frame Switch Disconnectors			
400	–	**7PDLH3400**	**7PDLH3N400**
630	–	**7PDLH3630**	**7PDLH3N630**
800	–	**7PDLH3800**	**7PDLH3N800**

- Conforms to BS EN 60947-2
- 50kA Icu at 415V ac
- Magnetic adjustable 5 – 10 rated current 250A – 315A
- Magnetic adjustable 4 – 10 rated current 400A – 800A
- Thermal adjustable 70 – 100% rated current 250A – 800A

Each MCCB supplied with a set of cranked copper extension terminals,

LH Frame Load connections (bottom), and Line connections (top) must be observed to obtain 50kA rating.

Switch neutral fitted on left hand side.

L FRAME MCCB ACCESSORIES ELECTRICAL

Shunt Trip Assembly (Inc. Aux Sw)	LIST No
18-30V ac: 12-36 V dc	**7PALT030**
110-120V ac:	**7PALT110**
220-240V ac:	**7PALT240**
380-415V ac:	**7PALT415**
Under Voltage Release (Inc. Power Pack)	
110-120V ac (Inc. transformer)	**7PALU110**
220-240V ac	**7PALU240**
380-440V ac (Inc. transformer)	**7PALU440**
Auxilliary Contacts (Changeover)	
1-N/O 1-N/C	**7PALA1**
2-N/O 2-N/C	**7PALA2**

L FRAME MCCB ACCESSORIES GENERAL

	LIST No
Interphase Barrier (2)	**7PALIB**
Dolly Locking Device	**7PALNDLD**
Padlock for above	**7PALNP**
Neutral Link Assembly 400A	**7PALN4**
Neutral Link Assembly 800A	**7PALN8**
Set of 3 Copper Extension Terminals	**7PALEC**
Key Interlock - Factory Fitted	**7PALHC**
Door Interlock Rotary Handle	**7PALHR**

'L' MCCBs used with System Powerstar Incomer Housings

Form 2: • 3P or 4P as required

Form 4: • 3P or 4P as required. Door Interlock handle must be ordered for each MCCB used

N FRAME MCCBs

Front Flat Terminals Current Rating (A)	3 Pole with Front Terminals LIST No
800	**7PBNH3800FF**
1000	**7PBNH31000FF**
1250	**7PBNH31250FF**
1600	**7PBNH31600FF**

Switch Disconnectors	
800 Amp	**7PDN3800FF**
1250 Amp	**7PDN31250FF**
1600 Amp	**7PDN31600FF**

Rear 'T' Terminals Current Rating (A)	3 Pole with Rear Terminals LIST No
800	**7PBNH3800TT**
1000	**7PBNH31000TT**
1250	**7PBNH31250TT**
1600	**7PBNH31600TT**

Switch Disconnectors	
1250 Amp	**7PDN31250TT**
1600 Amp	**7PDN31600TT**

- Conforms to BS EN 60947-2
- 50kA Icu at 415V ac
- Magnetic adjustable (See chart on page 237)
- Thermal adjustable (See chart on page 237)
- See page 236 for Front Flat and Rear 'T' Terminal details

N FRAME MCCB ACCESSORIES ELECTRICAL

Shunt Trip Assembly (Inc. Aux Sw)	LIST No
18-30V ac: 12-36 V dc	**7PANT030**
110-120V ac:	**7PANT110**
220-240V ac:	**7PANT240**
380-415V ac:	**7PANT415**

Under Voltage Release (Inc. Power Pack)	
110-120V ac (Inc. transformer)	**7PANU110**
220-240V ac	**7PANU240**
380-440V ac (Inc. transformer)	**7PANU440**

Auxilliary Contacts (Changeover)	
1-N/O 1-N/C	**7PANA1**
2-N/O 2-N/C	**7PANA2**

N FRAME MCCB ACCESSORIES GENERAL

	LIST No
Dolly Locking Device	**7PALNDLD**
Padlock for above	**7PALNP**
Neutral Link Assembly 800A	**7PANN08**
Neutral Link Assembly 1600A	**7PANN16**
Key Interlock - factory fitted	**7PANHC**
Door Interlock Rotary Handle	**7PANHR**

'N' MCCBs used with System Powerstar

Form 2: • 3P MCCB, front flat, only

Form 4: • 3P MCCB, front flat only
• Door Interlock handle must be ordered for each MCCB used

7PGPG3N as supplied

7PGPG4P as supplied

7PGPJ3N with 'J' MCCB fitted

7PGPF3N with 'F' MCCB fitted

7PGPL3N with 'L' MCCB fitted

GENERAL PURPOSE MCCB ENCLOSURES

Order MCCBs separately.

G FRAME

	LIST No
Suitable for SP or TP MCCB; fitted with integral Neutral link	**7PGPG3N**
Suitable for 4P MCCB	**7PGPG4P**

J FRAME

	LIST No
Suitable for SP or TP MCCB; fitted with integral Neutral link	**7PGPJ3N**
Suitable for 4P MCCB	**7PGPJ4P**
Additional Cable Spreader Box	**19100CSB**

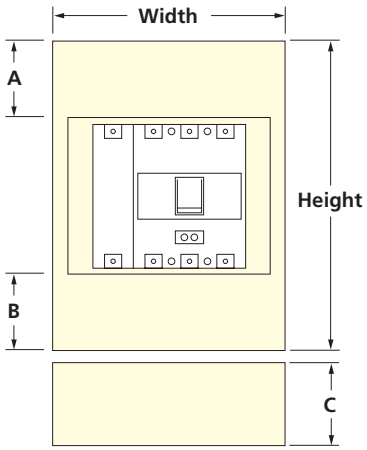
F FRAME

	LIST No
Suitable for TP MCCB; fitted with integral Neutral link	**7PGPF3N**
Additional Cable Spreader Box	**19100CSB**

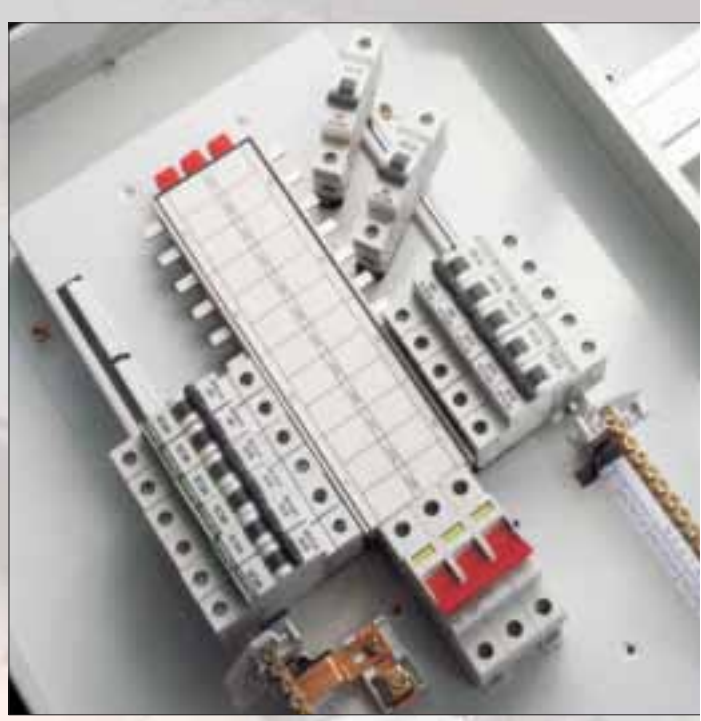
L FRAME

	LIST No
Suitable for TP MCCB; fitted with integral Neutral link	**7PGPL3N**
Suitable for 4P MCCB	**7PGPL4P**
Additional Cable Spreader Box	**19200CSB**

- Surface mounting Sheet Steel Enclosures
- Removable, screw fixed, front cover plates
- IP31
- Paint finish RAL7035



Frame Size	Width	Height	Depth	A	B	Add on CSB C
G	158	325	136	75	130	N/A
J	262.5	420	170	130	130	105
F	262.5	420	170	115	115	105
L	420	735	230	205	205	210

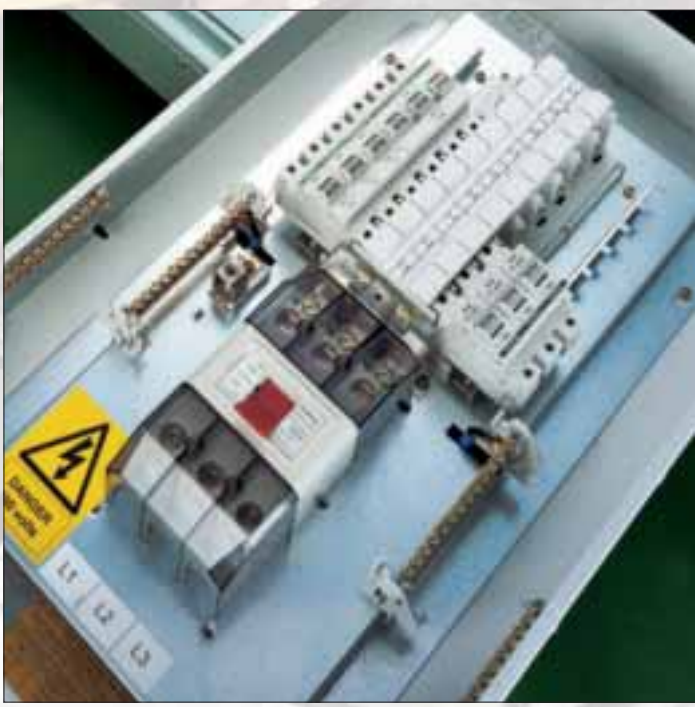


Loadstar

Powerstar 125

Assembly and Factory fitting of all the standard catalogue items, including:

- Incoming Devices
- Outgoing MCCBs
- DIN Rail and Control Devices
- Meter Packs



Polestar

Factory assembly and fitting of all the standard catalogue items, including:

- Incoming Devices
- Outgoing MCBs
- DIN Rail and Control Devices
- Meter Packs

Specialised Customisation Including:

- IP66 Boards
- Non Standard variants

FACTORY-BUILT ASSEMBLIES

The Crabtree standard product range is complemented by extensive facilities for the design and manufacture of factory-built assemblies. Made to exacting standards, Crabtree design, engineer and build distribution equipment, from custom MCB boards for specific applications, to modular switchboards.

System Powerstar

System Powerstar

Factory assembly and fitting of all the standard catalogue items,

- Form 2 Panel Boards, with outgoing 'J' or 'F' Frame MCCBs
- Incoming MCCBs, Switch Disconnectors or Fuse Switches
- Form 4 Panel Boards with outgoing 'J' or 'F' Frame MCCBs, 63A to 200A Fuse Switches
- Incoming MCCBs, Switch Disconnector or Fuse Switches
- Specialised Panels incorporating Horizontal Busbar Systems, MCCBs and Fuse Switches

Our Technical Services staff will provide advice and quotations for the application of Crabtree products, co-ordinating them with your project requirements.

L1
L2
L3

C50

MCBs AND DISTRIBUTION BOARDS

The tried and trusted Magnetic/Hydraulic mechanism of the C50 remains as before, albeit in a slightly reduced range. The Enclosure system for the C50 MCBs however, has undergone some dramatic change.

The old enclosure system with separate Enclosure/ Interior and 'dished front plates is being phased out. Current stocks, once exhausted, will not be replaced.

The New C50 Enclosure System utilises a modern style enclosure with doors fitted as standard, but will only be available in assembled format with 100A or 200A Incoming Isolators prefitted.


C08/3/100


C04/3/200


C06/1/100

TP&N DISTRIBUTION BOARDS, TYPE B (NEW ENCLOSURE)

Assembled boards only, with hinged door & catch

TP Outgoing	List No
100A TP Main Isolator Fitted	
4	**C04/3/100**
6	**C06/3/100**
8	**C08/3/100**
10	**C10/3/100**
12	**C12/3/100**

For flush mounting add suffix /F

200A TP Main Isolator Fitted	
4	**C04/3/200**
6	**C06/3/200**
8	**C08/3/200**
10	**C10/3/200**
12	**C12/3/200**

All boards supplied as standard with hinged outer door and catch (lock extra), and removable top/bottom gland plates
100A Isol 50mm^2 max
200A Isol 120mm^2 max
For flush mounting add suffix /F

SP&N DISTRIBUTION BOARDS, TYPE A (NEW ENCLOSURE) STEEL

Assembled boards only, with hinged door & catch

SP Outgoing ways	List No
100A DP Main Isolator Fitted	
6	**C06/1/100**
9	**C09/1/100**
12	**C12/1/100**

For flush mounting add suffix /F	
Extra for cylinder lock to replace catch- new boards only	**16CL**

TP & N DISTRIBUTION BOARDS TYPE B (ORIGINAL ENCLOSURE)

AVAILABLE ONLY WHILST STOCKS LAST

100A TPN Old Type

	Without Isolator			**With** Isolator		
No. of TP Ways	Box & Interior	Front Plates & Cover Surface	Flush	Box & Interior	Front Plate & Cover Surface	Flush
4	**4/4**	**36/1**	**36/3**	**4/48**	**36/18**	**36/38**
6	**6/4**	**39/1**	**39/3**	**6/48**	**39/18**	**39/38**
8	**8/4**	**37/1**	**37/3**	**8/48**	**37/18**	**37/38**
10	**10/4**	**40/1**	**40/3**	**10/48**	**40/18**	**40/38**
12	**12/4**	**38/1**	**38/3**	**Complete Board:**		**162/18**

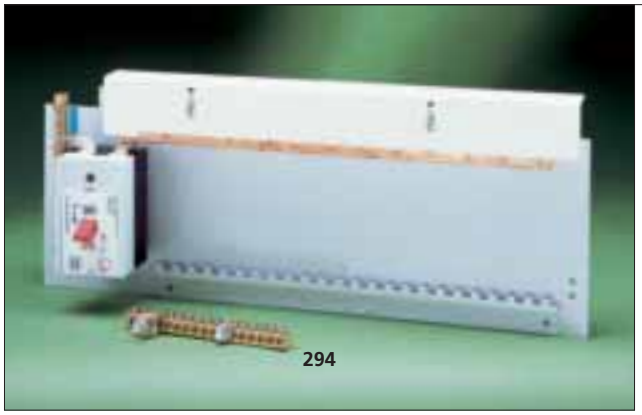
200A TPN Old Type with Isolator Fitted

4 Way	**154/1/200**	8 Way	**158/1/200**		
6 Way	**156/1/200**	10 Way	**160/1/200**	12 Way	**162/1/200**

CONSUMER UNIT, SINGLE DP ISOLATOR (ORIGINAL ENCLOSURE) STEEL

SP Ways	Box & Interior	Front Plate only Surface	Flush	Front Plate & Cover Surface	Flush
6	**6/1**	**30**	**30/2**	**30/1**	**30/3**
9	**9/1**	**31**	**31/2**	**31/1**	**31/3**
12	**12/1**	**32**	**32/2**	**32/1**	**32/3**

If hinged cover is required as lockable add 9 to Front Plate List No.


294

BACKPLATES AND PAN ASSEMBLIES

Single Pole Type A

SP Ways	Cons Unit Interior c/w 100A DP Isol
4	**291**
6	**292**
9	**293**
12	**294**

SP Pan Assemblies include Phase, Neutral & Earth.


Single Pole MCB Triple Pole MCB

MINIATURE CIRCUIT BREAKERS

Current Rating A	Single Pole MCB	Triple Pole MCB
2.5	**50/025**	**N/A**
5	**50/05**	**53/65**
10	**50/10**	**53/10**
15	**50/15**	**53/15**
20	**50/20**	**53/20**
30	**50/30**	**53/30**
40	**50/40**	**53/40**
50	**50/50**	**53/50**
60	**50/60**	**53/60**

- MCBs Type C (5-10 In)
- 4.5kA
- BSEN 60898
- 16mm² Terminals


100/SW3 200/22B

SWITCH DISCONNECTORS

100A DP As used in Consumer Unit	**80/1**
200A TP As Used in 200A TP DBs	**200/22B**
100A TP As Used in 100A TP DBs	**100/SW3**

INDIVIDUAL ENCLOSURES

Metal 4 Pole Enclosure	**4/1**

C50 MCB & DISTRIBUTION BOARD ACCESSORIES

MCB Locking Device (Universal)	**MCBLD**
Standard MCB Terminal Clamp - 16mm²	**90**
Heavy Duty Tunnel Clamp - 35mm²	**90/1**
Moulded Single Pole Blank Plate - Brown	**191/1**


191/1

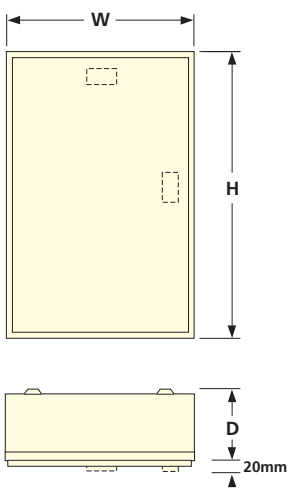

200/22B


MCBLD fitted


4/1

	W	H	D
C04/3/100	430	650	140
C06/3/100	430	675	140
C08/3/100	430	815	140
C10/3/100	430	815	140
C12/3/100	430	895	140
C04/3/200	430	650	140
C06/3/200	430	675	140
C08/3/200	430	675	140
C10/3/200	430	815	140
C12/3/200	430	895	140
C06/1/100	286	229	95
C09/1/100	336	229	95
C12/1/100	431	229	95

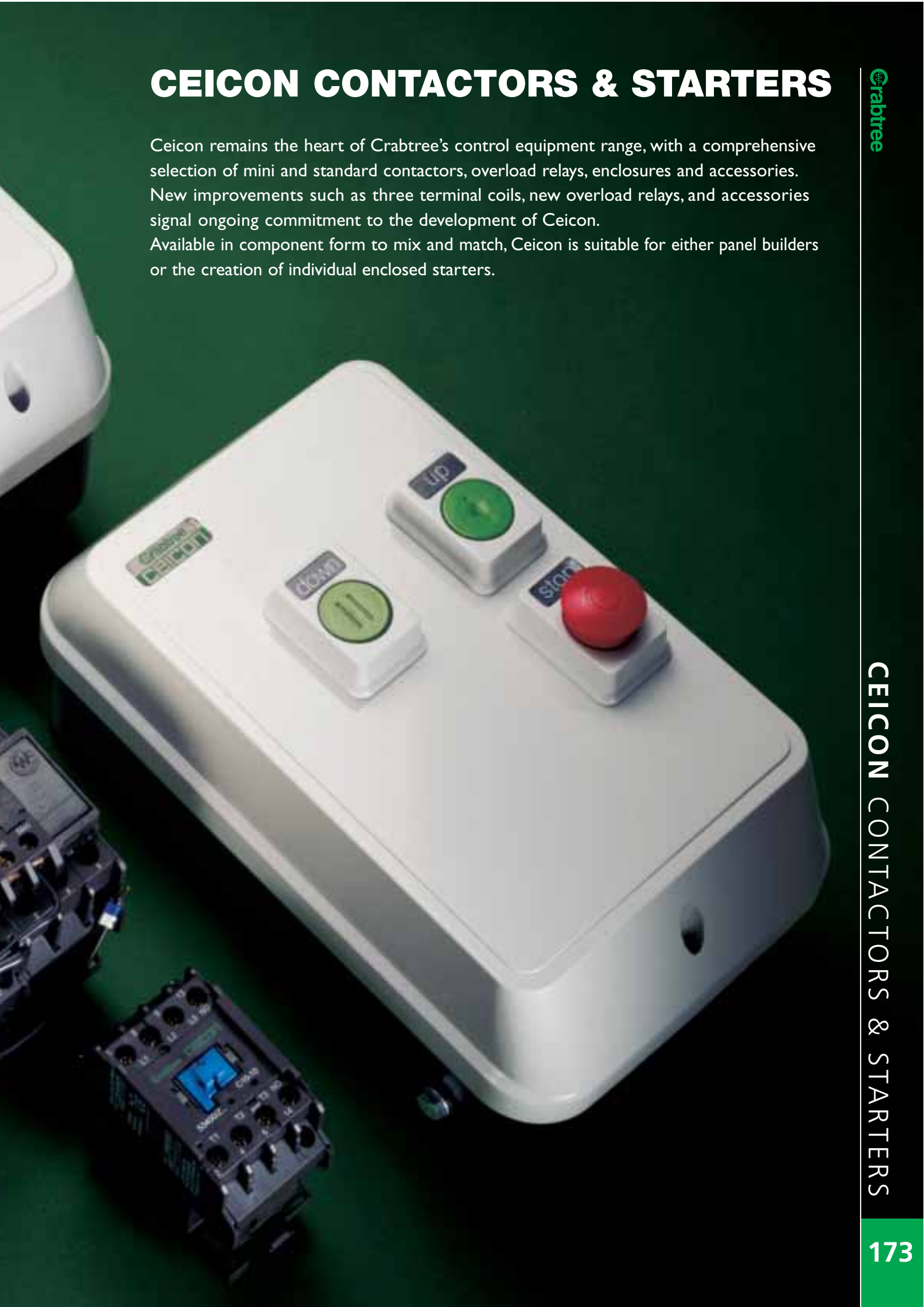
Add 50mm to W for Flush




reset
start
OFF

CEICON CONTACTORS & STARTERS

Ceicon remains the heart of Crabtree's control equipment range, with a comprehensive selection of mini and standard contactors, overload relays, enclosures and accessories. New improvements such as three terminal coils, new overload relays, and accessories signal ongoing commitment to the development of Ceicon.
Available in component form to mix and match, Ceicon is suitable for either panel builders or the creation of individual enclosed starters.



DIRECT-ON-LINE STARTERS up to 40A

- For example DOL starter, motor rating 4kW at 400/415V 3ph, contactor with 220/240V coil, enclosure with start/stop buttons & integral motor circuit switch: overload relay **55500/MC**, contactor **53400/ZB**, enclosure **55011/AA0**.

1 Locate the kW, HP or Full Load Current of the motor and select the overload relay.

2 Choose the contactor with the appropriate coil voltage (alternative coils see page 181).

3 Choose the enclosure with the required pushbuttons (with or without MCS).


55500/MC


53400/ZB


55001/AA0 55011/AA0

Overload relay				Direct-on contactor		Enclosure		
Approx motor rating at 400/415V 3ph		Full load current (A)		Coil voltage 50Hz	LIST No	Pushbutton arrangement	LIST No	
kW	**HP**	min–max	LIST No					
0.06	0.08	0.15-0.25	**55500/BC**					
0.12	0.16	0.24-0.4	**55500/CC**					
0.18	0.25	0.38-0.63	**55500/DC**	**C10**				
0.25	0.33	0.6-1	**55500/FC**	24V	**53400/ZP**			
0.55	0.75	0.96-1.6	**55500/GC**	110V	**53400/ZM**			
1.1	1.5	1.5-2.5	**55500/HC**	230V	**53400/ZB**			
1.5	2	2.4-4	**55500/JC**	400V	**53400/ZJ**	Start & Stop	**55001/AA0***	
2.2	3	3.8-6.3	**55500/KC**			None	**57001/AA1**	
4	5.5	6-10	**55500/MC**			Reset only	**57001/AA2**	
4	5.5	6–10	**55500/MC**	**C14**		Start & Stop	**55011/AA0***	*with Motor Circuit Switch*
5.5	7.5	6–10	**55500/MC**	110V	**54400/ZM**	None	**57011/AA1**	
				230V	**54400/ZB**	Reset only	**57011/AA2**	
				400V	**54400/ZJ**			
7.5	10	9.6–16	**55500/NC**	**C19**				
				110V	**55400/ZM**			
				230V	**55400/ZB**			
				400V	**55400/ZJ**			
11	15	15–25	**57500/PC**	**C22**		Start & Stop	**57001/AA0***	
				110V	**56400/ZM**	None	**57001/AA1**	
				230V	**56400/ZB**	Reset only	**57001/AA2**	
				400V	**56400/ZJ**			
15	20	24–40	**57500/QC**	**C30**		Start & Stop	**57011/AA0***	*with Motor Circuit Switch*
				110V	**57400/ZM**	None	**57011/AA1**	
				230V	**57400/ZB**	Reset only	**57011/AA2**	
				400V	**57400/ZJ**			

Enclosures: IP66, Steel back box with Polycarbonate front.

***** *Start Switch 40600/XA included*

Dimensions – see pages 260–261 Specification – see pages 241–242 Alternative coils see page 181
Wiring diagrams – see page 243

REVERSING STARTERS up to 40A

- For example reversing direct-on starter, motor rating 4kW at 400/415V 3ph, contactor with 380/415V coil, enclosure with 3 push buttons & integral motor circuit switch: overload relay **55500/MC**, contactor **53200/0J**, enclosure **55011/AC0**.

1 Locate the kW, HP or Full Load Current of the motor and select the overload relay.

2 Choose the contactor with the appropriate coil voltage (alternative coils see page 181).

3 Choose the enclosure with the required pushbuttons (with or without MCS).


55500/MC


53200/0J


55001/AB0 55011/AC0

Overload relay				Reversing contactor		Enclosure		
Approx motor rating at 400/415V 3ph		Full load current (A)		Coil voltage		Push-button		
kW	**HP**	min–max	LIST No	50Hz	LIST No	arrangement	LIST No	
0.06	0.08	0.15-0.25	**55500/BC**					
0.12	0.16	0.24-0.4	**55500/CC**					
0.18	0.25	0.38-0.63	**55500/DC**	**C10**				
0.25	0.33	0.6-1	**55500/FC**	24V	**53200/0P**			
0.55	0.75	0.96-1.6	**55500/GC**	110V	**53200/0M**			
1.1	1.5	1.5-2.5	**55500/HC**	230V	**53200/0B**	I, II & 0	**55001/AB0**	
1.5	2	2.4-4	**55500/JC**	400V	**53200/0J**	None	**57001/AB1**	
2.2	3	3.8-6.3	**55500/KC**			Reset only	**57001/AB2**	
4	5.5	6-10	**55500/MC**					
4	5.5	6–10	**55500/MC**	**C14**		I, II & 0	**55011/AC0**	*with Motor Circuit Switch*
5.5	7.5	6–10	**55500/MC**	110V	**54200/0M**	None	**57011/AC1**	
				230V	**54200/0B**	Reset only	**57011/AC2**	
				400V	**54200/0J**			
7.5	10	9.6–16	**55500/NC**	**C19**				
				110V	**55200/0M**			
				230V	**55200/0B**			
				400V	**55200/0J**			
11	15	15–25	**57500/PC**	**C22**		I, II & 0	**57001/AB0**	
				110V	**56200/0M**	None	**57001/AB1**	
				230V	**56200/0B**	Reset only	**57001/AB2**	
				400V	**56200/0J**			
15	20	24–40	**57500/QC**	**C30**		I, II & 0	**57011/AC0**	*with Motor Circuit Switch*
				110V	**57200/0M**	None	**57011/AC1**	
				230V	**57200/0B**	Reset only	**57011/AC2**	
				400V	**57200/0J**			

Enclosures: I, II & 0 versions supplied with separate legends FOR/REV, UP/DOWN, OPEN/CLOSE
C10-C30 are IP66, comprising Steel back box and Polycarbonate cover.

Dimensions – see pages 260–261 Specification – see pages 241–242 Alternative coils – see page 181
Wiring diagrams – see page 244

STAR-DELTA STARTERS up to 69A

- For example star-delta starter, motor rating 7.5kW at 380/415V AC3, contactor with 380/415V coil, enclosure with start/stop push buttons & integral motor circuit switch: overload relay **55500/MC**, star-delta contactor **55300/0J**, enclosure **55011/AD0**.

1 Locate the kW, HP or Full Load Current of the motor and select the overload relay.

2 Choose the contactor with the appropriate coil voltage (alternative coils see page 181).

3 Choose the enclosure with the required pushbuttons (with or without MCS).


55500/MC


55300/0J


55001/AC0


55011/AD0

Overload relay				Star-delta contactor		Enclosure		
Approx motor rating at 400/415V 3ph		Full load current (A)		Coil voltage		Push-button		
kW	**HP**	min–max	LIST No	50Hz	LIST No	arrangement	LIST No	
2.2	3	4.1-6.9	**55500/JC**	**C19**		Start & Stop	**55001/AC0**	
4	5.5	6.5-10.9	**55500/KC**	110V	**55300/0M**	None	**57001/AC1**	
7.5	10	10.3-17.2	**55500/MC**	230V	**55300/0B**	Reset only	**57001/AC2**	
11	15	16.5-27.6	**55500/NC**	400V	**55300/0J**	Start & Stop	**55011/AD0**	*with Motor Circuit Switch*
						None	**57011/AD1**	
						Reset only	**57011/AD2**	
20	25	25.9-43.3	**57500/PC**	**C22**		Start & Stop	**57001/AC0**	
				110V	**56300/0M**	None	**57001/AC1**	
				230V	**56300/0B**	Reset only	**57001/AC2**	
				400V	**56300/0J**			
22	30	25.8-43.1	**57500/PC**	**C30**		Start & Stop	**57011/AD0**	*with Motor Circuit Switch*
25	34	41.5-69	**57500/QC**	110V	**57300/0M**	None	**57011/AD1**	
				230V	**57300/0B**	Reset only	**57011/AD2**	
				400V	**57300/0J**			

STAR-DELTA APPLICATION

For Star-delta units, the overload relay is connected in the delta loop and carries the motor winding current only in the delta mode.
For ease of selection the ratings shown in the table are the equivalent motor (nameplate) currents.
The overload relay scale is calibrated for direct-on line use and therefore its scale must be set to 0.58 times rated motor (nameplate) current.
Star-Delta units are fitted with an electronic timing relay with a minimum adjustment range from 3 to 45 seconds.
Timers have an additional built-in delay period between the 'star' contactor opening and the 'delta' contactor closing.

Enclosures: C19-C30 are IP66, comprising Steel back box and Polycarbonate cover.

Dimensions – see pages 260–261 Specification – see pages 241–242 Alternative coils/timers – see page 181
Wiring diagrams – see page 245

HEATING & LIGHTING CONTACTORS up to 85A

- For example TP & N enclosed contactor with switch disconnector to control 85A heating load (AC1 duty): contactor **49400/XB**, enclosure **49011/AA1**, If additional space is required in the enclosure for control modules etc, select enclosure **49011/AE1**.

1 Check rating required and select contactor.

2 Choose enclosure with or without MCS for one contactor or two (or one with space for Control Module).


49400/XB


49001/AA1


49011/AE1

Contactor **Enclosure**

AMPS PER POLE

Heating and general mixed loads. Slightly Inductive AC1 duty (A)	Mixed Load (A)	LIST No. (220/240V) 50Hz Coil	For one contactor with or without Switch disconnector LIST No.	For two contactors (or one with space for control module) with or without Switch disconnector LIST No.
25	15	**Type C19** **55400/ZB**	**57001/AA1** **57011/AA1** } with Switch disconnector	**57001/AB1** **57011/AC1** } with Switch disconnector
35	20	**Type C30** **57400/ZB**		
75	45	**Type C43** **48400/XB**	**49001/AA1** **49011/AC1** } with Switch disconnector	**49001/AC1*** **49011/AE1*** } with Switch disconnector
85	55	**TypeC63** **49400/XB**		

ACCESSORIES

Paralleling links available for single pole switching for the following contactors (2 sets required per contactor):


49000/ZK

Contactor type	Current carrying capacity Amps (AC1 duty)	Maximum cable size	LIST No.
C30	60	16mm²	**56000/ZK**
C43/C63	120	50mm²	**49000/ZK**

Neutral terminal Space is provided for a proprietory neutral terminal.

C3/C7 TRIPLE POLE MINI CONTACTORS


41400/ZB

TYPE	RATING PER POLE (A) AC1 non inductive	AC3 inductive	Approx motor kW rating at 400/415V 3Ph	AUXILIARY POLES N/O	N/C	LIST No
AC COIL OPERATED						
C3	20	5	2.2	1	–	**41400/Z_**
				–	1	**41400/Y_**
C7	20	8.5	4	1	–	**42400/Z_**
				–	1	**42400/Y_**

C3/C7 AUXILIARY CONTACT BLOCKS


40000/M2X 40000/M4B

4A 400/415V AC15

TYPE	CONTACTS Normally open	Normally closed	Mini Contactor LIST No	Control Relay LIST No
2 pole	–	2	**40000/M2S** ▲	**40600/C2S** ▲
	1	1	**40000/M2X** ▲	**40600/C2X** ▲
	2	–	–	**40600/C2T** ▲
4 pole	–	4	–	**40600/C4N** ◆
	1	3	**40000/M4P** ◆	**40600/C4P** ◆
	2	2	**40000/M4B** ◆	**40600/C4B** ◆
	3	1	**40000/M4C** ◆	**40600/C4C** ◆
	4	–	–	**40600/C4A** ◆

▲ *Suitable for C3 & C7* ◆ *Suitable for C7 only*

*Enclosures: IP66, comprising Steel back box and Polycarbonate cover. Except * which comprise IP55 Steel cabinet and hinged gasketed door.*

Dimensions – see pages 260–261 Specification – see pages 241–242 Alternative coils – see page 181

DIRECT-ON (TRIPLE POLE) CONTACTORS

TYPE	RATING PER POLE (A) AC1 non inductive	AC3 inductive	Approx motor **kW** rating at 400/415V 3Ph	AUXILIARY POLES N/O	N/C	LIST No
AC COIL OPERATED						
C10	20	8.3	4	1	–	**53400/Z_**
				–	1	**53400/Y_**
C14	20	11	5.5	1	–	**54400/Z_**
				–	1	**54400/Y_**
C19	25	14	7.5	1	–	**55400/Z_**
				–	1	**55400/Y_**
C22	35	22	11	–	–	**56400/Z_**
C30	40	28	15	–	–	**57400/Z_**

Coil selection *Complete the List No. of the contactor selected by adding the appropriate coil code letter. Preferred ac coils are* ***M*** *– 110/125V 50/60Hz,* ***B*** *– 220/240V 50/60Hz,* ***J*** *– 380/415V 50/60Hz with a full listing on page 181.*


C10 C14 C19


C22 C63

REVERSING CONTACTORS

with electrical & mechanical Interlock

TYPE	RATING AC3	Approx motor **kW** rating at 400/415V 3Ph	LIST No
AC COIL OPERATED			
C10	8.3	4	**53200/0_**
C14	11	5.5	**54200/0_**
C19	14	7.5	**55200/0_**
C22	22	11	**56200/0_**
C30	28	15	**57200/0_**

Coil selection *Complete the List No. of the contactor selected by adding the appropriate coil code letter.*
Preferred ac coils are ***M*** *– 110/125V 50/60Hz,* ***B*** *– 220/240V 50/60Hz,* ***J*** *– 380/415V 50/60Hz with a full listing on page 181.*


C10/C14/C19 C22/C30


C43/C63

STAR-DELTA CONTACTORS

with electrical & mechanical Interlock

TYPE	RATING AC3	Approx motor **kW** rating at 400/415V 3Ph	LIST No
AC COIL OPERATED			
C19	24	11	**55300/0_**
C22	38	20	**56300/0_**
C30	48	25	**57300/0_**

Star Delta Contactors include electronic timer (adjustable 3–45s).
Coil selection *Complete the List No. of the contactor selected by adding the appropriate coil code letter. Preferred ac coils are* ***M*** *– 110/125V 50/60Hz,* ***B*** *– 220/240V 50/60Hz,* ***J*** *– 380/415V 50/60Hz with a full listing on page 181.*


C19


C43/C63

OVERLOAD RELAYS

- Direct mounting onto appropriate contactor type.
- Differential tripping mechanism.
- Ambient temperature compensation.
- Manual/Automatic reset facility.
- Front mounted current adjustment dial.



APPROX MOTOR **kW** RATING		APPROX MOTOR **HP** RATING					
Single phase 220/240V	Three phase 380/415V	Single phase 220/240V	Three phase 380/415V	Overload relay rating (A)	C3-C7 contactor mounting	C10-C19 contactor mounting	C22-C30 contactor mounting
DIRECT-ON STARTING				LIST NO.	LIST NO.	LIST NO.	
–	0.12	–	0.16	0.3–0.45	**51500/DC**	–	–
–	0.18	–	0.25	0.45–0.67	**51500/EC**	–	–
–	0.25	–	0.33	0.67–1.0	**51500/FC**	–	–
0.06	0.37	0.08	0.5	1.0–1.5	**51500/GC**	–	–
0.09	0.55	0.12	0.75	1.4–2.1	**51500/HC**	–	–
0.12	0.75	0.16	1.0	1.8–2.7	**51500/IC**	–	–
0.25	1.1	0.33	1.5	2.4–3.6	**51500/JC**	–	–
0.37	1.5	0.50	2.0	3.5–5.0	**51500/KC**	–	–
0.55	2.2	0.75	3.0	4.0–6.0	**51500/LC**	–	–
0.75	4	1.0	5.5	5.5–8.5	**51500/MC**	–	–
1.5	5.5	2.0	7.5	8.5–12.5	**51500/NC**	–	–
–	0.06	–	0.08	0.15-0.25	–	**55500/BC**	**57500/BC**
–	0.12	–	0.16	0.24-0.40	–	**55500/CC**	**57500/CC**
–	0.18	–	0.25	0.38-0.63	–	**55500/DC**	**57500/DC**
–	0.25	–	0.33	0.6-1.0	–	**55500/FC**	**57500/FC**
0.06	0.55	0.08	0.75	0.96-1.6	–	**55500/GC**	**57500/GC**
0.09	1.1	0.12	1.5	1.5-2.5	–	**55500/HC**	**57500/HC**
0.37	1.5	0.50	2	2.4-4.0	–	**55500/JC**	**57500/JC**
0.75	2.2	1.0	3	3.8-6.3	–	**55500/KC**	**57500/KC**
1.1	4	1.5	5.5	6.0-10.0	–	**55500/MC**	**57500/MC**
2.2	7.5	3.0	10	9.6-16.0	–	**55500/NC**	**57500/NC**
3.7	11	5.0	15	15.0-25.0	–	–	**57500/PC**
5.5	22	7.5	30	24.0-40.0	–	–	**57500/QC**
3	11	4	15	13-21	–	–	–
3.7	12.5	5	17	16-25	–	–	–
4	15	5.5	20	21-32	–	–	–
5.5	22	7.5	30	25-40	–	–	–
7.5	25	10	34	32-50	–	–	–
–	30	–	40	50-63	–	–	–
STAR-DELTA STARTING							
–	2.2	–	3	4.1-6.9	–	**55500/JC**	**57500/JC**
–	4	–	5.5	6.5-10.9	–	**55500/KC**	**57500/KC**
–	7.5	–	10	10.3-17.2	–	**55500/MC**	**57500/MC**
–	11	–	15	16.5-27.6	–	**55500/NC**	**57500/NC**
–	22	–	30	25.8-43.3	–	–	**57500/PC**
–	37	–	50	41.5-69	–	–	**57500/QC**
–	18.5	–	25	23-36	–	–	–
–	22	–	30	28-43	–	–	–
–	30	–	40	37-55	–	–	–
–	37	–	50	44-69	–	–	–
–	45	–	60	56-87	–	–	–
–	59	–	80	87-109	–	–	–

Dimensions – see pages 260–261 Specification – see pages 241–242 Wiring diagrams – see pages 243–245 Tripping characteristics – see page 242

CONTROL RELAYS

4A 400/415V AC15

TYPE	CONTACTS N/O	N/C	LIST No
AC coil operation			
C10	4	–	**53600/A_**
	2	2	**53600/B_**
	3	1	**53600/C_**

Coil selection *Complete the List No. of the control relay selected by adding the appropriate coil code letter.*
Preferred ac coils are ***M*** *– 110/125V 50/60Hz,* ***B*** *– 220/240V 50/60Hz,*
J *– 380/415V 50/60Hz*
as per list on page181 for C10-30.


53600/AB

MECHANICAL INTERLOCKS

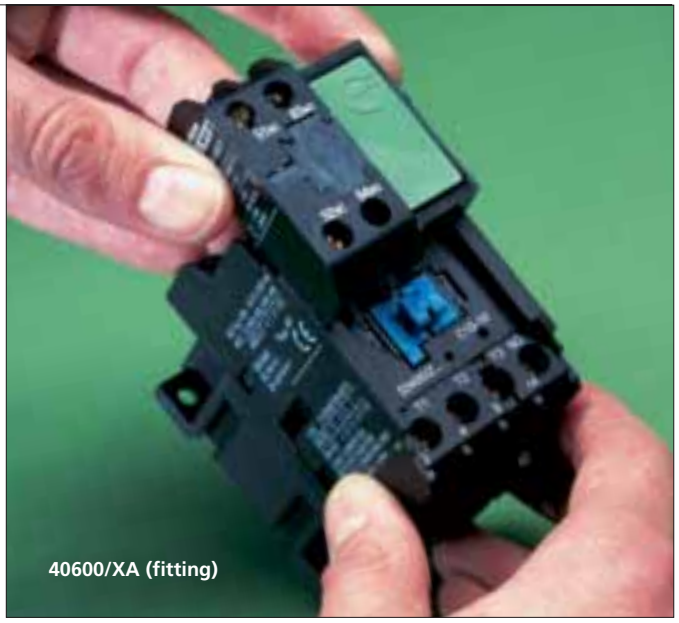
TYPE	LIST No
C10–C30	**57000/4**
C43/C63	**49000/4**


57000/4


49000/4

AUXILIARY CONTACTS

- Top mounting units are 4A 400/415V AC15
- Side mounting are 3A 400/415V AC15
- Units for enclosed starters have a "shallow" design to reduce overall height
- Correct selection of auxiliary contact will ensure that terminal markings comply with regulations
- Use the selection table to choose the correct auxiliary contact unit to suit the contactor or control relay according to application
- Side mounting auxiliary contacts are suitable for right hand side mounting only


40600/XA (fitting)

N/O	N/C	Start Switch	Top Mounting For Open C10-C19 Contactors	Top Mounting For Open C22-C30 Contactors	Top Mounting For Open C43-C63 Contactors	Top Mounting For C10-C63 Enc. Starters	Side Mounting For C10-C19 Contactors	Side Mounting For C22-C30 Contactors	Top Mounting For Control Relays
0	1	–	–	–	–	–	**50000/D01**	**50000/E01**	–
1	0	–	–	–	–	–	**50000/D10**	**50000/E10**	–
0	4	–	–	–	–	–	–	–	**50600/A04**
4	0	–	–	–	–	–	–	–	**50600/A40**
1	1	1	–	–	–	**40600/XA**	–	–	–
0	1	1	–	–	–	**40600/XC**	–	–	–
0	2	–	**50000/A02**	**50000/B02**	**50000/C02**	–	–	–	**50600/A02**
1	1	–	**50000/A11**	**50000/B11**	**50000/C11**	**40600/XB**	–	–	**50600/A11**
1	3	–	**50000/A13**	**50000/B13**	–	–	–	–	**50600/A13**
2	2	–	**50000/A22**	**50000/B22**	–	–	–	–	**50600/A22**
3	1	–	**50000/A31**	**50000/B31**	**50000/C31**	–	–	–	**50600/A31**
2	0	–	–	–	–	–	–	–	**50600/A20**

Dimensions – see pages 260-261

SPARE AND REPLACEMENT AC OPERATING COILS

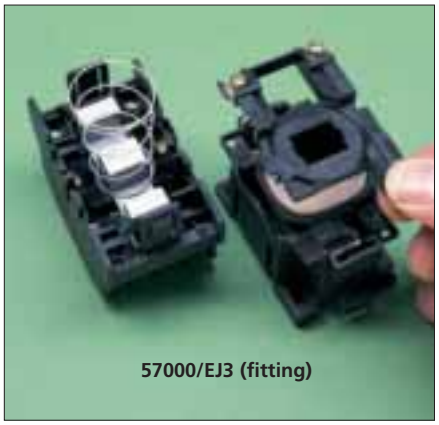
When ordering contactors or starters, the coil voltage is specified by adding to the basic list number the appropriate coil code letter from the table of coils.
e.g. if List No.54400/Z (C14 contactor) is required with a 220/240V 50/60Hz operating coil, the code letter **B** should be added, ie 54400/Z**B**.
Preferred coils (fitted to contactors and starters normally held in stock) are **M** (110/125V 50/60Hz), **B** (220/240V 50/60Hz) and **J** (380/415V 50/60Hz). Coils for other voltages and frequencies are available as outlined in the tables below.

Please note that early model C10-C30 contactors use a two terminal coil, and later models use a three terminal coil. Visual inspection of the contactor will easily show which version coil is required.



AC OPERATING COILS

Coil code	Coil rating (V) 50Hz	60Hz	2 Terminal **C10–C30** LIST No.	3 Terminal **C10–C30** LIST No.	**C43–C63** LIST No.
X	12	–	_	**57000/EX3**	–
P	24	–	**57000/EP**	**57000/EP3**	**49000/EP**
N	50	–	**57000/EN**	**57000/EN3**	**49000/EN**
M	110/125	110/125	**57000/EM**	**57000/EM3**	**49000/EM**
L	200	–	_	**57000/EL3**	–
B	220/240	220/240	**57000/EB**	**57000/EB3**	**49000/EB**
T	346	–	**57000/ET**	**57000/ET3**	–
E	365	–	_	**57000/EE3**	–
J	380/415	380/415	**57000/EJ**	**57000/EJ3**	**49000/EJ**
G	440	–	**57000/EG**	**57000/EG3**	**49000/EG**


57000/EJ3 (fitting)

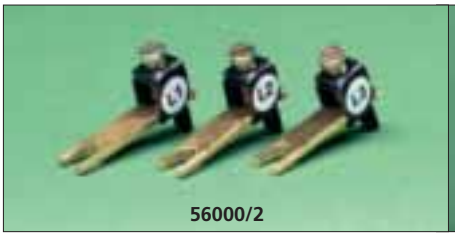
STAR–DELTA ELECTRONIC TIMER

DESCRIPTION	INPUT (V) 50/60HZ	LIST No
CEICON Electronic Timing Relay		
for star–delta contactor	50–55	**56600/QN**
supplied with 1 NC contact.	105–150	**56600/QM**
Nominal setting range 3–45 secs.	180–240	**56600/QB**
(DIN rail mounting only)	250–290	**56600/QC**
	330–400	**56600/QE**
As used with types C19–C30	380–440	**56600/QJ**
*List Nos.**55300/0_** to **57300/0_**.*	460–500	**56600/QH**

ACCESSORIES

DESCRIPTION	TYPE	LIST No
Extension terminals	C10–C19	**56000/2**
	C22-30	**57000/2**
	C43–C63	**49000/2**
Main contact sets	C43	**48000/ZA**
	C63	**49000/ZA**

One List No. comprises:
set of 6 fixed & 3 moving contacts
as required per contactor.


56000/2


48000/ZA

Dimensions – see pages 260-261

MANUAL MOTOR STARTERS

Manual Motor Starters are a new addition to the Crabtree range complimenting Ceicon. Ideal for panel builders requiring a compact solution to motor control including integral short circuit and overload protection.
An enclosure and a full range of accessories make them suitable for use as standalone starters for local control of motors on intermittent duty.

MANUAL MOTOR STARTERS

LIST No	Setting range (A)	Operating current of short-circuit release (A)	Rated ultimate short-circuit breaking capacity (IEC 947-2 EN 60947-2) and Max. backup fuse Icu (kA)/gL,aM(Δ)			
			230V	400V	500V	690V
CMS25-0.16	0.1 - 0.16	1.9	Switches are short-circuit proof for any value of prospective current *Icc*			
CMS25-0.25	0.16 - 0.25	2.6				
CMS25-0.4	0.25 - 0.4	4.4				
CMS25-0.63	0.4 - 0.63	8				
CMS25-1	0.63 - 1	11				
CMS25-1.6	1 - 1.6	19				
CMS25-2.5	1.6 - 2.5	30			3/25	2.5/20
CMS25-4	2.5 - 4	42			3/35	2.5/25
CMS25-6.3	4 - 6.3	69			3/50	2.5/35
CMS25-10	6.3 - 10	110		6/80	3/50	2.5/35
CMS25-16	10 - 16	210	6/80	4/80	2.5/63	2/35
CMS25-20	16 - 20	220	6/80	4/80	2.5/63	2/50
CMS25-25	20 - 25	330	6/80	4/80	2.5/63	2/50

ACCESSORIES

Auxiliary contacts	N/O	N/C	LIST No
	2	0	**CPS20**
	1	0	**CPS10**
	0	1	**CPS01**
	1	1	**CPS11**

Shunt Trip & Undervoltage Release	Voltage 50Hz	Shunt Trip	UVR
	24	**CA24**	**CU24**
	48	**CA48**	**CU48**
	110	**CA110**	**CU110**
	230	**CA230**	**CU230**
	400	**CA400**	**CU400**

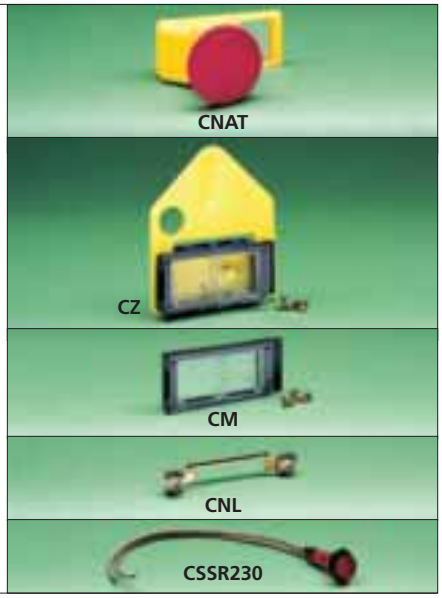
IP55 ENCLOSURE

Note: Enclosure is supplied with IP55 membrane. In the case of an Emergency Stop or padlock facility being fitted, IP rating will be IP40.

	LIST No
	CO–55

ENCLOSURE ACCESSORIES

	LIST No
Emergency Stop Pushbutton	**CNAT**
Padlocking Device	**CZ**
Pushbuttons Membrane	**CM**
Additional Neutral/Earth link	**CNL**
Signal Lamp 230V Red	**CSSR230**



Dimensions – see page 262

SILENT OPERATION INSTALLATION CONTACTORS

These are DIN rail mounted contactors with silent operation, they are ideal for mounting in Control panels, destined for either residential or commercial dwellings where quiet running is a priority. Suitable for heating, lighting, air-conditioning, motors and similar equipment.

SILENT OPERATION INSTALLATION CONTACTORS

TYPE	Thermal Rating per Pole AC1(A)	Motor Rating AC3 (kW) 230V	400V	Pole Configuration N/O	N/C		LIST No
CIK22	20	1.3 (N/O only)	–	2 1 0	0 1 2	1 Mod	**CIK22-20** **CIK22-11** **CIK22-02**
CIK24	24	2.2	4	4 3 2 0	0 1 2 4	2 Mod	**CIK24-40** **CIK24-31** **CIK24-22** **CIK24-04**
CIK40	40	5.5	11	4 3 2 0	0 1 2 4	3 Mod	**CIK40-40** **CIK40-31** **CIK40-22** **CIK40-04**
CIK63	63	8.5	15	4 3 2 0	0 1 2 4	3 Mod	**CIK63-40** **CIK63-31** **CIK63-22** **CIK63-04**
Auxiliary Contacts	230V AC15: 6	400V AC15: 4	–	–	1 2	1 0		**CHHSLA11** **CHHSLA20**

TYPE		MAXIMUM NUMBER OF LAMPS PER POLE CIK22	CIK24	CIK40	CIK63
Incandescent lamps	60W	21	25	65	85
	100W	13	15	40	50
	200W	7	7	20	25
	500W	3	3	8	10
	1000W	1	1	4	5
Energy saving lamps	7W	10	15	100	150
	11W	10	15	100	150
	15W	5	15	100	150
	20W	3	10	70	70
Halogen lamps	200W	–	5	15	20
	300W	–	3	10	13
	500W	–	2	6	8
	1000W	–	1	3	4
Low pressure sodium-vapour lamps (uncompensated)	35W	5	6	13	20
	55W	5	6	13	20
	90W	3	4	9	14
	135W	2	3	6	9
	180W	3	3	6	9
High pressure sodium-vapour lamps (uncompensated)	50W	12	12	24	38
	70W	10	10	20	30
	110W	8	7	16	25
	150W	6	5	10	16
	250W	3	3	6	10
	400W	2	2	4	6
	1000W	1	–	2	3
Low pressure sodium-vapour lamps (compensated)	35W	1	1	10	16
	55W	1	1	10	16
	90W	–	1	8	12
	135W	–	–	4	7
	180W	–	–	4	7
High pressure sodium-vapour lamps (compensated)	50W	3	3	22	33
	70W	2	3	18	27
	110W	2	2	18	27
	150W	1	1	10	16
	250W	–	1	6	9
	400W	–	–	4	7
	1000W	–	–	2	3
Fluorescent lamps (uncompensated)	18W	24	24	90	140
	36W	17	20	65	95
	58W	10	13	40	60
Fluorescent lamps (compensated)	18W	6	8	45	70
	36W	6	8	45	70
	58W	4	5	25	43
Fluorescent lamps (dual fitted)	18W	2 x 22	2 x 48	2 x 100	2 x 150
	36W	2 x 17	2 x 24	2 x 65	2 x 95
	58W	2 x 10	2 x 15	2 x 40	2 x 60
Fluorescent lamps with electronic starting device AC - operation	1 x 18W	25	35	100	140
	1 x 36W	15	20	52	75
	1 x 58W	14	19	50	72
	2 x 18W	12	17	50	70
	2 x 36W	7	10	26	38
	2 x 58W	7	9	25	36

Dimensions – see page 262

R22 22.5mm COMMAND DEVICES

The revised R22 range of command devices includes a broad range of components to offer numerous solutions to the control of low voltage circuits. A variety of popular ready assembled product combinations complete the range.

For Panel mounting select: (see inset)
1. Actuator/device
2. Legend if required
3. Contact block support
4. Front mounted contact block(s) /other device eg.lampholder

For R22 enclosure mounting select:
1. Actuator/device
2. Legend if required
3. Enclosure
4. Base mounted contact block (no contact block support is required).

INSULATED ASSEMBLED PUSH BUTTON UNITS

Supplied complete in an all-insulated IP65 enclosure with:

- Knockouts on side walls for ease of installation.
- Actuators affixed to the cover whilst the contact blocks are arranged for enclosure base mounting.
- Contact blocks, fitted with upward-facing terminals, can be pre-wired and then snapped to the enclosure base.
- Stop actuators are provided with a normally closed contact.
- Start, for, rev & selector switch actuators include a normally open contact.

DESCRIPTION	LIST No
1 Button START	**1/MB**
1 Button STOP	**1/MBS**
1 Button mushroom head STOP	**1/MBM**
1 Button mushroom head autolock STOP	**1/MBA**
1 Button mushroom head autolock STOP key reset	**1/MBAK**
Key switch 0–1	**1/MBK**
2 Button START/STOP	**2/MB**
2 Button START/mushroom head STOP	**2/MBM**
2 Button START/mushroom head autolock STOP	**2/MBA**
3 Button FOR/REV/STOP	**3/MB**
Emergency Jumbo Mushroom Head push button station	**22EV90**

Alternatively, actuator combinations to the customer's choice can be selected by ordering individual enclosures, contact blocks and actuators – R22 Range, see pages 189–191.

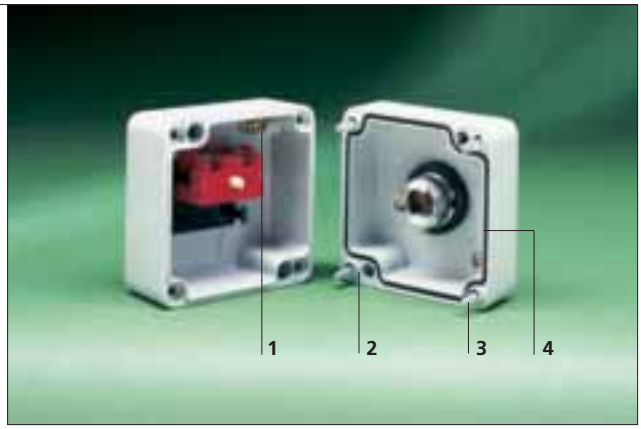
Dimensions – see page 264 Specification – see page 246

HEAVY DUTY METALCLAD ASSEMBLED PUSH-BUTTON UNITS

Supplied complete in a robust diecast enclosure with:

1 Earth terminal **2** Box & cover fixings outside gasket
3 Captive screws **4** IP65 gasket

- Stop actuators are provided with one normally closed contact.
- All other actuators have one normally open contact.



1 STATION UNITS	LIST No
1 button START	**22931/GV**
1 button STOP	**22931/RV**
Keyswitch 0–1	**22931/K2V**
Keyswitch 0–1, spring return to centre	**22931/SK2V**
Mushroom STOP	**22931/MV**
Autolock STOP	**22931/AV**
Autolock STOP, key reset	**22931/AKV**
Jumbo STOP	**22931/AJV**
Mushroom STOP with half collar shroud	**22931/MHCV**
Autolock STOP with half collar shroud	**22931/AHCV**
Autolock STOP, key reset with half collar shroud	**22931/AKHCV**

2 STATION UNITS	LIST No
UP/DOWN	**22932/UDV**
START/STOP	**22932/SV**
START/Mushroom STOP	**22932/MV**
START/Autolock STOP	**22932/AV**

3 STATION UNITS	LIST No
UP/DOWN, with Mushroom STOP	**22933/MUDV**
FOR/REV/Mushroom STOP	**22933/MFRV**
START/Mushroom STOP with Green Pilot Light, (220–240V neon)	**22933/MPLV**
4 STATION UNIT	LIST No
START/Mushroom STOP Red and Green Pilot Lights, (220–240V neons)	**22934/M2PLV**

One additional contact block can be fitted per actuator position except Autolock STOP with key reset.

Dimensions – see page 264 Specification – see page 246

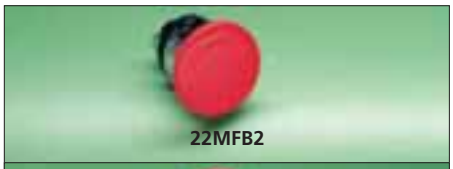
NON ILLUMINATED PUSH BUTTONS IP65

Supplied with contact block support		LIST No	
	Colour	Metal	Plastic
Flush Button	Black	**22MR1**	**22ER1**
	Red	**22MR2**	**22ER2**
	Green	**22MR3**	**22ER3**
	Yellow	**22MR4**	**22ER4**
	Blue	**22MR5**	**22ER5**
	White	**22MR6**	**22ER6**
Extended Button	Black	**22MRR1**	**22ERR1**
	Red	**22MRR2**	**22ERR2**
	Green	**22MRR3**	**22ERR3**
	Yellow	**22MRR4**	**22ERR4**
	Blue	**22MRR5**	**22ERR5**
	White	**22MRR6**	**22ERR6**
Push on - Push off Button	Black	**22MR/PP1**	**22ER/PP1**
	Red	**22MR/PP2**	**22ER/PP2**
	Green	**22MR/PP3**	**22ER/PP3**
	Yellow	**22MR/PP4**	**22ER/PP4**
	Blue	**22MR/PP5**	**22ER/PP5**
	White	**22MR/PP6**	**22ER/PP6**
Mushroom head button - 40mm	Black	**22MF1**	**22EF1**
	Red	**22MF2**	**22EF2**
	Green	**22MF3**	**22EF3**
Mushroom head with auto lock - 40mm	Red	**22MFB2**	**22EFB2**
Mushroom head with switching after auto lock (BSEN418) - 40mm	Red	**22MFBC2**	**22EFBC2**
Mushroom head with auto lock key reset - 40mm	Red	**22MFC2**	**22EFC2**
Spare Key		**22/KEY**	**22/KEY**
Push on - push off mushroom head - 40mm	Black	**22MFB/PP1**	**22EFB/PP1**
	Red	**22MFB/PP2**	**22EFB/PP2**
	Green	**22MFB/PP3**	**22EFB/PP3**
Jumbo mushroom head button - 60mm	Red	**22MFBA2**	**22EFBA2**
Reset button	White	**22MRESET**	**22RESET**

ILLUMINATED PUSH BUTTONS IP65

		LIST No	
	Colour	Metal	Plastic
Illuminated flush Button	Red	**22MRL2**	**22ERL2**
	Green	**22MRL3**	**22ERL3**
	Yellow	**22MRL4**	**22ERL4**
	Blue	**22MRL5**	**22ERL5**
	White	**22MRL6**	**22ERL6**
Push on - push off illuminated flush button	Red	**22MRL-PP2**	**22ERL-PP2**
	Green	**22MRL-PP3**	**22ERL-PP3**
	Yellow	**22MRL-PP4**	**22ERL-PP4**
	Blue	**22MRL-PP5**	**22ERL-PP5**
	White	**22MRL-PP6**	**22ERL-PP6**
Illuminated mushroom head auto lock button-40mm	Red	**22MFBL2**	**22EFBL2**
Illuminated push on - push off mushroom head button	Red	**22MFBL-PP2**	**22EFBL-PP2**
	Green	**22MFBL-PP3**	**22EFBL-PP3**
Illuminated mushroom head button	Red	**22MFL2**	**22EFL2**
	Green	**22MFL3**	**22EFL3**
Pilot light	Red	**22ML2**	**22EL2**
	Green	**22ML3**	**22EL3**
	Yellow	**22ML4**	**22EL4**
	Blue	**22ML5**	**22EL5**
	White	**22ML6**	**22EL6**
Monobloc pilot light	Red		**22ELE2**
	Green		**22ELE3**
	Yellow		**22ELE4**
	Blue		**22ELE5**
	White		**22ELE6**

Lamp not supplied = **BA9s**



SELECTOR SWITCHES

Supplied with contact block support


22MSL-L2CD


22MS1E


22MSCE/RS/Z

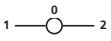
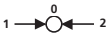
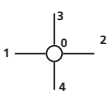
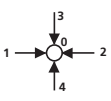
	LIST No Metal	Plastic	
Maintained left - right			
Standard selector switch (black)	**22MS1A**	**22ES1A**	
Illuminated selector switch (red)	**22MSL-L2A**	**22ESL-L2A**	
Key selector switch (black)	**22MSCA/J**	**22ESCA/J**	
Maintained middle - right			
Standard selector switch (black)	**22MS1CD**	**22ES1CD**	
Illuminated selector switch (red)	**22MSL-L2CD**	**22ESL-L2CD**	
Key selector switch (black)	**22MSCCD/J**	**22ESCCD/J**	
Momentary middle - right			
Standard selector switch (black)	**22MS1CD/R**	**22ES1CD/R**	
Illuminated selector switch (red)	**22MSL-L2CD/R**	**22ESL-L2CD/R**	
Key selector switch (black)	**22MSCCD/R/V**	**22ESCCD/R/V**	
Maintained left - middle - right			
Standard selector switch (black)	**22MS1E**	**22ES1E**	
Illuminated selector switch (red)	**22MSL-L2E**	**22ESL-L2E**	
Key selector switch (black)	**22MSCE/J**	**22ESCE/J**	
Momentary left and right			
Standard selector switch (black)	**22MS1E/RC**	**22ES1E/RC**	
Illuminated selector switch (red)	**22MSL-L2E/RC**	**22ESL-L2E/RC**	
Key selector switch (black)	**22MSCE/RC/V**	**22ESCE/RC/V**	
Maintained left - momentary right			
Standard selector switch (black)	**22MS1E/RD**	**22ES1E/RD**	
Illuminated selector switch (red)	**22MSL-L2E/RD**	**22ESL-L2E/RD**	
Key selector switch (black)	**22MSCE/RD/X**	**22ESCE/RD/X**	
Momentary left - maintained right			
Standard selector switch (black)	**22MS1E/RS**	**22ES1E/RS**	
Illuminated selector switch (red)	**22MSL-L2E/RS**	**22ESL-L2E/RS**	
Key selector switch (black)	**22MSCE/RS/Z**	**22ESCE/RS/Z**	
Spare Key	**22/KEY**		

▼ = direction of spring return (momentary)
□ = key removable position for key switches

JOY STICK SELECTOR SWITCHES


22MM2F

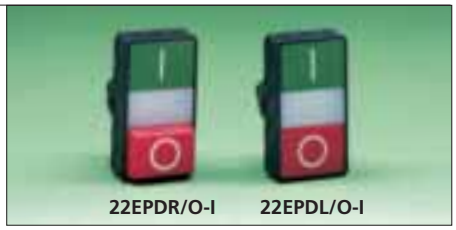

22MMB2R

	LIST No Metal	Plastic	
2 Position maintained			
Standard	**22MM2F**	**22EM2F**	
with lock release	**22MMB2F**	**22EMB2F**	
2 Position momentary			
Standard	**22MM2R**	**22EM2R**	
with lock release	**22MMB2R**	**22EMB2R**	
4 Position maintained			
Standard	**22MM4F**	**22EM4F**	
with lock release	**22MMB4F**	**22EMB4F**	
4 Position momentary			
Standard	**22MM4R**	**22EM4R**	
with lock release	**22MMB4R**	**22EMB4R**	

▼ = *direction of spring return (momentary)*

DUAL PUSH BUTTONS

Dual push button black-black with indicator	Plastic	**22EPD/F**
Dual push button green-red (extended) O-I	Plastic	**22EPDR/O-I**
Dual push button green-red O-I	Plastic	**22EPD/O-I**
Dual illuminated push button green-red O-I	Plastic	**22EPDL/O-I**
Dual illuminated push button black-black with indicator	Plastic	**22EPDL/F**
Dual illuminated push button green-red (extended) O-I	Plastic	**22EPDLR/O-I**



POWER SUPPLIES

Direct power supply	Plastic	**22ECD**
Power supply with flasher 24V	Plastic	**22ECL/24**
Power supply with flasher 130V	Plastic	**22ECL/130**
Power supply with flasher 230V	Plastic	**22ECL/230**
Power supply with transformer 110/6V	Plastic	**22ECT/110**
Power supply with transformer 230/6V	Plastic	**22ECT/230**
Power supply with transformer 400/6V	Plastic	**22ECT/400**

CONTACT BLOCKS

Contact block support	Plastic	**22EB**
Normally open front mounting (panel)	Plastic	**22EC/NO**
Normally closed front mounting (panel)	Plastic	**22EC/NC**
Normally open rear mounting (for R22 enclosure)	Plastic	**22EC/NO-EV**
Normally closed rear mounting (for R22 enclosure)	Plastic	**22EC/NC-EV**
Slimline contact block support	Plastic	**SL22EB**
Slimline normally open	Plastic	**SL22EC/NO**
Slimline normally closed	Plastic	**SL22EC/NC**
Slimline direct power supply	Plastic	**SL22ECD**

IP65 ENCLOSURES

	Plastic	Metal
Enclosure-Yellow-1 button hole	**22EVG1**	**22EVK-1/G**
Enclosure-Grey-1 button hole	**22EV1**	**22EVK-1**
Enclosure-Grey-2 button holes	**22EV2**	**22EVK-2**
Enclosure-Grey-3 button holes	**22EV3**	**22EVK-3**
Enclosure-Grey-4 button holes		**22EVK-4**

Protection cap for flush buttons	Plastic	**22ERPR**
Protection cap for illuminated flush buttons	Plastic	**22ERPL**
Protection cap for mushroom head buttons - 40mm	Plastic	**22ERPF**
Protection cap for dual push buttons	Plastic	**22ERPD**
Protection cap for extended dual push buttons	Plastic	**22ERPDR**

Legend Plate 30x40	Plastic	**22EQ8**
Legend Plate 30x50	Plastic	**22EQ15**
Legend Plate 30x40	Metal	**22EQ16**
Legend Plate 30x45	Metal	**22EQ21**

Yellow stop legend 40mm	Plastic	**22ED40**
Yellow stop legend 60mm	Plastic	**22ED60**
Yellow stop legend 90mm	Plastic	**22ED90**

LEGEND PLATES & ANCILLIARIES

Legend	List No.	Legend	List No.	Legend			List No.	Legend	List No.
OPEN	**22641**	FORWARD	**22637**		0	1	**22650**	FAST	**22643**
CLOSE	**22642**	REVERSE	**22638**	2	0	1	**22651**	SLOW	**22644**
UP	**22639**	START	**22636**	AUTO	0	MAN	**22652**	INCH	**22645**
DOWN	**22640**	STOP	**22635**		OFF	ON	**22654**	RESET	**22648**
								RUN	**22646**

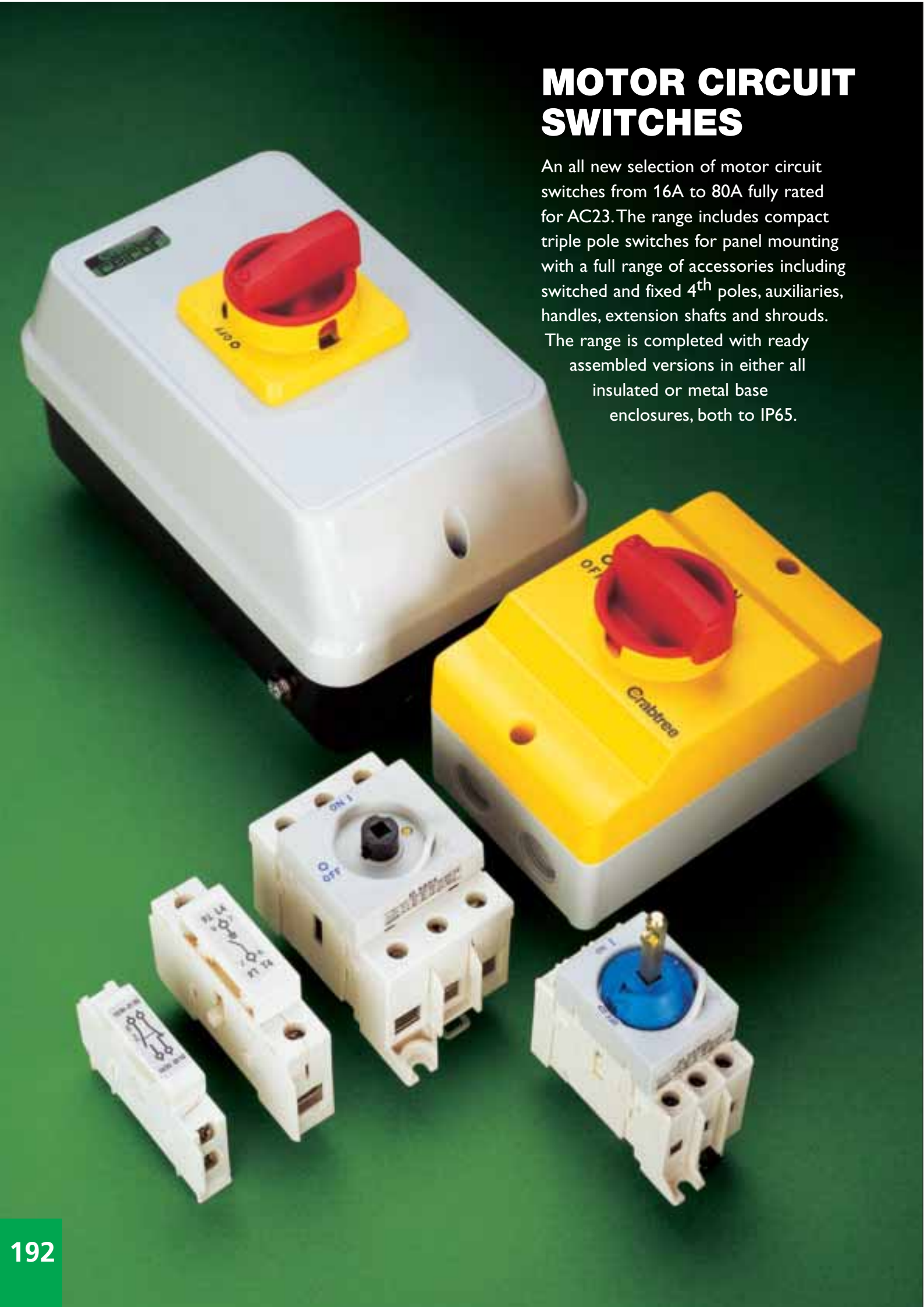
ANCILLARIES

	LIST No
Padlockable cover (for flush/extended buttons)	**22054**
Mushroom half collar shroud	**220HC/K**
Blanking plug for unused holes	**22T22**
Earth terminal for metal body actuators	**220Z**

220HC/K *suitable for all enclosures except List Nos.* **22EV2** *&* **22EV3**. *Spare keys on application.*

MOTOR CIRCUIT SWITCHES

An all new selection of motor circuit switches from 16A to 80A fully rated for AC23. The range includes compact triple pole switches for panel mounting with a full range of accessories including switched and fixed 4th poles, auxiliaries, handles, extension shafts and shrouds. The range is completed with ready assembled versions in either all insulated or metal base enclosures, both to IP65.



TP & N ENCLOSED MOTOR CIRCUIT SWITCHES

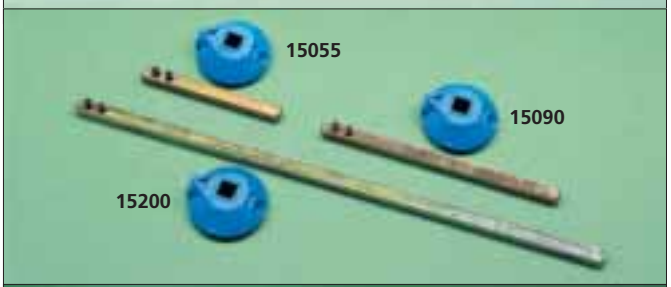
Rating (A) AC21	AC23	415V/kW	List Numbers All Insulated IP65	Box Size	Metal Base IP65	Box Size
16	16	7.5	**15416/11**	**A**	**16/MS**	**1**
25	25	9	**15425/11**	**A**	**25/MS**	**1**
32	32	11	**15432/11**	**B**	**32/MS**	**1**
40	40	11	**15440/11**	**B**	**40/MS**	**1**
63	63	15	**15463/11**	**C**	**63/MS**	**1**
80	80	22	**15480/11**	**D**	**80/MS**	**1**

PANEL MOUNTED MOTOR CIRCUIT SWITCHES

Rating (A) AC21	AC23	415V/kW	TP Switch	List Numbers Switched 4th pole	Neutral Link-63A
16	16	7.5	**15416**	**19016**	**19963**
25	25	9	**15425**	**19025**	**19963**
32	32	11	**15432**	**19032**	**19963**
40	40	11	**15440**	**19040**	**19963**
63	63	15	**15463**	**19063**	**19963**
80	80	22	**15480**	**19080**	**199125**

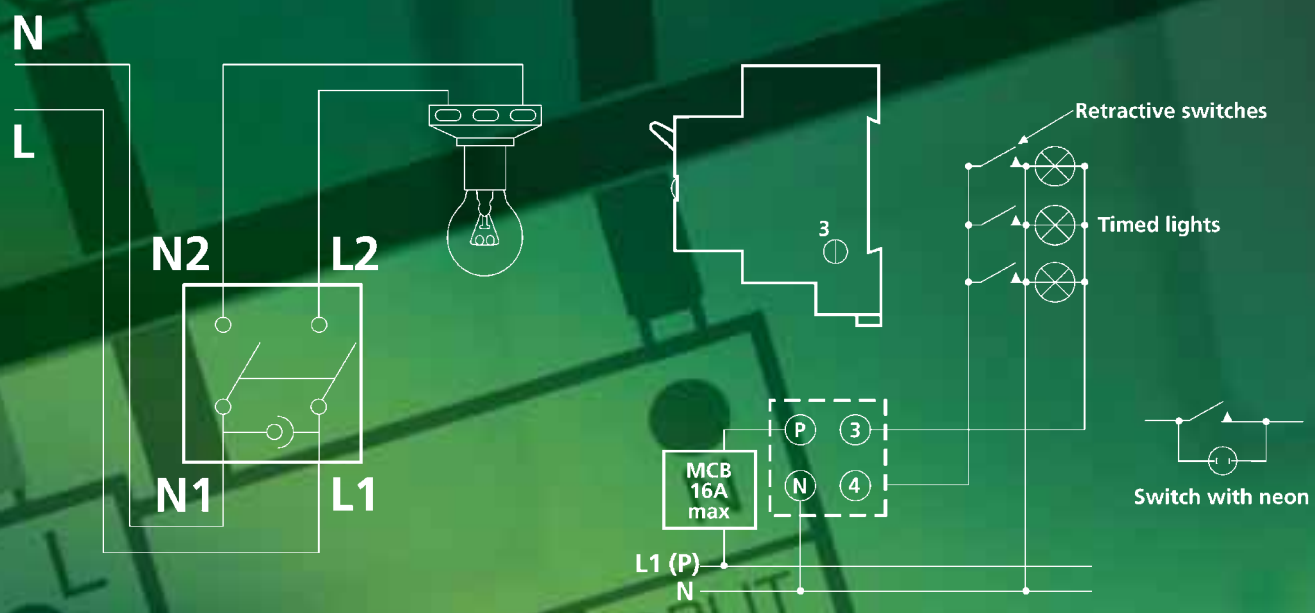
ACCESSORIES

Description		List No
Auxiliary contact (10A)		**19701**
Door Interlocked Handle Red/Yellow		**15045**
Door Interlocked Handle Black/Grey		**15046**
Shaft Extension	55mm	**15055**
Shaft Extension	70mm	**15070**
Shaft Extension	90mm	**15090**
Shaft Extension	150mm	**15150**
Shaft Extension	200mm	**15200**
Shaft Extension	300mm	**15300**
16-40A SP Terminal Shroud		**19811**
16-40A TP Terminal Shroud		**19813**
63-80A SP Terminal Shroud		**19821**
63-80A TP Terminal Shroud		**19823**



Dimensions – see page 263 *Specification – see page 246*

TECHNICAL DATA



MCBs – GENERAL

Crabtree Polestar, Loadstar and C50 range of MCBs comply fully with BSEN60898 and therefore enable the requirements of BS7671, formerly the IEE Wiring Regulations to be met.

TYPE CLASSIFICATION

BSEN60898 specifies different tripping characteristics for different types of MCB, depending on the level of overload current required to make the MCB trip out in less than 100 milliseconds. Crabtree Polestar and Loadstar MCBs are available as types B, C or D, enabling installation designers to choose an MCB with a characteristic closely matched to the circuit requirement.
C50 range is available as type C only.

FAULT LEVELS

Regulation 432–02–01 of BS7671 requires that a device providing protection against overload currents and fault currents shall be capable of breaking any overcurrent up to and including the prospective fault current at the point where the device is installed.
In domestic situations this could be as high as 16kA, in industrial situations it could be even higher.
According to regulation 434–03–01, the prospective fault current can be higher than the breaking capacity of the protective device if another protective device having the necessary breaking capacity is installed on the supply side.
This means that MCBs can be backed up by devices of greater capacity such as HRC fuses.
Crabtree Polestar Type B & C, Polestar Type D and Loadstar 'H' Types B, C & D, Loadstar 'F' Types B, C & D and C50 MCBs can protect installations with prospective currents up to 16kA, 10kA, 6kA and 4.5kA respectively without the need for back-up devices.
When providing back-up protection, consideration must be given to discrimination. Discrimination is said to occur when the device nearest the fault operates first.

AMBIENT TEMPERATURE CONSIDERATIONS

Polestar and Loadstar MCBs are calibrated to meet the requirements of BS EN 60898, 30°C Ref Calibration Temperature. At other temperatures the following rating factors should be used:

At 60°C 0.9 At 20°C 1.0 At 0°C 1.1

Adjacent thermal-magnetic MCBs should not be continuously loaded at or near their nominal rated currents when mounted in enclosures. It is good engineering practice to either apply generous de-rating factors or make provision for adequate free air between devices. In common with other manufacturers, we recommend a 66% diversity factor is applied to the MCB nominal rated current where it is intended to load adjacent MCBs continuously (in excess of 1 hour).

The C50 Range of MCBs meet the requirements of BS EN 60898 for 30°C Ref calibration temperature, but are virtually unaffected by ambient temperature variations over their working range from below freezing to 55°C

INDIRECT SHOCK RISK PROTECTION

BS7671, requires that measures are taken to protect against the risk of electric shock, which can be the result of contact with live parts.
MCBs can be used in conjunction with earthed equipotential bonding to achieve the required disconnection times of 0.4 seconds for 230V socket outlets and 5 seconds for circuits supplying fixed equipment (Regulation 413–02–08). This regulation, together with tables 41B1, 41B2 and 41D, specifies the maximum permissible earth fault loop impedance which is allowed using various protective devices. For unspecified ratings the formula of Regulation 413-02-08 should be used.

EARTH FAULT LOOP IMPEDANCES (Z_S) TO GIVE COMPLIANCE WITH BS7671 REGULATION 413-02-08 AT 230V

Maximum earth fault loop impedance in ohms for circuits supplying socket outlets (also fixed equipment in bathrooms)

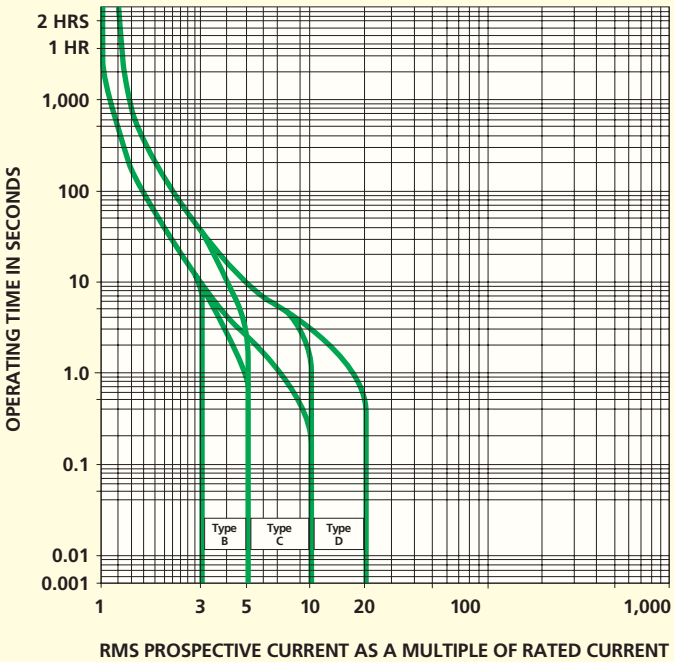
	RATINGS								
DEVICE	*5A*	*10A*	*15A*	*20A*	*30A*	*40A*	*45A*	*50A*	*60A*
Rewireable Fuse BS3036	*10.0*		*2.67*	*1.85*	*1.14*		*0.62*		
Cartridge Fuse BS1361	*10.9*		*3.43*	*1.78*	*1.20*		*0.60*		
Type C MCB BSEN60898	*4.80*	*2.40*	*1.60*	*1.20*	*0.80*	*0.60*	*0.53*	*0.48*	*0.40*

	RENARD SERIES OF RATINGS							
DEVICE	*6A*	*10A*	*16A*	*20A*	*32A*	*40A*	*50A*	*63A*
HRC fuse BS88	*8.89*	*5.33*	*2.82*	*1.85*	*1.09*	*0.86*	*0.63*	*–*
Type B MCB BSEN60898	*8*	*4.8*	*3*	*2.4*	*1.5*	*1.2*	*0.96*	*0.76*
Type C MCB BSEN60898	*4*	*2.4*	*1.5*	*1.2*	*0.75*	*0.60*	*0.48*	*0.38*
Type D MCB BSEN60898	*2.0*	*1.2*	*0.75*	*0.6*	*0.38*	*0.3*	*0.24*	*0.19*

At these values of loop impedance fuses will operate within 0.4 seconds and MCBs will operate in 0.1 second.

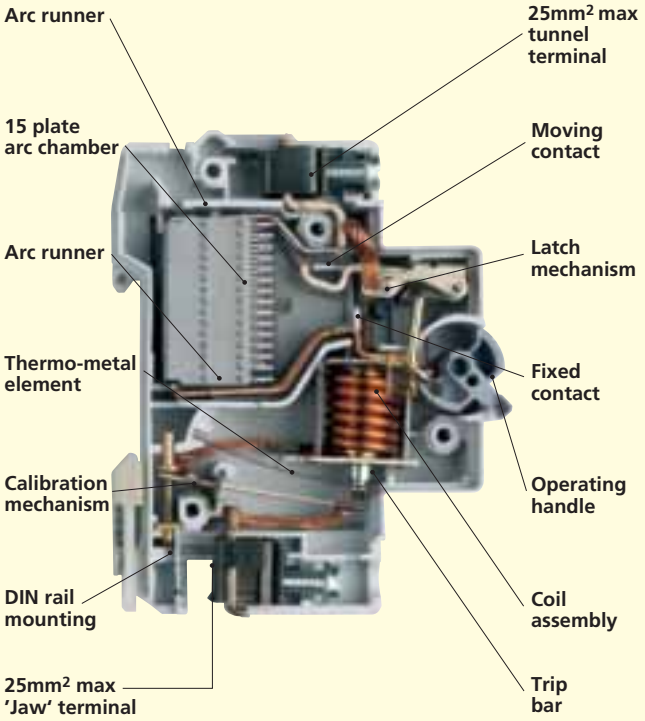
The loop impedances given in the tables should not be exceeded when the conductors are at their normal operating temperatures. If the conductors are at a different temperature when tested, the reading should be adjusted accordingly.

POLESTAR & LOADSTAR MCBs



METHOD OF OPERATION

POLESTAR



Polestar MCBs are of the thermal-magnetic current limiting type. There are 3 distinct modes of operation:

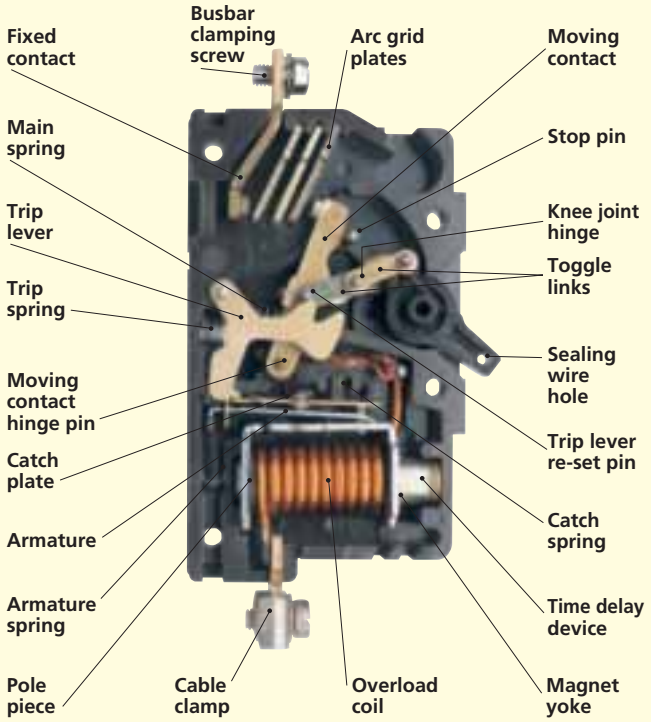
1 Small overload conditions
Small overload currents are detected by the use of a thermo-metal, which deflects at a rate in proportion to the size of the overload. The thermo-metal moves against a latching system which releases the contacts, allowing them to open under spring pressure.

2 Large overload conditions
If the overload current reaches a predetermined level (which depends on the current rating and type classification of the MCB), then the current in the coil produces a magnetic field in the solenoid which is strong enough to pull in the armature and operate the latching mechanism. Again the contacts open under spring pressure.

3 Short circuit conditions
If the fault current is of a high enough level, not only does the solenoid trip the mechanism, it forces the contacts apart very rapidly in a process known as 'hammer trip'.

Under these conditions as the contacts separate an arc is drawn between them. The combination of magnetic fields in the MCB and the flow of the current in the arc acts to push the arc along the runners and into the arc chamber where it is quickly extinguished. The rapid opening of the contacts and extinction of the arc give a total operating time that is typically 3.5–5 milliseconds.

C50



The C50 MCB employs the hydraulic/magnetic principle, the heart of which is a hermetically sealed tube filled with silicone fluid and containing a closely-fitting iron slug. In normal load conditions, the magnetic pull from the trip coil is unable to overcome the restoring force of the time delay spring, and the iron slug remains at the far end of the tube.
When an overload occurs, the magnetic field pulls the slug through the tube, the speed of travel being governed by the magnitude of the current.
As the slug nears the end of the tube, the gap in the magnetic circuit is reduced, so increasing the pull on the armature until it moves and the breaker is tripped.
If a large overload or short circuit occurs, the magnetic field generated is much greater and the armature moves without having to wait for the slug to reach the end of the tube. In this way instantaneous tripping occurs.

INSTALLATION CONDITIONS

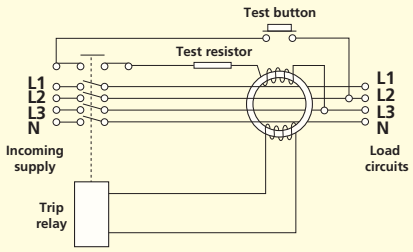
When used in Crabtree distribution boards and consumer units, Polestar and C50 MCBs are mounted on specially-designed rails for ease of installation. Polestar MCBs are also suitable for use in custom built panels, where they should be mounted on standard 35mm top hat rail to BS 5584: 1978 EN50022 giving a projection within the standard 70mm.

SPECIFICATION

- BSEN61008 (Voltage independent)
- Range of current ratings 16–100A
- Range of sensitivities 10–300mA
- Operation General Type A or AC
  Selective Type S (Time Delay)
- Pole configurations DP and TP&N
- Voltage ratings DP 230V
  TP&N 240V/415V
- Frequency ratings 50/60Hz

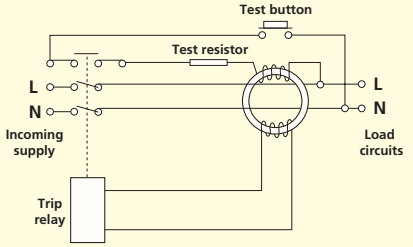
OPERATION

The RCD employs the current balance principle which involves the supply conductors to the load (phase and neutral) being wound onto a common transformer core to form the primary windings. The secondary winding of the current transformer is then connected to the electro-magnetic relay. Under healthy circuit conditions, the current in the phase conductor is equal to the current in the neutral and the vector sum of the current is zero. In the event of an earth fault, an amount of current will flow to earth, creating an out of balance situation in the transformer assembly. This out of balance is detected by the secondary winding of the transformer and at a pre-determined level of out of balance will activate the trip mechanism.
Single phase and neutral or three phase and neutral units (suitable for 3 or 4 wire systems) are available, the latter being suitable for balanced or unbalanced 3 phase loads.
The RCD trip mechanism will operate at a residual current of between 50–100% of its rated tripping current (sensitivity).



Note
Exposed installation metal work must be earthed.

RCD circuit diagram (triple pole and neutral)



Note
Exposed installation metal work must be earthed.

RCD circuit diagram (double pole)

TEST BUTTON

A test button is provided on all RCDs to enable the operation of the device to be checked.
It is recommended that an RCD is tested at least quarterly. (See BS7671) Regulation 514-12-02.

APPLICATIONS

Residual Current Devices (RCDs) may be required for one of two main reasons:
(a) to ensure the compliance of an installation with BS7671.
An RCD may be installed to meet the requirements where a high earth fault loop impedance disqualifies the use of overcurrent protection devices as a means of providing protection against indirect contact. To comply with Regulation 413-02-16 the earth fault loop impedance in ohms multiplied by the rated tripping current of the RCD in amperes must not exceed 50. With the RCD having a sensitivity of 30mA, the maximum permissible earth fault loop impedance is calculated as follows:
Z_S (max)=50/0.03=1666 Ohms

Rated tripping current of RCD	*Max permissible earth fault loop impedance*
30mA	*1666 Ohms*
100mA	*500 Ohms*
300mA	*166 Ohms*

(b) to provide a higher degree of protection than that given by direct earthing, against fire or shock risks caused by earth leakage currents.
Overcurrent protection devices cannot detect earth fault currents below their operating current. If they are the only means of earth fault protection, it is possible for sufficient earth fault current to flow undetected to constitute a fire risk.
By using an RCD, the flow of the sustained earth fault current, above the tripping current of the RCD, is prevented. The shock risk associated with these earth fault currents is also greatly reduced.
For personnel protection, a high sensitivity RCD with a maximum tripping current of 30mA should be used. This is particularly important with portable appliances where there is a danger of losing earth continuity due to damage or fatigue.
Residual current devices are completely selective in their operation. They are unaffected by parallel earth paths and are thus ideally suitable for the protection of installations in modern high density dwellings or office blocks. They are virtually tamperproof and provide a predetermined level of protection. Even if earthing conditions deteriorate substantially, they will continue to provide a higher degree of protection than would have been given by direct earthing.

SENSITIVITIES

The choice of RCD depends upon the application of the degree of protection required.
300mA provide the means to achieve compliance with the Wiring Regulations in conditions of poor earth loop impedance and also give a good level of fire risk protection.
100mA provide the means to achieve compliance with the Wiring Regulations, a high level of fire risk protection and a degree of indirect shock risk protection.
30mA for use where a higher degree of protection is required, with portable equipment or equipment used in hazardous conditions. BS7671 regulation 471-16-01 indicates that where a socket outlet may reasonably be expected to supply equipment to be used outside the zone, protection shall be afforded by a residual current device having a rated residual operating current not exceeding 30mA.
If using RCDs in series, discrimination can only be achieved by using Type S devices in series with Types A or AC. See chart below.

BSEN61008-1:1995

Type of RCD	Rated Residual Current (In) RCD to Trip between 50%-100% In	Tripping times 1x In	2x In	5x In	500Amps	Scope
Standard A & AC	Any Value, eg 10, 30, 100mA	300ms	150ms	40ms	40ms	Maximum-Trip
Time Delay (S)	Greater than 30mA, eg 100mA	500ms 130ms	200ms 60ms	150ms 50ms	150ms 40ms	Maximum-Trip Minimum-Non Trip

TRANSIENT EARTH LEAKAGE CURRENTS

All Crabtree residual current devices incorporate a high degree of immunity to tripping when subjected to transient earth leakage currents.
Such transients can occur when there is a significant level of capacitance to earth as can result from cable capacitance (particularly MICC) or RF filter networks. Crabtree RCDs are therefore less susceptible to nuisance tripping due to transient earth leakage currents.

SPECIFICATION

RCBOs (MCB/RCD)	POLESTAR	LOADSTAR
● Standards	BS4293/BS3871	BSEN61009
● Short circuit breaking capacity	10kA	10kA or 6kA
● Current rating	6 to 40A	6 to 40A
● MCB Type classification	C	C
● RCD Type classification	AC	A
● Rated voltage & frequency	240V 50Hz	240V 50Hz
● RCD Tripping principle	Electromechanical	Electronic
● Neutral configuration	Switched	Solid
● Positive contact indication	Yes	Yes
● Loss of supply Neutral	Inherent	Via functional earth circuit

APPLICATIONS

RCBOs provide both earth fault and overcurrent protection. For commercial and industrial applications a unit should be employed, utilising Type C (5–10In) classification of MCB. RCBOs, other MCB classifications available to order.
Polestar and 2 module Loadstar RCBOs employ an electromechanical operating principle.
Loadstar 1 module RCBOs employ an electronic operating principle incorporating loss of supply neutral protection via a functional earth lead.
All RCBOs give a high level of protection to individual circuits whilst exhibiting improved immunity to response caused by transients.
Two module switched neutral RCBOs have safety advantages over single module RCBOs and are exclusively used in continental Europe.

ADVANTAGES OF SWITCHED NEUTRAL RCBOs

If a neutral to earth fault occurs in a circuit fed via an RCBO with a solid neutral which is backed up by an upstream selective RCD, the selectivity or discrimination will be lost and the main RCD will also trip as it will still detect the fault which has not been cleared.

The main requirements of RCD protection are:

- Additional protection against direct contact with live parts
- Protection against direct connection with live parts
- Protection against fire in the case of a fault to earth

If a fault occurs between neutral and earth where a solid neutral RCBO is protecting a circuit, the RCBO will trip. However, as previously stated, the fault will still be in the circuit within the rest of the installation.
As the neutral will be common throughout the installation, it is possible that current could still flow through the fault and lead to a fire hazard. This would mean that the RCBO would not offer full protection against fire and therefore does not comply with one of it's main protection requirements.
Testing of outgoing circuits is easier with RCBOs incorporating a switched neutral as an electrician does not have to disconnect terminals before testing.
BS7671 requires that the main switch to a TT earthed installation must have a switched neutral.

INSTALLATION TESTING – **CAUTION**

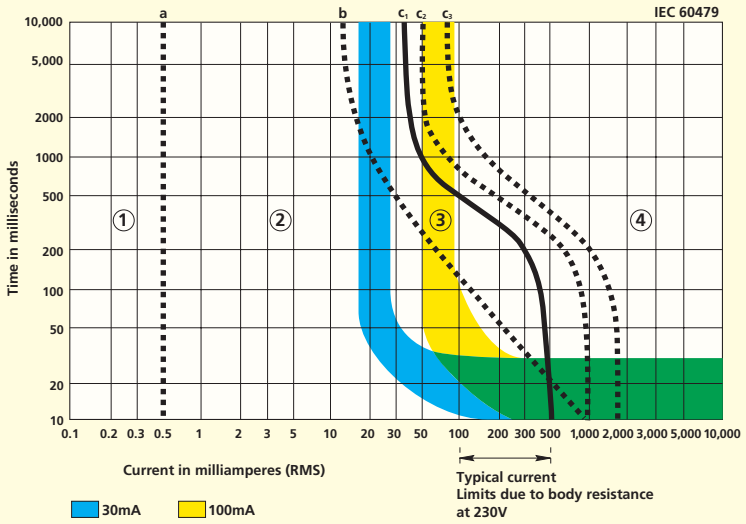
As Single Module RCBOs employ electronic components they should be disconnected when carrying out the following tests on the electrical installation:

(a) Earth fault loop impedance test
The load terminals should be disconnected if it is intended to parallel-out the unit for test purposes.
It may incur damage if mains potential is maintained on the load terminals of this unit after the trip mechanism has operated.

(b) Insulation test
Whilst RCBOs can withstand the effects of normal insulation testers without damage, false readings may be given on the test instrument. For this reason it is recommended that the device is disconnected during this test.

IEC PUBLICATION 60479 CURVES WITH CRABTREE RCD CHARACTERISTICS SUPERIMPOSED

TIME/CURRENT ZONES OF EFFECTS OF AC CURRENT (15–100Hz) ON PERSONS



Zone	Physiological effects
1	Usually no reaction effects.
2	Usually no harmful physiological effects.
3	Usually no organic damage to be expected. Likelihood of muscular contraction and difficulty of breathing, reversible disturbances of formation and conduction of impulses in the heart, and transient cardiac arrest without ventricular fibrillation increases with current magnitude and time.
4	In addition to the effects of zone 3, probability of ventricular fibrillation increased up to 5% (Curve C2) up to 50% (Curve C3) and above 50% beyond Curve C3. Increasing with magnitude and time, pathyphysiological effects such as cardiac arrest, breathing arrest and heavy burns may occur.

STANDARDS COMPLIANCE

POLESTAR & LOADSTAR

Consumer units	BSEN60439-3
Distribution boards	BSEN60439-3
Control module enclosure	BSEN62208
Degree of protection	IP40 (IP20 with door open)
Switch disconnector	BSEN60947-3, IEC 60947-3
MCB	BSEN60898, IEC 60898
RCBO (MCB/RCD)	BSEN61009, IEC 61009
RCCB	BSEN61008, IEC 61008

Maximum terminal cable capacities	**POLESTAR**	**LOADSTAR**
125A (Heavy Duty)	70mm^2	-
MCB	25mm^2	35mm^2
Switch disconnector (DP)	50mm^2	50mm^2
Switch disconnector (TP) 125A (Modular)	50mm^2	50mm^2
200A	120mm^2	120mm^2
250A	-	185mm^2
RCCB	50mm^2	50mm^2
Earth busbar	16mm^2	25mm^2
Neutral busbar	16mm^2	25mm^2
Direct busbar connection	120mm^2	120mm^2

C50

Consumer units	BS5486, Part 13: 1989
Distribution boards	BS5486, Part 12: 1989
Degree of protection	IP20
Switch disconnector (DP)	BSEN60947-3, IEC 60947-3
Triple pole main switch	BS5419: 1977
MCB	BSEN60898, IEC 60898

Maximum terminal cable capacities	
MCB	16mm^2
Switch disconnector (DP)	50mm^2
Triple pole main switch	50mm^2
Earth busbar	16mm^2
Neutral busbar	16mm^2

SWITCH DISCONNECTORS

A switch disconnector is defined in BSEN60947-3 as:

"A switch which, in the open position, satisfies the isolating requirements specified for a disconnector"

IEC 60947–3 also defines a switch and a disconnector. In general terms the definitions cover a device that is capable of making, carrying and breaking normal circuit currents, and may also be capable of carrying, for a specified time, abnormal loads such as short circuit currents. In the open position, the device will provide isolation and it will indicate reliably the position of the contacts.
All Crabtree switch disconnectors rated in the following table comply with BSEN60947-3 and IEC 60947-3.

LIST No	*100SW3 100/21BA*	*125SW3* 125/21BA**	*125/3MS 125/21B*	*125/21BDP*	*200/3MS 200/22B*	*200/22BDP*	*250/22B*
Rated current	*100A*	*125A*	*125A*	*125A*	*200A*	*200A*	*250A*
Utilisation category	*AC22a AC23b @63A*	*AC22a*	*AC22b*	*AC22b*	*AC22b*	*AC22b*	*AC22b*
Rated voltage	*240V/415V*	*240V/415V*	*415V*	*240V*	*415V*	*240V*	*415V*
Rated frequency	*50Hz*	*50Hz*	*50Hz*	*50Hz*	*50Hz*	*50Hz*	*50Hz*
Rated insulation voltage	*500V ac*	*500V ac*	*500V ac*	*500V ac*	*500V ac*	*500V ac*	*500V ac*
Rated impulse withstand voltage	*6kV ac peak*	*6kV ac peak*	*6kV ac peak*	*6kV ac peak*	*6kV ac peak*	*6kV ac peak*	*6kV ac peak*
Rated duty	*Uninterrupted*	*Uninterrupted*	*Uninterrupted*	*Uninterrupted*	*Uninterrupted*	*Uninterrupted*	*Uninterrupted*
Rated short time withstand current	*1.5kA rms for 1 sec*	*1.5kA rms for 1 sec*	*5.5kA rms for 100ms*	*5.5kA rms for 100ms*	*5.5kA rms for 100ms*	*5.5kA rms for 100ms*	*5.5kA rms for 100ms*
Rated short circuit making capacity	*2.5kA peak*	*2.5kA peak*	*8.0kA peak*	*8.5kA peak*	*8.5kA peak*	*8.5kA peak*	*8.5kA peak*
Rated conditional short circuit	*16.5kA rms (BS1361 100A fuse)*	*16.5kA rms (BS88 125A fuse)*	*16kA rms (BS88 160A fuse)*	*16kA rms (BS88 125A fuse)*	*16kA rms (BS88 200A fuse)*	*9kA rms (BS88 200A fuse)*	*16kA rms (BS88 200A fuse)* *6kA rms (BS88 250A fuse)*

**Rated conditional short circuit levels only apply when used as Incomer to Crabtree MCB Distribution Board and includes series connected outgoing MCB.*

TRANSFORMERS

Transformers produce inrush currents when they are switched on, typically 15 times the normal running current.
The tables below show the recommended MCB rating for single phase (230V) and 3 phase (400V) transformers.

SINGLE PHASE 230V AC SUPPLY

TRANSFORMER RATING (VA)	*MCB RATING (A) Type B*	*Type C*	*Type D*
50	*6*	*6*	*6*
100	*6*	*6*	*6*
200	*6*	*6*	*6*
300	*10*	*6*	*6*
400	*10*	*6*	*6*
500	*16*	*10*	*6*
750	*16*	*10*	*6*
1000	*32*	*16*	*10*
2500	*63*	*32*	*16*
5000	–	*63*	*32*
7500	–	–	*50*
10000	–	–	*63*

THREE PHASE 400V AC SUPPLY

TRANSFORMER RATING (VA)	*MCB RATING (A) Type B*	*Type C*	*Type D*
500	*6*	*6*	*6*
750	*6*	*6*	*6*
1000	*10*	*6*	*6*
2000	*16*	*10*	*6*
3000	*32*	*16*	*10*
4000	*32*	*20*	*10*
5000	*40*	*32*	*16*
7500	*63*	*32*	*16*
10000	–	*50*	*32*
15000	–	*63*	*32*
20000	–	–	*50*
25000	–	–	*63*
30000	–	–	*63*

The above information applies to MCBs supplying transformers irrespective of the load on the secondary circuit. If the MCBs are on the secondary side of the transformer, they do not see the inrush current and so nuisance tripping does not occur.

LOW VOLTAGE LIGHTING

Low voltage lighting is generally supplied via a transformer. If MCBs are used on the primary (input) side of the transformer, then the information given in the section below left is applicable. If MCBs are used on the secondary (output) side, then no special precautions are necessary.

FLUORESCENT LIGHTING

Fluorescent lighting can also produce high inrush currents, especially when electronic ballasts are used. However, the duration of the inrush current is generally less than 1ms, so that the current may fall to normal levels before the MCBs have had time to react.
It is recommended that fluorescent lighting is protected by type C MCBs, which give a good level of protection whilst avoiding the risk of nuisance tripping.

MCB RATING (A) ***TYPE C***	*MAXIMUM NUMBER OF LAMPS AT 230V 36W*	*58W*	*80W*
6	*10*	*6*	*5*
10	*16*	*10*	*8*
16	*26*	*16*	*13*
20	*33*	*20*	*17*
32	*53*	*33*	*27*
40	*66*	*41*	*34*
50	*83*	*51*	*42*
63	*105*	*65*	*54*

HIGH-PRESSURE SODIUM LAMPS

High-pressure sodium lamps draw current of more than 30 times their normal running currents for the first few milliseconds after start up.

MCB RATING (A) ***TYPE B***	*MAXIMUM NUMBER OF LAMPS 150W*	*250W*	*400W*
6	–	–	–
10	*1*	–	–
16	*1*	*1*	–
20	*2*	*1*	–
32	*3*	*2*	*1*
40	*4*	*2*	*1*
50	*5*	*3*	*1*
63	*6*	*4*	*2*
TYPE C			
6	*1*	–	–
10	*1*	*1*	–
16	*2*	*1*	–
20	*3*	*2*	*1*
32	*5*	*3*	*1*
40	*6*	*4*	*2*
50	*8*	*5*	*2*
63	*10*	*7*	*3*
TYPE D			
6	*2*	*1*	–
10	*3*	*2*	*1*
16	*5*	*3*	*1*
20	*6*	*4*	*2*
32	*10*	*7*	*3*
40	*13*	*8*	*4*
50	*16*	*11*	*5*
63	*21*	*14*	*7*

It is recommended that type D MCBs are used where possible, as they will give good thermal protection without suffering from nuisance tripping.

POLESTAR & LOADSTAR MCB APPLICATIONS – MOTOR STARTERS

In general miniature circuit breakers by themselves can only provide short circuit protection for motor loads.
Motor start-up currents can be as high as 12 times the normal running current. MCBs in general cannot accommodate this and provide the close thermal protection required by motors.
They can, however, be used to protect lightly loaded motors or motors started off load, or they can be used in conjunction with thermal overload relays. In this case the MCB will protect the cable to the motor against short circuit faults, and the motor will be protected by a second thermal device.

RECOMMENDED TYPE D MCB RATINGS
for single phase 230/240V ac motors

Motor power **HP**	**kW**	*Normal running current (A)*	*Start-up current (A)*	*MCB current rating (A)*
0.25	*0.18*	*1.5*	*18*	*6*
0.50	*0.37*	*3.0*	*36*	*6*
0.75	*0.55*	*4.5*	*54*	*6*
1.00	*0.75*	*5.5*	*66*	*10*
1.50	*1.1*	*8.5*	*102*	*10*
2.00	*1.5*	*10.5*	*126*	*16*
3.00	*2.2*	*15.5*	*186*	*20*
4.00	*3.0*	*20.0*	*240*	*32*
5.00	*3.75*	*24.0*	*288*	*32*
7.50	*5.5*	*34.0*	*408*	*40*
10.00	*7.5*	*45.0*	*540*	*63*

RECOMMENDED TYPE D MCB RATINGS
for 3 phase 400/415V ac motors

Motor power **HP**	**kW**	*Normal running current (A)*	*Start-up current (A)*	*MCB current rating (A)*
0.25	*0.18*	*0.7*	*8.4*	*6*
0.5	*0.37*	*1.35*	*16.2*	*6*
0.75	*0.55*	*1.55*	*18.6*	*6*
1.0	*0.75*	*1.93*	*23.2*	*6*
1.5	*1.1*	*2.5*	*30.0*	*6*
2.0	*1.5*	*3.5*	*42.0*	*6*
3.0	*2.2*	*4.8*	*57.6*	*6*
4.0	*3.0*	*6.4*	*76.8*	*10*
5.0	*3.75*	*7.8*	*93.6*	*10*
7.5	*5.5*	*11.0*	*132.0*	*16*
10.0	*7.5*	*14.4*	*172.8*	*20*
12.5	*9.33*	*17.3*	*207.6*	*32*
15.0	*11.0*	*21.0*	*252.0*	*32*
20.0	*15.0*	*28.0*	*336.0*	*40*
25.0	*18.5*	*35.0*	*420.0*	*50*
30.0	*22.0*	*40.0*	*480.0*	*50*
40.0	*30.0*	*54.0*	*648.0*	*63*

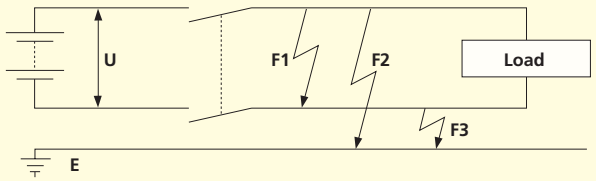
POLESTAR MCB APPLICATIONS – DC SUPPLIES

Crabtree circuit breakers are generally designed for use on ac systems, but can also be used on dc supplies. The selection of the most suitable circuit breaker depends on the following conditions:

- **The type of circuit**
- **The short circuit current**
- **The circuit time constant**
- **The circuit voltage**

TYPICAL CIRCUITS

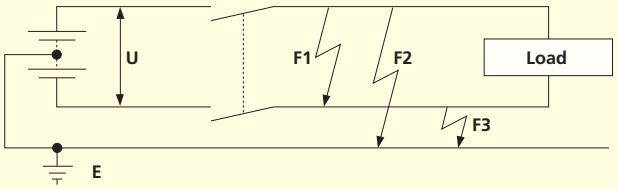
NOT EARTHED



FAULT F1 *Will produce the maximum short circuit current with half the supply voltage dropped across each pole*

FAULTS F2 & F3 *No effect*

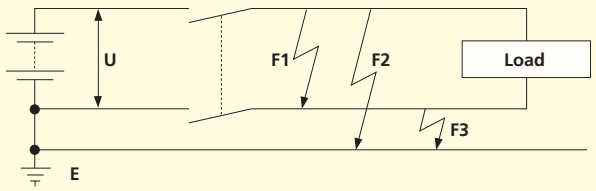
EARTHED AT THE SUPPLY CENTRE POINT



FAULT F1 *Will produce the maximum short circuit current with half the supply voltage dropped across each pole*

FAULTS F2 & F3 *Will produce a short circuit current of less than the maximum. Half the supply voltage will appear across the affected MCB*

EARTHED AT ONE OF THE SUPPLY TERMINALS



FAULT F1 *Will produce the maximum short circuit current with half the supply voltage dropped across each pole*

FAULT F2 *Will produce the maximum short circuit current with all of the supply voltage appearing across one pole*

FAULT F3 *No effect*

NORMAL CIRCUIT CURRENTS

The rating and normal running temperature of the MCB are unaffected by dc. The MCB can be selected using the thermal section of the standard time/current curves in the normal manner.
Magnetic tripping on dc is different from the equivalent ac by a factor of $\sqrt{2}$.

ie type B ac magnetic range = $3–5I_n$
type B dc magnetic range = $\sqrt{2}(3–5)I_n = 4–7I_n$

type C ac magnetic range = $5–10I_n$
type C dc magnetic range = $\sqrt{2}(5–10)I_n = 7–14I_n$

type D ac magnetic range = $10–20I_n$
type D dc magnetic range = $\sqrt{2}(10–20)I_n = 14–28I_n$

SHORT CIRCUIT CURRENTS

The maximum short circuit current possible on a dc system is determined by the voltage of the battery and the total internal resistance of the cells. It is given by Ohm's law:

$I_{SC} = \frac{V_b}{R_b}$ *where V_b is the voltage of the battery (with the battery 100% charged)*
R_b is the internal resistance of the battery cells
(this is usually quoted by the manufacturer)

CIRCUIT TIME CONSTANT

The time constant is given by:

$\frac{L}{R}$ *where L is the inductance of the circuit*
R is the resistance of the circuit

The time constant is usually given in milliseconds (ms). Ideally, dc circuits would be mainly resistive (ie a low number), as inductive circuits produce a back emf when the current suddenly falls. This in turn tends to prolong arcing during switching operations, and so reduces contact life.

CIRCUIT VOLTAGE

The voltage of the circuit is dependent upon the power supply. The lower the voltage the easier switching operations will be, but the voltage makes no difference to the normal running of the MCBs.
Contact life can be significantly increased by reducing the voltage drop across each pole. This can be achieved by wiring poles in series. It is also recommended that for frequent switching the voltage across each pole should not exceed 110V dc.

Crabtree Polestar MCBs have been successfully tested on dc and can be used under the following conditions:

Circuit Time Constant L/R **15ms max**
Voltage **24–220V**
Short circuit breaking capacity 9kA

C50 MCBs are not suitable for dc circuits and must not be used.

POLESTAR MCBs – Type B, C & D typical tripping times/I^2t energy let-through values

TYPE B TYPICAL TRIPPING TIMES

RATING	CURRENT REQUIRED TO OPERATE									
(A)	60s	10s	5s	4s	3s	2s	1s	0.4s	0.1s	0.02s
6	12	23	24	24	24	24	24	24	24	24
10	19	32	40	40	40	40	40	40	40	40
16	30	50	64	64	64	64	64	64	64	64
20	40	68	80	80	80	80	80	80	80	80
32	67	112	128	128	128	128	128	128	128	128
40	80	120	160	160	160	160	160	160	160	160
50	100	160	200	200	200	200	200	200	200	200
63	138	230	252	252	252	252	252	252	252	252

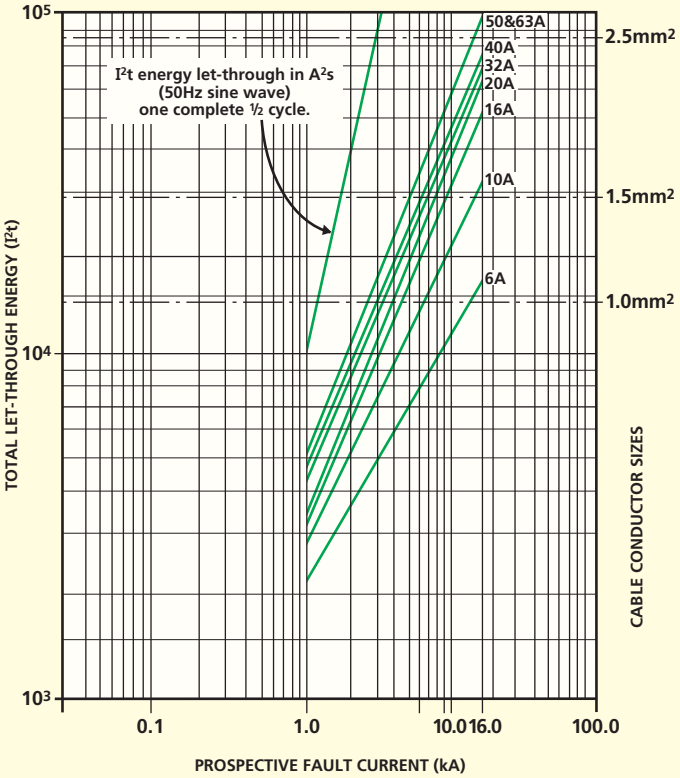
TYPE C TYPICAL TRIPPING TIMES

RATING	CURRENT REQUIRED TO OPERATE									
(A)	60s	10s	5s	4s	3s	2s	1s	0.4s	0.1s	0.02s
6	12	23	33	37	44	45	45	45	45	45
10	19	32	48	55	67	75	75	75	75	75
16	30	50	67	72	83	100	120	120	120	120
20	40	68	92	104	120	150	150	150	150	150
32	67	112	144	153	176	208	240	240	240	240
40	80	120	152	168	190	230	300	300	300	300
50	100	160	210	230	260	312	375	375	375	375
63	138	220	283	302	334	397	472	472	472	472

TYPE D TYPICAL TRIPPING TIMES

RATING	CURRENT REQUIRED TO OPERATE									
(A)	60s	10s	5s	4s	3s	2s	1s	0.4s	0.1s	0.02s
6	12	23	33	37	44	55	90	90	90	90
10	19	32	48	55	67	93	150	150	150	150
16	30	50	67	72	83	100	147	240	240	240
20	40	68	92	104	120	150	240	300	300	300
32	67	112	144	153	176	208	288	432	480	480
40	80	120	152	168	190	230	340	600	600	600
50	100	160	210	230	260	312	450	750	750	750
63	138	220	283	302	334	397	555	819	945	945

TOTAL I^2t LEVELS

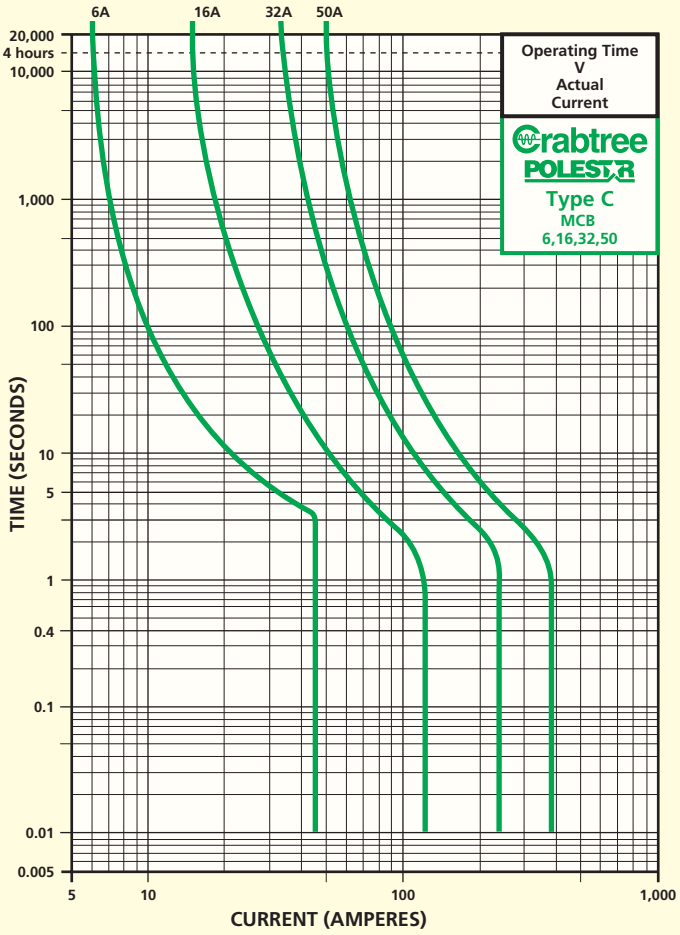


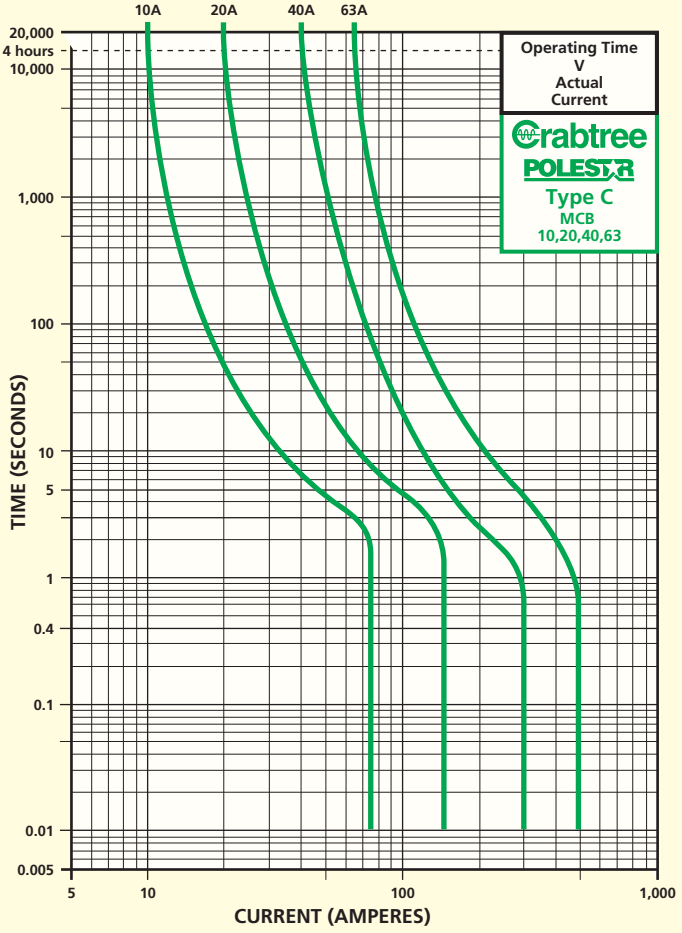
NOTE
Tests performed at 240V 50Hz at most unfavourable closing angle, ie +60°.

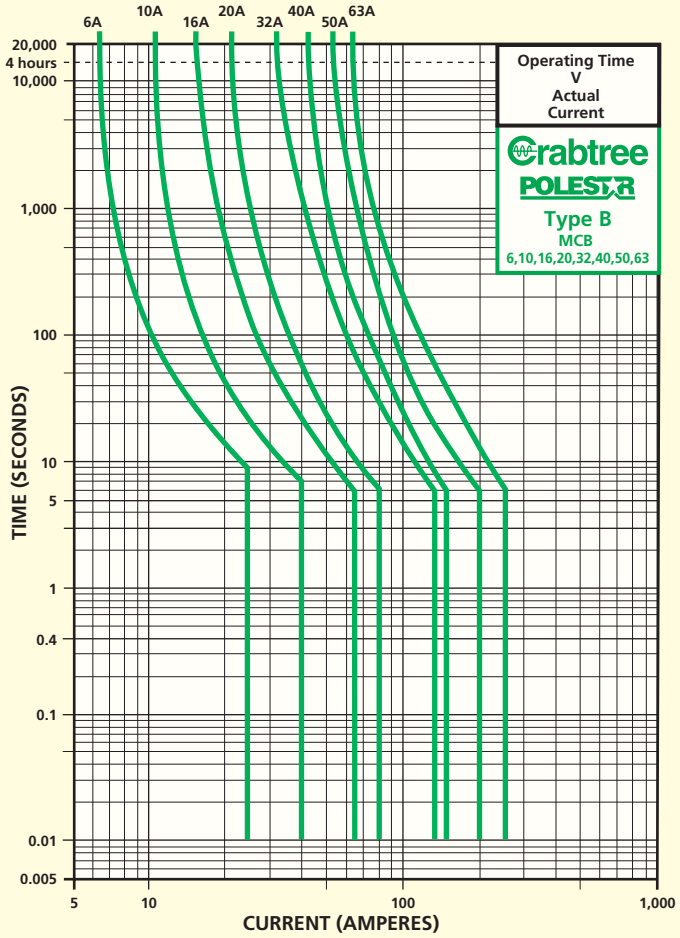
TYPICAL VALUES OF I^2t ENERGY LET-THROUGH FOR POLESTAR MCBs

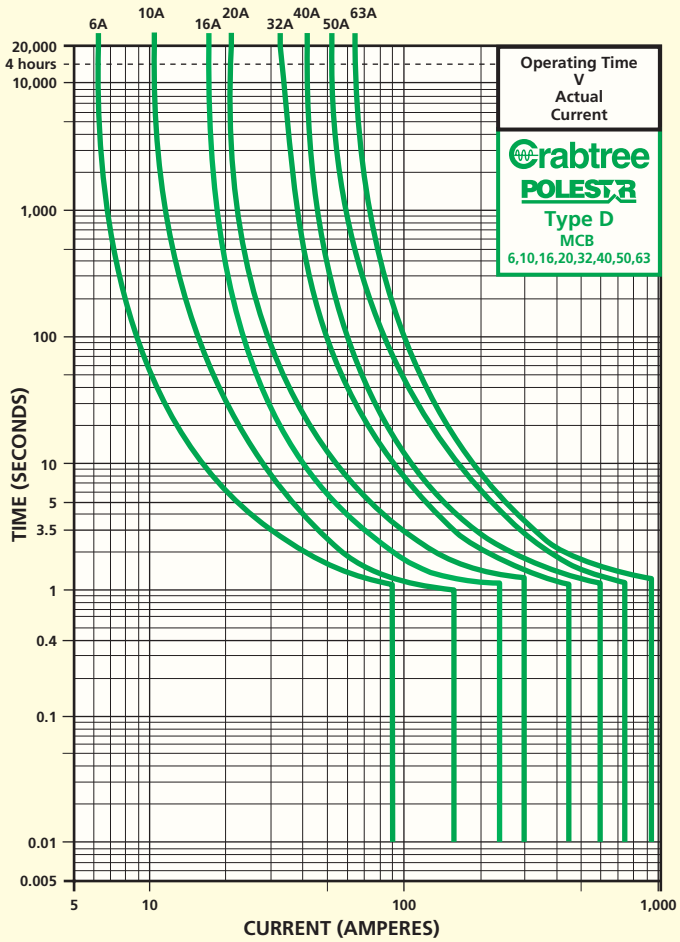
	TOTAL I^2t LET-THROUGH (A^2 SEC)		
MCB RATING	6kA	10kA	16kA
6	8000	12000	16000
10	15000	25000	34000
16	20000	35000	53000
20	25000	40000	64000
32	28000	50000	70000
40	30000	65000	85000
50	36000	75000	110000
63	36000	75000	110000

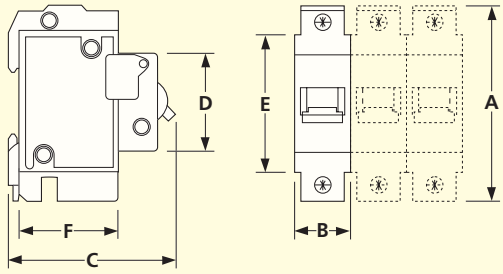
POLESTAR MCBs TYPE C, B & D – Typical time/current characteristics









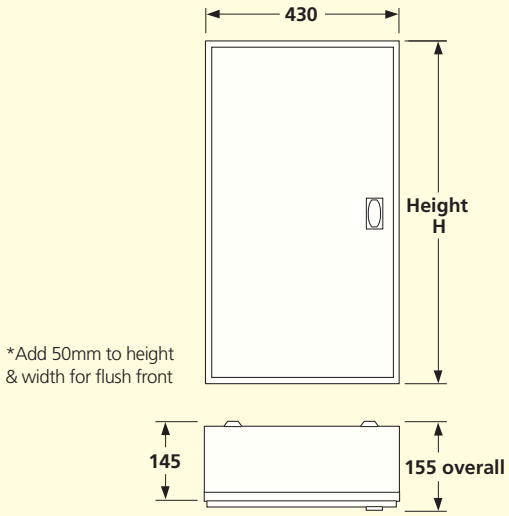


APPROXIMATE DIMENSIONS (mm)

MINIATURE CIRCUIT BREAKERS (MCBs) & RCBOs

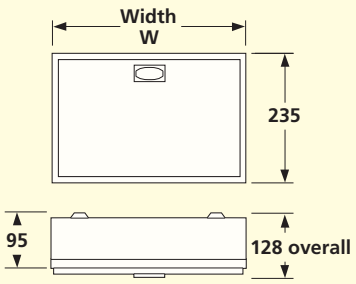
TYPE	A	B	C*	D	E	F
Single pole	90	25	82.5	45	63	44
Double pole & RCBO	90	50	82.5	45	63	44
Triple pole	90	75	82.5	45	63	44

* Allow 4mm for handle clearance



'PRIMARY' TP & N DISTRIBUTION BOARDS

List No	Height 'H'
1804/OB	650
1806/OB	675
1808/OB	815
1810/OB	815
1812/OB	895
1816/OB	1085
1820/OB	1190
1824/OB	1360
18SB	245
18DIN18	245

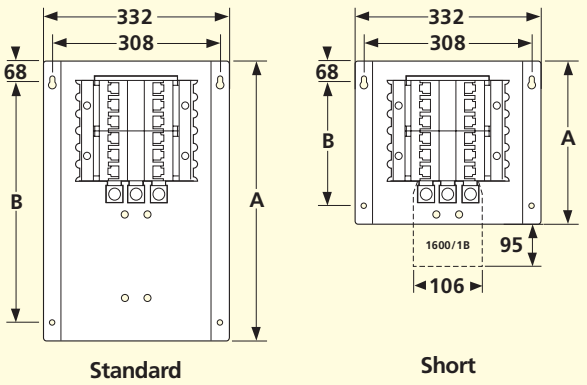


Boards Hinged at Bottom

SP & N ENCLOSURES

List No	WIDTH 'W'
1806 Series	292
1809 Series	343
1813 Series	437
***1818 Series**	343
***1826 Series**	437
1808 Series	437
1811 Series	437

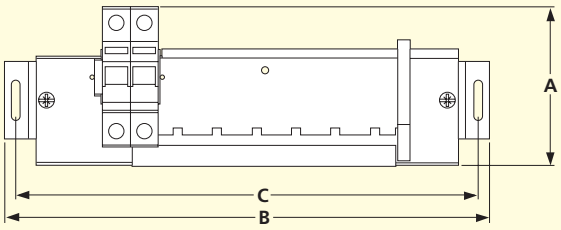
*1818 and 1826 Series are hinged at Left Hand side, and are 450mm high.



PRIMARY TRIPLE POLE BACKPLATE

Standard OBI			**Short OBIS**		
List No	A	B	List No	A	B
1804/OBI	533	414	**1804/OBIS**	285	167
1806/OBI	561	442	**1806/OBIS**	361	243
1808/OBI	695	576	**1808/OBIS**	437	319
1810/OBI	695	576	**1810/OBIS**	513	395
1812/OBI	776	657	**1812/OBIS**	589	470
1816/OBI	965	846	**1816/OBIS**	741	622

Please confirm dimensional details with Technical Services before commencing manufacture.



SINGLE POLE BACKPLATES

List No	A	B	C
1806	113	310	296
1809	113	360	345
1813	113	458	444

LOADSTAR RANGE

Crabtree Loadstar MCBs comply fully with BSEN60898 and and therefore enable the requirements of BS7671 to be met.

DISTRIBUTION BOARDS

Standards Compliance:	BSEN60439-3 and IEC 60439-3
Rated Voltage:	230/400V, 50/60Hz
Rated Current:	125/250A
Rated Insulation Voltage:	500V a.c.
Short Circuit Withstand:	16kA Conditional
Protection Degree:	BSEN60529 IP4X (Door Closed) IP3X (Door Open)

MINIATURE CIRCUIT BREAKERS (MCBs)

Standards Compliance:	EN60898 and IEC 60898
Rated Voltage:	230/400V, 50/60Hz
Short Circuit Capacity:	6kA or 10kA (EN60898 and IEC60898).
Tripping Class:	Types B, C and D
Temperature Range:	Maximum Operating Temperature: 55˚C
Pole Configuration:	Single Pole, Double Pole, Triple Pole

ISOLATORS & SWITCH DISCONNECTORS

Standards Compliance:	BSEN60947-3 and IEC 60947-3
Rated Voltage:	230/400V, 50/60HZ
Rated Insulation Voltage:	500V a.c.
Rated Impulse Withstand Voltage:	4kV a.c. peak
Rated Duty:	
63 to 125A Modular	AC 22A (63A at AC23B)
Heavy Duty 200/250A	AC 22B

RESIDUAL CURRENT CIRCUIT BREAKERS (RCCBs)

Standards Compliance:	EN61008 and IEC 61008
Rated Voltage:	230/400V, 50/60Hz
Tripping Characteristic:	AC

MOULDED CASE CIRCUIT BREAKERS (MCCBs)

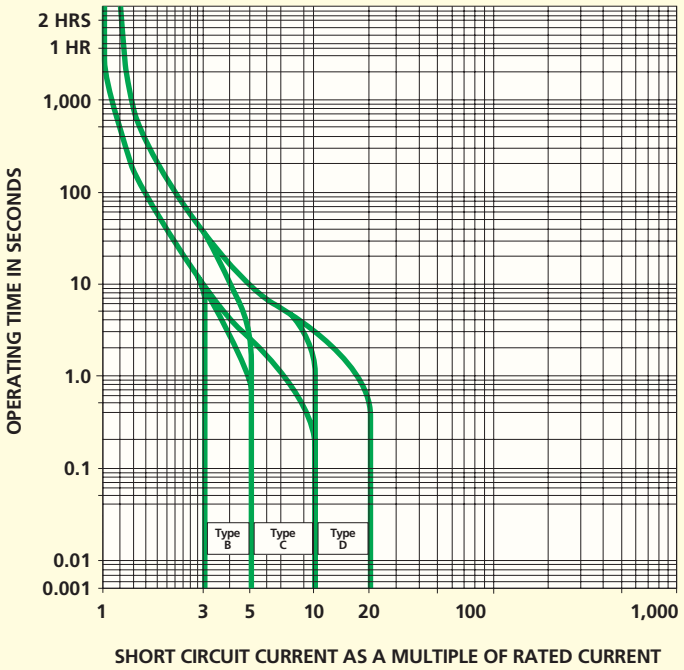
Standards Compliance:	BSEN60947-2 and IEC 60947-2
Rated Voltage:	415V, 50/60Hz
Rated Insulation Voltage:	500V a.c.
Rated Ultimate Short Circuit Capacity (Icu):	
	25kA (G Frame) 25kA (J Frame)
Rated Service Short Circuit Capacity (Ics):	
	50% of Icu (G Frame) 75% of Icu (J Frame)

MAXIMUM TERMINAL CAPACITIES

MCB		35mm²
RCCB		50mm²
Isolators 63 to 125A		50mm²
	200A Heavy Duty	120mm²
	250A Heavy Duty	185mm² via sockets
MCCB	200A Frame	120mm² (Stranded)

TYPE CLASSIFICATION

BSEN60898 specifies different tripping characteristics for different types of MCB, depending on the level of overcurrent required to make the MCB trip out in less than 100 milliseconds. Crabtree MCB's are available as types B, C or D, enabling installation designers to choose an MCB with a characteristic closely matched to the circuit requirement.



RCBOs

Single module

Standards Compliance:	EN61009, IEC 601009
Rated Voltage:	230V 50Hz
Rated Short Circuit Capacity:	6kA or 10kA
MCB Tripping:	Type C
RCD Tripping (Electronic):	Type A
Neutral:	Unswitched

Neutral flying lead and functional earth lead provided

Two module

Standards Compliance:	EN61009, IEC601009
Rated Voltage:	230V 50Hz
Rated Short Circuit Capacity:	6kA or 10kA
MCB Tripping:	Type C
RCD Tripping: (Electromechanical)	Type AC
Neutral	Switched

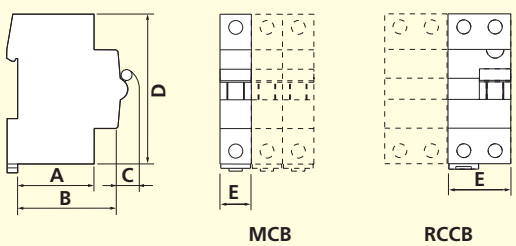
Neutral flying lead provided

MINIATURE CIRCUIT BREAKERS (MCBs)

	A	B	C	D	E
Single pole	43.8	56.5	13.5	86	18
Double pole	43.8	56.5	13.5	86	36
Triple pole	43.8	56.5	13.5	86	54

RESIDUAL CURRENT CIRCUIT BREAKERS (RCCB)

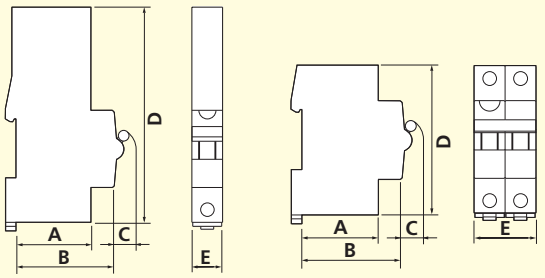
	A	B	C	D	E
2 pole	43.8	56.5	13.5	86	36
4 pole	43.8	56.5	13.5	86	72



APPROXIMATE DIMENSIONS (mm)

RESIDUAL CURRENT CIRCUIT BREAKERS WITH OVERLOAD PROTECTION (RCBOs)

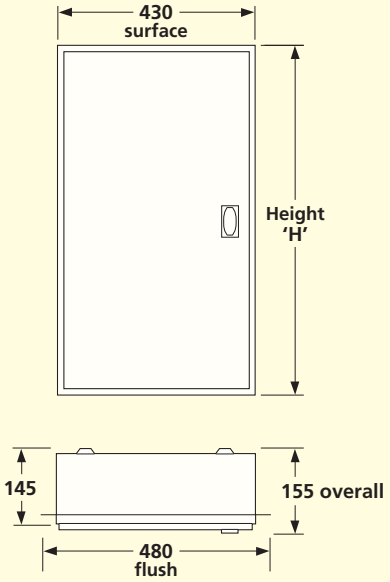
	A	B	C	D	E
Single module	43.8	56.5	13.5	126	18
Two module	43.8	56.5	13.5	86	36



TYPE B AND ROW DISTRIBUTION BOARDS

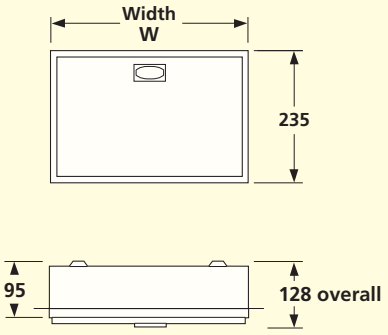
125A 'L'		125A 'DIN'		250A 'H'	
List No.	H	List No.	H	List No.	H
18LS04	490	**18LS04D**	650	**18HS04**	650
18LS06	570	**-**	-	**18HS06**	815
18LS08	650	**18LS08D**	815	**18HS08**	815
18LS12	815	**18LS12D**	975	**18HS12**	895
18LS16	895	**18LS16D**	1140	**18HS16**	975
18LS20	975	**18LS20D**	1140	**18HS20**	1085
18LS24	1140	**-**	-	**18HS24**	1190
18LS12A	675	**-**	-	**18HS12A**	675
18SB	245	**18SB**	245	**18SB**	245

DIN Rail Only Enclosure		Row Boards	
List No.	H	List No.	H
18DIN18	245	**18AS1**	245
18DIN36	410	**18AS2**	410
		18AS3	570
		18AS4	735
		18AS5	815



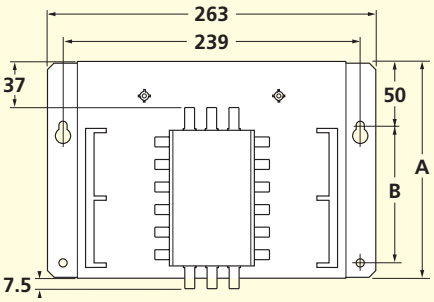
* Add 50mm to height and width for flush front plate

SP Distribution Board c/w 100A DP Isolator		GP Enclosure			
List No.	W	List No.	W	H	D
18SN05	188	**18GP2S**	61	152	61
18SN08	242	**18GP4S**	76	140	67
18SN11	293				
18SN14	343	**18GP2M**	90	225	66
18SN19	437	**18GP4M**	135	316	74



250A TP 'H' Type Pan Assemblies

List No.	A	B
18HP04	174	110
18HP06	228	164
18HP08	282	218
18HP12	390	326
18HP16	498	434
18HP20	606	542
18HP24	714	650



Incoming cable connection Kit fits to top of pan as illustrated.
Spare phase identity labels allow the pan to be used either way up.

FUSESTAR HOUSED FUSE SWITCH

SPECIFICATION

- BSEN947-3
- Range of ratings 20A -800A in 4 frame sizes
- Pole configurations SP & N, TP & N, and 4 Pole
- Voltage rating 415V ac
- Frequency rating 50/60 Hz
- Fuse type BS88
- Fused Short Circuit, 80kA RMS

PRODUCT FEATURES

- Switching speed totally operator independent
- Handle padlockable on or off

HOUSED UNITS

- Modular enclosure design (52.5mm) with inbuilt cable spreader box
- Reversible door which opens 180˚
- IP4X

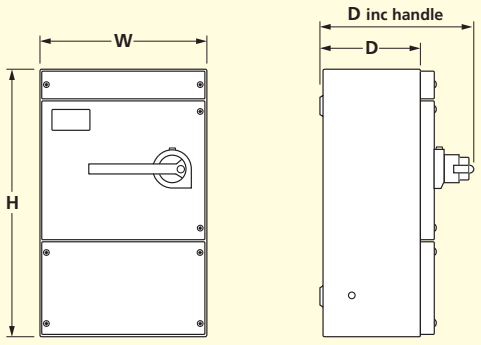
TECHNICAL DATA

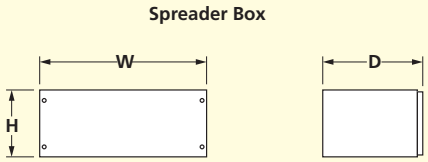
	20–32A	63A	100A	125A	160A	200A	315A	400A	630A	800A
Mechanical Endurance	20,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	8,000	8,000
Ratings	**A kW**	**A kW**	**A kW**	**A kW**	**A kW**	**A kW**	**A kW**	**A kW**	**A kW**	**A kW**
415V Ie/pe	32 15	63 30	100 51	125 75	160 90	200 80	315 160	400 220	630 355	800 450

FUSE COMPARISON DATA

Current Rating	BS 88 Reference	Lawson	GEC	Bussman
20/32A	A1	NIT	NIT	NITD
63A	A3	TIS, TIA GTIA	TIS, TIA	BAO, AAO
100A	A4 (Dia 31 max)	TCP	-	CEO
125A	A4 (Dia 31 max)	TFP	TFP	DEO, CEO
160/200A	A4 (Dia 31 max)	TFP	TFP	DEO, CEO
315A	B3, B2, B1	TFK, TF	TF	ED, DD, CD
400A	B3, B2, B1	TMF, TFK, TF, TC	TMF, TFK, TF, TC	ED, DD, CD
630A	C2, C1	TTM, TM	TTM, TM	FF, EF
800A	C3, C2, C1	TLM, TTM, TM	TLM, TTM, TM	GF, FF, EF

FUSESTAR DIMENSION DETAILS





DIMENSIONS (mm)

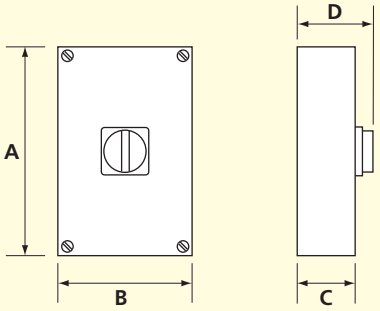
	H	W	D	D inc. handle		H	W	D
20-32A	220	210	136	200	SPREADER BOX	105	210	105
63A	420	263	188	263	SPREADER BOX	105	262.5	157.5
100A	420	263	188	263	SPREADER BOX	105	262.5	157.5
125-200A	525	315	241	305	SPREADER BOX	105	315	210
315-400A	735	420	241	305	SPREADER BOX	210	420	210
630-800A	850	620	293	355	SPREADER BOX	210	620	262.5

FUSESTAR HOUSED SWITCH DISCONNECTOR

	Moulded Enclosure								Sheet Steel Enclosure								
RATING IN AMPS	16A	25A	32A	40A	63A	80A	100A	125A	20A	32A	40A	63A	63A*	100A	125A	20A	32A
Rated Insulation Voltage Ui (V)	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Dielectric Strength (kV) 50 Hz 1min	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Shock Resistance Uimp (kV)	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		
OPERATIONAL CURRENT Ie (A)																	
415 V AC - AC21A / AC21B	16	25	32	40	63	80	100	125	20	32	40	63	80	100	125	20	32
AC22A / AC22B	16	25	32	40	63	80	100	125	20	32	40	63	80	100	125	20	32
AC23A / AC23B	16	25	32	40	63	80	80	80	20	32	40	63	80	80	80	20	32
500 V AC - AC21A / AC21B	16	25	32	40	63	80	100	125	20	32	40	63	80	100	125	20	32
AC22A / AC22B	16	25	32	40	63	80	100	125	20	32	40	63	80	100	125	20	32
AC23A / AC23B	16	25	32	40	40	63	63	63	20	32	40	40	63	63	63	20	32
690 V AC - AC20A / AC20B	16	25	32	40	63	80	100	125	20	32	40	63	80	100	125	20	32
AC21A / AC21B	16	25	32	40	63	80	100	125	20	32	40	63	80	100	125	20	32
AC22A / AC22B	16	25	32	40	63	80	100	100	20	32	40	63	80	100	100	20	32
AC23A / AC23B	16	25	25	25	25	50	50	50	20	25	25	25	50	50	50	20	25
MOTOR POWER (KW) AC 23																	
415 V AC	7.5	9	11	11	15	22	37	40	7.5	11	11	15	18.5	37	40	7.5	11
500 V AC	7.5	9	11	15	18.5	30	37	37	7.5	11	15	18.5	22	37	37	11	11
690 V AC	11	11	11	18.5	18.5	30	30	30	11	11	18.5	18.5	25	30	30	11	11
FUSE TYPES TO BS88																NS	NS
OVERLOAD CAPACITY																	
Fuse rating gG	16	25	32	40	63/40	80	100	125	20	32	40	63/40	63	100	125	20	32
Short circuit current with fuses (kA Rms)	50	50	50	50	20/50	40	20	15	50	50	50	20/50	50	20	15	50	50
Asymmetric short time rating current (kA peak)	6	6	6	6	6	9	9	9	6	6	6	9	9	9	9	6	6
Admissible short time current 1 s. (kA Rms)	1.26	1.26	1.26	1.26	1.26	1.5	1.5	1.5	1.26	1.26	1.26	1.5	1.5	1.5	1.5	1.26	1.26
MAKING & BREAKING CHARACTERISTICS																	
Breaking capacity (A Rms) 415 V AC 23 A	128	200	256	320	504	640	640	640	160	256	320	504	504	640	640	160	256
Making capacity (A Rms) 415 V AC 23 A	160	250	320	400	630	800	800	800	200	320	400	630	630	800	800	200	320
WITHSTAND																	
Mechanical (number of operations) x 1000	100	100	100	100	100	30	30	30	100	100	100	100	30	30	30	100	100
Electrical (number of operations at 415V AC 23A) x 1000	3	3	3	3	3	1.5	1.5	1.5	3	3	3	3	1.5	1.5	1.5	3	3
CONNECTION																	
Maximum Cu cable section (mm^2) Ith	16	16	16	16	16	50	50	50	16	16	16	16	50	50	50	16	16
using stranded cable (mm^2)	25	25	25	25	25												
WEIGHT (KG)																	
3 pole	0.13	0.13	0.13	0.13	0.13	0.26	0.26	0.26	2.00	2.00	2.00	2.00	2.50	2.50	2.50	3.0	3.0
4 pole	0.18	0.18	0.18	0.18	0.18	0.34	0.34	0.34	2.00	2.00	2.00	2.00	2.50	2.50	2.50	3.0	3.0

63* = Size 2 Enclosure

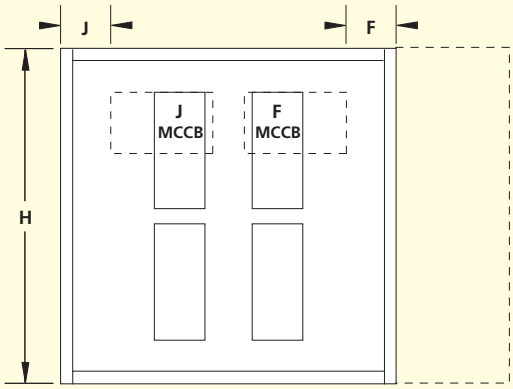
APPROXIMATE DIMENSIONS (mm)



BOX	A	B	C	D
A	130	85	75	105
B	175	125	100	137
C	250	175	100	135
D	310	200	135	170
E	410	200	135	170
1	220	158	136	172.5
2	325	158	136	172.5

APPROXIMATE DIMENSIONS (mm)

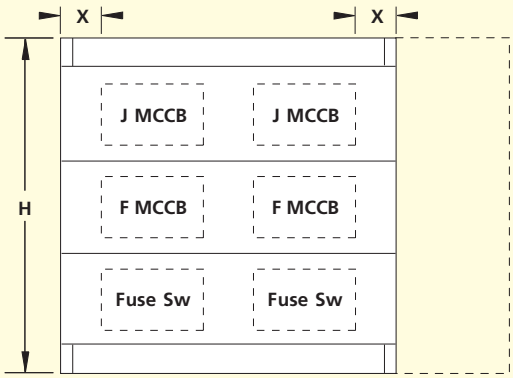
FORM 2



List No		H	Mod.	Cabling Room J	Cabling Room F
KP2J404	**KP2F404**	576	3	175	140
KP2J804	**KP2F804**	576	3	175	140
KP2J408	**KP2F408**	768	4	175	140
KP2J804	**KP2F808**	768	4	175	140
KP2J412	**KP2F412**	960	5	175	140
KP2J812	**KP2F812**	960	5	175	140
KP2J416	**KP2F416**	1162	6	175	140
KP2J816	**KP2F816**	1162	6	175	140

Optional Cableway shown as a dotted line.

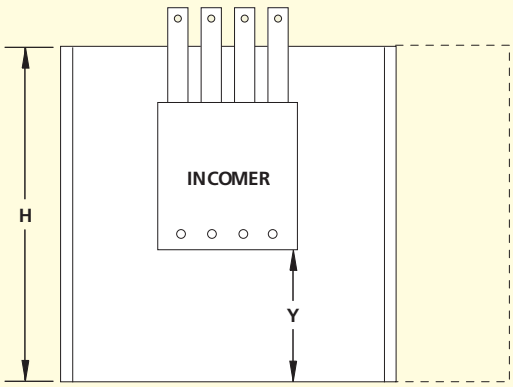
FORM 4



List No	H	Mod.	Cabling Room X
KP4J806	768	4	170
KP4J810	1162	6	170
KP4F806	768	4	135
KP4F810	1162	6	135
KP4S806	768	4	160
KP4S810	1162	6	160

Optional Cableway shown as a dotted line.

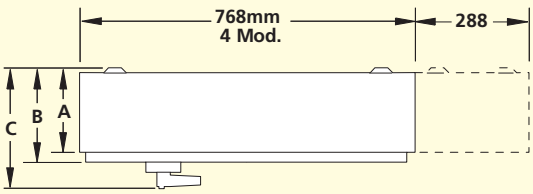
INCOMER FORM 2 AND FORM 4



Form 2	Form 4	H	Mod.	Cabling Room Y
K12J1	**K14J1**	576	3	320
K12F1	**K14F1**	576	3	300
K12L1	**K14L1**	768	4	460
K12N1	**K14N1**	960	5	440
K12L2		960	5	460
K12S2	**K14S2**	576	3	310
K12S4	**K14S4**	768	4	480
	K14S8	960	5	540

Optional Cableway shown as a dotted line.

ENCLOSURE DEPTH



	A	B	C
Standard (eg. KP2J408)	265		
With Doors (eg. KP2J408 & KPXD04)		297	
With Doors and Handle (eg. KP4F806)			385

Optional Cableway shown as a dotted line.

FORMS OF SEPARATION

Main criteria	Sub criteria	Form	Type of Construction
No separation		Form 1	
Separation of busbars from the functional units.	Terminals for external conductors not separated from busbars.	**Form 2**	
	Terminals for external conductors separated from busbars.		Type 1 Busbar separation is achieved by insulated coverings, e.g. sleeving, wrapping or coatings
			Type 2 Busbar separation is by metallic or non-metallic rigid barriers or partitions.
Separation of busbars from the functional units and separation of all functional units from one another. Separation of the terminals for external conductors from the functional units, but not from each other.	Terminals for external conductors not separated from busbars.	Form 3a Form 3b	
	Terminals for external conductors separated from busbars.		Type 1 Busbar separation is achieved by insulated coverings, e.g. sleeving, wrapping or coatings
			Type 2 Busbar separation is by metallic or non-metallic rigid barriers or partitions.
Separation of busbars from the functional units and separation of all functional units from one another including the terminals for external conductors which are an integral part of the functional unit.	Terminals for external conductors in the same compartment as the associated functional unit.	**Form 4**	Type 1 Busbar separation is achieved by insulated coverings, e.g. sleeving, wrapping or coatings Cables may be glanded elsewhere.
			Type 2 Busbar separation is by metallic or non-metallic rigid barriers or partitions. Cables may be glanded elsewhere.
			Type 3 All separation requirements are by metallic or non-metallic rigid barriers or partitions. The termination for each functional unit has its own integral glanding facility.
	Terminals for external conductors not in the same compartment as the associated functional unit. but in individual, separate, enclosed protected spaces or compartments.		Type 4 Busbar separation is achieved by insulated coverings, e.g. sleeving, wrapping or coatings Cables may be glanded elsewhere.
			Type 5 Busbar separation is by metallic or non-metallic rigid barriers or partitions. Terminals may be separated by insulated coverings and glanded in common cabling chamber(s).
			Type 6 All separation requirements are by metallic or non-metallic rigid barriers or partitions. Cables are glanded in common cabling chamber(s).
			Type 7 All separation requirements are by metallic or non-metallic rigid barriers or partitions. The termination for each functional unit has its own integral glanding facility.

FORMS OF SEPARATION

As described in BSEN60439-1 the Forms of Separation comprise four levels as detailed in the above table. The various methods of achieving separation can involve sleeving the busbars inside a separate box or a combination of both methods.

COST EFFECTIVE SPECIFICATION

In order to gain maximum benefit from the standard it is necessary to consider the application for which the switchboard is required and the appropriate level of separation for the environment in which it is to be installed. For example a Form 4 switchboard may be appropriate where general access is permitted to the switch room but where the switchboard is in a locked substation with access restricted to qualified personnel, a lesser degree of separation may be more appropriate.

TYPICAL APPLICATIONS

Form 1 – No separation

Typical applications are places where the switchboard is in a secure location and where failure of the switchboard will cause little or no additional disruption to other areas being fed by the switchboard.

Form 2 – Separation of busbars from functional units.

Applications may well be the same as Form 1 but where it is important that a fault in the switchboard need not affect all functional units being fed from the same busbar system.

Form 3 – Separation of busbars from functional units and the functional units from one another but not their terminations.

Should be applied where it is important to provide protection from internal live parts and where failure of functional units being fed from the same busbar would cause unacceptable disruption.

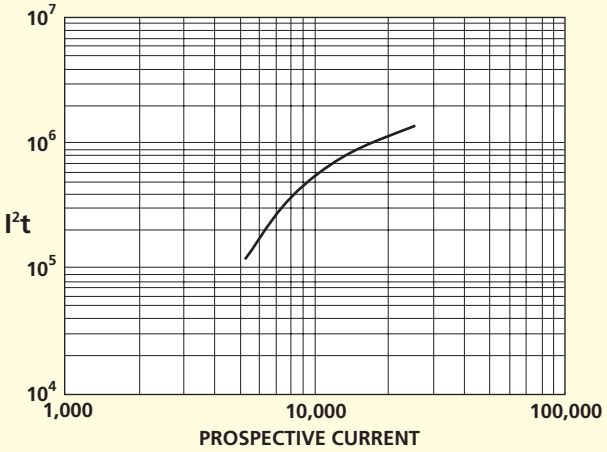
Form 4 – Separation of busbars from functional units and the functional units from one another including their terminations.

Should be applied where it is important to provide protection from internal live parts and where failure of functional units being fed from the same busbar would cause unacceptable disruption. Because all the terminations are separated it is possible to isolate and work on a single functional unit.

G FRAME MCCBs TECHNICAL SPECIFICATION

G FRAME SPECIFICATION

• Specification	BSEN60947-2
• Current Range	16 – 125A
• Ue Rated Operation Voltage	240V SP 415V TP
• Ui Rated Insulation Voltage	500V AC
• Rated Frequency	50/60Hz
• Release	Thermal Magnetic
• Adjustment	None
• Ambient Range	-20°C to 55°C
• Humidity Range	0 – 90%
• Weight	SP - 0.4kg TP - 0.95kg
• Mechanical Duration	8000 operations



FEATURES

The symmetrical vertical and horizontal axis with a double stepped escutcheon plate, enabling it to fit through either a 46mm or 80mm cut-out.
A double insulated compartment located behind the removable escutcheon plate, facilities easy on-site installation of shunt trip and auxiliary switch units.

AVAILABLE OPTIONS

- ST (See Product Section for selection)
- Aux Switches
- Padlocking
- Terminal Shrouds

SHORT CIRCUIT BREAKING CAPACITY

Type	**GB**	**GN**
Ue	**Icu**	**Icu**
	SP/TP	TP
220 V	30	30
380 V	16	25
415 V	16	25

Ics = 50% Icu

INSTANTANEOUS TRIP BANDS

25 – 50A	500A
63 – 80A	800A
100 – 125A	1000A

TERMINALS

Front-connected clamps –
16A to 125A – 70mm² cable
– 10mm strip

AUXILIARY EQUIPMENT

G Frame MCCBs

a) Shunt Trip & Auxiliary Switch
b) Two Auxiliary Switches

(For Shunt Trip with 2 Auxiliary C/O Switches add suffix A to ST List No.).

Shunt Trip

Max on time 1 cycle: 10 seconds
Max on time con. cycle: 6 seconds

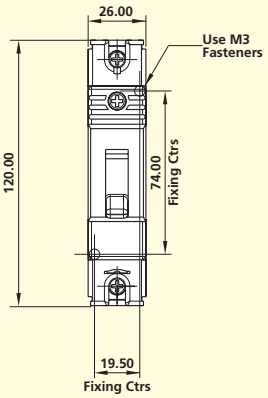
24V dc	30W	} Closed Power Consumption 10% Duty Cycle
115V ac	43VA	
230V ac	43VA	

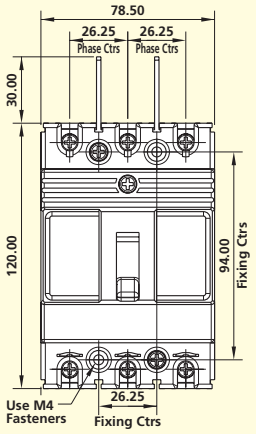
Auxiliary Contact Ratings (A)

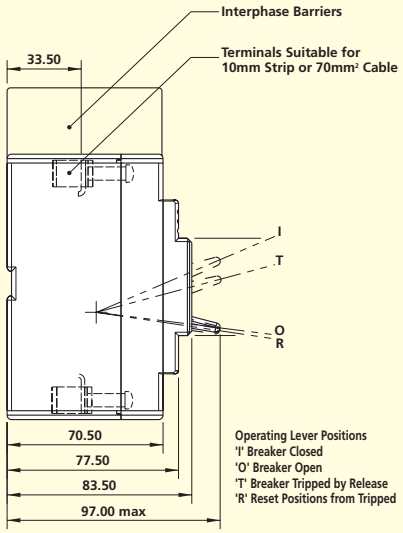
Voltage	Resistive Load (A)	Tungsten Load NC (A)	Tungsten Load NO (A)	Inductive Load (A)
AC				
125	3	0.5	0.5	3
250	3	0.5	0.5	3
DC				
30	3	3	0.5	3
50	1	0.7	0.7	1
125	0.5	0.4	0.4	0.05

POWERSTAR G FRAME MAXIMUM EARTH LOOP IMPEDANCES Zs (ohms) for Uo = 240V~

Current Rating (A)	16	20	25	32	40	50	63	80	100	125
0.4 Seconds Disconnection Time	0.48Ω	0.48Ω	0.48Ω	0.48Ω	0.48Ω	0.48Ω	0.30Ω	0.30Ω	0.24Ω	0.24Ω
5.00 Seconds Disconnection Time	1.68Ω	1.37Ω	1.06Ω	0.81Ω	0.69Ω	0.51Ω	0.37Ω	0.32Ω	0.27Ω	0.25Ω

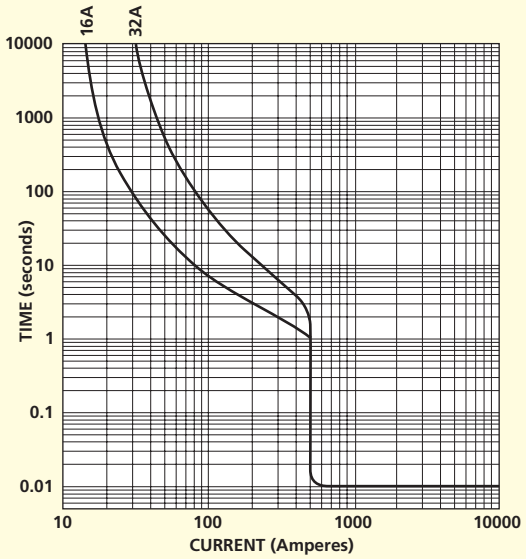




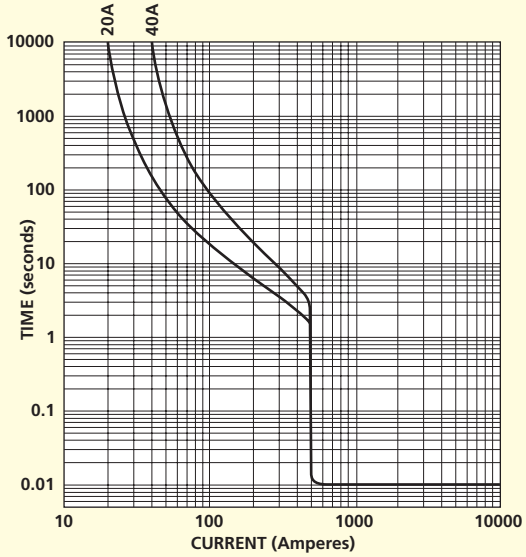


G FRAME MCCBs TRIPPING CHARACTERISTICS - TYPICAL TIME/CURRENT CHARACTERISTICS

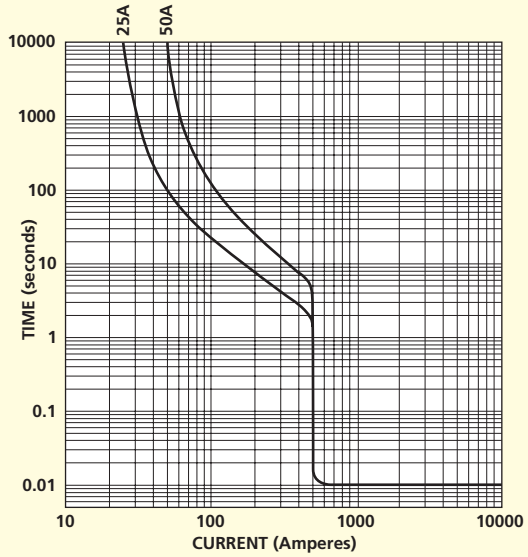
G 16-32A



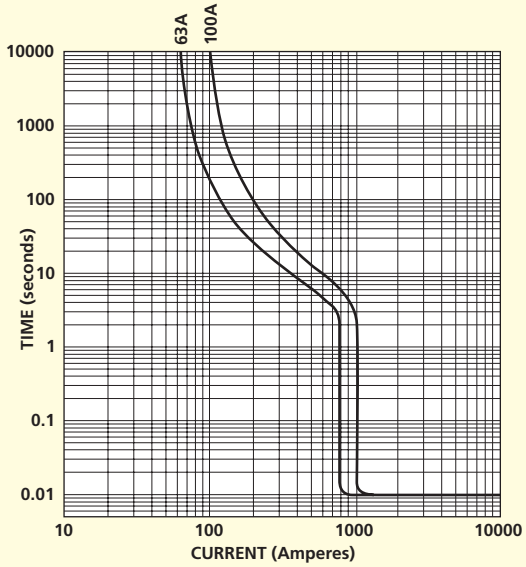
G 20-40A



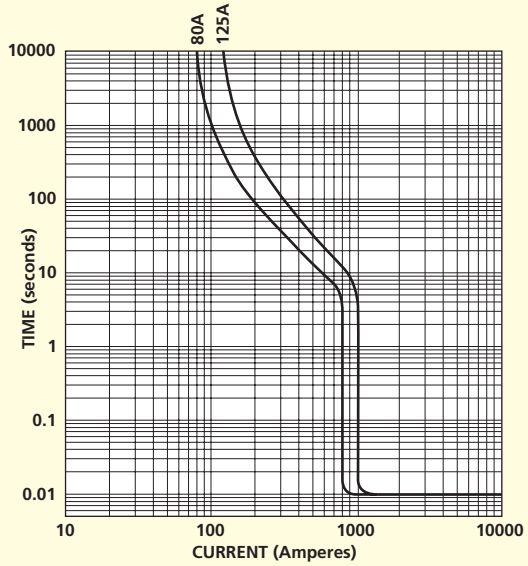
G 25-50A



G 63-100A



G 80-125A

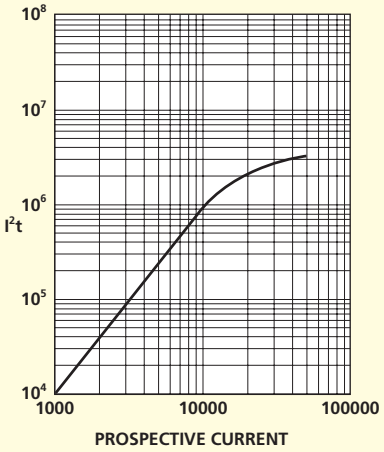


Tolerance on instantaneous current values ± 10%.

JN & JM FRAME MCCBs TECHNICAL SPECIFICATION

JN & JM FRAME SPECIFICATION

- Specification — BSEN60947-2
- Current Range — 25 – 200A
- Ue Rated Operation Voltage — 240V SP 415V TP
- Ui Rated Insulation Voltage — 660V AC
- Rated Frequency — 50/60Hz
- Release — Thermal Magnetic
- Thermal Adjustment — 0.7 – 1.0 x Rated Current
- Instantaneous Adjustment — Non-adjustable
- Short Circuit Breaking Capacity — Icu at 415V = 25KA, Ics = 75%Icu
- Ambient Range — -20°C to 55°C
- Humidity Range — 0 – 90%
- Weight — SP – 0.7Kg TP – 1.8Kg TP & Sw N – 2.4Kg



FEATURES

From J Frame to N Frame Powerstar MCCBs feature escutcheons of the same height allowing any of the frame sizes to be grouped together in a single panel cutout.

Front adjustable thermal tripping elements.

OPTIONS

- ST UVR
- Aux SW
- Rotary Handle
- Padlocking
- Terminal Shrouds
- 4th Poles when fitted are left hand side

(See Product Section for selection)

SHORT CIRCUIT BREAKING CAPACITY

Ue	**Icu**
220 V	50 kA
380 V	32 kA
415 V	25 kA

Ics = 75% Icu

INSTANTANEOUS TRIP BANDS

J Frame	JM Frame
25 – 63A = 400A	
80 – 125A = 800A	
160 – 200A = 1600A	50 – 200 = 1600A

TERMINALS

Front-connected clamps –
25A to 200A – 120mm² solid/150mm² stranded

AUXILIARY EQUIPMENT OPTIONS

a) UVR & Auxiliary Switch
b) Shunt Trip & Auxiliary Switches
c) Two Auxiliary Switches each to change over

Shunt Trip Voltage Range	70 – 110%
Under Voltage Release Threshold	70 – 35%
UVR Power Pack	10VA

(110V & 415V units also supplied with transformer additional to Powerpack.).

Auxiliary Contact Ratings

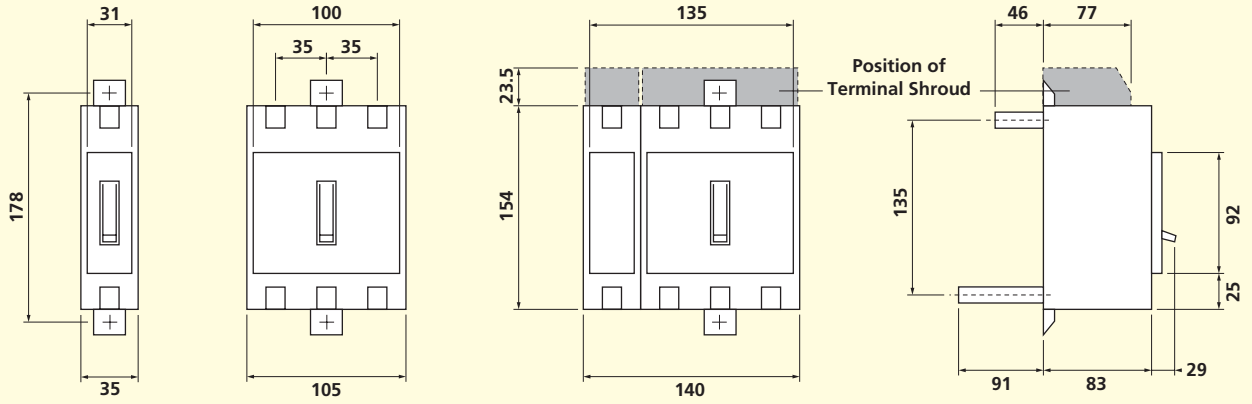
Voltage	Resist' Load (A)	Tungsten Load NC (A)	Tungsten Load NO (A)	Induct' Load (A)
AC				
125	10	2	1	10
250	10	1.5	1	10
DC				
30	10	3	1.5	10
50	3	0.8	0.8	2.5
125	0.5	0.5	0.5	0.07

POWERSTAR JN FRAME MAXIMUM EARTH LOOP IMPEDANCES Zs (ohms) for Uo = 240V~

Current Rating (A)	16/20/25	32	40	50	63	80	100	125	160	200
0.4 Sec Disconnection Time	0.500Ω	0.500Ω	0.500Ω	0.500Ω	0.500Ω	0.250Ω	0.250Ω	0.250Ω	0.125Ω	0.125Ω
5.00 Sec Disconnection Time	0.500Ω	0.500Ω	0.500Ω	0.500Ω	0.500Ω	0.250Ω	0.250Ω	0.250Ω	0.125Ω	0.125Ω

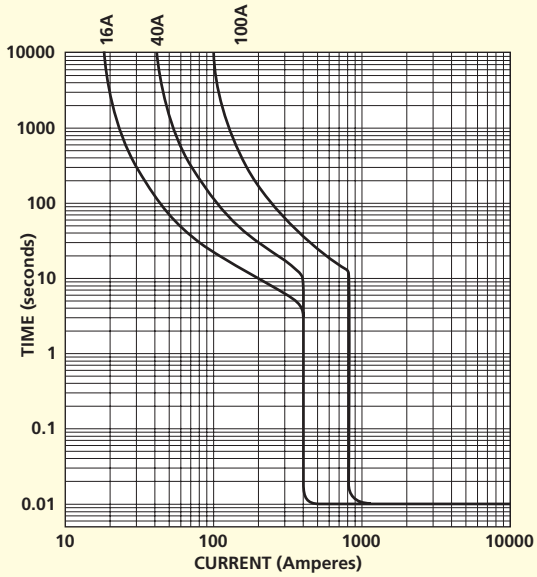
POWERSTAR JM FRAME MAXIMUM EARTH LOOP IMPEDANCES Zs (ohms) for Uo = 240V~

Current Rating (A)	50	63	80	100	125	160	200
0.4 Sec Disconnection Time	0.125Ω	0.125Ω	0.125Ω	0.125Ω	0.125Ω	0.125Ω	0.125Ω
5.00 Sec Disconnection Time	0.125Ω	0.125Ω	0.125Ω	0.125Ω	0.125Ω	0.125Ω	0.125Ω

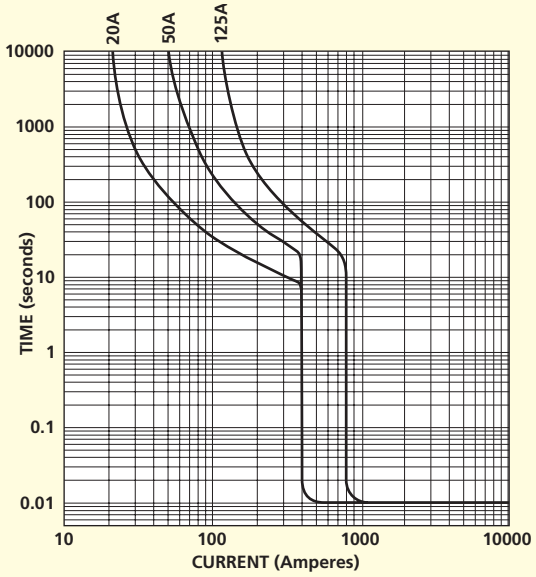


JN & JM FRAME MCCBs - TYPICAL TIME/CURRENT CHARACTERISTICS

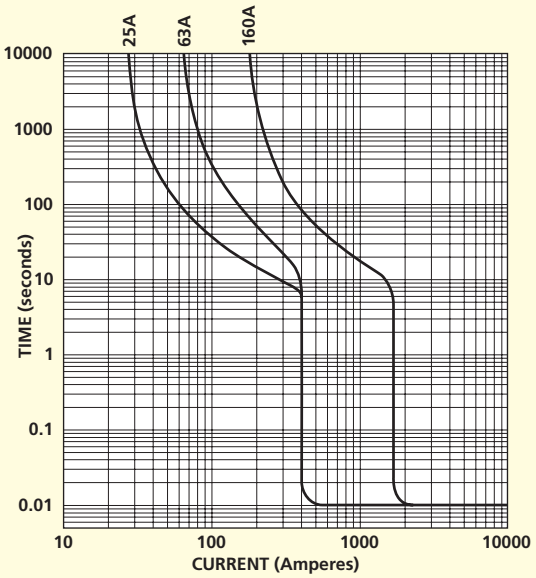
J 16-100 AMP



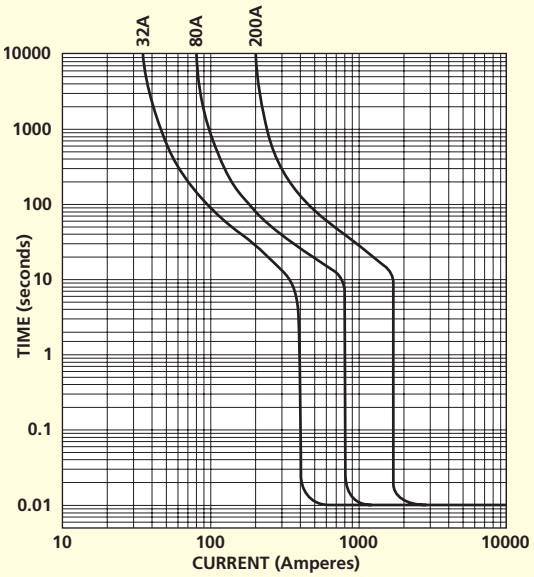
J 20-125 AMP



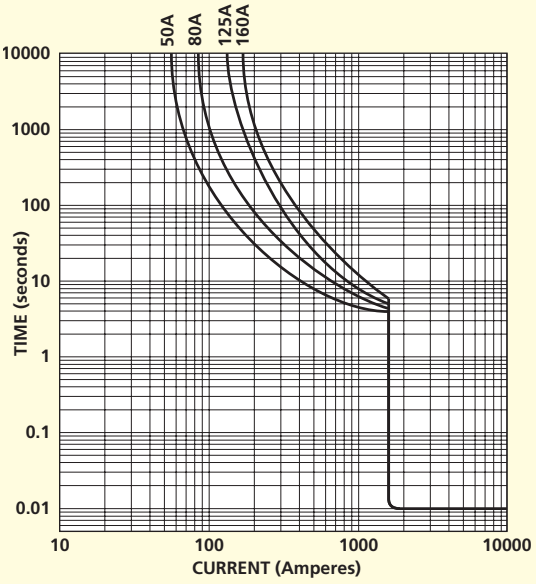
J 25-160 AMP



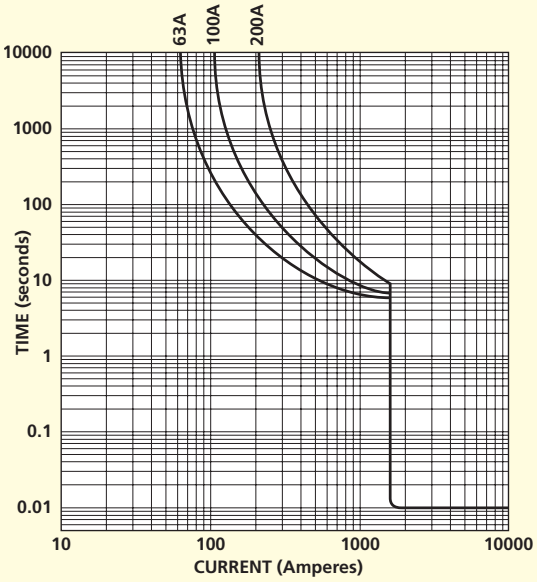
J 32-200 AMP



JM 50-100 AMP



JM 63-200 AMP



Tolerance on Instantaneous Current Values ± 10%

F FRAME MCCBs TECHNICAL SPECIFICATION

F FRAME SPECIFICATION

Current Range:	25 – 250A
I_n Rated Current:	250A
I_u Rated Uninterrupted Current:	250A
U_e Rated Operation Voltage:	415V
U_i Rated Insulation Voltage:	660V
I_{cm}Rated Short Circuit Making Capacity: (at 415V)	S Type - 73.5kA peak H Type - 105kA peak

Trip Unit Type

Magnetic trip setting:	(25 - 32A)	500A
	(40 - 80A)	800A
	(100 - 125A)	1250A
	(160 - 250A)	1600A

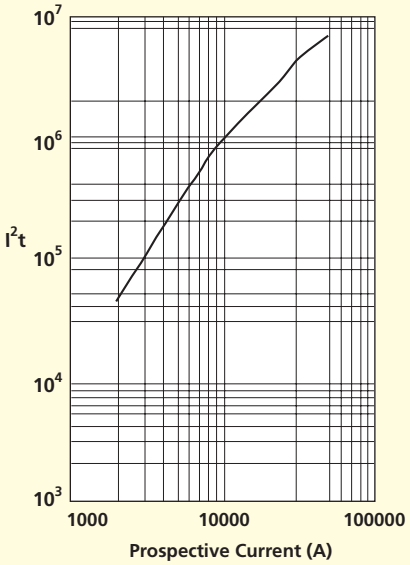
Rated Ultimate Short Circuit Breaking Capacity

Icu Rated Service Short Circuit Triple Pole:	S Type - 35kA H Type - 50kA
Ics Breaking Capacity:	50% Icu
Mechanical duration:	8,000 operations

Ambient Temperature Range:	-20 to 55˚C
Humidity Range:	0 - 90%
Terminal Type:	M8 Screw
Terminal Capacity:	185mm² (cable) 22mm wide (strip)

Shunt Release

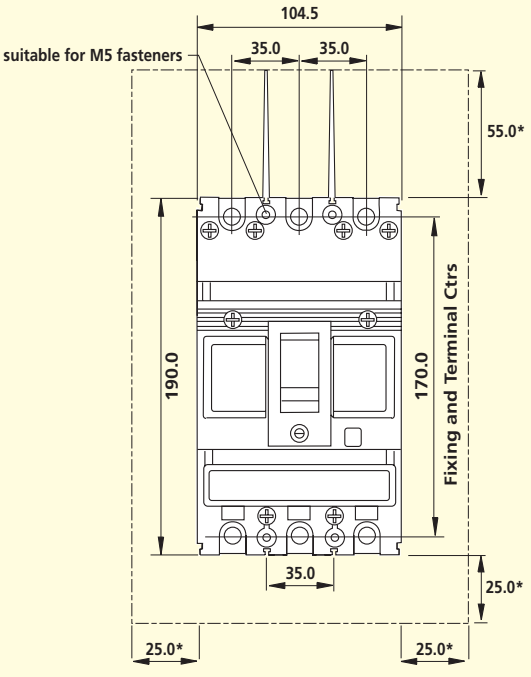
Max. on time 1 cycle:	10 seconds	
Max. on time con. cycle	6 seconds	
24V dc	30W	Closed Power Consumption 10% Duty Cycle
115V ac	43VA	
230V ac	43VA	



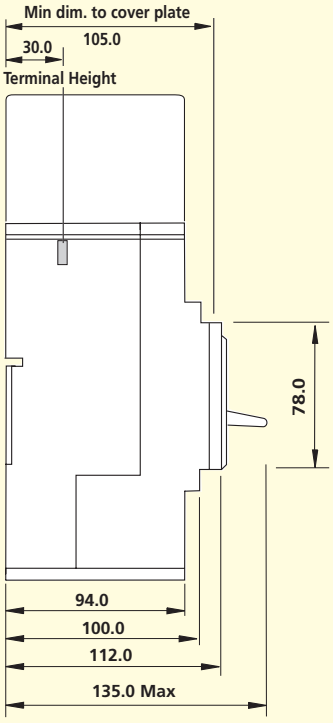
Auxiliary Contacts	Resistive Load	Inductive Load	Tungsten Lamp Load NC	Tungsten Lamp Load NO
50V dc	3A	2.5A	0.8A	0.8A
125V ac	10A	10A	2A	1A
250V ac	10A	10A	1.5A	1A

F FRAME MAXIMUM EARTH LOOP IMPEDANCES Zs (ohms) for Uo = 240V~

Current Rating (A)	25	32	40	50	63	80	100	125	160	200	250
0.4 Seconds Disconnection Time	0.40Ω	0.40Ω	0.25Ω	0.25Ω	0.25Ω	0.25Ω	0.16Ω	0.16Ω	0.125Ω	0.125Ω	0.125Ω
5.00 Seconds Disconnection Time	0.40Ω	0.40Ω	0.25Ω	0.25Ω	0.25Ω	0.25Ω	0.16Ω	0.16Ω	0.125Ω	0.125Ω	0.125Ω



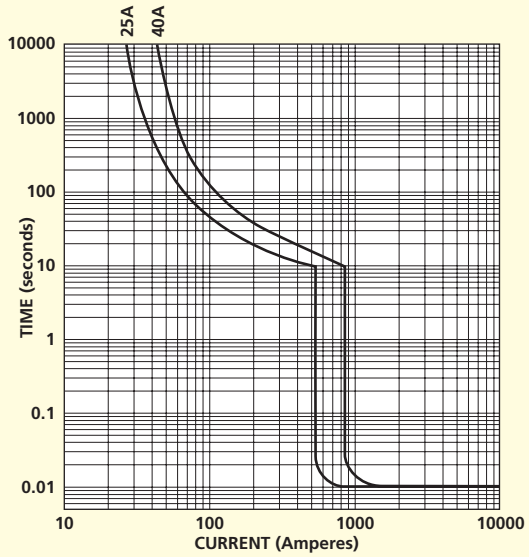
* Denotes Min distance to earthed metal



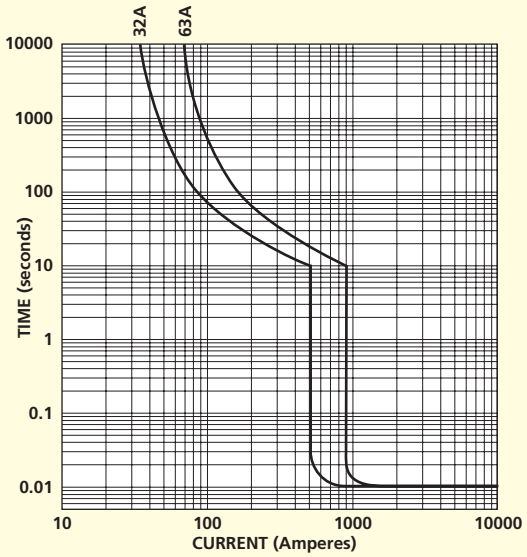
Panel cutout 105 wide x 80 deep

F FRAME MCCBs - TYPICAL TIME/CURRENT CHARACTERISTICS

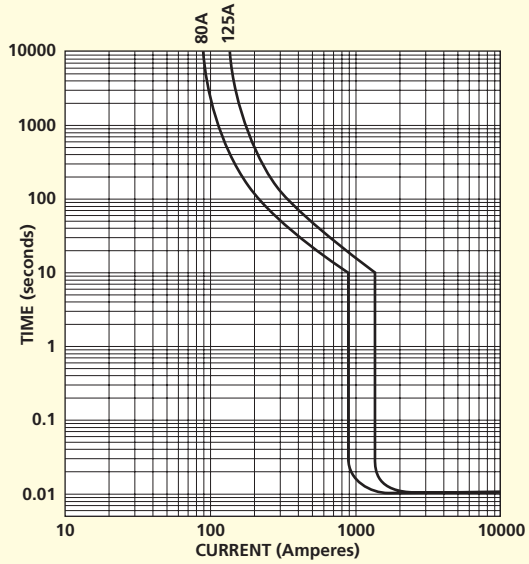
F 25 - 40 AMP



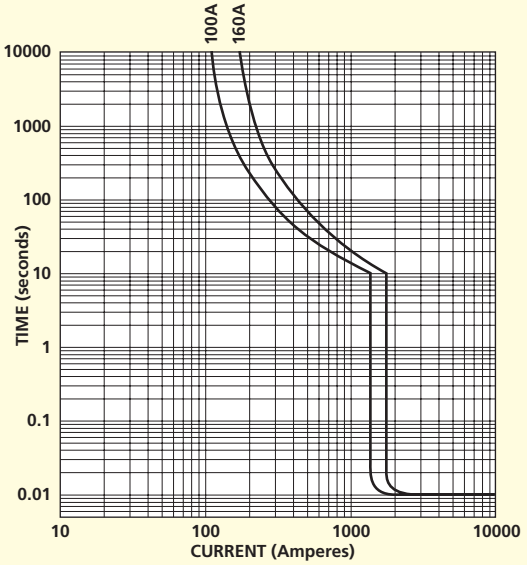
F 32 - 63 AMP



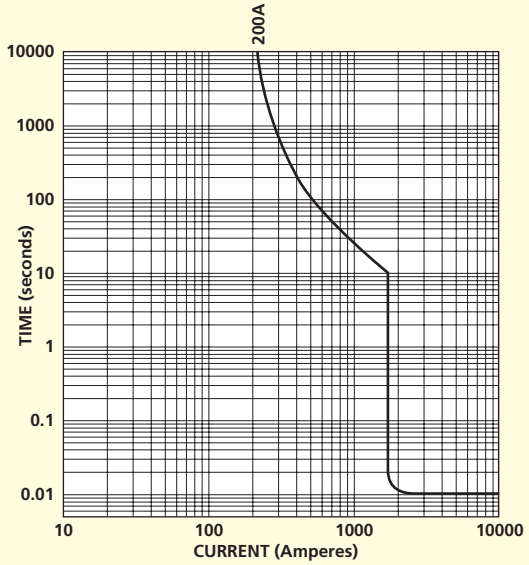
F 80 - 125 AMP



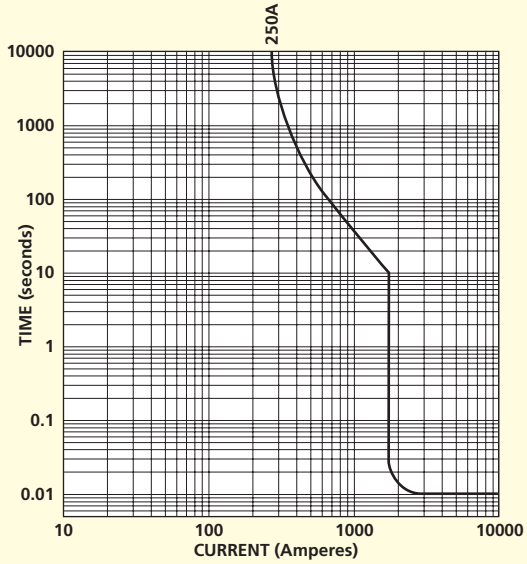
F 100 - 160 AMP



F 200 AMP



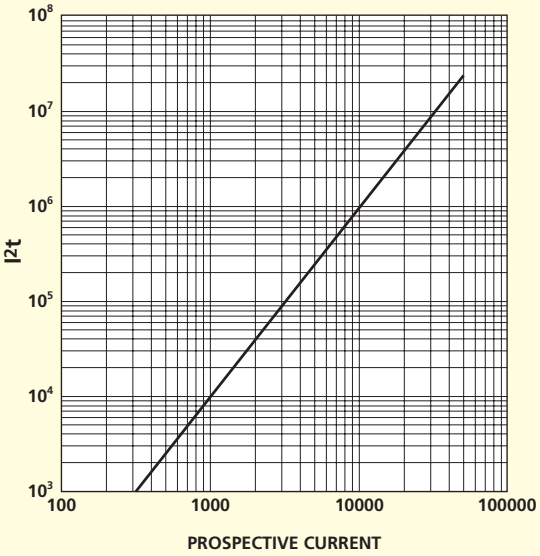
F 250 AMP



Tolerance on Instantaneous Current Values ± 10%

L FRAME SPECIFICATION

• Specification	BSEN60947-2
• Current Range	250 – 800Amps
• Ue Rated Operation Voltage	415V
• Ui Rated Insulation Voltage	660V AC
• Rated Frequency	50/60Hz
• Icu (415V) Short Circuit Breaking Capacity	LS-32kA, LH-50kA
• Release	Thermal Magnetic
• Thermal Adjustment	70 – 100% Rated Current
• Instantaneous Adjustment	Adjustable – see below
• Ambient Range	-20°C to 55°C
• Humidity Range	0 – 90%
• Weight	TP – 9.2Kg TP & Sw N – 11.6Kg



L FRAME FEATURES

From J Frame to N Frame Powerstar MCCB's feature escutcheons of the same height to simplify switchboard installations.
Front adjustable thermal and instantaneous tripping elements

AVAILABLE OPTIONS

- ST UVR
- Aux SW
- Key Interlock Direct Mounting
- Rotary Handle
- Padlocking
- Dolly Extension
- 4th Poles when fitted are left hand side

(See Product Section for selection)

SHORT CIRCUIT BREAKING CAPACITY

Ue	Icu
220 V	40 kA
380 V	32 kA
415 V	32 kA

Ics = 50% Icu

with correct line 'load' connection

MAGNETIC TRIP BANDS

Magnetic – (250 – 315A) Adjustable 5 – 10x In
– (400 – 800A) Adjustable 4 – 10x In

TERMINALS

Cranked front connection terminals c/w M12 connection bolts for direct coupling of cable sockets. Supplied with 2 interphase barriers.

AUXILIARY EQUIPMENT OPTIONS

L Frame MCCBs

a) UVR & Auxiliary Switch
b) Shunt Trip & Auxiliary Switches
c) Two Auxiliary Switches

Note: All Shunt Trips supplied with coil disconnection Auxiliary Switch.

Shunt Trip Voltage Range 70 – 110%
UVR Power Pack 10VA

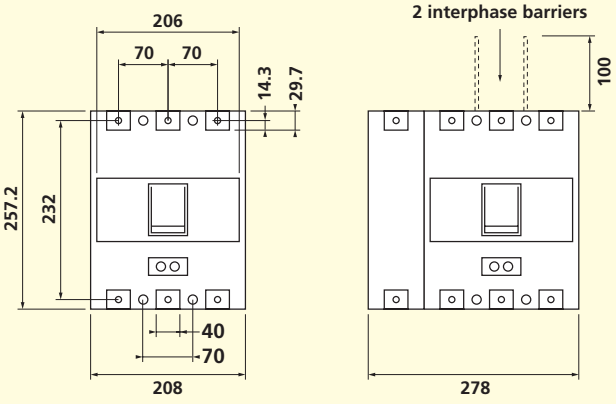
(110V & 415V units supplied with Transformer in addition to Powerpack.).

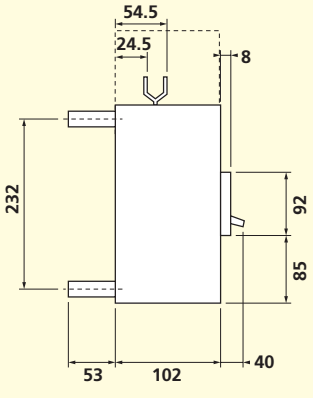
Auxiliary Contacts

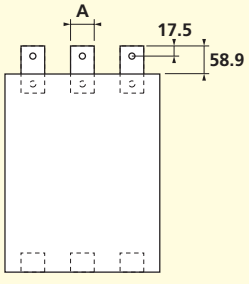
Volts	Resistive Load (A)	Tungsten Load NC (A)	Tungsten Load NO (A)	Inductive Load (A)
AC				
125	15	1.5	1.0	5
250	15	0.7	0.5	5
DC				
30	2	3	1.5	1
50	0.7	0.7	0.7	0.5
125	0.5	0.4	0.4	0.03

POWERSTAR LS & LH FRAME MAXIMUM EARTH LOOP IMPEDANCES Zs (ohms) for U_o = 240V~

Current Rating (A)	250	315	400	500	630	800	Magnetic Trip Setting
0.4 Seconds Disconnection Time	0.0872Ω	0.0692Ω	0.0545Ω	0.0436Ω	0.0346Ω	0.0272Ω	High
5.00 Seconds Disconnection Time	0.1745Ω	0.1385Ω	0.1363Ω	0.1090Ω	0.0865Ω	0.0681Ω	Low



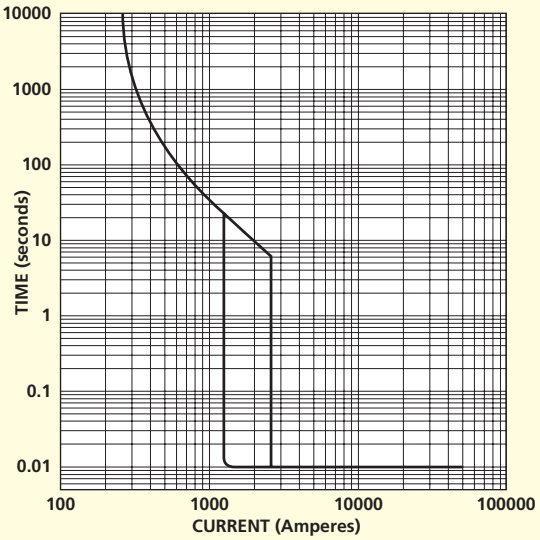




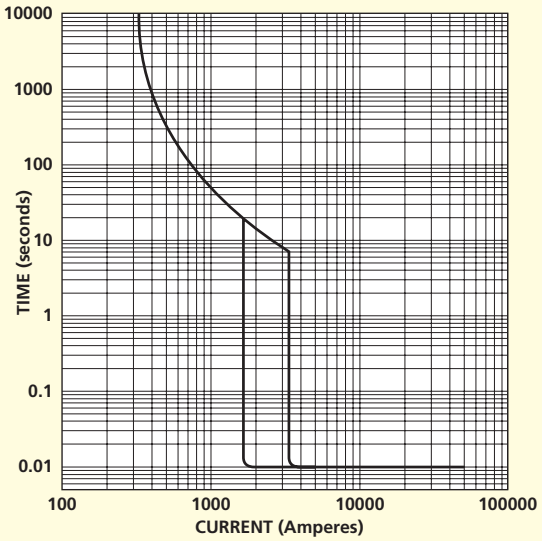
Terminal Extensions
250 - 400A, A = 30
500 - 800A, A = 50

LS & LH FRAME MCCBs - TYPICAL TIME/CURRENT CHARACTERISTICS

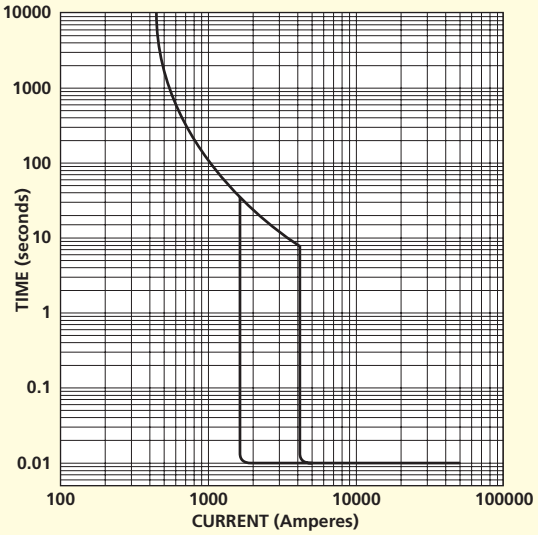
LS/LH 250 AMP



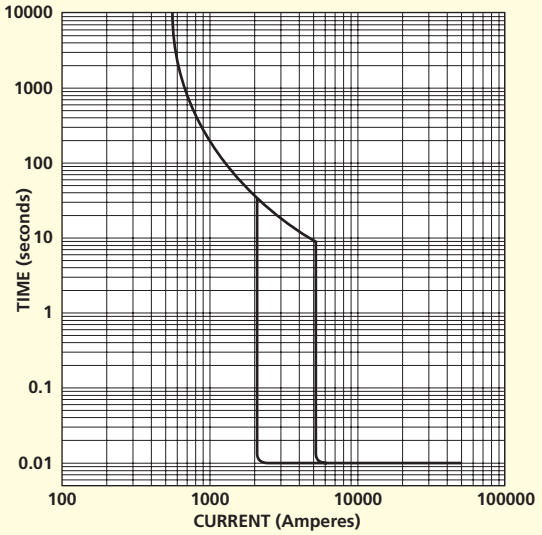
LS/LH 315 AMP



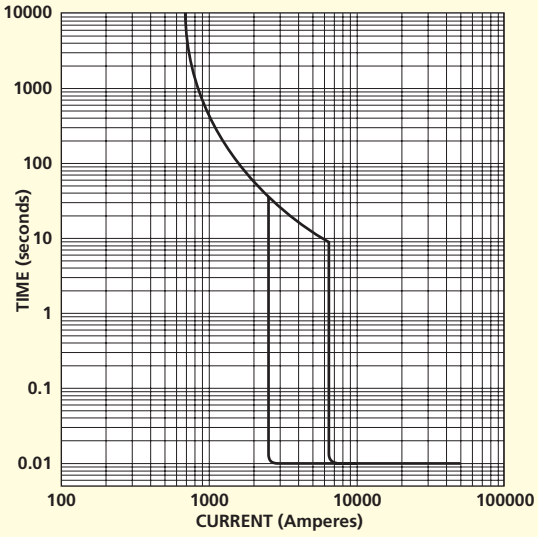
LS/LH 400 AMP



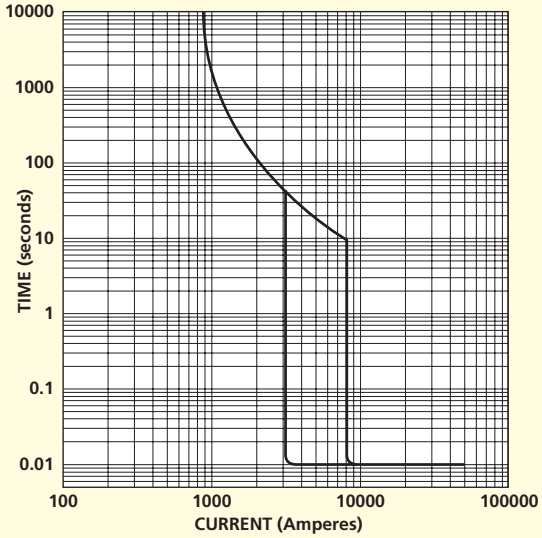
LS/LH 500 AMP



LS/LH 630 AMP



LS/LH 800 AMP



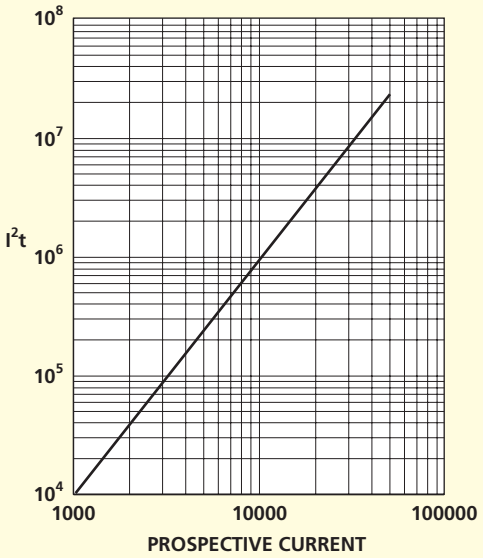
Tolerance on instantaneous current values ± 10%.

N FRAME MCCBs TECHNICAL SPECIFICATION

N FRAME SPECIFICATION

• Specification	BSEN60947-2
• Current Range	800 – 1600Amps
• Uie Rated Operation Voltage	415V
• Ui Rated Insulation Voltage	660V AC
• Rated Frequency	50/60Hz
• Icu (415V) Short Circuit Breaking Capacity	50kA
• Thermal Adjustment	See Detail Page over
• Instantaneous Adjustment	See Detail Page over
• Ambient Range	-20°C to 55°C
• Humidity Range	0 – 90%
• Weight	Rear Terminals 17kg Front Flat 19kg

N Frame MCCB Energy Let Through



N FRAME FEATURES

From J Frame to N Frame Powerstar MCCB's feature escutcheons of the same height to simplify switchboard installations.
Front adjustable thermal and instantaneous tripping elements.

AVAILABLE OPTIONS

- ST UVR
- Aux SW
- Key Interlock Direct Mounting
- Rotary Handle
- Padlocking
- Dolly Extension
  (See Product Section for selection)

SHORT CIRCUIT BREAKING CAPACITY

Ue	Icu
220 V	70kA
380 V	50kA
415 V	50kA

Ics = 75% Icu

TERMINALS

Back connected units supplied with 6 tee terminals which can be positioned either vertically or horizontally.
Front connected units supplied with 6 front flat terminals.

AUXILIARY EQUIPMENT OPTIONS

a) UVR & Auxiliary Switch
b) ST & Auxiliary Switch
c) N Frame 3 Auxiliary C/O Switches

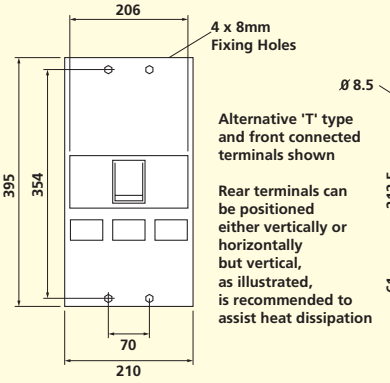
Shunt Trip Voltage Range 70 – 110%
UVR Power Pack 10VA
(110v & 415V units supplied with Transformer in addition to Powerpack.).

Auxiliary Contact Ratings

Voltage	Resist' Load (A)	Tungsten Load NC (A)	Tungsten Load NO (A)	Induct' Load (A)
AC				
125	3	0.5	0.5	3
250	3	0.5	0.5	3
DC				
30	3	3	0.5	3
50	1	0.7	0.7	1
125	0.5	0.4	0.4	0.05

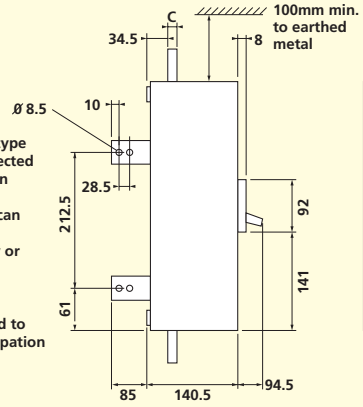
POWERSTAR N FRAME MAXIMUM EARTH LOOP IMPEDANCES Zs (ohms) for Uo = 240V~

Current Rating (A)	800	1000	1250	1600	Magnetic Trip Setting
0.4 Seconds Disconnection Time	0.0242Ω	0.0218Ω	0.0218Ω	0.0218Ω	High
5.00 Seconds Disconnection Time	0.0727Ω	0.0545Ω	0.0545Ω	0.0545Ω	Low

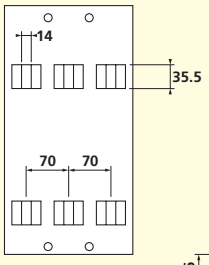


Alternative 'T' type and front connected terminals shown

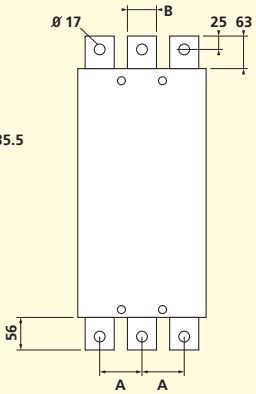
Rear terminals can be positioned either vertically or horizontally but vertical, as illustrated, is recommended to assist heat dissipation



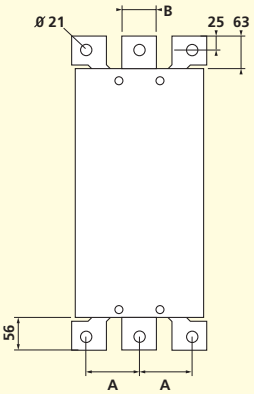
T Type Terminal



800A-1600A Rear



800A-1000A Front

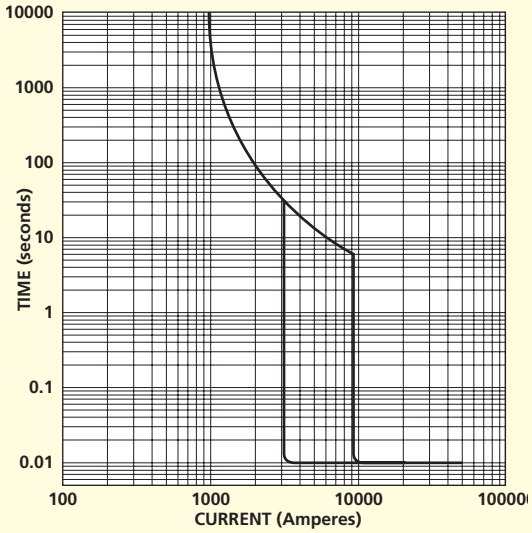


1250A-1600A Front

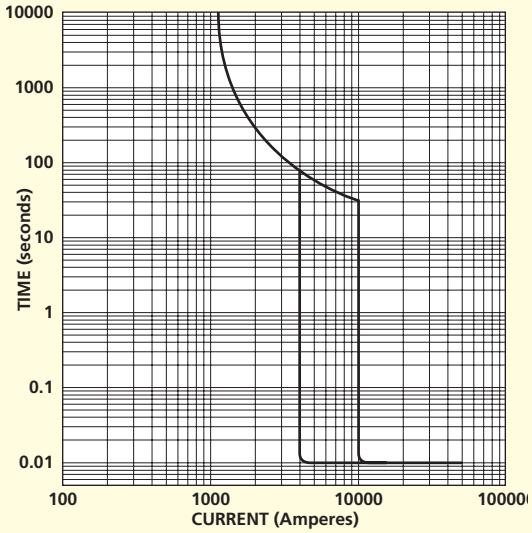
Rating	A	B	C
800A	70mm	45mm	12mm
1000A	70mm	45mm	15mm
1250A	82mm	60mm	15mm
1600A	87mm	65mm	18mm

N FRAME MCCBs - TYPICAL TIME/CURRENT CHARACTERISTICS

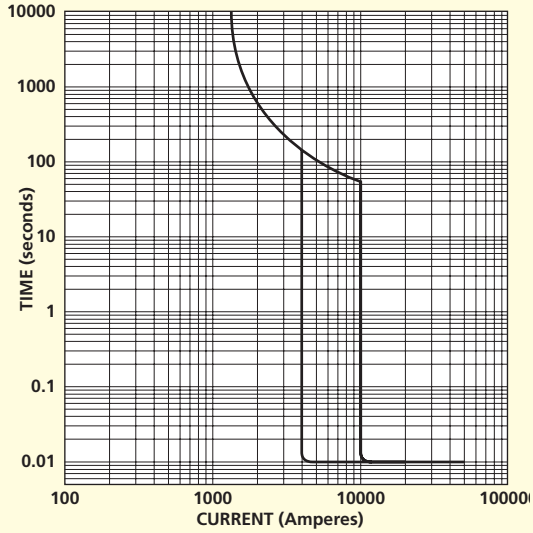
N 800 AMP



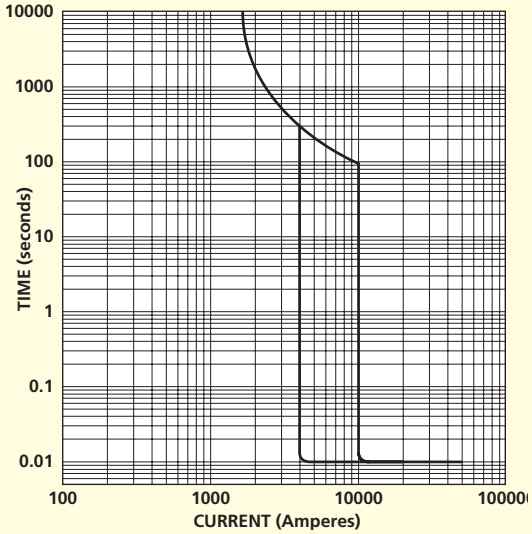
N 1000 AMP



N 1250 AMP



N 1600 AMP



Tolerance on Instantaneous Current Values ± 10%

N FRAME OVERLOAD SETTINGS Ith @ 50/60Hz

Ambient Rating (A) **7PBNH3800**

Temp(C°)	450	500	550	600	650	700	750	800	850	900	950
20				1	2	2	3	3	4	5	5
25			1	1	2	2	3	4	4	5	
30			1	1	2	3	3	4	5	5	
35			1	2	2	3	4	4	5		
40			1	2	3	3	4	5	5		
45		1	1	2	3	3	4	5	5		
50		1	2	2	3	4	4	5			

* 800A 'N' Frame Instantaneous Trip: 3000A Low, 9,000A High

Ambient Rating (A) **7PBNH31250**

Temp(C°)	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450
20			1	1	1	2	2	3	3	3	4	4	5	5	
25			1	1	2	2	2	3	3	4	4	5	5	5	
30			1	1	2	2	3	3	3	4	4	5	5		
35		1	1	1	2	2	3	3	4	4	4	5	5		
40		1	1	2	2	2	3	3	4	4	5	5			
45		1	1	2	2	3	3	3	4	4	5	5			
50	1	1	2	2	3	3	3	4	4	4	5				

* 1250A 'N' Frame Instantaneous Trip: 4000A Low, 10,000A High

Ambient Rating (A) **7PBNH31000**

Temp(C°)	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
20			1	1	2	2	3	3	4	4	5	5	
25			1	1	2	2	3	3	4	4	5	5	
30		1	1	2	2	3	3	4	4	5	5		
35		1	1	2	2	3	3	4	4	5	5		
40		1	1	2	2	3	3	4	5	5			
45		1	1	2	3	3	4	4	5	5			
50		1	1	2	3	3	4	5	5	5			

* 1000A 'N' Frame Instantaneous Trip: 4000A Low, 10,000A High

Ambient Rating (A) **7PBNH31600**

Temp(C°)	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600
20							1	1	2	2	3
25						1	1	2	2	3	3
30					1	1	2	2	3	3	4
35				1	1	2	2	3	3	4	4
40			1	1	2	2	3	3	4	4	5
45		1	1	2	2	3	3	4	4	5	
50	1	1	2	2	3	3	4	4	5		

* 1600A 'N' Frame Instantaneous Trip: 4000A Low, 10,000A High

POWERSTAR MCCB Upstream Device - Instantaneous Trip set at High

POWERSTAR MCCB, downstream device Instantaneous Trip Set at Low

		GB & GN 16/25kA										JN 25kA											JM 25kA		
		16	20	25	32	40	50	63	80	100	125	16	20	25	32	40	50	63	80	100	125	160	200	All		
GB & GN	16							800	800	1000	1000								800	800	1600	1600	1600	1600	16	**GB & GN**
	20							800	800	1000	1000								800	800	1600	1600	1600	1600	20	
	25							800	800	1000	1000								800	800	1600	1600	1600	1600	25	
	32							800	800	1000	1000								800	800	1600	1600	1600	1600	32	
	40							800	800	1000	1000								800	800	1600	1600	1600	1600	40	
	50							800	800	1000	1000								800	800	1600	1600	1600	1600	50	
	63									1000	1000										1600	1600	1600	1600	63	
	80									1000	1000										1600	1600	1600	1600	80	
	100																				1600	1600	1600	1600	100	
16 & 25kA	125																				1600	1600	1600	1600	125	16 & 25kA

JN	16																		800	800	1600	1600	1600	1600	16	**JN**
	20																		800	800	1600	1600	1600	1600	20	
	25																		800	800	1600	1600	1600	1600	25	
	32																		800	800	1600	1600	1600	1600	32	
	40																		800	800	1600	1600	1600	1600	40	
	50																		800	800	1600	1600	1600	1600	50	
	63																		800	800	1600	1600	1600	1600	63	
	80																				1600	1600	1600	1600	80	
	100																				1600	1600	1600	1600	100	
	125																				1600	1600	1600	1600	125	
	160																								160	
25kA	200																								200	25kA

JM																										**JM**
25kA	All																								All	25kA

FS & FH	25																								25	**FS & FH**
	32																								32	
	40																								40	
	50																								50	
	63																								63	
	80																								80	
	100																								100	
	125																								125	
	160																								160	
	200																								200	
35 & 50kA	250																								250	35 & 50kA

LS & LH	250																								250	**LS & LH**
	315																								315	
	400																								400	
	500																								500	
	630																								630	
32 & 50kA	800																								800	32 & 50kA

NH	800																								800	**NH**
	1000																								1000	
	1250																								1250	
50kA	1600																								1600	50kA

POWERSTAR MCCB Upstream Device - Instantaneous Trip set at High

		FS & FH 35/50kA											LS & LH 32/50kA						NH 50kA					
		25	32	40	50	63	80	100	125	160	200	250	250	315	400	500	630	800	800	1000	1250	1600		
GB & GN	16			800	800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	16	**GB & GN**
	20			800	800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	20	
	25			800	800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	25	
	32			800	800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	32	
	40				800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	40	
	50					800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	50	
	63							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	63	
	80							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	80	
	100							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	100	
16 & 25kA	125									1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	125	16 & 25kA
JN	16							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	16	**JN**
	20							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	20	
	25							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	25	
	32							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	32	
	40							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	40	
	50							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	50	
	63							800	1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	63	
	80								1250	1250	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	80	
	100								1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	100	
	125									1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	125	
	160												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	160	
25kA	200												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	200	25kA
JM																								**JM**
25kA	All												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	All	25kA
FS & FH	25			800	800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	16	**FS & FH**
	32			800	800	800	800	1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	20	
	40							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	25	
	50							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	32	
	63							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	40	
	80							1250	1250	1600	1600	1600	2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	50	
	100												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	63	
	125												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	80	
	160												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	100	
	200												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	125	
35 & 50kA	250												2500	3000	4000	5000	6300	8000	8000	9000	10000	10000	160	35 & 50kA
LS & LH	250													3000	4000	5000	6300	8000	8000	9000	10000	10000	250	**LS & LH**
	315														4000	5000	6300	8000	8000	9000	10000	10000	315	
	400															5000	6300	8000	8000	9000	10000	10000	400	
	500																6300	8000	8000	9000	10000	10000	500	
	630																	8000	8000	9000	10000	10000	630	
32 & 50kA	800																		8000	9000	10000	10000	800	32 & 50kA
NH	800																			9000	10000	10000	800	**NH**
	1000																				10000	10000	1000	
	1250																						1250	
50kA	1600																						1600	50kA

MOTOR PROTECTION

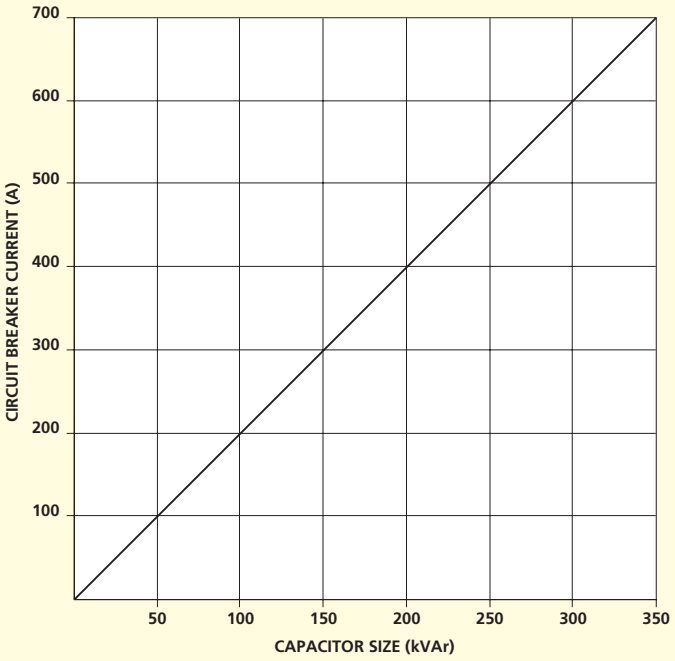
Motor Rating		Approx. Full Load Current (A)	Direct On Line MCCB Rating/Type					Star/Delta MCCB Rating/Type				
HP	KW	@ 415V	G	J	JM	LS/LH	N	G	J	JM	LS/LH	N
10	7.5	14	25	25	–	–	–	25	25	–	–	–
12.5	9	17	25	25	–	–	–	25	25	–	–	–
15	11	21	25	25	–	–	–	25	25	–	–	–
20	15	28	32	32	–	–	–	32	32	–	–	–
25	19	35	40	–	–	–	–	40	40	–	–	–
30	22	41	50	–	50	–	–	50	50	50	–	–
40	30	52	63	–	63	–	–	63	63	63	–	–
50	37	69	–	–	80	–	–	–	80	80	–	–
60	45	80	–	–	100	–	–	–	100	100	–	–
75	55	97	–	–	125	–	–	–	125	125	–	–
100	75	125	–	–	160	–	–	–	160	160	–	–
125	90	156	–	–	–	250	–	–	–	200	–	–
150	112	190	–	–	–	315	–	–	–	–	250	–
175	130	225	–	–	–	315	–	–	–	–	315	–
200	149	255	–	–	–	315	–	–	–	–	315	–
220	160	275	–	–	–	400	–	–	–	–	400	–
250	186	320	–	–	–	400	–	–	–	–	400	–
300	224	375	–	–	–	500	–	–	–	–	500	–
350	261	449	–	–	–	630	600	–	–	–	630	600
400	298	505	–	–	–	630	600	–	–	–	630	600

The figures shown are based on motor starting conditions.
Direct online 7 x full load current for 5 seconds.
Star/Delta 4 x full load current for 12 seconds.

CAPACITOR CIRCUIT

Circuit breakers are widely used to protect circuits containing capacitors. Because of circuit harmonics and high "in rush" transients associated with capacitor circuits it is necessary to select a circuit breaker with a current rating not less than 1.5 times the capacitor current.

Powerstar circuit breakers are suitable for off load switching of capacitors only.



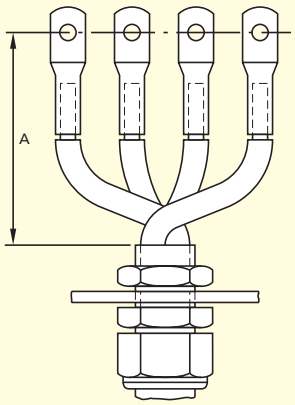
BS5372 SPREADING ROOM

The scope of BS5372 relates to dimensions which should be observed in the design of cable terminations, having uninsulated conductor fittings, for external cables on electrical equipment to enable the cables to be connected satisfactorily.

The standard is based upon the use of compression type conductor terminations and allows for the cores to be crossed within the terminal enclosure because this combination requires more space.

The diagram and table below gives the dimensions quoted by this standard.

4 CORE TERMINATIONS, SPREADING ROOM



Cable Size (mm^2)	Dimension 'A' (mm^2)
16	103
25	127
35	142
50	167
70	197
95	224
120	245
150	272
185	297
240	333
300	375

CONTACTOR SPECIFICATION

FEATURES	UNITS	C3	C7	C10	C14	C19	C22	C30	C43	C63
Main poles		3	3	3	3	3	3	3	3	3
Auxiliary poles - standard		1	1	1	1	1	0	0	2	2
Rated impulse withstand voltage (Uimp)	Kv	6	6	6	6	6	6	6	6	6
Rated impulse withstand voltage (Ui) - main poles	V	690	690	690	690	690	690	690	690	690
Rated impulse withstand voltage (Ui) - Aux. poles	V	690	690	690	690	690	–	–	690	690
Rated operational current (Ie) 400/415V 50Hz										
AC1 Non-inductive (@45 degrees)	A	20	20	25	25	25	35	35	75	85
AC3 Squirrel cage motors - normal switching	A	5	8.5	8.5	11	14	22	28	40	55
AC4 Squirrel cage motors - plugging/inching	A	5	8.5	8.5	8.3	11	14	22	28	40
Other ratings										
Conventional thermal rating (ith) open @45 degrees)	A	20	20	25	25	25	35	35	75	85
Star-delta starter	A	–	–	14.4	19	24	–	–	69	95
Transformer primary switching	A	5	5.7	8.3	10	11	–	–	32	36
Tungsten and infra red lamps	A	–	4.5	8.5	10	13	–	–	37	48
Non-compensated high-pressure mercury, sodium vapour and halide lamps	A	–	8.5	8.5	11	18	–	–	44	50
Compensated high-pressure mercury, sodium vapour and halide lamps	A	–	4.5	4.5	7	14	–	–	22	24
Capacitor switching (single bank only) 400/415V	kVAr	–	–	–	–	–	–	–	17	25
Mechanical durability - number of operations	x10^6	10	10	10	10	10	10	10	3	3
Maximum operations per hour (AC3)		3000	3000	3000	3000	3000	3000	3000	3000	3000
Maximum HRC back up fuse links (50kA)										
-Type 2 co-ordination	A	20	20	–	–	–	–	–	–	–
-Type 1 co-ordination	A	25	25	25	25	35	50	50	80	125
Rating of auxiliary poles and relays (AC15)										
- 230/2400V (Built in aux pole)	A	6	6	6	6	6	–	–	6	6
- 400/415V	A	4	4	4	4	4	–	–	4	4
- 500V	A	2	2	2	2	2	–	–	2	2
Operating coil voltage range										
Consumption, ac coil varients - pull in	VA	37	32	66	66	66	66	66	130	130
- hold in	VA	5.5	5.5	8	8	8	8	8	10	10
Average operating times, ac coil varients - pick up	ms	6-12	6-12	–	–	–	–	–	10-20	10-20
- drop out	ms	5-10	5-10	–	–	–	–	–	8-15	8-15
Cable termination -maximum conductor size										
Main pole terminals - single or stranded	mm	2.5	2.5	4	4	4	10	10	35	35
- flexible	mm	2.5	2.5	2.5	2.5	2.5	6	6	25	25
Auxiliary pole terminals - single or stranded	mm	2.5	2.5	2.5	2.5	2.5	–	–	2.5	2.5
- flexible	mm	2.5	2.5	2.5	2.5	2.5	–	–	2.5	2.5
Ambient temperature limits - open	deg C	-20/+60	-20/+60	-20/+60	-20/+60	-20/+60	-20/+60	-20/+60	-20/+60	-20/+60
- enclosed	deg C	-20/+45	-20/+45	-20/+45	-20/+45	-20/+45	-20/+45	-20/+45	-20/+45	-20/+45
Weight	kg	0.16	0.18	0.3	0.3	0.3	0.32	0.32	0.93	0.93

OVERLOAD RELAYS SPECIFICATION

	UNITS	51500/-	55500/-	57500/-	49500/-
Range - Direct on	A	0.3-12.5	0.15-16	0.15-40	0.15-40
- Star delta	A	–	4.1-27.6	4.1-69	23-109
Rated impulse withstand voltage (Uimp)	kV	6	6	6	6
Rated insulation voltage (Ui) - main poles	V	690	690	690	690
- auxiliary poles	V	500	500	500	500
Auxiliary contact rating AC15 -230/240V	A	2	3	3	2
- 400/415V	A	1	2	2	1
- 500V	A	0.5	1	1	0.5
Cable termination - maximum conductor size					
Main pole terminals - single or stranded	mm	4	16	16	25
- flexible	mm	4	10	10	16
Auxiliary pole terminals - single or stranded	mm	2.5	2.5	2.5	2.5
- flexible	mm	1.5	1.5	1.5	1.5
Control circuit fuse maximum (normal or slow)	A	6	10	10	6
Ambient temperature limits - open	deg C	-20/+55	-20/+60	-20/+60	-20/+55
- closed	deg C	-20/+55	-20/+40	-20/+40	-20/+55
Weight	kg	0.16	0.16	0.16	0.3

Maximum HRC back up fuse links (50kA)
Type 1 or type 2 co-ordination

CEICON C3–C63 OVERLOAD RELAYS

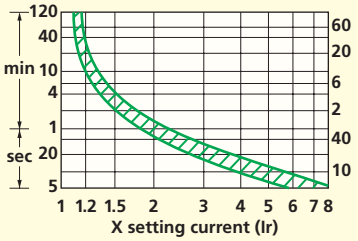
CEICON overload relays should be backed up by HRC fuse links selected from the following table.
When selecting a motor rated fuse link the recommended rating relates to the largest rated current, eg for an application requiring a 50A fuse link, a motor rated fuse link marked 32M50 should be used.

OVERLOAD RELAY			*FUSE LINK RATING (A)*	
Type	*LIST No series*	*Rating (A)*	*Type gL*	*MPSCC*
C3/7	*51500/DC*	*0.3–0.45*	*2*	*80kA*
	51500/EC	*0.45-0.67*	*2*	*80kA*
	51500/FC	*0.67-1.0*	*4*	*80kA*
	51500/GC	*1.0-1.5*	*6*	*80kA*
	51500/HC	*1.4-2.1*	*6*	*80kA*
	51500/IC	*1.8-2.7*	*10*	*80kA*
	51500/JC	*2.4-3.6*	*10*	*80kA*
	51500/KC	*3.5-5.0*	*16*	*80kA*
	51500/JC	*4.0-6.0*	*20*	*80kA*
	51500/MC	*5.5-8.5*	*20*	*80kA*
	51500/NC	*8.5-12.5*	*25*	*80kA*
C10/30				
	55 or 57 500/BC	*0.15–0.25*	*1*	*80kA*
	55 or 57 500/CC	*0.24–0.4*	*1*	*80kA*
	55 or 57 500/DC	*0.38–0.63*	*1*	*80kA*
	55 or 57 500/FC	*0.6–1*	*2*	*80kA*
	55 or 57 500/GC	*0.96–1.6*	*4*	*80kA*
	55 or 57 500/HC	*1.5–2.5*	*6*	*80kA*
	55 or 57 500/JC	*2.4–4*	*10*	*80kA*
	55 or 57 500/KC	*3.8–6.3*	*16*	*80kA*
	55 or 57 500/MC	*6–10*	*20*	*80kA*
	55 or 57 500/NC	*9.6–16*	*25*	*80kA*
	57500/PC	*15–25*	*50*	*80kA*
	57500/QC	*24–40*	*80*	*80kA*
C43/63	*49500/AD*	*13–21*	*50*	*80kA*
	49500/BD	*16–25*	*50*	*80kA*
	49500/CD	*21–32*	*63*	*80kA*
	49500/DD	*25–40*	*80*	*80kA*
	49500/ED	*32–50*	*100*	*80kA*
	49500/FD	*50–63*	*125*	*80kA*

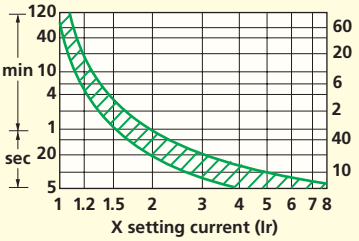
CEICON OVERLOAD RELAY CHARACTERISTICS

The 3-phase overload tripping characteristics are taken from a cold condition in an ambient temperature of 20°C and are therefore worst case curves.
The tripping times should not be longer than those shown (it will be noted that they apply over a range: curves for individual units will operate within a narrower band).
It should be noted that the best single phasing protection is obtained when the overload relay is operating at or near its maximum rating.

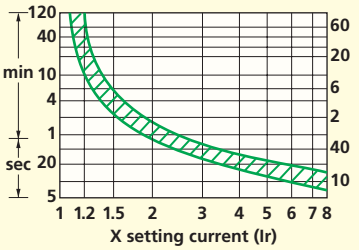
C3/7 (class 10A)



C10/30 (class 10A)



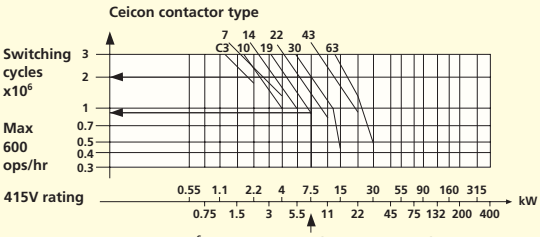
C43/C63 (class 10A)



CONTACT LIFE FOR CEICON C3/181 CONTACTORS

Normal switching conditions for squirrel-cage motors
Utilisation category AC3

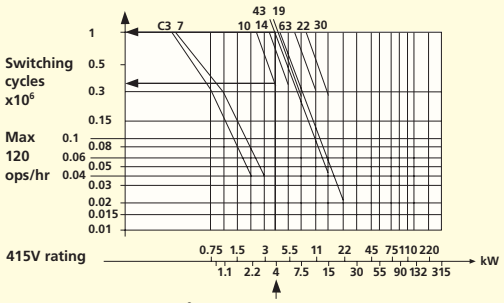
OPERATING CHARACTERISTICS
Switching on: From standstill 6xFLC of motor
Switching off: While running 1xFLC of motor
TYPICAL APPLICATIONS
Compressors, lifts, mixers, sluices, pumps, escalators, stirrers, barrels, blowers, conveyors, centrifuges, air-conditioning, general drives on manufacturing and processing machinery



Example: 7.5kW C19: 0.9x10⁶ switching cycles (= 900 thousand)
C22: 2x10⁶ switching cycles (= 2 million) Ceicon contactor type

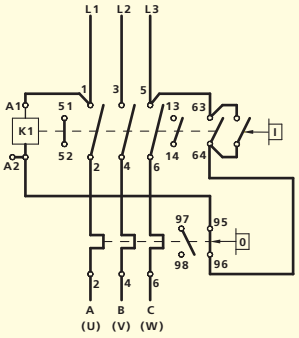
Severe conditions for squirrel-cage motors
Utilisation category AC4

OPERATING CHARACTERISTICS
Inching, reverse-power braking, plugging
Switching on: 6xFLC of motor
Switching off: 6xFLC of motor
TYPICAL APPLICATIONS
Printing presses, wire-drawing machines, centrifuges, special drives on manufacturing and processing machinery



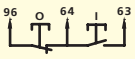
Example: 4kW C10: 3.5x10⁶ switching cycles (= 350 thousand)
C19: 1x10⁶ switching cycles (= 1 million)

C10–C30 DIRECT-ON STARTER



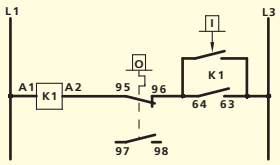
Connections for 3 phase 3 wire supply - as shown above

Connections for 3 phase 4 wire supply
1. Remove connection 1(L1) - A1
2. Connect neutral to terminal A1

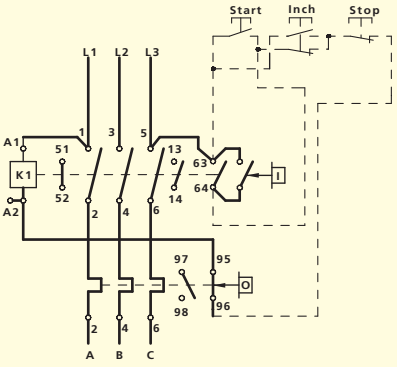


Connections for Remote Push Button Control

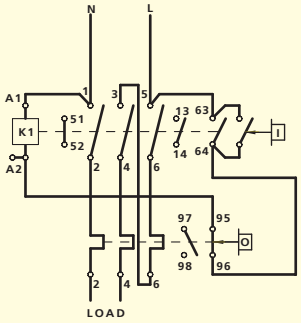
1 Remove connections 96 - 64
2 Connect as illustrated



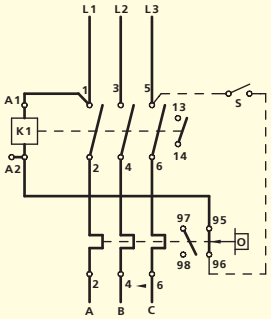
Schematic Diagram



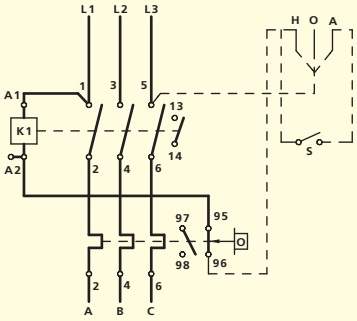
Connections for Remote Start-Inch-Stop Control



Connections for Single Phase Motors

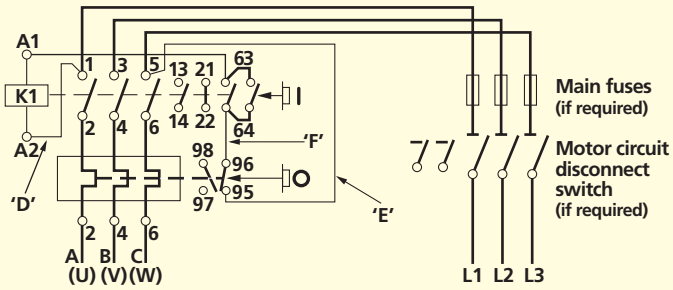


Connections for Remote Pilot Switch Control



Connections for Remote Hand-Off-Auto Control

C43–C63 DIRECT-ON STARTER

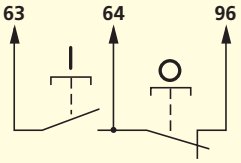


Control circuit supply arrangements

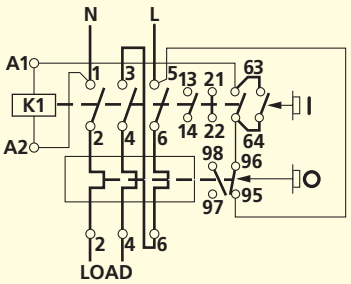
SUPPLY	*CONNECTIONS*
Phase to phase	*Connect as shown*
Phase to neutral	*Omit connection D* *Connect neutral to terminal A2 on coil*
Separate	*Omit connections D & E* *Connect separate coil supply feed to terminal A2 on coil & terminal 95 on overload relay*

Remote push-button control

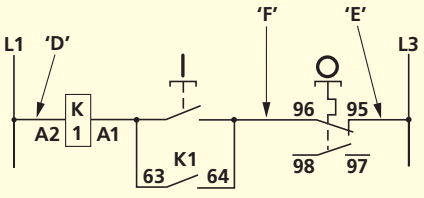
1 Omit connection F
2 Connect as illustrated



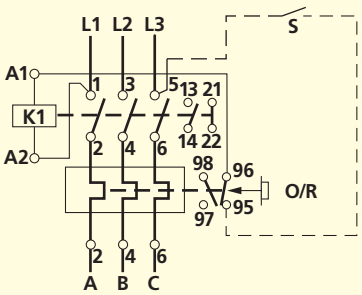
Connections for single phase motors

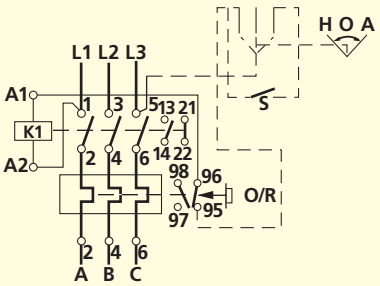


Schematic diagram

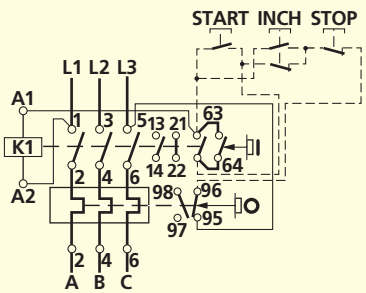


Connections for remote pilot switch control

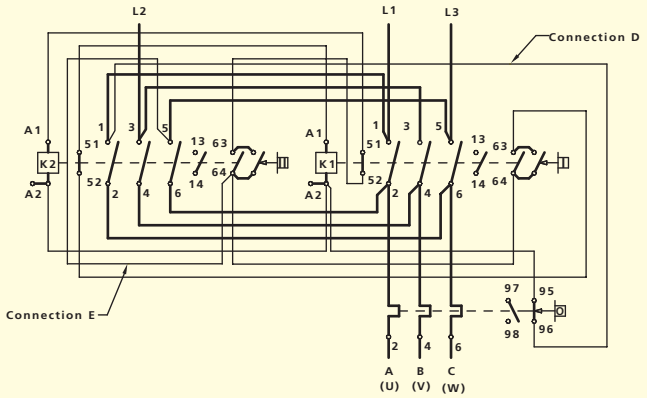




Connections for remote start inch stop control



C10–C30 REVERSING STARTER



Connections if overtravel position switches are required

1. Remove connections 52 to 63
2. Connect as illustrated

K1 Position Switch

K2 Position Switch

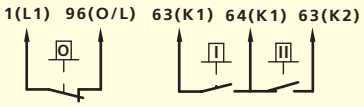
Note:-
Auxiliary contact 13-14 fitted to C10-C19 contactors only as standard.

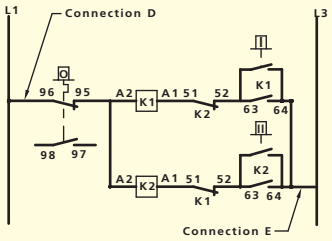
Control Circuit Supply Arrangements

SUPPLY	CONNECTIONS
Phase to Phase	Connect as shown
Phase to Neutral	Omit connection D Connect neutral to terminal 96
Separate	Omit connections D and E Connect separate coil supply to terminal 96 on overload and terminal 64 on contactor K2

Connections for Remote Push Button Control

1 Omit connection D
2 Connect as illustrated

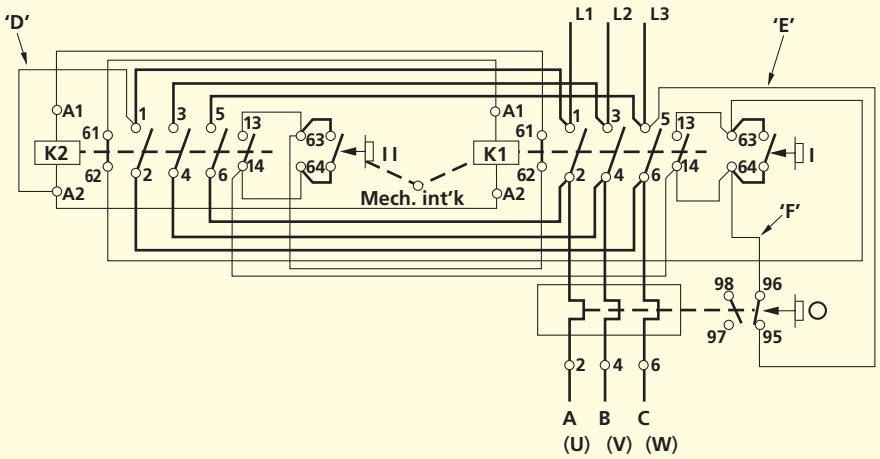




Schematic diagram

Push to Run
A simple push-to-run arrangement can be achieved in either or both directions by changing the top adder start switches. Contact Technical Services Dept.

C43–C63 REVERSING STARTER



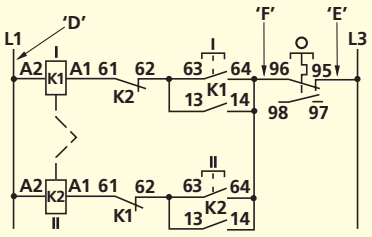
Push-to-run control

A simple push-to-run arrangement can be achieved in either or both directions by removing connections 13 to 63 as appropriate

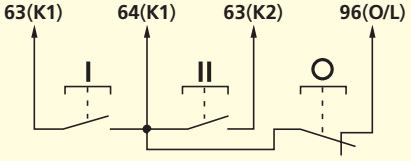
Control circuit supply arrangements

SUPPLY	*CONNECTIONS*
Phase to phase	*Connect as shown*
Phase to neutral	*Omit connection D* *Connect neutral to terminal A2 on coil*
Separate	*Omit connections D & E* *Connect separate coil supply feed to terminal A2 on coil & terminal 95 on overload relay*

Schematic diagram

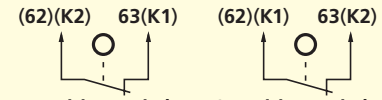


Connections for remote push-button control
1 Connection F is omitted
2 Connect as illustrated



If overtravel position switches are required

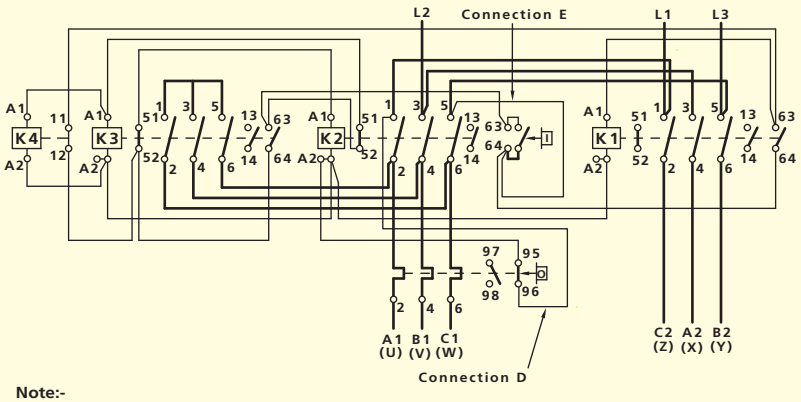
1 Remove connections 62 to 63
2 Connect as illustrated



K1 position switch

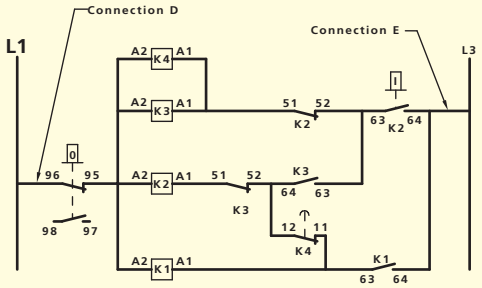
K2 position switch

C19–C30 STAR-DELTA STARTER



Note:-

Auxiliary contact 13-14 fitted to C10-C19 contactors only as standard.



Schematic Diagram (Push Button Control)

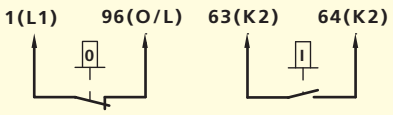
Control Circuit Supply Arrangements

Supply	Connections
Phase to Phase	Connect as shown
Phase to Neutral	Omit connection D Connect neutral to terminal 96
Separate	Omit connections D and E Connect separate coil supply to terminal 96 on overload and terminal 64 on contactor K2

Connections for Remote Push Button Control

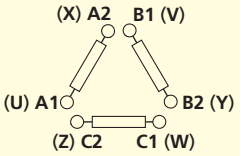
1 Omit connection D

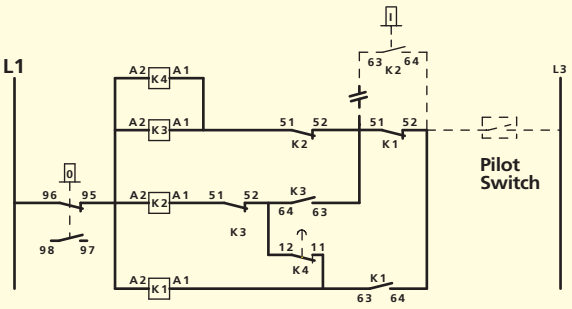
2 Connect as illustrated



Motor Windings

Connect to appropriate terminals on starter





Schematic Diagram (Remote Pilot Switch Control)

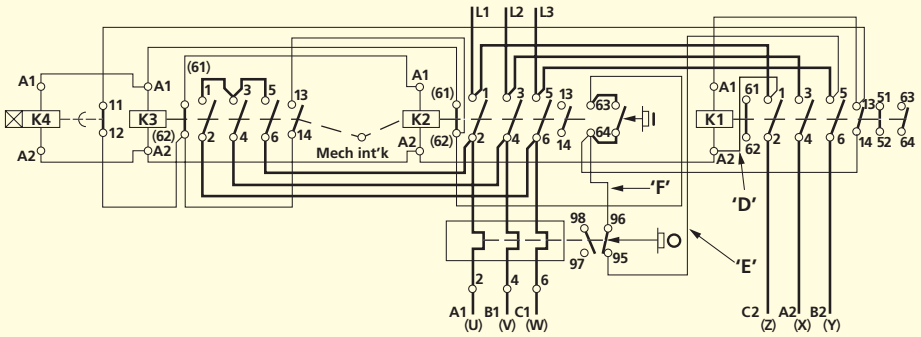
1 Remove connection 63 to 52 on K2 contactor

2 Connect between 52 and 64 on K1 contactor and from terminal 51 on K1 contactor to terminal 52 on K2 contactor

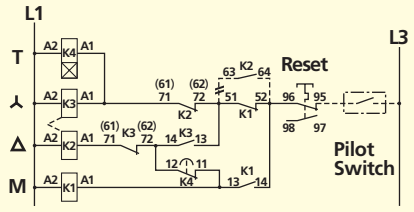
3 Connect pilot switch in place of connection E

4 Set overload relay to hand reset position

C43–C63 STAR-DELTA STARTER



Remote pilot switch control schematic diagram

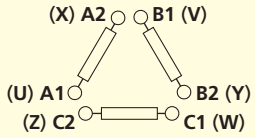


Control circuit supply arrangement

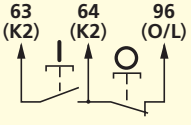
SUPPLY	*CONNECTIONS*
Phase to phase	*Connect as shown*
Phase to neutral	*Omit connection D* *Connect neutral to terminal A2 on coil*
Separate	*Omit connections D & E* *Connect separate coil supply feed to terminal A2 on coil & terminal 95 on overload relay*

Motor windings

Connect to appropriate terminals on starter.



Connections for remote push-button (start/stop) control



1 Connection F is omitted

2 Connect as illustrated

Connections for remote pilot switch control

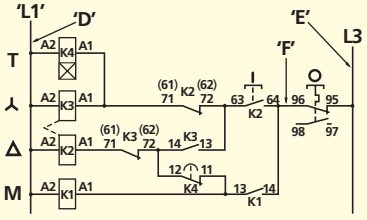
1 Remove connection 63 to (62) on K2 contactor

2 Connect between 52 and 14 on K1 contactor and from terminals 51 on K1 contactor to terminal (62) on K2 contactor

3 Connect pilot switch in place of connection E

4 Set overload relay to hand reset position

Push-button control schematic diagram



SPECIFICATION R22 PUSH-BUTTON UNITS

Conventional thermal current(*Ith*) - open		12A					
- enclosed		10A					
Rated operating current (AC15)	V	120	240	380	480	500	600
	A	6	3	1.9	1.5	1.4	1.2
Rated operating current (DC15)	V	12	250	440	500	600	
	A	1.1	0.55	0.31	0.27	0.2	
Cable termination - min conductor size		1 x 0.5mm^2					
- max conductor size		2 x 2.5 or 1 x 3.3mm^2					
Back-up protection HRC fuse gG		10A					
Ambient temperature limits - operation		˚C -20 to +55					
- storage		˚C -30 to +70					
Standards (type tests)		IEC947-5-1, BS EN60947-5-1					

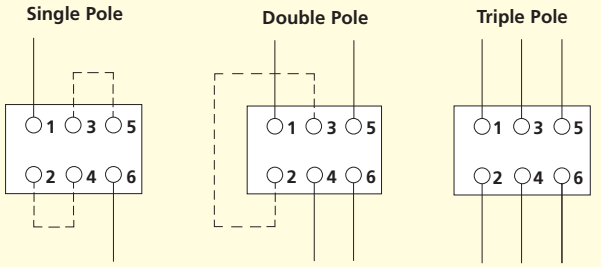
MCS SPECIFICATION DATA

RATING IN AMPS	16A	25A	32A	40A	63A	80A
Rated Insulation Voltage Ui (V)	800	800	800	800	800	800
Dielectric Strength (kV) 50 Hz 1min	3	3	3	3	3	3
Shock Resistance Uimp (kV)	8	8	8	8	8	8
OPERATIONAL CURRENT Ie (A)						
415 V AC - AC 21 A / AC 21 B	16	25	32	40	63	80
AC 22 A / AC 22 B	16	25	32	40	63	80
AC 23 A / AC 23 B	16	25	32	40	63	80
500 V AC - AC 21 A / AC 21 B	16	25	32	40	63	80
AC 22 A / AC 22 B	16	25	32	40	63	80
AC 23 A / AC 23 B	16	25	32	40	40	63
690 V AC - AC 20 A / AC 20 B	16	20	32	40	63	80
AC 21 A / AC 21 B	16	20	32	40	63	80
AC 22 A / AC 22 B	16	20	32	40	63	80
AC 23 A / AC 23 B	16	25	25	25	50	50
MOTOR POWER (KW) AC 23						
415 V AC	7.5	9	11	11	18.5	22
500 V AC	7.5	9	11	15	22	30
690 V AC	11	11	11	18.5	25	30
OVERLOAD CAPACITY						
Fuse rating gG	16	25	32	40	63	80
Short circuit current with fuses (kA Rms)	50	50	50	50	50	40
Asymetric short time rating current (kA peak)	6	6	6	6	9	9
Admissible short time current 1 s. (kA Rms)	1.26	1.26	1.26	1.26	1.5	1.5
MAKING & BREAKING CHARACTERISTICS						
Breaking capacity (A Rms) 415 V AC 23 A	128	200	256	320	504	640
Making capacity (A Rms) 415 V AC 23 A	160	250	320	400	630	800
WITHSTAND						
Mechanical (number of operations) x 1000	100	100	100	100	30	30
Electrical (number of operations at 415V AC 23A) x 1000	3	3	3	3	1.5	1.5
CONNECTION						
Maximum Cu cable section (mm^2) Ith	16	16	16	16	50	50

INSTALLATION CONTACTORS
CONNECTION DIAGRAMS

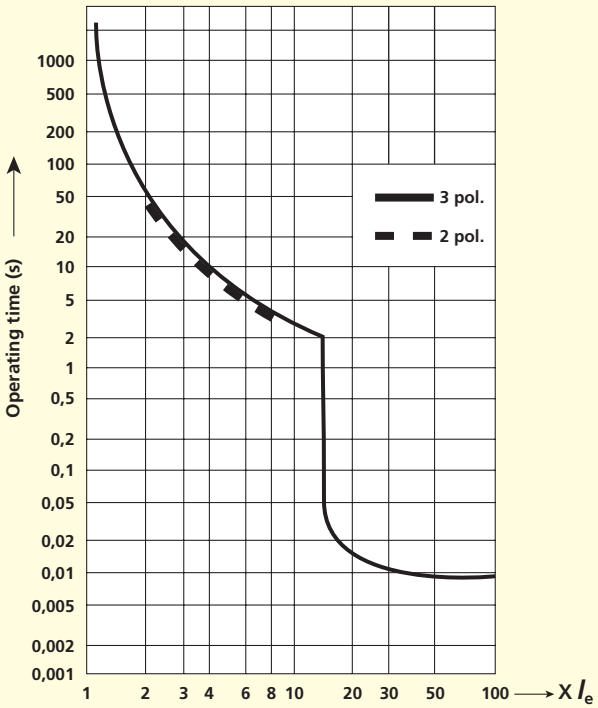
Control circuit

- *230V 50/60 Hz AC*
- *Rectified Coil*



MANUAL MOTOR STARTERS
TIME CURRENT CHARACTERISTIC CMS25

Mean values of operating times for CMS 25



Ambient temperature 20°C
x setting current

FULL LOAD CURRENTS OF MOTORS (approx)

Please note that the kW and HP ratings given below and elsewhere in this publication are to be used only as a guide to the selection of the required starter. The actual full load current of the motor should be determined to ensure that a starter having a suitably rated overload relay is chosen.

RATING OF MOTOR		*ALTERNATING CURRENT (A)*					
		Single phase	*Three phase*				
kW	***HP***	*240V*	*220V*	*380V*	*415V*	*440V*	*500V*
0.06	*0.08*	*1.2*	*0.38*	*0.22*	*0.21*	*0.19*	*0.16*
0.09	*0.12*	*1.5*	*0.56*	*0.33*	*0.30*	*0.28*	*0.24*
0.12	*0.16*	*1.8*	*0.76*	*0.42*	*0.39*	*0.37*	*0.33*
0.18	*0.25*	*2.8*	*1.1*	*0.58*	*0.52*	*0.49*	*0.46*
0.25	*0.33*	*3.2*	*1.4*	*0.88*	*0.71*	*0.64*	*0.59*
0.37	*0.50*	*3.5*	*2.1*	*1.3*	*1.2*	*1.1*	*0.85*
0.55	*0.75*	*4.8*	*2.7*	*1.5*	*1.4*	*1.3*	*1.2*
0.75	*1.0*	*6.2*	*3.3*	*2.1*	*2.0*	*1.7*	*1.5*
1.1	*1.5*	*8.7*	*4.9*	*2.6*	*2.5*	*2.3*	*2.1*
1.5	*2.0*	*11.8*	*6.2*	*3.6*	*3.5*	*3.1*	*2.6*
2.2	*3.0*	*17.5*	*8.7*	*5.1*	*5.0*	*4.4*	*3.8*
3.0	*4.0*	*20*	*11.6*	*6.6*	*6.5*	*5.8*	*5.1*
3.7	*5.0*	*24*	*14.2*	*8.2*	*7.5*	*7.1*	*6.2*
4.0	*5.5*	*29*	*15.3*	*8.5*	*7.7*	*7.6*	*6.5*
5.5	*7.5*	*36*	*21*	*11.5*	*11*	*10.3*	*8.9*
7.5	*10*	*45*	*27*	*15.5*	*14*	*13.5*	*11.9*
11.0	*15*	*70*	*39*	*22*	*21*	*19.3*	*16.7*
15.0	*20*	*91*	*53*	*30*	*29*	*27*	*23*
18.5	*25*	*113*	*64*	*37*	*35*	*32*	*28*
20	*27*	*128*	*70*	*40*	*38*	*35*	*31*
22	*30*	*135*	*75*	*43*	*40*	*38*	*33*
25	*34*	*156*	*85*	*50*	*45*	*42*	*38*
30	*40*	*180*	*101*	*60*	*54*	*51*	*44*
37	*50*		*124*	*72*	*66*	*62*	*54*
40	*54*		*134*	*79*	*77*	*67*	*60*
45	*60*		*150*	*85*	*80*	*74*	*65*
55	*75*		*181*	*105*	*98*	*90*	*79*
59	*80*		*194*	*112*	*105*	*97*	*85*
75	*100*		*245*	*140*	*135*	*123*	*106*
90	*125*		*292*	*170*	*165*	*146*	*128*
100	*134*		*325*	*188*	*179*	*162*	*143*
110	*150*			*205*	*200*	*178*	*156*
129	*175*			*242*	*230*	*209*	*184*
132	*180*			*245*	*236*	*214*	*186*
147	*200*			*273*	*259*	*236*	*207*
160	*220*			*295*	*278*	*256*	*220*
184	*250*			*340*	*325*	*295*	*259*
200	*270*			*370*	*350*	*321*	*278*

DIMENSIONS

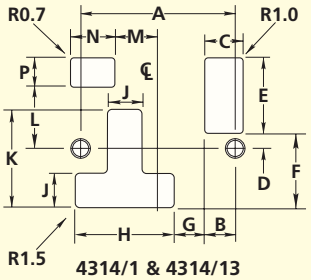
PANEL CUT-OUT DETAILS

CAPITAL 13A SINGLE SOCKET OUTLET INTERIORS

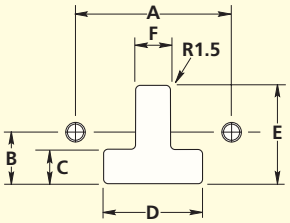
List No	*A	B	C	D	E	F	G	H	J	K	L	M	N	P
4314/1	60.3	12.0	15.4	5.7	28.6	30.4	10.8	38.8	14.2	38.4	–	–	–	–
4314/13	60.3	12.0	15.4	5.7	28.6	30.4	10.8	38.8	14.2	38.4	23.4	16.8	16.6	10.5
7259	60.3	50.0	–	–	–	–	–	–	–	–	–	–	–	–
8255/1	60.3	21.6	14.2	38.9	38.4	14.3	–	–	–	–	–	–	–	–

* Fixing holes drill to accept 4mm countersunk screws.

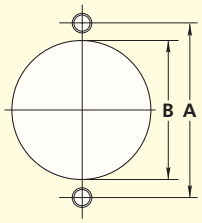
Max panel thickness 1.6mm (except 7259 – 2.5mm).



4314/1 & 4314/13



8255/1



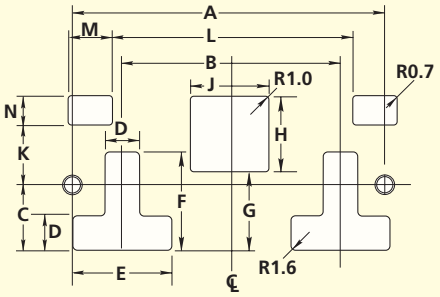
7259

CAPITAL 13A TWIN SOCKET OUTLET INTERIORS

List No	*A	B	C	D	E	F	G	H	J	K	L	M	N
4316/1	120.6	84.4	24.7	14.2	38.8	38.4	30.4	28.6	29.9	–	–	–	–
4316/13	120.6	84.4	24.7	14.2	38.8	38.4	30.4	28.6	29.9	23.4	94.1	16.6	10.5
8257/1	120.6	60.0	21.6	14.3	38.9	38.4	–	–	–	–	–	–	–

* Fixing holes drill to accept 4mm countersunk screws.

Max panel thickness 1.6mm.



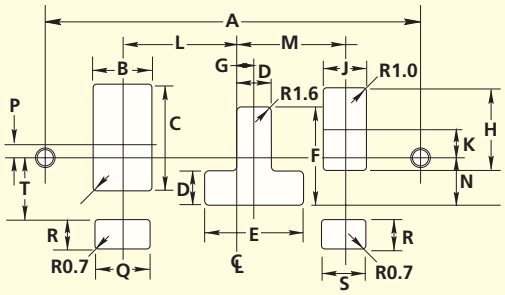
CAPITAL 45A DP 'SLIMLINE' COOKER CONTROL UNIT INTERIORS

List No	*A	B	C	D	E	F	G	H	J	K	L	M	N	P
4522/1	120.6	21.7	40.2	14.2	38.8	38.4	7.6	30.2	17.0	10.0	40.5	41.6	19.2	5.0
4522/13	120.6	21.7	40.2	14.2	38.8	38.4	7.6	30.2	17.0	10.0	40.5	41.6	19.2	5.0

List No	Q	R	S	T
4522/13	21.5	10.5	16.6	25.75

* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 1.6mm.

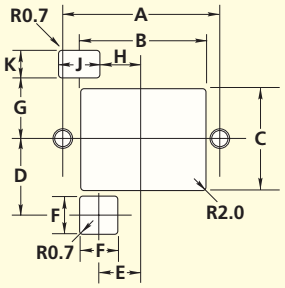


CAPITAL 13A FUSED CONNECTION UNIT INTERIORS

List No	*A	B	C	D	E	F	G	H	J	K
4831/1	60.3	22.0	38.0	–	–	–	–	–	–	–
4832/1	60.3	48.0	38.0	–	–	–	–	–	–	–
4832/13	60.3	48.0	38.0	–	–	–	23.4	16.8	16.6	10.5
4836/1	60.3	22.0	38.0	29.0	17.0	14.0	–	–	–	–
4837/1	60.3	48.0	38.0	29.0	17.0	14.0	–	–	–	–
4837/13	60.3	48.0	38.0	29.0	17.0	14.0	23.4	16.8	16.6	10.5

* Fixing holes drill to accept 4mm countersunk screws.

Max panel thickness 1.6mm.



CAPITAL TELEPHONE & CO-AXIAL OUTLETS

List No	*A	B	C	D
8283/1	60.3	20.3	23.3	16.2
8284/1	60.3	20.3	23.3	16.2

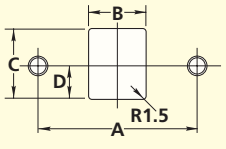
* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 1.7mm.

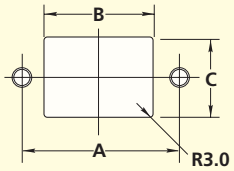
List No	*A	B	C
8265/1	60.3	21	30
8266/1	60.3	41	30

* Fixing holes drill to accept 4mm countersunk screws.

Max panel thickness 1.6mm.



8283/1 & 8284/1



8265/1 & 8266/1

All dimensions in mm. General tolerance ±0.13mm. These dimensions are a guideline only, more detailed drawings are available upon request.

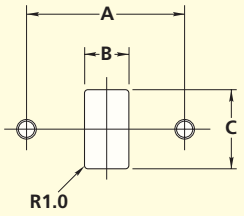
PANEL CUT-OUT DETAILS

CAPITAL 10AX/20A/32A SWITCH INTERIORS

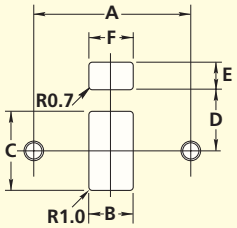
List No	*A	B	C	D	E	F
All 1 gang	60.3	17.1	30.6			
6172/1	60.3	33.4	30.6			
6173/1	60.3	49.7	30.6			
4011/1 & 4012/1	60.3	17.1	30.6	–	–	–
4011/13 & 4012/13	60.3	17.1	30.6	23.7	10.5	16.6

* Fixing holes drill to accept 4mm countersunk screws.

Max panel thickness 2.5mm.



6172/1 & 6173/1



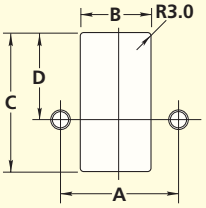
4011/1 & 4012/1
4011/13 & 4012/13

CAPITAL 50A DP SWITCHES

List No	*A	B	C	D
4512/1	52	31	61.3	38.5
4512/13	52	31	61.3	38.5

* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 2.5mm.



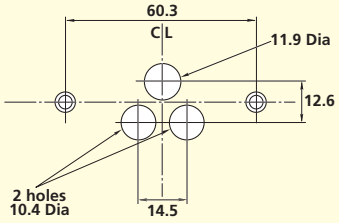
4512/1 & 4512/13

CAPITAL 2A ROUND PIN SOCKET OUTLETS

List No
8075/1

* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 1.6mm.

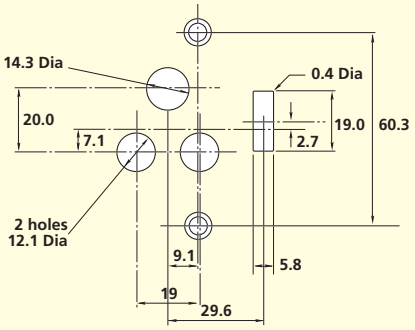


CAPITAL 5A ROUND PIN SOCKET OUTLETS

List No
2240/1

* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 1.6mm.

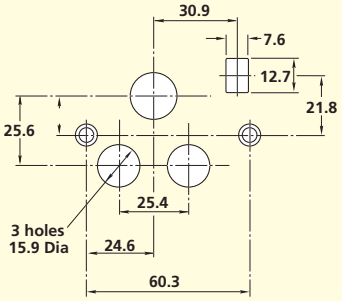


CAPITAL 15A ROUND PIN SOCKET OUTLETS

List No
2272/1

* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 1.6mm.

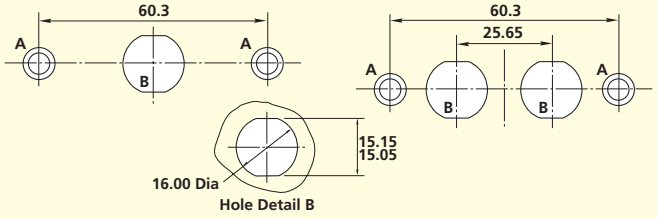


ROCKERGRID TOGGLE SWITCH PLATES

List No
6551/_ _ – 1 gang
6552/_ _ – 2 gang

* Fixing holes drill to accept 3.5mm countersunk screws.

Max panel thickness 1.6mm.

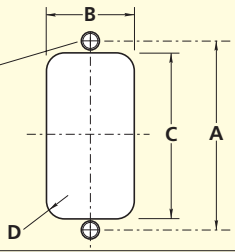


ROCKERGRID PANEL CUT OUT DETAILS

For Rockergrid switches and accessories, single screw fixing to grid, second fixing hole facilitates panel mounting if required. Extra screws to order.

Dimensions
A = 40mm
B = 18mm
C = 35mm
D = 3mm

2 holes 3.048mm dia countersunk to 5.08mm dia at 90° (for 6BA screw) and alternatively tap 6BA

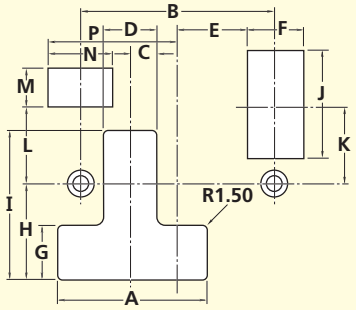


These dimensions are a guideline only, more detailed drawings are available upon request.

PANEL CUT-OUT DETAILS

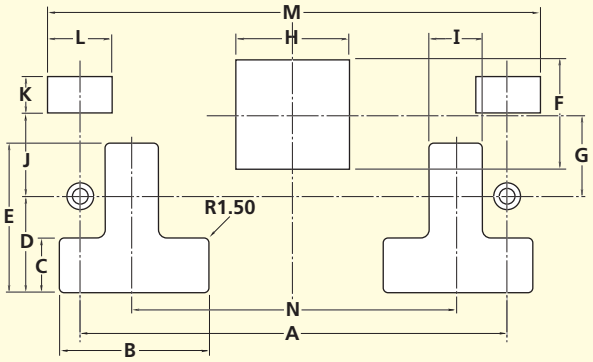
PLATINUM 13A SINGLE SOCKET OUTLET

List No	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
1314/1	38.4	50.0	12.0	13.8	18.7	14.4	13.8	24.5	38.0	28.5	20.0	-	-	-	-
1314/13	38.4	50.0	12.0	13.8	18.7	14.4	13.8	24.5	38.0	28.5	20.0	19.65	10.30	16.30	33.15



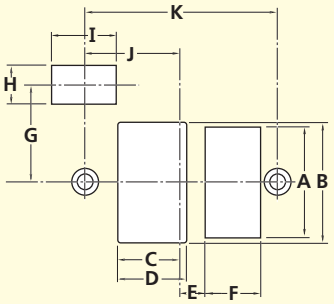
PLATINUM 13A TWIN SOCKET OUTLET

List No	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1316/1	110	38.4	13.8	24.5	38.0	28.5	20.0	29.0	13.8	-	-	-	-	-
1316/13	110	38.4	13.8	24.5	38.0	28.5	20.0	29.0	13.8	20.15	10.3	16.3	127.3	84.4



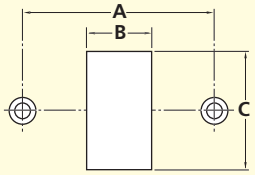
PLATINUM 13A FUSED CONNECTION UNIT

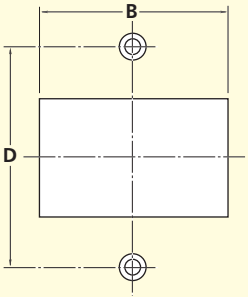
List No	A	B	C	D	E	F	G	H	I	J	K
1832/1	27.7	30.5	1.50	17.75	6.20	14.60	-	-	-	-	50.0
1832/13	27.7	30.5	1.50	17.75	6.20	14.60	24.8	10.2	16.2	25.0	50.0



PLATINUM 10AX SWITCH

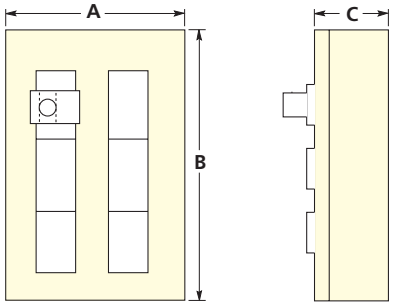
List No	A	B	C	D
1170/1	50.0	16.5	30.0	-
1096/1	50.0	16.5	30.0	-
1172/1	50.0	32.8	30.0	-
1173/1	-	49.5	30.0	55.8





These Dimensions are a guideline only, more detailed drawings are available upon request.

LDB DIMENSION DETAILS



All dimensions are approximate and in mm.
Please allow for clearance of approximately 8mm for interior 21mm for the LSC plug when inserted.

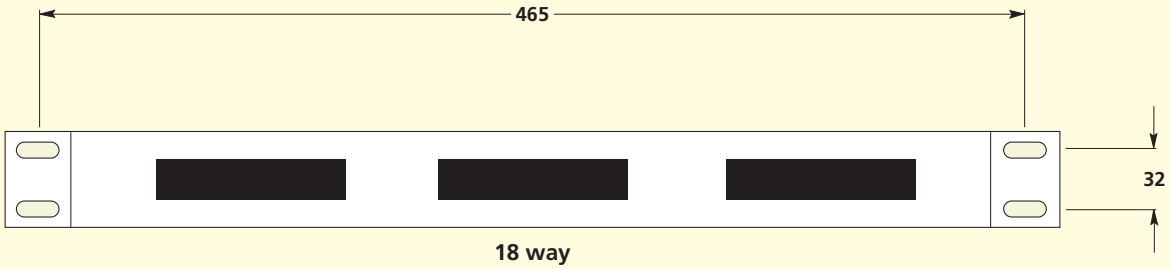
List No.	Height A	Width B	Depth C
6 way			
5020/3	180	245	70
5020/4	180	300	70
5020/5	180	366	70
5020/7	180	445	70
8 way			
5021/3	180	245	70
5021/4	180	300	70
5021/5	180	366	70
5021/7	180	445	70
10 way			
5022/3	180	245	70
5022/4	180	300	70
5022/5	180	366	70
5022/7	180	445	70

Commercial and office layouts may require frequent modification to the lighting requirements and the LDB can provide a cost effective solution when a number of units are connected through a lighting system. Light fittings can be conveniently un-plugged and re-connected into another LDB at a different point of the lighting circuit to provide optimum light and maximum flexibility.

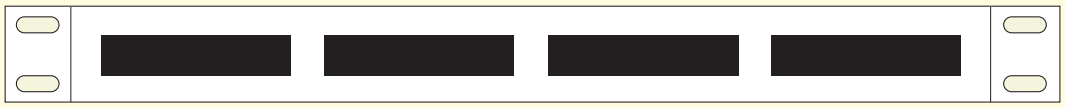
A lighting system utilising LDBs with 4 pin interiors offers an emergency light circuit at every point but allows a 3 pin LSC plug to connect to offer standard lighting. This can also be acheived with the 5 and 7 pin interiors as the 3 pin LSC plug fits all interiors.
A typical layout is as shown:-

Other configurations of LDB are available on request.

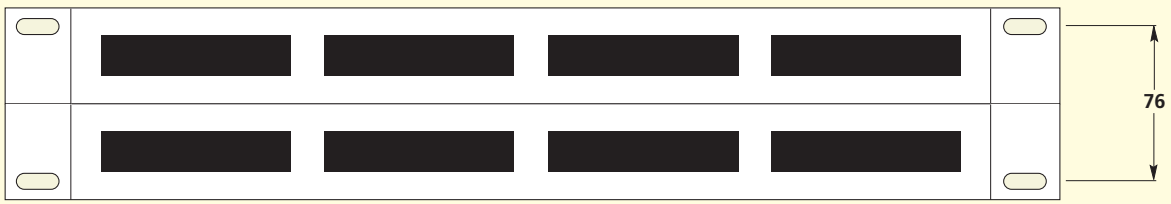
PATCH PANELS



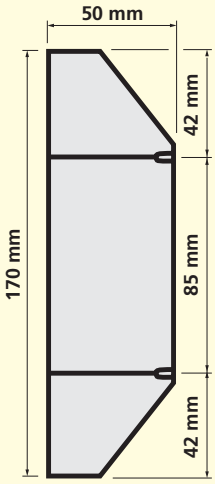
18 way



24 way



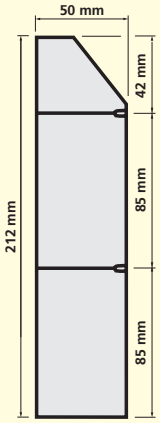
48 way



EXTERNAL DIMENSIONS, WARWICK 1

Profile assembly includes:
- Base Unit
- 2 x Angled Covers
- 1 x Main Cover

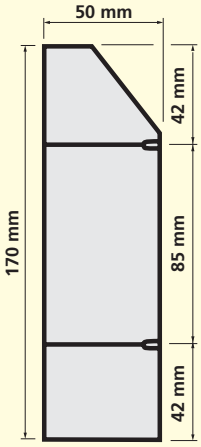
Overall Size:
- 170mm x 50mm



EXTERNAL DIMENSIONS, WARWICK 4

Profile assembly includes:
- Base Unit
- 1 x Base Extension
- 1 x Angled Cover
- 2 x Main Covers

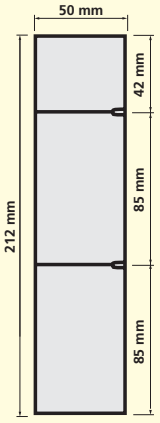
Overall Size:
- 212mm x 50mm



EXTERNAL DIMENSIONS, WARWICK 2

Profile assembly includes:
- Base Unit
- 1 x Angled Cover
- 1 x Main Cover
- 1 x Square Cover

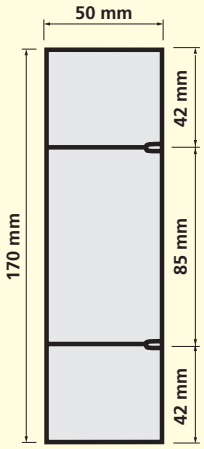
Overall Size:
- 170mm x 50mm



EXTERNAL DIMENSIONS, WARWICK 5

Profile assembly includes:
- Base Unit
- 1 x Base Extension
- 1 x Angled Cover
- 2 x Main Covers

Overall Size:
- 212mm x 50mm



EXTERNAL DIMENSIONS, WARWICK 3

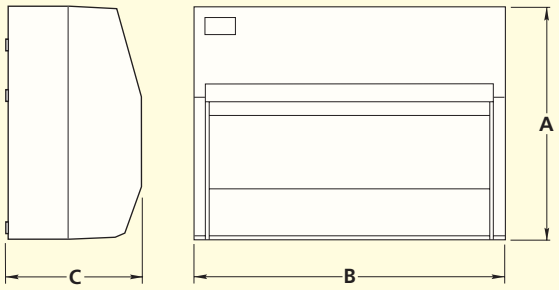
Profile assembly includes:
- Base Unit
- 2 x Square Covers
- 1 x Main Cover

Overall Size:
- 170mm x 50mm

APPROXIMATE DIMENSIONS (mm)

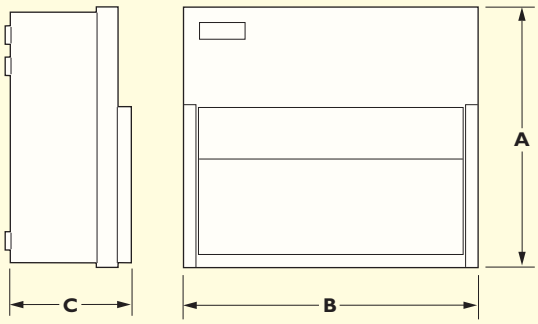
SURFACE ALL-INSULATED ENCLOSURES

List No	A	B	C
404/0A	160	117	102
406/0A	230	190	120
409/0A	230	243	120
412/0A	230	294	120
415/0A	230	344	120
420/0A	230	439	120



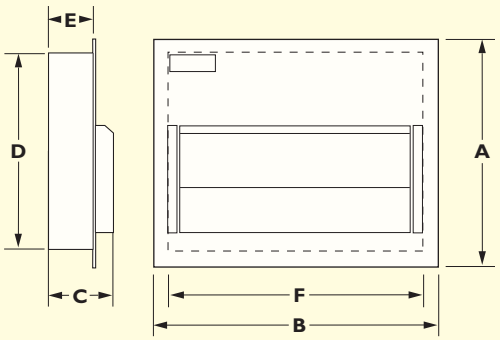
SURFACE METAL-CASED ENCLOSURES

List No	A	B	C
804/0A	177	120	100
806/0A	210	188	122
809/0A	210	242	122
812/0A	210	292	122
815/0A	210	343	122
820/0A	210	439	122



FLUSH METAL-CASED ENCLOSURES

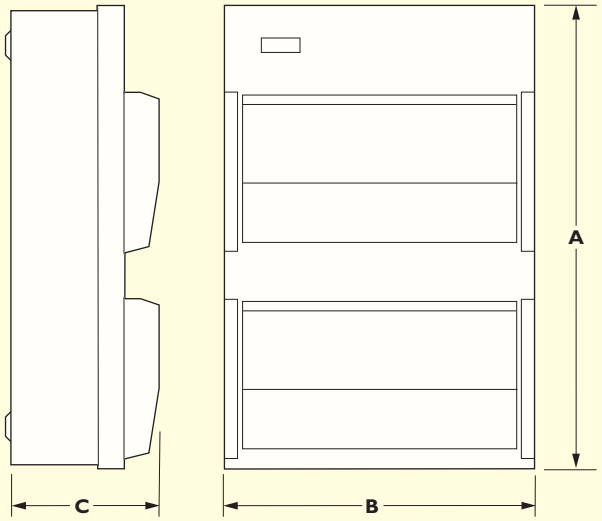
List No	A	B	C	D	E	F
809/0AF	250	281	122	203	90	235
812/0AF	250	332	122	203	90	286
815/0AF	250	393	122	203	90	336
820/0AF	250	478	122	203	90	431



APPROXIMATE DIMENSIONS (mm)

2 BANK SURFACE METAL CASED ENCLOSURES

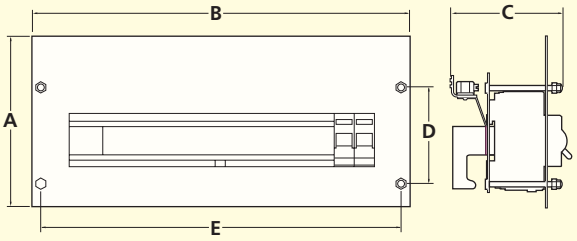
List No	A	B	C
824/2A	450	292	121
830/2A	450	353	121
840/2A	420	438	121



SPINE BACKPLATE ASSEMBLIES (METAL COVER)

List No	A	B	C	D	E
915/0M	152	335	100	85	319

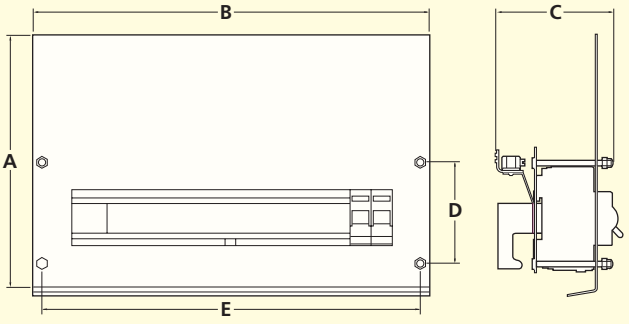
***** Allow 4mm for dolly clearance.



SPINE BACKPLATE ASSEMBLIES (WHITE PVC COVER)

List No	A	B	C	D	E
915/0W	221	335	100	85	319

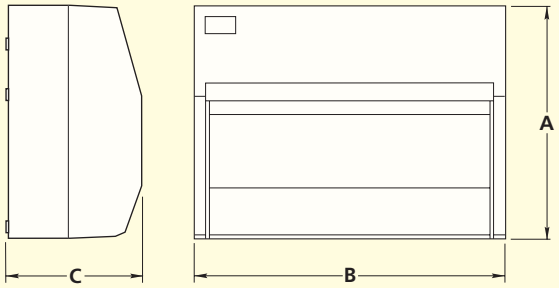
***** Allow 4mm for dolly clearance.



APPROXIMATE DIMENSIONS (mm)

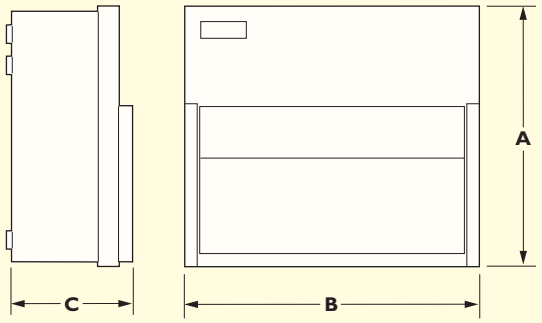
SURFACE ALL-INSULATED ENCLOSURES

List No	A	B	C
18LC2	160	117	102
18LC5	230	190	120
18LC8	230	243	120
18LC11	230	294	120
18LC14	230	344	120
18LC19	230	439	120
18LC9SL	230	294	120
18LC12SL	230	344	120
18LC17SL	230	439	120



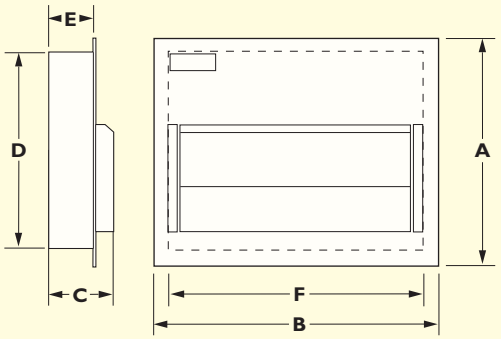
SURFACE METAL-CASED ENCLOSURES

List No	A	B	C
18P-2	177	120	90
18P-5	210	188	122
18P-8	210	242	122
18P-11	210	292	122
18P-14	210	343	122
18P-19	210	439	122
18PRSL09	210	292	122
18PRSL12	210	343	122
18PRSL17	210	439	122



FLUSH METAL-CASED ENCLOSURES

List No	A	B	C	D	E	F
18P-8F	250	286	122	203	90	235
18P-11F	250	335	122	203	90	286
18P-14F	250	387	122	203	90	336
18P-19F	250	482	122	203	90	431
18PRFL09	250	335	122	203	90	286
18PRFL12	250	387	122	203	90	336
18PRFL17	250	482	122	203	90	431

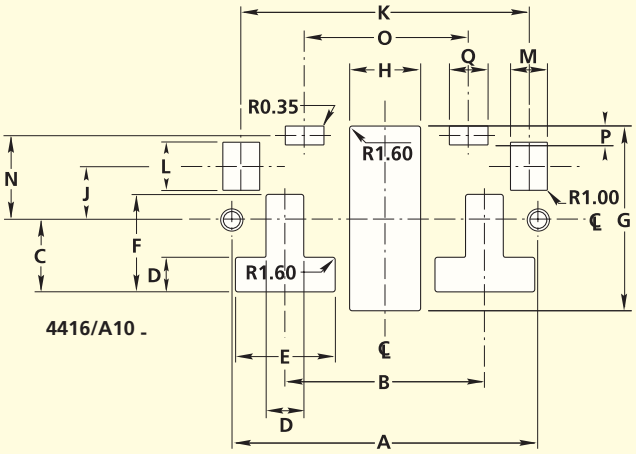


APPROXIMATE DIMENSIONS (mm)

13A 2 GANG SRCD (SAFETY SOCKET)

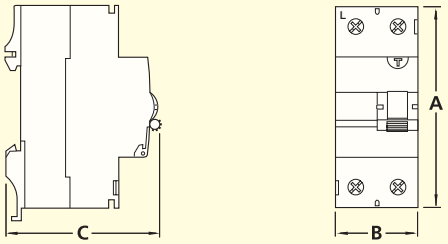
List No	A	B	C	D	E	F	G	H
4416/A10 .	120.6	79.5	28.45	14.2	38.8	38.4	72.8	27.3

	J	K	L	M	N	O	P	Q
	20.85	113.1	12.9	13.9	32.7	63.5	7.4	14.5



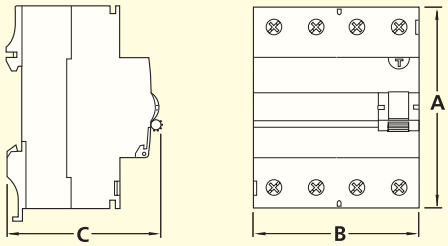
2 MODULE RESIDUAL CURRENT CIRCUIT BREAKERS

List No	A	B	C
223/A010	90	35	75
224/ . . ., 226/ . . ., 228/ . . .	90	35	75
224/A . . ., 226/A . . ., 228/A . . .	90	35	75



4 MODULE RESIDUAL CURRENT CIRCUIT BREAKERS

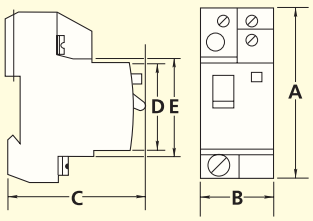
List No	A	B	C
244/ . . ., 246/ . . .,241/ . . .	90	70	75
244/A . . ., 246/A . . .,241/A . . .	90	70	75



2 MODULE RCBOs (MCB/RCDs)

List No	A	B	*C	D	E
6132/0 . 0	87	36	75	45	50

* Allow 4mm for dolly clearance.

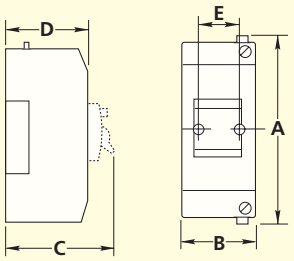


APPROXIMATE DIMENSIONS (mm)

3 MODULE GENERAL PURPOSE ENCLOSURE IP20

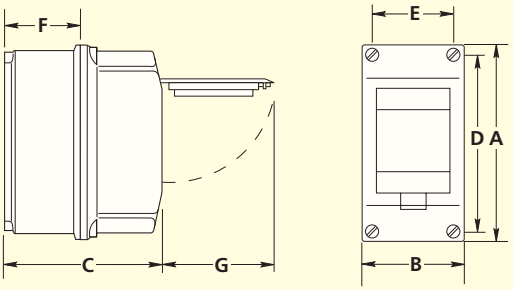
List No	A	B	*C	D	E
744/3	150	60	89	68	38

* Allow 4mm for dolly clearance.



3 MODULE ALL-PURPOSE ENCLOSURE IP65

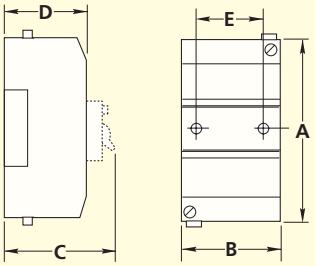
List No	A	B	C	D	E	F	G
CBE3	160	85	114	140	65	69	96



4 MODULE GENERAL PURPOSE ENCLOSURES IP20

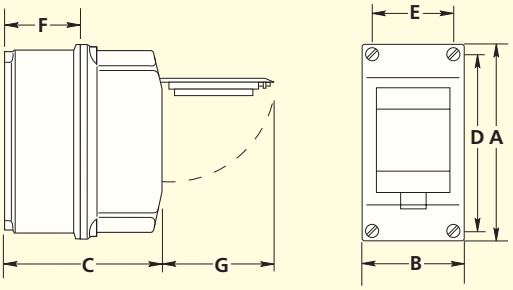
List No	A	B	*C	D	E
744/4	150	77	105	68	56

* Allow 4mm for dolly clearance.



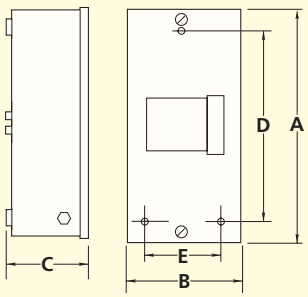
4 MODULE ALL-PURPOSE ENCLOSURE IP65

List No	A	B	C	D	E	F	G
CBE4	160	110	114	140	90	69	96



4 MODULE FABRICATED STEEL ENCLOSURE IP20

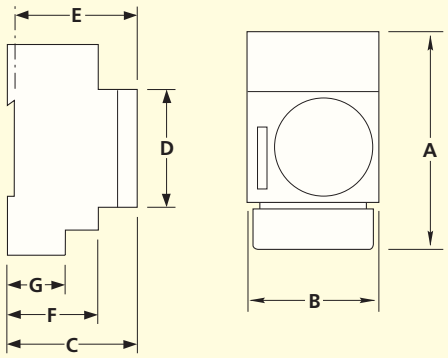
List No	A	B	C	D	E
844/4	223	112	66	184	73



APPROXIMATE DIMENSIONS (mm)

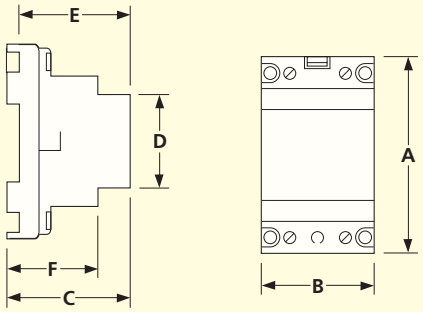
TIME SWITCHES

LIST No	A	B	C	D	E	F	G	H	J	K	L
Analogue											
303/TS24	90	54	66	45	60	46	–	–	–	–	–
303/TQ24	90	54	66	45	60	46	–	–	–	–	–
303/TQ7	90	54	66	45	60	46	–	–	–	–	–
Digital											
302/TD1	86	36	66	45	60	40	–	–	–	–	–
302/TD2	86	36	66	45	60	40	–	–	–	–	–
Staircase											
301/S7	84	18	70	45	60	43	25	–	–	–	–



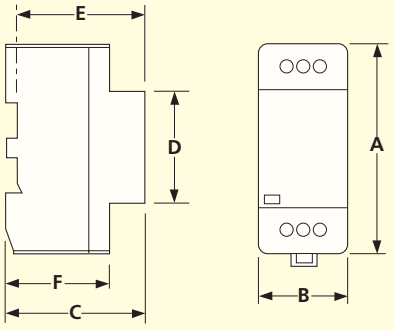
BELL TRANSFORMER

LIST No	A	B	C	D	E	F	G	H	J	K	L
303/B12	85	36	65	45	58	50	–	–	–	–	–
301/B6, B8, & B12	90	17.5	70	45	64	51	–	–	–	–	–



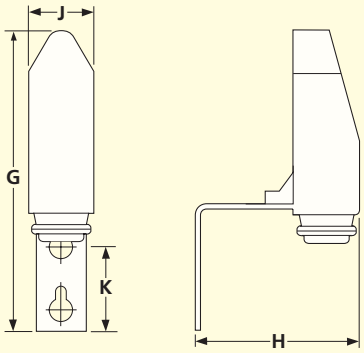
CONTACTORS & IMPULSE RELAYS

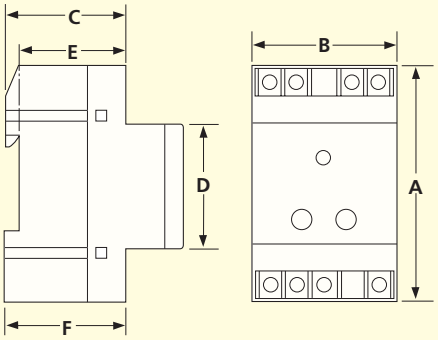
LIST No	A	B	C	D	E	F
CIK22-20	84	17.5	65.5	45	60	48.5
CIK24-30	84	35	65.5	45	60	48.5
CIK24-40	84	35	65.5	45	60	48.5
CIK40-20	84	53.5	65.5	45	60	48.5
CIK40-30	84	53.5	65.5	45	60	48.5
CIK63-31	84	53.5	65.5	45	60	48.5
CIK63-40	84	53.5	65.5	45	60	48.5



TWILIGHT SWITCH

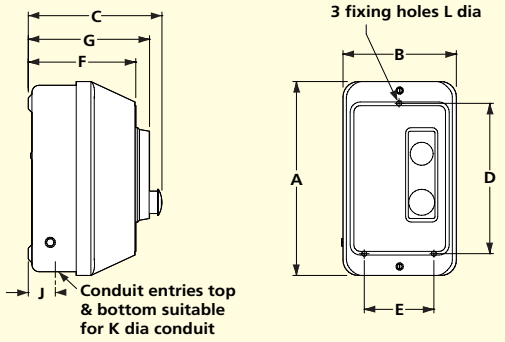
LIST No	A	B	C	D	E	F	G	H	J	K	L
303/P2	86	54	66	45	60	46	116	61	27	25	–





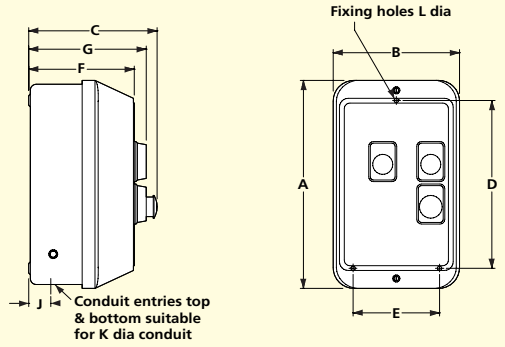
APPROXIMATE DIMENSIONS (mm)

ENCLOSURES FOR CONTACTORS & DIRECT-ON STARTERS

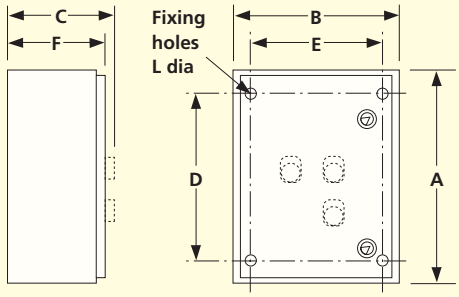


IP66	A	B	C	D	E	F	G	H	J	K	L
C10/14/19 contactor	212	124	–	164	76	117	–	–	29.5	3x20	5.5
C10/14/19 direct-on	212	124	146	164	76	117	132.5	–	29.5	3x20	5.5
C22/30 contactor	212	124	–	164	76	117	–	–	29.5	3x20	5.5
C22/30 direct-on	212	124	146	164	76	117	132.5	–	29.5	3x20	5.5
C43/63 contactor	260	158	–	210	108	132	–	–	27.5	2x20 1x25	5.5
C43/63 direct-on	260	158	160	210	108	132	147	–	27.5	2x20 1x25	5.5

ENCLOSURES FOR REVERSING & STAR-DELTA STARTERS



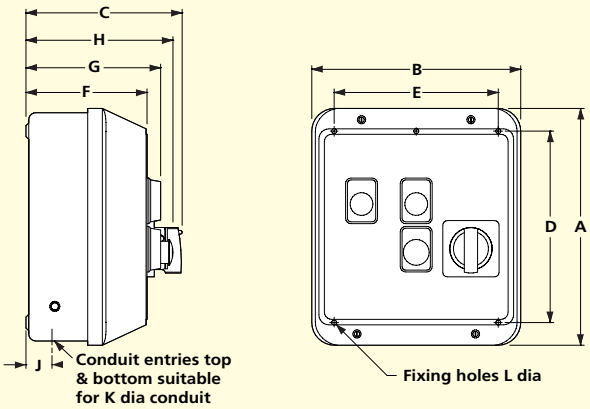
IP66	A	B	C	D	E	F	G	H	J	K	L
C10/14/19/22/30 reversing	260	158	160	210	108	132	147	–	27.5	2x20 1x25	3x5.5
C19/22/30 star-delta	260	230	161	210	180	133	148	–	28.5	2x20 1x25	4x5.5



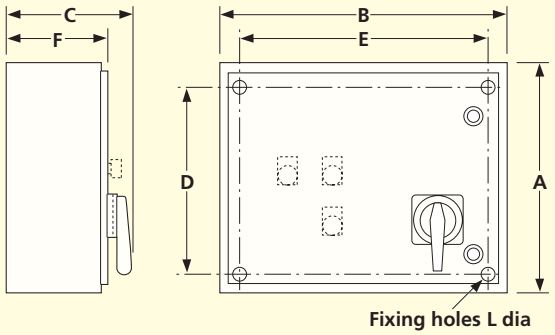
IP55	A	B	C	D	E	F	G	H	J	K	L
C43/63 reversing	400	300	209	350	250	177	–	–	–	–	8
C43/63 star-delta	400	300	209	350	250	177	–	–	–	–	8

Sheet steel enclosures are supplied with removable top and bottom gland plates.

ENCLOSURES WITH MOTOR CIRCUIT SWITCH FOR CONTACTORS, DIRECT-ON, REVERSING & STAR-DELTA STARTERS



IP66	A	B	C	D	E	F	G	H	J	K	L
C10/14/19/22/30 contactor + MCS	212	124	156	164	78	117	–	–	29.5	3x20	3x5.5
C10/14/19/22/30 direct-on + MCS	212	124	156	164	76	117	132	146	29.5	3x20	3x5.5
C10/14/19/22/30 reversing + MCS	260	230	171	210	180	133	148	161	28.5	2x20 1x25	4x5.5
C19/22/30 star-delta + MCS	260	332	171	210	282	133	148	161	28.5	2x20 1x25	5.5



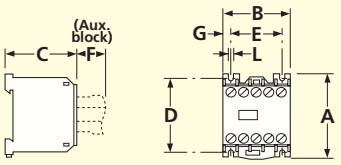
IP55	A	B	C	D	E	F	G	H	J	K	L
C43/63 reversing	400	500	222	350	450	177	–	–	–	–	8
C43/63 star-delta	400	500	222	350	450	177	–	–	–	–	8

Sheet steel enclosures are supplied with removable top and bottom gland plates.

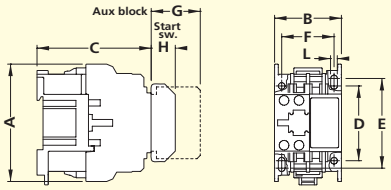
APPROXIMATE DIMENSIONS (mm)

CONTROL RELAYS & CONTACTORS

	A	B	C	D	E	F	G	H	J	K	L
C3	62.5	35	49	50	25.5	26	–	–	–	–	4.1
C7	56.5	45	49	50	35	26	–	–	–	–	4.1

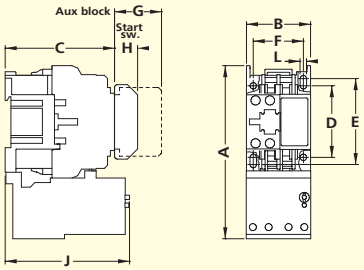


	A	B	C	D	E	F	G	H	J	K	L
C10/14/19	78.5	45	76.5	50	60	35	33	16	–	–	4.5
C22/30	78.5	45	86	50	60	35	33	16	–	–	4.5
C43/63	107	65	109	70	–	50	33	16	–	–	4.5



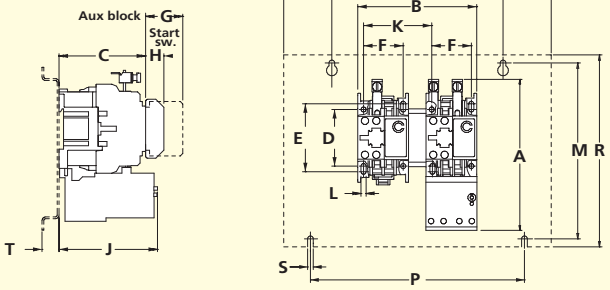
DIRECT-ON STARTERS

	A	B	C	D	E	F	G	H	J	K	L
C7	98	45	49	50	–	35	26	–	87	–	4.1
C10/14/19	121	45	76.5	50	60	35	33	16	87	–	4.5
C22/30	121	45	86	50	60	35	33	16	87	–	4.5
C43/63	170	65	109	70	–	50	33	16	124	–	4.5



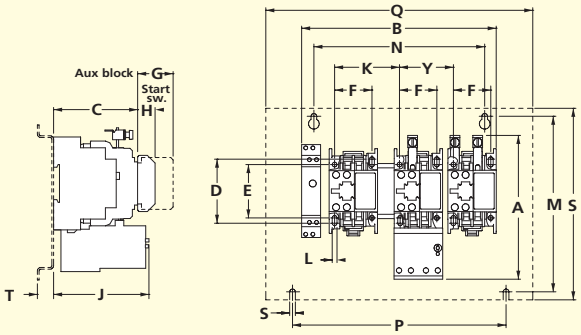
REVERSING STARTERS

For DIN rail or screw mounting	A	B	C	D	E	F	G	H	J	K	L
C10/14/19	134	105	76.5	50	60	35	33	16	87	60.2	4.5
C22/30	134	105	86	50	60	35	33	16	87	60.2	4.5
Supplied mounted on backplate	A	B	C	D	E	F	G	H	J	K	L
C43/63	–	–	–	–	–	50	33	–	–	–	–
	M	N	P	Q	R	S	T	U	V		
	210	160	200	250	225	5.3	15	–	–		



STAR-DELTA STARTERS

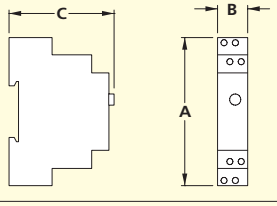
For DIN rail or screw mounting	A	B	C	D	E	F	G	H	J	K	L
C10/14/19	134	180	76.5	50	60	35	33	16	87	60.2	4.5
	M	N	P	Q	R	S	T	U	V		
	–	–	–	–	–	–	–	56.7	–		
C22/30	134	180	86	50	60	35	33	16	87	60.2	4.5
	M	N	P	Q	R	S	T	U	V		
	–	–	–	–	–	–	–	56.7	–		
Supplied mounted on backplate	A	B	C	D	E	F	G	H	J	K	L
C43/63	–	–	–	–	–	50	33	–	–	–	–
	M	N	P	Q	R	S	T	U	V		
	210	160	200	250	225	5.3	15	70	–		



ELECTRONIC TIMER FOR RAIL MOUNTING

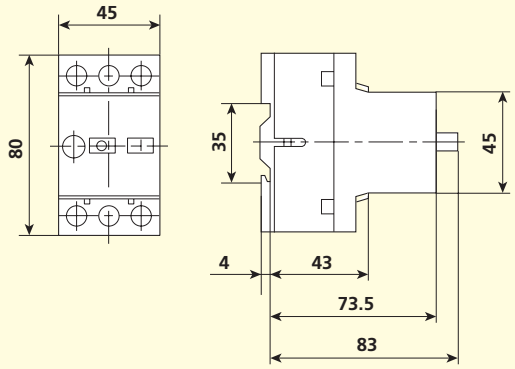
	A	B	C	D	E	F	G	H	J	K	L
Electronic timer	86	17.5	61	–	–	–	–	–	–	–	–

Fits 35mm DIN rail to BS5584: 1978, EN50 022-35.

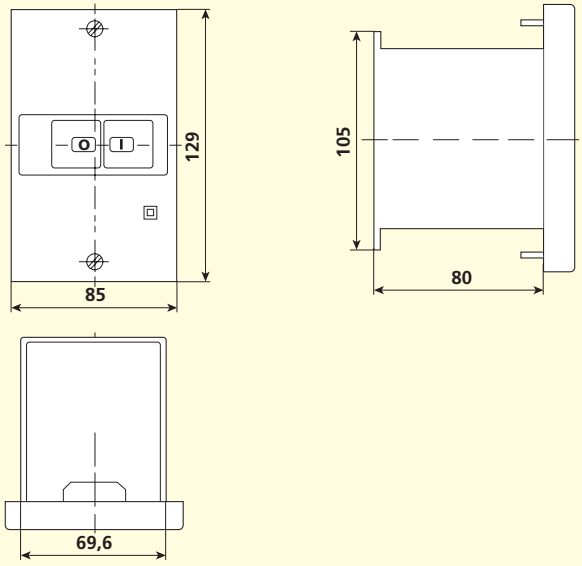


DIMENSIONS CMS25 MANUAL MOTOR STARTER

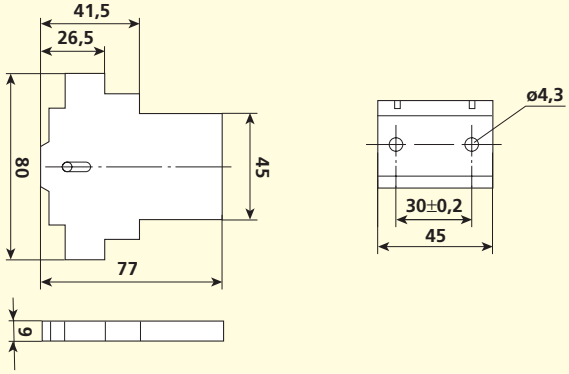
Motor Protection Switch



Enclosure CO-55

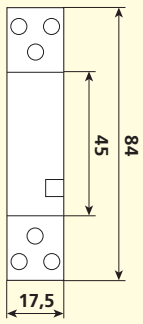


Auxiliary Contact

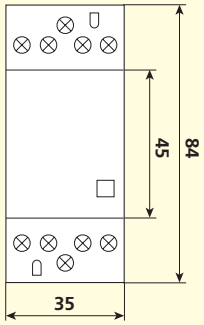


DIMENSIONS CIK SILENT OPERATION INSTALLATION CONTACTORS

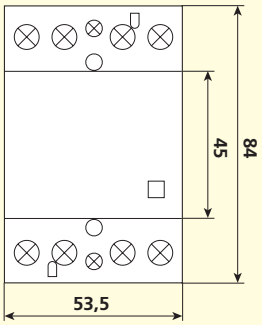
CIK22



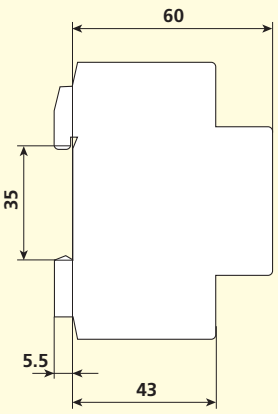
CIK24



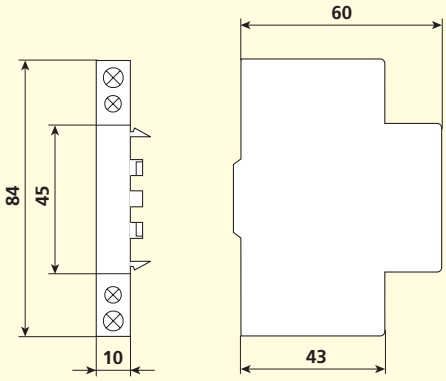
CIK40 / CIK63



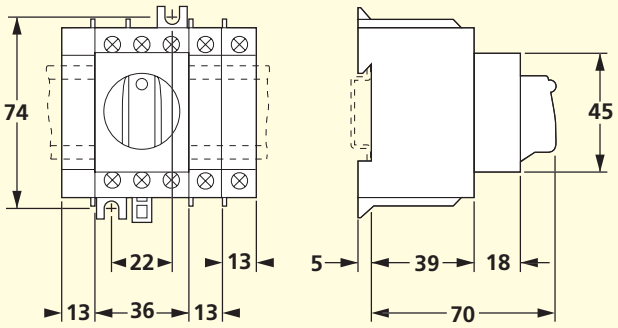
Side Elevation



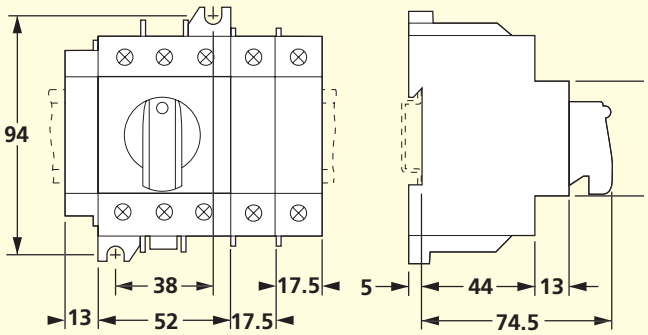
Auxiliary Switch CHHSLa



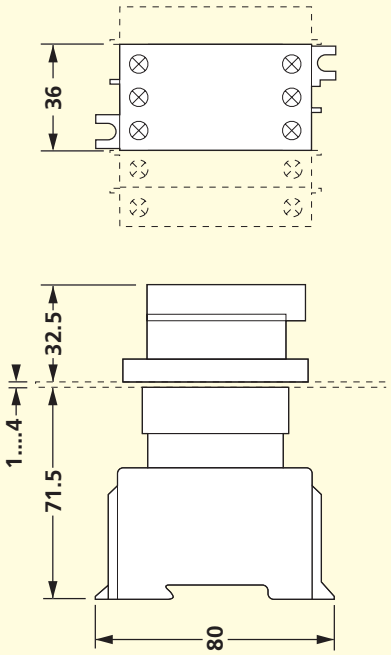
MCS DIMENSIONS



16A - 40A MCS



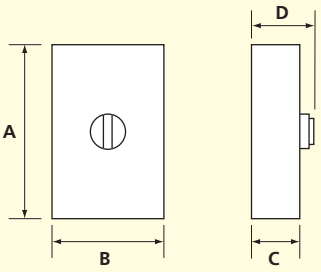
63A - 80A MCS



Door Mounting Details

IP65 ENCLOSURES

BOX SIZE	A	B	C	D
A	130	85	75	105
B	175	125	100	137
C	250	175	100	135
D	310	200	135	170
1	212	124	117	156

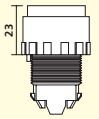


DIMENSIONS R22 PUSH-BUTTON UNITS

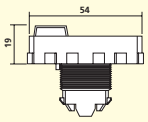
22ER
22MR

22ERR
22MRR

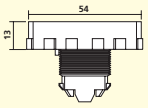
22ER/PP
22MR/PP
22ERL/PP
22MRL/PP



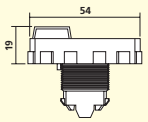
22EPD/0-1
22EPDL/0-1



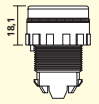
22EPD/F
22EPDL/F



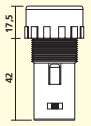
22EPDR/0-1
22EPDLR/0-1



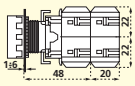
22EL
22ML



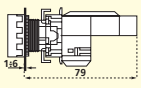
22ELE



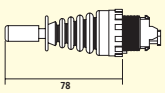
With contact block fitted
22EC
22ECD



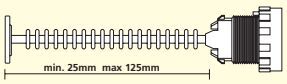
With contact block fitted
22ECT
22ECL



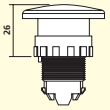
22EM
22MM



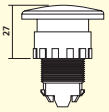
22RESET
22MRESET



22EF
22MF



22EFB
22MFB
22EFBL
22MFBL



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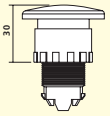
22MFBC



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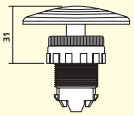
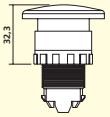
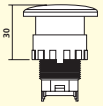
22MFBA



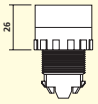
22EFB/PP
22MFB/PP
22EFBL/PP
22MFBL/PP



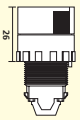
22EFC
22MFC



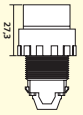
22ERL
22MRL



22ES
22MS



22ESL-L
22MSL-L



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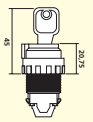
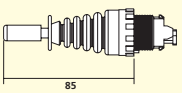
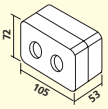


22EMB
22MMB



22EV2



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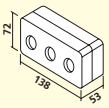

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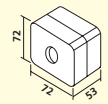
22EVK1



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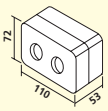
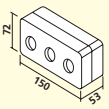
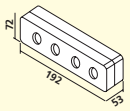


22EVK3



22EVK4



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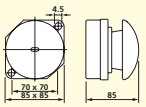

NUMERICAL INDEX

- WIRING ACCESSORIES
- CABLE MANAGEMENT
- CIRCUIT PROTECTION
- CONTROL EQUIPMENT

CIRCUIT PROTECTION

CONTROL EQUIPMENT

CONTROL EQUIPMENT

HOME

1 Contract Terms Quotations & Orders

1.1 Unless other terms and conditions are expressly accepted by Electrium by means of a specific written amendment hereto signed by Electrium or a Director of Electrium the contract will be on the terms and conditions set out below ("the Contract Terms") to the exclusion of any other terms and conditions (except those implied in favour of a seller which are not inconsistent with the Contract Terms) whether or not the same are endorsed upon, delivered with or referred to in any purchase order or other document delivered or sent by the Customer to Electrium or by Electrium to the Buyer reference made by Electrium to the Customer's order, specification or like document will not be deemed to imply that any terms or conditions endorsed upon, delivered with or referred to in such order, specification or like document will have effect to the exclusion or amendment of the Contract Terms. No variation, addition or modification of the Contract Terms conditions shall be binding on Electrium unless such variation, addition or modification be agreed to in writing under the signature of a Director of Electrium.

1.2 Any quotation is given on the basis that no contract will come into existence until the Customer places an order pursuant thereto. Any quotation is valid for a period of 30 days only from its date provided that Electrium has not previously withdrawn it.

2 Price

The price of Goods supplied hereunder ("the Goods") is exclusive of VAT or any successor tax thereto unless otherwise agreed in writing. The price for the Goods shall be (unless otherwise agreed by Electrium in writing) the list price of Electrium current at the date of despatch and in the case of an order for delivery by instalments the price payable for each instalment shall be Electrium's list price current at the date of despatch for each instalment. All prices are based on standard pack sizes and quantities and Electrium reserves the right to levy an additional charge if such packs must be broken up to fulfil an order. The price of Goods is inclusive of costs of carriage to the Customer's premises in Great Britain and Northern Ireland except on individual orders having a net value calculated by reference to the Company's most recent price list of less than £200 (excluding VAT) which shall be subject to an additional charge of not less than £15.00 (excluding VAT) to cover carriage and packing. The price of Goods is based on the costs of materials, labour, sub-contracts, transport, taxes, duties and currency exchange rates ruling at the date of the quotation. Electrium reserves the right to amend the contract price to take account of any variations in these costs or the imposition of any new taxes or duties occurring from whatever cause before delivery of the Goods.

3 Payment

The due date for payment shall be the last day of the month following the month of despatch of Goods supplied by Electrium. Payment made before the due date for payment shall be subject to a settlement discount of 2.5%. VAT is calculated on the discounted value of the invoice and is not subject to settlement discount. Interest at an annual rate of 3% per month will accrue daily and be calculated on a daily basis on overdue accounts from the date of invoice until payment. Notwithstanding any Contract Term allowing the Customer credit payment shall become due and payable to Electrium immediately upon the termination of the contract. The Customer shall not be entitled to exercise any right of set-off or lien or any similar right or claim in connection with the Goods or the price payable therefor.

4 Packing Materials

Packing cases and cartons will be provided free of charge by Electrium. All pallets used shall remain at all times the property of Electrium and are to be returned to Electrium on demand in good condition. Electrium reserves the right to alter the method of packing without reference to the Customer.

5 Damage or Loss in Transit

Electrium will not be liable in respect of any damage or discrepancy, shortage or loss in transit or any claim that the Goods delivered do not otherwise comply with the contract unless the Customer shall have informed the Company in writing, telex or facsimile as follows:

(a) Within three days of delivery in the event of any damage, discrepancy or shortage.

(b) Within seven days of delivery in the event that the Goods do not comply with the contract,

and

(c) Within twenty-one days of receipt of the Company's invoice in the event of non-delivery.

Where the Goods are accepted from the Company's carriers they shall be deemed to have been checked by the Purchaser and accepted unless the delivery receipt is signed and endorsed 'unexamined' and the packing and its contents are retained for later inspection.

6 Delivery

The place of delivery for Goods shall be the Customer's premises or as otherwise agreed by Electrium in writing. The time of delivery will be as agreed between the parties or if no such agreement has been reached will be within a reasonable time and the Company will be entitled to make delivery by instalments. In no circumstances will Electrium be liable for loss or damage of any kind whatsoever caused directly or indirectly by any delay in the delivery of Goods, nor unless such delay exceeds 180 days will any delay entitle the Customer to terminate or rescind the contract. Notwithstanding any other Contract Term, risk in the Goods shall pass to the Buyer when the Goods are delivered to the Customer or its agent.

7 Title of Goods

Until Electrium has been paid in full for the Goods comprised in this and/or any other contract between the Customer and Electrium, the Customer shall hold the Goods in a fiduciary capacity as bailee for Electrium and:

(i) the title to, ownership of, and the property in, the Goods shall remain vested in Electrium (notwithstanding delivery of the same and parting of the risk therein to the Customer) until payment in full for all Goods comprised in this and every other contract between Electrium and the Customer has been received by Electrium.

(ii) The Customer shall be in possession of the Goods as Electrium's bailee. If so required the Customer shall store the Goods for Electrium without charge to Electrium separate from any goods which are the property of the Customer and/or any third party and ensure that they are clearly marked and identified as belonging to Electrium.

(iii) Electrium reserves the right to require the Customer to return the Goods and may recover and sell the same at any time. For that purpose Electrium's servants and agents together with all necessary and appropriate transport shall be entitled to unrestricted access to the Customer's premises and any other location where the Goods are situated to take possession of the Goods and, if necessary, dismantle the Goods from any article or articles to which they may have been attached and to remove the Goods from the Customer's premises.

(iv) Prior to the property in the Goods passing to the Customer Electrium permits the Customer to deliver the Goods to a third party pursuant to a bona fide and arms-length agreement to re-sell the Goods and allows the Customer to convert or incorporate the Goods into or mix the Goods with other goods but such liberty will cease upon the termination of the contract.

(v) Where Electrium is unable to determine whether any goods are Electrium's Goods the Customer shall be deemed to have sold all goods of the kind sold by Electrium to the Customer in the order in which they were invoiced to the Customer.

8 Descriptive Matter

Descriptive matter, illustrations, dimensions and weights issued by Electrium are to be regarded as being for guidance only and cannot be held as binding in any way. In pursuance of Electrium's policy of product improvement Electrium reserves the right to alter patterns and designs without prior notice.

9 Guarantee

Electrium will make good by replacement (or its option by repair) defects which under proper use appear in the Goods within a period of twelve calendar months after the Goods have been despatched, and which arise solely from faulty design, materials or workmanship provided always that defective Goods have been returned to Electrium and Electrium was notified of the defect or suspected defect immediately the same became known to the Customer. The cost of carriage on such returned Goods and the cost of re-delivery of the repaired or new Goods to be borne by Electrium. Save for the Electrium's control equipment which has been correctly repaired or modified by the use of standard parts supplied by Electrium for such purpose, Electrium excludes all liability in respect of any Goods which have been re-finished and dismantled or altered in any way or if the Goods were improperly installed or connected or if the Customer fails to observe or perform the requirements of any maintenance procedures relating to the Goods. Any Goods replaced will belong to Electrium. Any repaired or replacement Goods will be guaranteed on these terms for the unexpired portion of the twelve month period. In addition, the obligations of Electrium under this condition will not apply if the Customer is in breach of this or any other contract with Electrium. Subject to this condition, all conditions, warranties and representations, whether express or implied (by statute or otherwise) relating to the Goods are hereby excluded insofar as the same can be excluded without such exclusion being void or unenforceable.

Electrium will be under no liability under the contract for any personal injury, death, loss or damage of any kind whatsoever (other than death or personal injury resulting from Electrium's negligence) whether consequential or otherwise including but not limited to loss of profits and Electrium hereby excludes all conditions, warranties and stipulations express or implied, statutory, customary or otherwise which but for such exclusion would or might subsist in favour of the Customer except that such exclusion will not apply to any implied condition that Electrium has or will have the right to sell the Goods when the property is to pass; or when Electrium deals as a consumer (as defined in section 12 of the Unfair Contract Terms Act 1977), any implied term relating to the conformity of the Goods with their description or sample or as to their quality or fitness for a particular purpose. In no circumstances will Electrium or its employees, agents or sub-contractors be liable for any loss or damage of any kind whatsoever (other than death or personal injury resulting from Electrium's negligence) whether consequential or otherwise caused directly or indirectly by any negligence or other tortious act or breach of statutory duty on the part of Electrium or on the part of any of its employees, agents or sub-contractors in connection with or arising out of the manufacture or supply of the Goods or in connection with any statement given or made (or advice not given or made) by or on behalf of Electrium.

10 Patents

Electrium will indemnify the Customer against any claim of infringement of letters patent, registered design, trademark or copyright (existing at the date of the contract) arising from the use or sale of any article or materials supplied by Electrium to the Customer and against all costs and damages which the Customer may incur in any action for such infringement or for which the Customer may become liable in any such action provided always that this indemnity shall not apply to any infringement which arises in connection with any design or instruction issued or given by the Customer to Electrium or to the use of such article or material in a manner or for a purpose outside the UK or to any infringement which is due to the use of such article or material in association or combination with any other article or material not supplied by Electrium and provided also that this indemnity is conditional on the Customer making no admission in respect of such alleged infringement and giving Electrium the earliest possible notice in writing of any claim being made or action threatened or brought against the Customer and on the Customer permitting Electrium at Electrium's expense to conduct any litigation that may ensue and all negotiations for the settlement of a claim.

The Customer warrants that any design or instruction issued or given by the Customer shall not be such as will cause Electrium to infringe any letters patent, registered design, trademark or copyright in the execution of the Customer's order and the Customer agrees to indemnify and keep Electrium indemnified against all liability in the event that such warrant is found to be untrue, misleading or breached.

11 Advice

Advice which Electrium or its agents may give to the Customer shall be given in good faith but Electrium shall not be liable for any loss or damage arising directly or indirectly therefrom or attributable thereto unless contained in any written representation or statement issued directly by Electrium.

12 Safety

The Customer shall ensure that any modifications whatsoever made to the Goods supplied hereunder comply with the requirements of any applicable Safety Regulations. Plugs supplied hereunder shall be so connected as to ensure that they are safe and in full compliance with any applicable Safety Regulations. The Customer shall ensure that any kits supplied hereunder are so assembled as to ensure that the assembled product is safe and complies with the requirements of any applicable Safety Regulations. Without prejudice to the above provisions, where Electrium provides the Customer with information about the use for which Goods are designed and have been tested and about any conditions to ensure that when put to that use they would be safe and without risk to health, the Customer shall use the Goods accordingly and comply with the said conditions. To be properly used the Goods shall be selected, installed, commissioned and maintained in accordance with good engineering practice and under the supervision of suitably qualified personnel.

13 Statutory and other Regulations

If the cost to Electrium of performing its obligations under any contract shall be increased or reduced by reason of making or amendment after the date of its quotation of any law or of any other order, regulation or bye-law having the force of law that shall affect the performance of Electrium's contractual obligations, the amount of such increase or reduction shall be added to or deducted from the contract price as the case may be.

14 Cancellation

If the Customer cancels, extends or delays or purports to cancel, extend or delay the contract or part thereof, or fails to take delivery of any Goods at the time agreed (if any) or if no time is agreed within a reasonable time, then the Customer will be liable (without prejudice to any other rights of Electrium to claim damages) to indemnify and keep indemnified Electrium against any resulting loss, damage or expense incurred by Electrium in connection with the supply or non-supply of the Goods including the cost of any material, used or intended to be used therefor and the cost of labour and other overheads including a percentage in respect of profit. If Electrium is unable (whether temporarily or permanently) to procure any services or goods necessary to enable it to supply the Goods or if the supply of the Goods is prevented or hindered by reason of any cause beyond Electrium's reasonable control which for the avoidance of doubt and without prejudice to the generality of the foregoing shall include governmental action, war, riot, civil commotion, fire, flood, epidemic, labour disputes including labour disputes involving the work force or any part thereof of Electrium, restraints or delays affecting shipping or carriers, currency restrictions and Act of God, Electrium may cancel the contract by notice in writing to the Customer so far as it relates to Goods not then supplied or work not then done and such cancellation shall not give rise to any claims by the Customer provided that the Customer shall remain liable to pay for Goods delivered prior to the date of such cancellation.

15 General

(a) The headings herein are inserted for convenience only and shall not affect the interpretation of the Contract Terms.

(b) Should any clause contained in the Contract Terms be held to be invalid such invalidity will not affect the validity of the remaining clauses.

(c) Any dispute arising out of this contract or the Contract Terms shall be referred in writing to an independent arbitrator who shall be appointed by agreement between Electrium and the Customer or in default of agreement by the President for the time being of the Institute of Electrical Engineers whose decision shall be binding on both parties.

(d) The formation, interpretation and operation of the contract will be subject to English Law and the Customer submits himself to the non-exclusive jurisdiction of the English Courts.

(e) Electrium will be entitled to assign sub-contract or sub-let the contract or any part thereof.

(f) Failure by Electrium to enforce any of the Contract Terms will not be construed as a waiver of any of its rights hereunder.

EXPORT

All Contract Terms set out above apply to overseas transactions (ie sales outside the United Kingdom), where appropriate, except the following:

1.2 Any quotation is given on the basis that no contract will come into existence until Electrium despatches an acknowledgement of order to the Customer. Any quotation is valid for a period of 30 days only from its date provided that Electrium has not previously withdrawn it.

2 Price

The price of Goods includes the cost of packing for shipment FOB British Port or Airport except that orders having a net value of £500 and below shall be subject to an additional charge to cover packing and carriage. No allowance will be made in lieu of transportation if the Customer accepts delivery at the factory, container depot or at any other inland destination or provides his own transportation or where packing of a lesser standard is required.

3 Payment

First orders from overseas Customers should be accompanied by bank references to enable payment terms to be agreed. Unless otherwise agreed in writing, payment is due on delivery. Goods shall be deemed to have been delivered when the invoice has been presented in the United Kingdom accompanied by the appropriate documents of title.

16 Others

The Goods will be sold FOB British Port or Airport and the Seller will be under no obligation to give the Buyer notice as specified in Section 32(3) of the Sale of Goods Act 1979. CIF or C & F arrangements can be made if requested by the Customer, at cost, and Electrium will, on receipt of Customer's indemnity, take all reasonable steps to recover from the Underwriters any loss or damage for which they may be liable.

The Customer shall be solely responsible for complying with all legislation and regulations governing the importation of the Goods into the country of destination including import and export licences and the payment of duties thereon including but not limited to customs duties and VAT. The Customer shall indemnify Electrium against all costs claims and demands arising out of any breach by the Customer of this Agreement.

Electrium

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