4 Series Circuit Protection

Technical Specifications Catalogue

CLIPSAL®

by Schneider Electric

High performance.

Complete protection.

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INDUSTRIAL

About 4 Series

Overview

First established in 1920, Clipsal is Australia's number one manufacturer of electrical products, accessories and solutions. Over the years Clipsal have grown and evolved with great success, and continued to manufacture product at multiple facilities across Australia. As an industry leader, Clipsal is dedicated to supplying customers with the most innovative and sustainable electrical solutions available on the market. Clipsal, as part of Schneider Electric, the largest global specialists in energy management, enables us to provide a total electrical solution for any project or application.

Clipsal 4 Series – Complete Circuit Breaker Solutions

The Clipsal 4 Series range of circuit protection comes with everything you need for your residential, commercial or industrial switchboard requirements. Included are MCBs, RCDs, MCB/RCD combinations, isolating switches, change over switches and busbar systems.

A huge variety of accessories are also available to complement the range, including auxiliary contacts, shunt trip and voltage protection devices, push-buttons, audio and visual signalling devices, timers, relays, contactors, counters and transformers.

The Clipsal 4 Series MCBs, RCDs, MCB/RCDs and Isolators comply with the latest standards AS/NZS60898, AS/NZS61008, AS/NZS61009 and AS/NZS609473 respectively.

Housing for all devices is made of sturdy, self-extinguishing material in a new white colour to suit most switchboard designs.

Each miniature circuit breaker has 'lift-up' terminals with combination head screws. Additional safety is provided with 'ON' and 'OFF' marking in contrasting colours on toggle mechanisms.

All devices are for 35mm DIN rail mounting with a two position DIN clip of heavy duty moulded material. Miniature circuit breakers (MCBs) are constructed with provisions for quick, easy and safe field application of auxiliary contacts and shunt trip release mechanisms. Mechanism locking and sealing wire facilities are also provided where required.

Contents

Miniature Circuit Breakers

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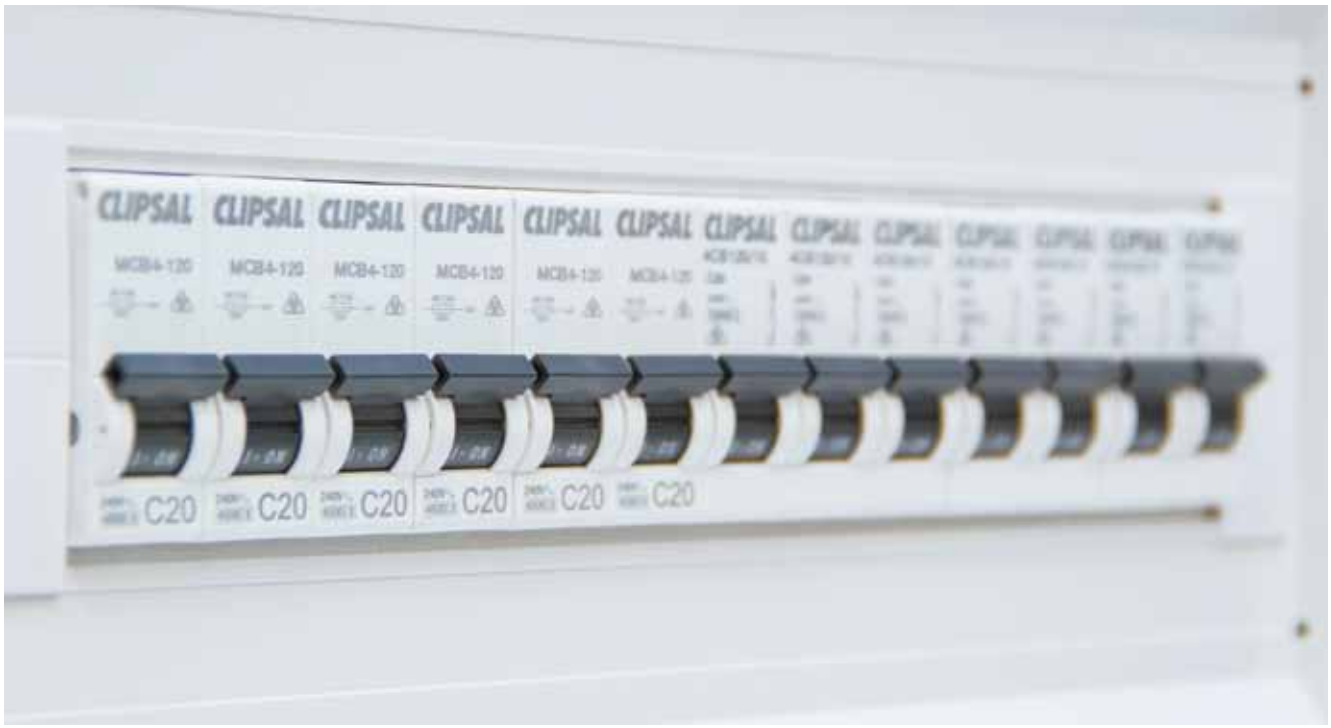


The Range

The 4 Series MCB is an all new high performance current limiting device with the ability to disconnect short circuits up to 10kA.

Clipsal 4 Series MCBs include two types of operation:

- Thermal, for normal overload.
- Magnetic, for short circuit protection.

Features and benefits:

- Unique new white finish for a fresh modern look.
- Standard characteristic is C-Curve suits most applications.
- 10kA D-Curve available, suits circuits with high inrush currents (large motors).
- Base module = 18mm wide. Compact standardised and consistent module dimensions.
- Lift-up terminals. Safer 'no hot spot' terminations and all cable strands are locked in.
- Combination head screws, choice of screwdrivers.
- 4.5, 6 and 10kA units are also fitted with bottom cog rail terminals which provides easier and faster installation with busbars.
- Field fitted auxiliary switches, standard units for any application.
- Field fitted shunt trips, standard units for any application.

Connection (1):

- Cable automatically guided to the correct position: terminals with guard.
- Insulated terminals IP20.
- Enhanced cable tear-off strength: serrated terminals.
- Fast closure.
- Downstream by connect comb busbar.
- Downstream/upstream by tunnel terminals.

Positive contact indication (2):

- The presence of the green strip guarantees physical opening of the contacts and allows operations to be performed on the downstream circuit in complete safety.

Catalogue Number Legend

Using the following catologue number as an example: **4CB120/10.**

CATALOGUE NUMBER LEGEND

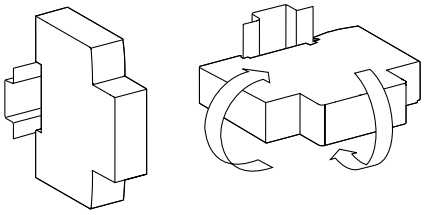
Miniature Circuit Breakers

4 Series

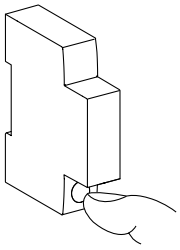
Miniature Circuit Breakers

Clipsal offer an industry leading range of miniature circuit breakers (MCBs), which are ideal for retrofit installations or switchboards that are limited for space.

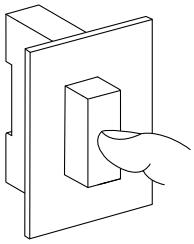
Clipsal MCBs are suitable for horizontal or vertical 35mm DIN rail mounting, with the option of a two-position clip. All Clipsal MCBs are moulded from heavy-duty material and are finger-proof, providing additional protection from live terminal contact.



35mm DIN rail installations



IP20 protection device only



IP40 protection device in modular enclosure

Thermal operation

Occurs when the bi-metal strip **(1)**, is heated by the overload current and deflected. This trips the tripping lever which, with its spring action **(2)**, causes the contacts **(3)** to open.

Magnetic tripping

Is achieved by utilising the solenoid **(4)**, which causes the armature **(5)** in conjunction with the mechanical action of the spring **(2)** to open the MCB's contacts.

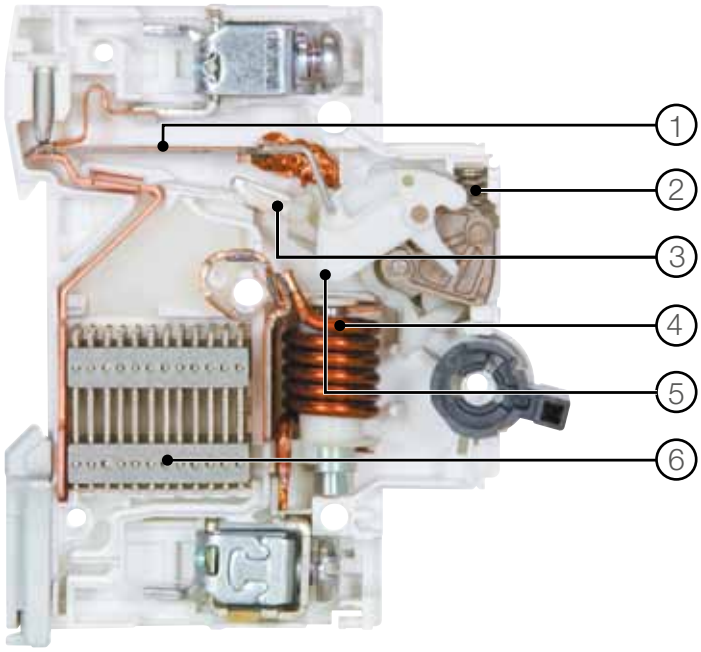
Note: The splitter plates **(6)** break up the ionised gas as the switch mechanism opens, extinguishing the arc.

Top or bottom connection

Clipsal MCBs allow line or load cables to be connected at either top or bottom for greater installation flexibility.

Free tripping mechanism

The 4 Series MCB mechanism is free tripping and cannot be held in the ON position against a fault. If the switch is held in the ON position, the MCB will still operate.



Miniature Circuit Breakers

4 Series

4.5kA C-Curve - MCB Residential

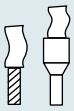
The 4.5kA breaking capacity of these MCBs makes them ideal for residential applications. This range has C-Curve characteristics, to suit most applications when connected with a backup (service) fuse, up to 100A, 6kA breaking capacity is acheived. Please refer to page 84 of the catalogue for tripping curves.

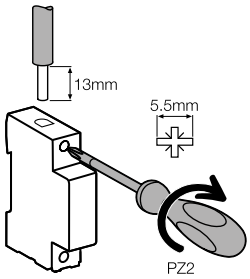
1-Pole, 1-Module, 240V

Catalogue No.	C-Curve
MCB4-106	6A
MCB4-108	8A
MCB4-110	10A
MCB4-116	16A
MCB4-120	20A
MCB4-125	25A
MCB4-132	32A
MCB4-140	40A
MCB4-150	50A
MCB4-163	63A

MCB4-120

Connection

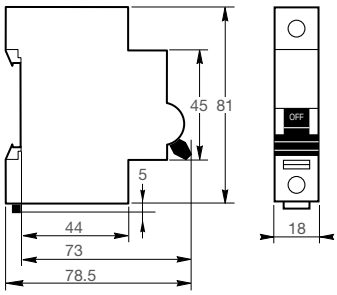
Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
6 to 25A	2 Nm	0.75 to 16mm²	0.33 to 10mm²
32 to 63A	3.5 Nm	0.5 to 35mm²	0.5 to 25mm²



Weight

Circuit-breaker	
Type	MCB4
1P	115g

Dimensions (mm)



Technical Data

Main characteristics			MCB4
Insulation voltage (Ui)			440V a.c.
Rated voltage (Ue)			240V a.c.
Operating frequency			50/60Hz
Thermal tripping	C-Curve	5 to 10 In	
According to AS/NZS 60898-1			
Limitation class			3
Rated breaking capacity (Icn)			4500A (6000A HRC 100A fuse)
Rated making and breaking capacity of an individual pole (Icn 1)			Icn1 = Icn
Additional characteristics			
d.c. voltage			48V d.c.
Rated impulse withstand voltage (Uimp)			4kV
Breaking capacity (Icu)			6kA
Pollution degree			3
Degree of protection	Device only		IP20
(IEC 60529)	Device in modular enclosure		IP40 Insulation class II
Endurance (O-C)	Electrical Mechanical	≤ 20A ≥ 25A	20,000 cycles 10,000 cycles 20,000 cycles
Operating temperature			-25°C to 70°C
Storage temperature			-40°C to 70°C
Tropicalisation (IEC 60068-1)			Treatment 2 (relative humidity 95% to 55°C)

Miniature Circuit Breakers

4 Series

6kA C-Curve - MCB Industrial

The 6kA breaking capacity of these MCBs makes them ideal for commercial and industrial applications. This range has C-Curve characteristics, to suit most applications. Please refer to page 84 of the catalogue for tripping characteristic curves.

1-Pole, 1-Module, 240V

Catalogue No.	C-Curve
4CB101/6	1A
4CB102/6	2A
4CB104/6	4A
4CB106/6	6A
4CB110/6	10A
4CB116/6	16A
4CB120/6	20A
4CB125/6	25A
4CB132/6	32A
4CB140/6	40A
4CB150/6	50A
4CB163/6	63A

4CB120/6

2-Pole, 2-Module, 415V

Catalogue No.	C-Curve
4CB201/6	1A
4CB202/6	2A
4CB204/6	4A
4CB206/6	6A
4CB210/6	10A
4CB216/6	16A
4CB220/6	20A
4CB225/6	25A
4CB232/6	32A
4CB240/6	40A
4CB250/6	50A
4CB263/6	63A

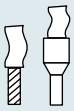
4CB220/6

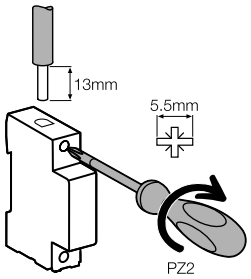
3-Pole, 3-Module, 415V

Catalogue No.	C-Curve
4CB301/6	1A
4CB302/6	2A
4CB304/6	4A
4CB306/6	6A
4CB310/6	10A
4CB316/6	16A
4CB320/6	20A
4CB325/6	25A
4CB332/6	32A
4CB340/6	40A
4CB350/6	50A
4CB363/6	63A

4CB320/6

Connection

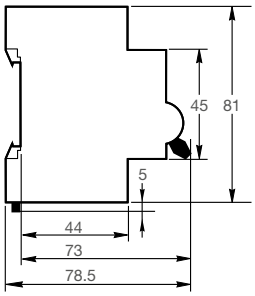
Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
1 to 25A	2 Nm	0.75 to 16mm²	0.33 to 10mm²
32 to 63A	3.5 Nm	0.5 to 35mm²	0.5 to 25mm²



Weight

Circuit-breaker	
Type	**4CBxxx/6**
1P	115g
2P	215g
3P	310g

Dimensions (mm)



Technical Data

Main characteristics			4CBxxx/6
Insulation voltage (Ui)			440V a.c.
Rated voltage (Ue)			240/415V a.c.
Operating frequency			50/60Hz
Thermal tripping	C-Curve D-Curve	5 to 10 In 10 to 14 In	
According to AS/NZS 60898-1			
Limitation class			3
Rated breaking capacity (Icn)			6000A
Service breaking capacity (Ics)			100% Icn
Rated making and breaking capacity of an individual pole (Icn1)			Icn1=Icn
Additional characteristics			
d.c. rated voltage			48V d.c.
Degree of protection (IEC 60529)	Device only		IP20
	Device in modular enclosure		IP40 Insulation class
Endurance (O-C)	Electrical Mechanical	≤ 20A ≥ 25A	20,000 cycles 10,000 cycles 20,000 cycles
Operating temperature			-25°C to 70°C
Storage temperature			-40°C to 70°C
Tropicalisation (IEC 60068-1)			Treatment 2 (relative humidity 95% to 55°C)

Miniature Circuit Breakers

4 Series

10kA C-Curve and D-Curve - MCB Industrial

The 10kA breaking capacity of these MCBs makes them ideal for commercial and industrial applications. This range has C-Curve and D-Curve characteristic to suit most applications. Please refer to page 84 of this catalogue for tripping characteristic curves.

1-Pole, 1-Module, 240V

Catalogue No.	C-Curve	Catalogue No.	D-Curve
4CB101/10	1A		
4CB102/10	2A		
4CB104/10	4A		
4CB106/10	6A	4CB106D10	6A
4CB110/10	10A	4CB110D10	10A
4CB116/10	16A	4CB116D10	16A
4CB120/10	20A	4CB120D10	20A
4CB125/10	25A	4CB125D10	25A
4CB132/10	32A	4CB132D10	32A
4CB140/10	40A	4CB140D10	40A
4CB150/10	50A	4CB150D10	50A
4CB163/10	63A	4CB163D10	63A

4CB120/10

2-Pole, 2-Module, 415V

Catalogue No.	C-Curve
4CB201/10	1A
4CB202/10	2A
4CB204/10	4A
4CB206/10	6A
4CB210/10	10A
4CB216/10	16A
4CB220/10	20A
4CB225/10	25A
4CB232/10	32A
4CB240/10	40A
4CB250/10	50A
4CB263/10	63A

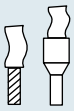
4CB220/10

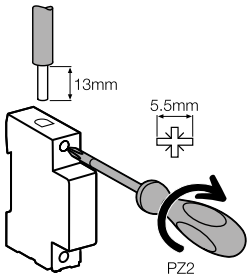
3-Pole, 3-Module, 415V

Catalogue No.	C-Curve	Catalogue No.	D-Curve
4CB301/10	1A		
4CB302/10	2A		
4CB304/10	4A		
4CB306/10	6A	4CB306D10	6A
4CB310/10	10A	4CB310D10	10A
4CB316/10	16A	4CB316D10	16A
4CB320/10	20A	4CB320D10	20A
4CB325/10	25A	4CB325D10	25A
4CB332/10	32A	4CB332D10	32A
4CB340/10	40A	4CB340D10	40A
4CB350/10	50A	4CB350D10	50A
4CB363/10	63A	4CB363D10	63A

4CB320/10

Connection

Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
1 to 25A	2 Nm	0.75 to 16mm²	0.33 to 10mm²
32 to 63A	3.5 Nm	0.5 to 35mm²	0.5 to 25mm²



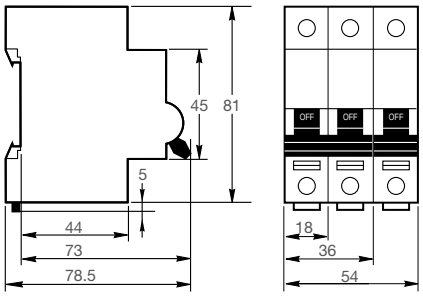
Weight

Circuit-breaker	
Type	**4CBxxx/10**
1P	115g
2P	215g
3P	310g

Technical Data

Main characteristics			4CBxxx/10
Insulation voltage (Ui)			500V a.c.
Rated voltage (Ue)			240/415V a.c.
Operating frequency			50/60Hz
Thermal tripping	C-Curve D-Curve	5 to 10 In 10 to 14 In	
According to AS/NZS 60898-1			
Limitation class			3
Rated breaking capacity (Icn)			10,000A Except cat. no. 4CB150D10, 4CB163D10, 4CB350D10 and 4CB363D10: 6000A
Service breaking capacity (Ics)			100% Icn
Rated making and breaking capacity of an individual pole (Icn1)			Icn1=Icn
Additional characteristics			
d.c. rated voltage			48V d.c.
Degree of protection (IEC 60529)	Device only		IP20
	Device in modular enclosure		IP40
Endurance (O-C)	Electrical Mechanical	≤ 20A ≥ 25A	20,000 cycles 10,000 cycles 20,000 cycles
Operating temperature			-25°C to 70°C
Storage temperature			-40°C to 70°C
Tropicalisation (IEC 60068-1)			Treatment 2 (relative humidity 95% to 55°C)

Dimensions (mm)



Miniature Circuit Breakers

4 Series

10kA C-Curve - MCB Industrial

The 10kA breaking capacity of these MCBs makes them ideal for commercial and industrial applications. This range has C-Curve and D-Curve characteristic to suit most applications. Please refer to page 85 of this catalogue for tripping characteristic curves.

1-Pole, 1.5-Module, 240V

Catalogue No.	C-Curve	Catalogue No.	D-Curve
4CB180/10	80A	**4CB180D10**	80A
4CB1100/10	100A	**4CB1100D10**	100A
4CB1125/10	125A		

4CB1125/10

2-Pole, 2x1.5-Module, 415V

Catalogue No.	C-Curve
4CB280/10	80A
4CB2100/10	100A
4CB2125/10	125A

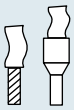
4CB2125/10

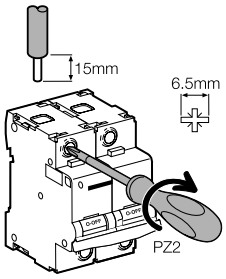
3-Pole, 3x1.5-Module, 415V

Catalogue No.	C-Curve	Catalogue No.	D-Curve
4CB380/10	80A	**4CB380D10**	80A
4CB3100/10	100A	**4CB3100D10**	100A
4CB3125/10	125A		

4CB3125/10

Connection

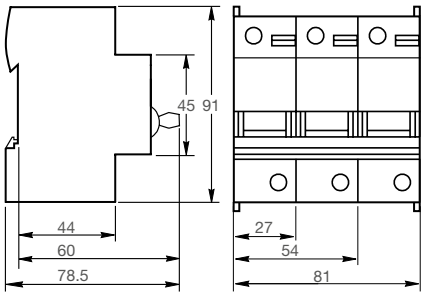
Rating	Tightening torque	Copper cables	
		Rigid/semi rigid	Flexible or ferrule
			
80 to 125A	3.5 Nm	1 to 50mm²	1.5 to 35mm²



Weight

Circuit-breaker	
Type	**4CBxxxx/10**
1P	205g
2P	410g
3P	615g

Dimensions (mm)



Direct Current (d.c.)

Breaking capacity (Icu)				Service breaking capacity (Ics)
Type	Voltage (V)			
1P	24/48V	125V	250V	
Rating (In) 80 to 125A	10kA	10kA	-	100% Icu
2P (in series)	24/48V	125V	250V	
80 to 125A		-	10kA	100% Icu

Technical Data

Main characteristics			4CBxxx/10
Insulation voltage (Ui)			500V a.c.
Degree of pollution			3
Rated impulse withstand voltage (Uimp)			6kA
Thermal tripping Magnetic tripping	Reference temperature		50°C
	C-Curve	5 to 10 In	
	D-Curve	10 to 14 In	
Limitation class			3
Rated breaking capacity (Icn)			10,000A
Service breaking capacity (Ics)			100% Icn
Rated making and breaking capacity of an individual pole (Icn1)			Icn1=Icn
Additional characteristics			
Degree of protection (IEC 60529)	Device only		IP20
	Device in modular enclosure		IP40
Endurance (O-C)	Electrical Mechanical	80... 125A	5000 cycles (O-C) 20,000 cycles
Operating temperature			-25°C to 70°C
Storage temperature			-40°C to 70°C
Tropicalisation (IEC 60068-1)			Treatment 2 (relative humidity 95% to 55°C)

Miniature Circuit Breakers

4 Series

d.c. 6kA C-Curve - MCB Industrial

These dedicated d.c. circuit breakers are available in models from 6 to 40 ampere. This range has C-Curve characteristic to suit most applications. Please refer to page 85 of this catalogue for tripping characteristic curves.

Note: Observe wiring polarity during installation.

Features and benefits:

- Same housing as a.c. type MCBs. Uniformity in space requirements and installation.
- Full 250V d.c. breaking capability. Superior, safe and reliable d.c. breaking per pole.
- 1 and 2 pole versions in all amperage sizes. Up to 500V d.c. breaking for all amperage sizes.
- 6kA rating. Excellent breaking capability for its compact size.

Applications:

- Marine.
- Telecommunications.
- Solar power.
- Emergency power.
- Battery power.

1-Pole, 1-Module, 250V d.c.

Catalogue No.	C-Curve
4CB106/6DC	6A
4CB110/6DC	10A
4CB116/6DC	16A
4CB120/6DC	20A
4CB125/6DC	25A
4CB132/6DC	32A
4CB140/6DC	40A

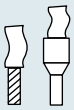
4CB120/6DC

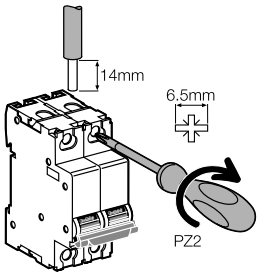
2-Pole, 2-Module, 500V d.c.

Catalogue No.	C-Curve
4CB206/6DC	6A
4CB210/6DC	10A
4CB216/6DC	16A
4CB220/6DC	20A
4CB225/6DC	25A
4CB232/6DC	32A
4CB240/6DC	40A

4CB220/6DC

Connection

Rating	Tightening torque	Copper cables	
		Rigid/semi rigid	Flexible or ferrule
			
≤ 25A	2.5 Nm / 22 lb.in	1 to 25mm² #18 - #4 AWG	1 to 16mm² #18 - #6 AWG
> 25A	3.5 Nm / 31 lb.in	1 to 35mm² #18 - #2 AWG	1 to 25mm² #18 - #4 AWG



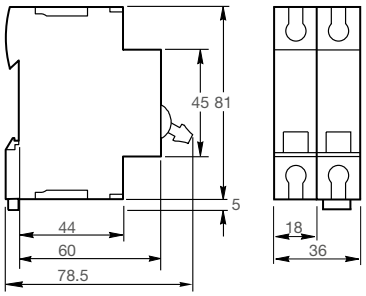
Weight

Circuit-breaker	
Type	4CBxxx/6DC
1P	128g
2P	256g

Technical Data

Main characteristics		4CBxxx/6DC
Insulation voltage (Ui)		500V d.c.
Magnetic tripping (Ii)		8.5 In (±20%) (compatible with C-Curve)
Rated impulse withstand voltage (Uimp) under frame		6kV
Pollution degree		3
Limitation class		3
Rated breaking capacity (Icn)		5kA / 250V d.c. (1P) 5kA / 500V d.c. (2P)
Service breaking capacity (Ics)		100% Icn
Rated making and breaking capacity of an individual pole (Icn1)		Icn1=Icn
Additional characteristics		
Endurance (O-C)	Electrical	3000 cycles (where L/R=2 ms) 6000 cycles (where the circuit is resistive)
	Mechanical	20,000 cycles
Utilisation category		A (no delay in accordance with IEC/EN 60947-2 standards)
Operating temperature		-25°C to 70°C
Storage temperature		-40°C to 85°C
Tropicalisation (IEC 60068-2 and GB 14048.2)		Relative humidity 95% at 55°C

Dimensions (mm)



Residual Current Devices

4 Series

RCD - safety switches

Although Australia has one of the safest electrical systems in the world, accidents can still happen. A faulty or poorly maintained appliance, a person who innocently pushes something into a power socket or cuts through an electrical wire, a frayed cord, wet hands or carelessness with power tools are all situations that can lead to serious consequences.

The high level of protection offered by residual current devices (RCDs) is well documented and they are now mandatory in every new home.

How an RCD works

The RCD works by constantly monitoring and comparing the current flow in both the Active and Neutral circuits of an electrical installation.

During normal operation, these Active and Neutral currents are in balance. However, should any current flow to Earth, an imbalance is created in these circuits. If this imbalance is sufficient, the RCD will cut the electrical supply.

Apart from the protection to people that an RCD offers, it will also cut off power to expensive electrical equipment in the event of an electrical fault to Earth. This protects appliances against costly damage and the installation against fire, resulting from faults of this nature.

Checking installations and appliances before installation

It is important to check the installation thoroughly to ensure that there is no inherent leakage or other problems in the installation, which will cause commissioning problems or other tripping.

Any leakage greater than 5mA will need to be located and eliminated.

Residual Current Devices

4 Series

Switchboard Mounted RCDs - Safety Switches

These RCDs incorporate the same housing and installation features as the MCBs. With a range that includes pulse current sensitive and super immune devices, there's a unit for every application.

Features and benefits:

- Same housing and installation features as the MCBs. Safe, easy and fast installation.
- Standard large coloured test button. Simple and convenient testing.
- Leading and lagging Neutral devices. Protects downstream sensitive 'no-floating' star-point.
- Large range of delayed surge-proof and pulse current sensitive devices. Availability of a unit for any application.

Connection (1):

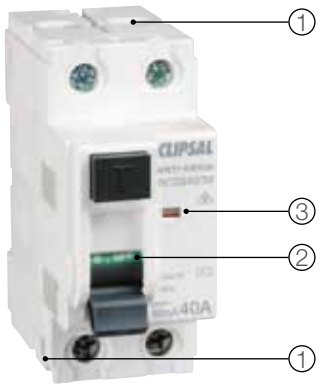
- Downstream by biconnect comb busbar.
- Upstream/downstream by tunnel terminal.
- DIN locking clip.

Positive contact indication (2):

- Suitability for isolation in industrial sector.
- The presence of the green strip guarantees physical opening of the contacts and allows operations to be performed on the downstream circuit in complete safety.
- Test button.

Window (3):

- Tripping upon fault is indicated by a red mechanical status indicator on the front panel.



Design improvements

Clipsal's on-going research has resulted in significant design improvements, which have eliminated or reduced the incidence of nuisance tripping.

Tertiary winding is now fitted to all electromechanical 30mA Clipsal RCDs to prevent tripping caused by high frequency residual currents.

In addition to our standard RCD, three special RCDs have been designed: the SI-type, S-type and SIS-type.

Clipsal S-Type (selective), SI-Type (super immune) and SIS-Type (super immune and selective) RCDs

Selective type uses a simple network on the secondary winding to charge a capacitor to a certain level before discharging it into the tripping relay.

These devices provide a high level of immunity to tripping caused by short term transients and capacitive surges, which can occur when long cable runs are present that inherently have a high capacitance to Earth.

The SI range of RCDs provides reliable disturbance free tripping, mostly caused by non-dangerous Earth leakage.

The SIS range of RCDs provides a combination of selective and super immune features. SIS-type RCDs are highly recommended for installations where variations on voltage oscillations exist, either by high, or slow and damped, frequency.

Applications

S-Type

- Machinery.
- Series installation with other RCDs.
- Cable systems.

SI-Type

- High dependency installations.
- Computers.
- Fluorescent lighting with electronic ballasts.

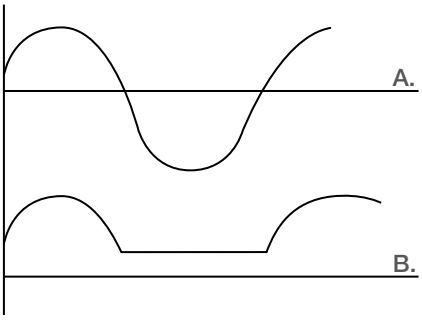
SIS-Type

- Servers.
- Lighting strike zones.
- Application with drastic variation in voltage oscillations.

Selective S-Type

- Machinery.
- Series installation with other.
- RCD types.
- Cable systems.

Fault current



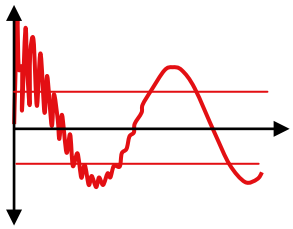
A. 30mA pure sine wave a.c.

Non d.c. sensitive breakers will trip and d.c. sensitive breakers will trip.

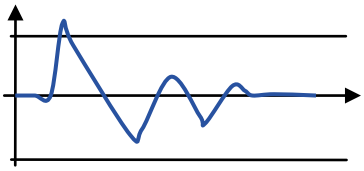
B. The test current is half wave pulsating d.c.

Non d.c. sensitive breakers may not trip but d.c. sensitive breakers will trip.

High frequency oscillations



Slow and damped oscillations



Residual Current Devices

4 Series

Interference Immunity - AC, A and SI-Types - Safety Switches

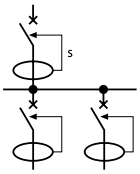
Clipsal provides various equipment technologies capable of overcoming the consequences of interference of all kinds.

Operating conditions		Examples	Types		
			AC	A	A si
Characteristics					
With no special characteristics		General purpose power sockets Incandescent lighting Household appliances: microwave oven, dishwasher, clothes dryer Electric heating, water heater	Yes	Yes	Yes
Including a rectifier	Single-phase	Household appliances: induction cooking appliances, washing machines (variable speed) Single-phase variable speed drives	-	Yes	Yes
	Three-phase	Three-phase variable speed industrial drives Three-phase uninterruptible power supplies	-	-	-
Generating high frequency interference (current peaks, harmonics)		Fluorescent lighting powered by extra low voltage transformer, by electronic ballast Variable luminosity lighting Powerful IT equipment Single-phase variable speed industrial drives Air conditioning Telecommunications equipment Capacitor banks	-	-	Yes
Including an anti-harmonic filter in the power supply		Microcomputer systems Computer peripherals (printers, scanners, etc.)	-	-	Yes
Electrical Environment					
Vicinity of equipment generating transient overvoltages		High-powered switching devices Reactive energy compensation banks	-	-	Yes
Circuits powered by an uninterruptible power supply		Backed-up networks	-	-	Yes
“Isolated neutral” (IT) Earthing system		-	-	-	Yes
Major risk of lightning strikes		Buildings protected by a lightning protection system Mountainous or humid regions Regions with high keraunic level	-	-	Yes
Atmosphere					
Ambient temperature which could be less than -5°C		-	-	Yes	Yes
Presence of corrosive agents (AF2 to AF4) or dust		Indoor swimming pools Harbours, marinas, camping grounds Water treatment Chemical industries, heavy industries, paper mills Mines and cellars, road tunnels Markets, stock raising, food processing industries	-	-	Yes

Discrimination - S-Types

The RCDs of average sensitivity (100mA and more) is available in the (S) type version. This option ensures that, in the event of an Earth fault downstream of the installation, only the defective part is switched off.

The table below shows which upstream/downstream equipment combinations provide this discrimination.

Sensitivity (mA) - Downstream		Sensitivity (mA) - Upstream										
		Instantaneous						Selective S				
		30	100	300	500	1000	3000	100	300	500	1000	3000
 Instantaneous	30	-	-	-	-	-	-	Yes	Yes	Yes	Yes	Yes
	100	-	-	-	-	-	-	-	Yes	Yes	Yes	Yes
	300	-	-	-	-	-	-	-	-	-	Yes	Yes
	500	-	-	-	-	-	-	-	-	-	-	Yes
	1000	-	-	-	-	-	-	-	-	-	-	Yes
	3000	-	-	-	-	-	-	-	-	-	-	-

Residual Current Devices

4 Series

AC-Type, Safety Switch - RCCB Residential

The residential range of RCDs offer an economical product with the reliability you expect from a Clipsal Safety Switch.

Available in 2 and 4 pole, 40 and 63 amp to suit most residential applications.

Residential range 30mA non-delayed

Catalogue No.	2 pole current A
RCD240/30	40A
RDC263/30	63A

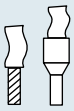
RCD240/30

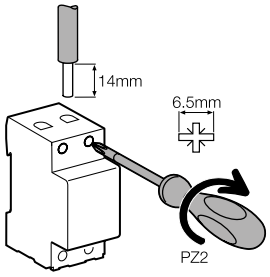
Residential range 30mA non-delayed

Catalogue No.	4 pole current A
RCD440/30	40A
RCD463/30	63A

RCD440/30

Connection

Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
40 to 63A	3.5 Nm	1 to 35mm²	1 to 25mm²



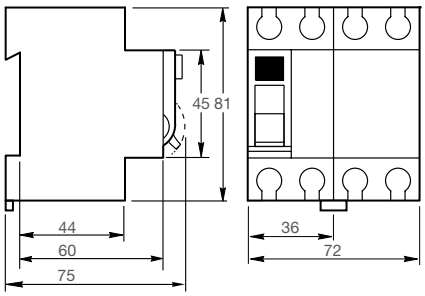
Weight

Residual current device	
Type	**RCDxxx/30**
1P	210g
4P	370g

Technical Data

Main characteristics		RCDxxx/30
Insulation voltage (Ui)		500V
Degree of pollution		2
Rated impulse withstand voltage (Uimp)		6kV
According to AS/NZS 61008-1		
Making and breaking capacity (Im/IΔm)		10 In
Impulse current withstand (8/20 µs) without tripping)	AC type	250A
Rated conditional short circuit current (Inc/IΔc)	With MCB	Equal to the breaking capacity of the MCB circuit breaker
	With fuse	6000A residential
Additional characteristics		
Degree of protection	Device in modular enclosure	IP40
Endurance (O-C)	Electrical	2000 cycles
	Mechanical	20,000 cycles
Operating temperature	AC type	-5°C to 40°C
	Asi type	-25°C to 40°C
Storage temperature		-40°C to 85°C

Dimensions (mm)



Residual Current Devices

4 Series

AC-Type, Safety Switch - RCCB Industrial

The industrial range of RCDs offer an economical product with the reliability you expect from a Clipsal Safety Switch.

Comes in 2 and 4 pole, 25 to 80 amp to suit most industrial applications.

Applications

Standard Type - AC Type

- General applications.

2-Pole, 2-Module, 240V

Standard-type, 30mA, non-delayed, surge current protected to 250A 8/20µS

Catalogue No.	C-Curve
4RC225/30	25A
4RC240/30	40A
4RC263/30	63A
4RC280/30	80A

4RC225/30

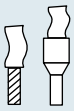
4-Pole, 4-Module, 415V

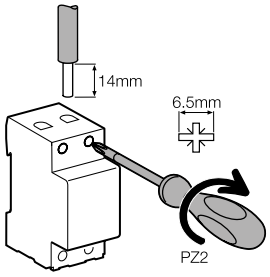
Standard-type, 30mA, non-delayed, surge current protected to 250A 8/20µS

Catalogue No.	C-Curve
4RC425/30	25A
4RC440/30	40A
4RC463/30	63A
4RC480/30	80A

4RC425/30

Connection

Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
25 to 80A	3.5 Nm	1 to 35mm²	1 to 25mm²



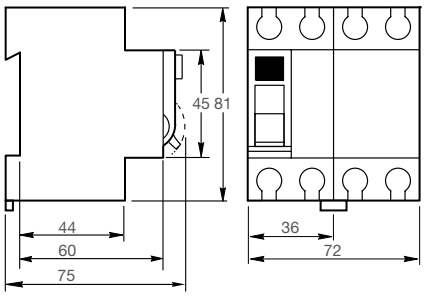
Weight

Residual current device	
Type	**4RCxxx/30**
1P	210g
4P	370g

Technical Data

Main characteristics		
Insulation voltage (Ui)		500V
Degree of pollution		2
Rated impulse withstand voltage (Uimp)		6kV
According to AS/NZS 61008-1		
Making and breaking capacity (Im/IΔm)		10 In
Impulse current withstand (8/20 µs without tripping)	AC type	250A
Rated conditional short circuit current (Inc/IΔc)	With MCB	Equal to the breaking capacity of the MCB circuit breaker
	With fuse	10,000A industry, service selector 6000A residential
Additional characteristics		
Degree of protection	Device in modular enclosure	IP40
Endurance (O-C)	Electrical	2000 cycles
	Mechanical	20,000 cycles
Operating temperature	AC type	-5°C to 40°C
Storage temperature		-40°C to 85°C

Dimensions (mm)



Residual Current Devices

4 Series

S, SI, SIS-Type Safety Switch RCCB Industrial

4-Pole, 4-Module, 415V

S-type, 300mA, (not for personal protection)

Catalogue No.	C-Curve
4RC463S300	63A

2-Pole, 2-Module, 240V

SI-type, 30mA, super immune

Catalogue No.	C-Curve
4RC240SI30	40A
4RC263SI30	63A

4RC240SI30

4-Pole, 4-Module, 415V

SI-type, 30mA, super immune

Catalogue No.	C-Curve
4RC425SI30	25A
4RC440SI30	40A
4RC463SI30	63A

4RC440SI30

2-Pole, 2-Module, 240V

SIS-type, 300mA, selective, super immune (not for personal protection)

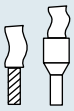
Catalogue No.	C-Curve
4RC240SIS300	40A

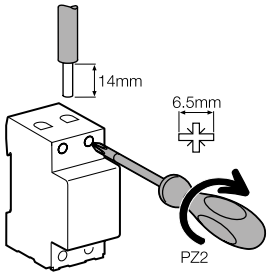
4-Pole, 4-Module, 415V

SIS-type, 300mA, selective, super immune (not for personal protection)

Catalogue No.	C-Curve
4RC440SIS300	40A
4RC463SIS300	63A

Connection

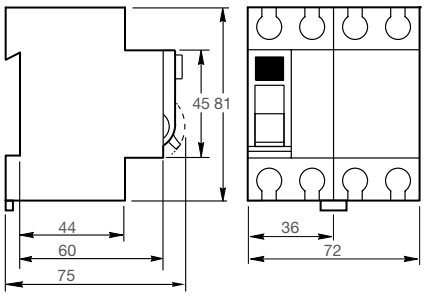
Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
25 to 63A	3.5 Nm	1 to 35mm²	1 to 25mm²



Weight

Circuit-breaker	
Type	**4RCxxx/(S)(SI)(SIS)30**
1P	210g
4P	370g

Dimensions (mm)



Technical Data

Main characteristics		
Insulation voltage (Ui)		500V
Degree of pollution		2
Rated impulse withstand voltage (Uimp)		6kV
According to AS/NZS 61008-1		
Making and breaking capacity (Im/IΔm)		10 In
Impulse current withstand (8/20 µs without tripping)	(s) type, (si) type	3kA
Rated conditional short circuit current (Inc/IΔc)	With MCB	Equal to the breaking capacity of the MCB circuit breaker
	With fuse	10,000A industry, service selector 6000A residential
Additional characteristics		
Degree of protection	Device in modular enclosure	IP40
Endurance (O-C)	Electrical	2000 cycles
	Mechanical	20,000 cycles
Operating temperature	AC type	-5°C to 40°C
Storage temperature		-40°C to 85°C

Residual Current Devices

4 Series

MCB/RCD Combinations - Residential RCBO

Clipsal switchboard mounted combination MCBs and RCDs fall into two main categories (electro mechanical and electronic).

The electro mechanical devices derive their 'action energy' from actual leakage (residual) current.

They work on an electromagnetic principle. A toroidal transformer is used to detect the magnetic fields created by current flowing in the Active and Neutral wires of the protective circuit, which pass through the RCD.

Taking into account the magnitude and direction of these currents, under normal circuit conditions the vector sum of the currents (known as the residual current) is effectively zero and the magnetic fields cancel.

Should the condition occur where a current flows from an Active or Neutral wire to Earth, the residual current will not be zero and the magnetic field will establish a tripping signal to disconnect the protected circuit. These devices are not voltage dependant.

RCBM220/30

6kA 2-Module MCB/RCD Combination C-Curve, Mechanical - Residential

These 240V single-phase + Neutral combination devices incorporate the same housing (two base modules wide). Unique design features include:

- seperate RCD trip flag for easy fault finding **(1)**
- new insulated openings for easy busbar installation **(2)**
- no need to cut the busbar providing safe and quick fit off **(3)**
- top and bottom line load compatible for easy installation.

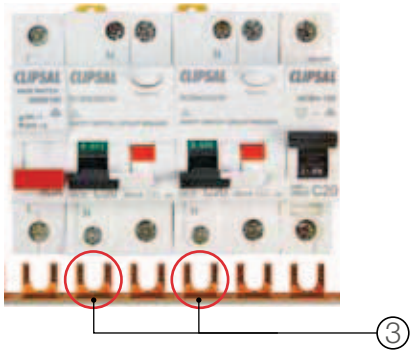
RCBM220/30
Insulated busbar slot

2-Pole, 2-Module, 240V

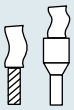
Standard-type, 6kA, 30mA, non-delayed

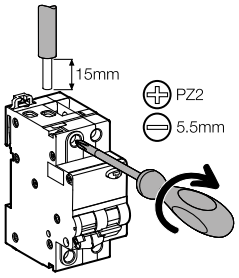
Catalogue No.	C-Curve
RCBM210/30	10A
RCBM216/30	16A
RCBM220/30	20A
RCBM225/30	25A
RCBM232/30	32A

NOTE: Auxilaries not compatible - refer Industrial range.



Connection

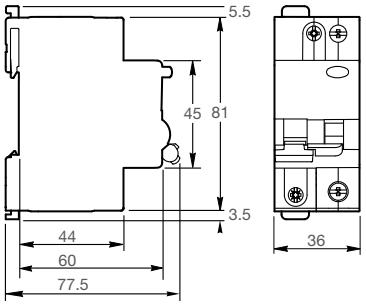
Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
10 to 32A	3.5 Nm	1 to 16mm²	1 to 10mm²



Weight

Residual current device	
Type	**RCBMxxx/30**
2P	230g

Dimensions (mm)



Technical Data

Main characteristics			
Insulation voltage (Ui)			400V
Setting temperature for ratings			30°C
Thermal curve		C-Curve	The magnetic tripping devices act at between 5 and 10 In
Limitation class			3
Rated breaking capacity (Icn)			6000A
Rated residual breaking and making capacity (IΔm)			4500A
Rated impulse withstand voltage (Uimp)			4kV
Earth leakage protection with instantaneous tripping			30mA voltage independent
Insulation class			2
8/20 µs impulse withstand without tripping			250A
Degree of protection	Device only		IP20
	Device in modular enclosure		IP40 Insulation class II
Endurance (O-C)	Electrical Mechanical	≤ 20A ≥ 25A	20,000 cycles 10,000 cycles 20,000 cycles
Service temperature			-5°C to 40°C
Storage temperature			-30°C to 70°C
Tropicalisation			Treatment 2 (relative humidity 95% at 55°C)

Residual Current Devices

4 Series

10kA MCB/RCD Combination C-Curve, Mechanical - Industrial RCBO

These 240V single-phase + Neutral combination devices incorporate the same housing (two base modules wide), installation features and offer individual recognition of a particular circuit. These 240V single-phase + Neutral combination devices incorporate the same housing (two base modules wide).

This range has C-Curve characteristic to suit most applications. Please refer to page 85 of this catalogue for tripping characteristic curves.

4RCBM220/30

Features and benefits:

- Seperate RCD trip flag for easy fault finding **(1)**
- New insulated openings for easy busbar installation **(2)**
- No need to cut the busbar providing safe and quick fit off **(3)**
- Same base module as the 10kA MCBs. Uniformity in space requirements and installation.
- Same housing and installation features as the MCBs. Safe, easy and fast installation.
- Top and bottom line and load compatible for ease of installation.
- Labelled terminals. Safe, easy and fast installation.
- Top and bottom clip allowing dismounting with comb busbar in place.
- Busbar compatible through an insulated slot.

RCBM220/30
Insulated busbar slot

Applications

Standard-Type - AC Type

- General applications.

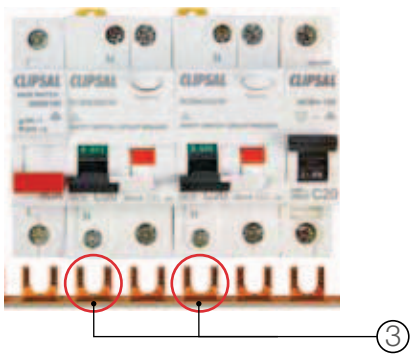
Delayed SI-Type - Super Immune A-Type

- High dependency installation.

2-Pole, 2-Module, 240V

Standard-type, 10kA, 30mA, non-delayed, surge current protected to 250A 8/20µS

Catalogue No.	C-Curve
4RCBM210/30	10A
4RCBM216/30	16A
4RCBM220/30	20A
4RCBM225/30	25A
4RCBM232/30	32A
4RCBM240/30	40A

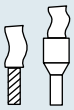


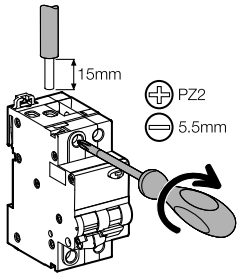
2-Pole, 2-Module, 240V

SI-type, 10kA, super immune, 3mA A-type, surge current protected to 3000 A 8/20ms

Catalogue No.	C-Curve
4RCBM210SI30	10A
4RCBM216SI30	16A
4RCBM220SI30	20A
4RCBM225SI30	25A
4RCBM232SI30	32A
4RCBM240SI30	40A

Connection

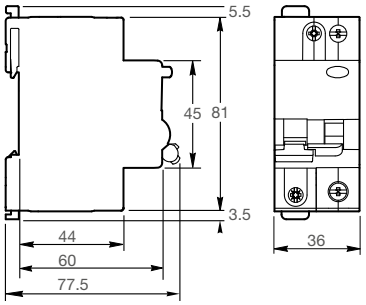
Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
10 to 40A	3.5 Nm	1 to 16mm²	1 to 10mm²



Weight

Residual current device	
Type	**4RCBMxxx/30**
2P	205g

Dimensions (mm)



Technical Data

Main characteristics			
Earth leakage protection with instantaneous tripping		30mA	Voltage independant
Setting temperature for ratings			30°C
Tripping curve		C-Curve	The magnetic tripping devices act at between 5 and 10 In
Rated breaking capacity (Icn)		≤ 20A	10,000A
		≥ 25A	6000A
Rated residual breaking and making capacity (IΔm)		≤ 20A	4500A
		≥ 25A	4500A
Endurance (O-C)	Electrical	≤ 20A	20,000 cycles
		≥ 25A	10,000 cycles
	Mechanical		20,000 cycles
Degree of protection	Device only		IP20
	Device in modular enclosure		IP40 Insulation class II
Insulation voltage (Ui)			400V
Rated impulse withstand voltage (Uimp)			4kV
Service temperature		AC type	-5°C to 40°C
		SI type	-25°C to 40°C
Storage temperature			-30°C to 70°C
8/20 µs impulse withstand without tripping		AC type	250A
		SI type	3kA
Limitation class			3
Insulation class			2
Tropicalisation			Treatment 2 (relative humidity 95% at 55°C)

Residual Current Devices

4 Series

10kA MCB/RCD Combination C-Curve, Electronic - Industrial RCBO

Clipsal switchboard mounted combination MCBs and RCDs fall into two main categories; electro mechanical and electronic.

These 240V single-phase + Neutral electronic combination devices incorporate the same housing (two base modules wide), installation features and ampere colour coding as the MCBs and offer individual recognition of a particular circuit.

Separate flag indication **(1)** for MCB or RCD tripping enables easy and speedy fault finding.

Electronic type devices derive their 'action energy' from the mains supply. They typically utilise much simpler toroidal sensors, coupled to sensing amplifiers, filters, discrimination circuits and triac driven solenoids to operate the contacts.

The major advantages of electronic types lies in their simple construction, improving their chances in areas in adverse conditions where vibration and environmental conditions affect electrical products.

The added benefit of electronic types are that the filters prevent unwanted tripping. These devices are voltage dependent.

4RCBE220/10

Applications

Standard Type - AC-Type

- General applications.
- Generators.
- Extreme environmental conditions.
- 10mA hospital applications.

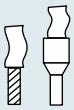
2-Pole, 2-Module, 240V

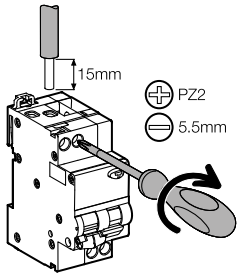
Standard-type, 10mA non-delayed, 40ms trip time

Catalogue No.	C-Curve
4RCBE210/10	10A
4RCBE216/10	16A
4RCBE220/10	20A
4RCBE232/10	32A
4RCBE240/10	40A

NOTE: This device is top feeding only.

Connection

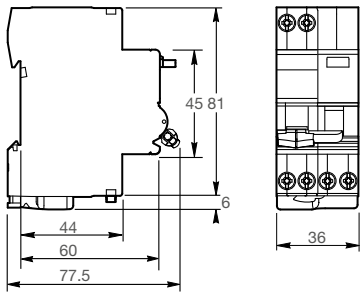
Rating	Tightening torque	Copper cables	
		Rigid	Flexible or ferrule
			
10 to 40A	3.5 Nm	1 to 16mm²	1 to 10mm²



Weight

Residual current device	
Type	**4RCBExxx/10**
1P+N	189g

Dimensions (mm)



Technical Data

Main characteristics			
Earth leakage protection with instantaneous tripping		10mA	Voltage dependant
Setting temperature for ratings			30°C
Tripping curve		C-Curve	The magnetic tripping devices act at between 5 and 10 In
Rated breaking capacity (Icn)		≤ 20A	10,000A
		≥ 25A	6000A
Rated residual breaking and making capacity (IΔm)		≤ 20A	4500A
		≥ 25A	4500A
Endurance (O-C)	Electrical	≤ 20A	20,000 cycles
		≥ 25A	10,000 cycles
	Mechanical		20,000 cycles
Degree of protection	Device only		IP20
	Device in modular enclosure		IP40 Insulation class II
Insulation voltage (Ui)			400V
Rated impulse withstand voltage (Uimp)			4 kV
Service temperature		AC type	-5°C to 40°C
Storage temperature			-30°C to 70°C
8/20 µs impulse withstand without tripping		AC type	250A
Limitation class			3
Insulation class			2
Tropicalisation			Treatment 2 (relative humidity 95% at 55°C)

Residual Current Devices

4 Series

Slim 1-Module MCB/RCD Combination C-Curve, Electronic - Industrial RCBO

Clipsal's slim DIN mounted, 30mA combination MCB/RCDs are available as single module devices to save valuable switchboard space.

4RCBE210/30S

Features and benefits:

- Top and bottom line and load compatible for ease of installation.
- 6kA fault level suits both residential and commercial applications.
- Only 18mm wide and available in four current ratings.
- Short circuit interrupting capacity of 6kA.
- Rated at 240V, 30mA, type A, C-Curve.
- One module width – ideal for retrofit installations where space is limited.
- Two-pole safety feature allows switching of both Active and Neutral contacts.
- Trip free locking device (lockable 'ON' or 'OFF' position).
- Compatible with Clipsal's 4LD Lock Dog.
- AS/NZS 61009 compliance.

Applications:

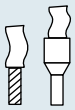
- Suitable for residential, commercial and industrial applications.
- Ideal for retrofit installations where pole space is a problem.
- Small width allows a greater number of MCB/RCDs to be installed in the one enclosure.

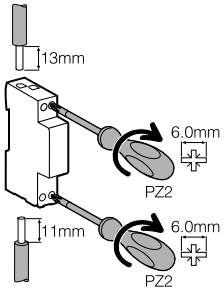
2-Pole, 1-Module, 240V

A-type 30mA non delayed

Catalogue No.	C-Curve
4RCBE210/30S	10A
4RCBE216/30S	16A
4RCBE220/30S	20A
4RCBE225/30S	25A

Connection

Type	Rating	Tightening torque	Copper cables	
Slim RCBO			Rigid	Flexible or ferrule
				
L and N upstream	10 to 25A	2 Nm	1 to 16mm²	1 to 16mm²
L and N downstream	10 to 25A	2 Nm	1 to 10mm²	1 to 10mm²



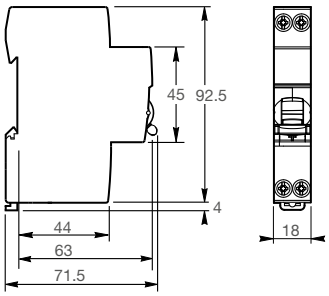
Weight

Residual current device	
Type	**Slim RCBO**
1P+N	130g

Technical Data

Main characteristics		
Voltage rating (Ue)		240V + 10%, -15%
Insulation voltage (Ui)		400V
Rated impulse withstand voltage (Uimp)		4kV
Rated residual operating current (IΔn)		30mA
Thermal tripping reference temperature		30°C
Magnetic tripping	C-Curve	Between 5 and 10 In
Limitation class		3
Surge current withstand (8/20 µs) without tripping		3000A
Rated nominal breaking capacity (Icn)		6000A
Phase/Earth rated residual breaking and making capacity (IΔm)		6000A
Additional characteristics		
Degree of protection	Device only	IP20
	Device in modular enclosure	IP40
Endurance (O-C)	Electrical	10,000 cycles
	Mechanical	20,000 cycles
Operating temperature		-5°C to 40°C
Storage temperature		-25°C to 70°C
Tropicalisation		Treatment 2 (relative humidity 95% at 55°C)

Dimensions (mm)



Residual Current Devices

4 Series

1-Module MCB/RCD Combination C-Curve, Electronic - Industrial RCBO

4RCBE120/30

These 240V single-phase single-pole combination devices incorporate the same housing (one base module wide) and installation features as the MCBs.

This range has C-Curve characteristic to suit most applications.

Features and benefits:

- Same base module as the 10kA MCBs. Uniformity in space requirements and installation.
- Same housing and installation features as the MCBs. Safe, easy and speedy installation.
- Extra long 950mm Neutral line cable.
- Trip-free handle through an over-centre toggle mechanism that ensures tripping even when the handle is held or locked in the ON position.
- A push-test button (T) is positioned on the front of the device for testing.
- Suitable for Clipsal 4MCxxM series fish bone chassis switchboards.

Applications

A-type

- General applications.

1-Pole, 1-Module, 240V

A-type, 30mA, non-delayed, 40ms trip time

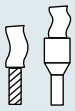
Catalogue No.	C-Curve	kA rating
4RCBE110/30	10A	10kA
4RCBE116/30	16A	10kA
4RCBE120/30	20A	10kA
4RCBE125/30	25A	10kA
4RCBE132/30	32A	10kA
4RCBE140/30	40A	10kA

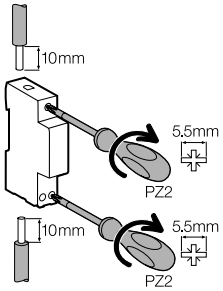
1-Pole, 1-Module, 240V

A-type, 10mA, non-delayed, 40ms trip time

Catalogue No.	C-Curve	kA rating
4RCBE110/10	10A	10kA
4RCBE116/10	16A	10kA
4RCBE120/10	20A	10kA

Connection

Type	Rating	Tightening torque	Copper cables	
4RCBE1xx/xx			Rigid	Flexible or ferrule
				
L and N upstream	10 to 40A	2 Nm	1 to 25mm²	1 to 16mm²
L and N downstream	10 to 40A	2 Nm	1 to 16mm²	1 to 16mm²



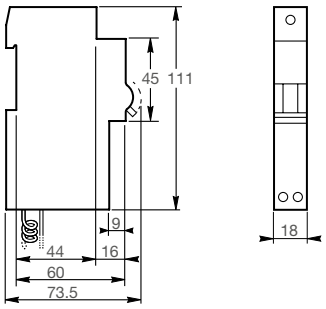
Weight

Residual current device	
Type	**4RCBE1xx/xx**
1P	180g

Technical Data

Main characteristics		
Voltage rating (Ue)		240V + 10%, -15%
Rated nominal breaking capacity (Icn)		10,000A
Phase/eEarth rated residual breaking and making capacity (IΔm)		10,000A
Additional characteristics		
Degree of protection	At the terminals	IP20
Endurance (O-C)	Mechanical	20,000 cycles
Operating temperature		-5°C to 40°C
Storage temperature		-25°C to 80°C
Tropicalisation		Treatment 2 (relative humidity 95% at 55°C)

Dimensions (mm)



Residual Current Devices

4 Series

1-Module MCB/RCD Combination C-Curve, Electronic - Industrial RCBO

30mA combination MCB/RCDs are available as single pole devices to save valuable switchboard space, fitting Heinmann CF and Quicklag switchboards. Available in 6 current ratings, these combination devices have a short circuit interrupting capacity of 6kA, rated at 240V, 30mA with a thermal/overload protection C-Curve.

4RCBE110/30H

Features and benefits:

- AS/NZS 61009 compliance.
- C-Curve characteristic suits most applications.
- Combination head screws for quick and easy termination.
- Trip free operating mechanism allows toggle to be on while still disconnecting supply under fault conditions.
- Terminal capacity 25mm². Still disconnecting supply under fault conditions.

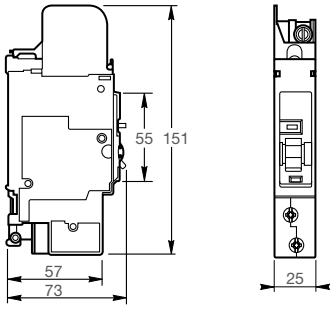
Applications

Standard-Type

- 4RCBE1xx/30H for retrofit Heinemann CF1 MCBs.
- 4RCBE1xx/30Q for retrofit Quicklag MCBs.
- Provides RCD protection to circuits without the need to replace existing switchboards.

Dimensions (mm)

4RCBE110/30H



1-Pole, 1-Module, 240V

Standard-type, 6kA, 30mA, Heinmann

Catalogue No.	C-Curve
4RCBE110/30H	10A
4RCBE116/30H	16A
4RCBE120/30H	20A
4RCBE125/30H	25A
4RCBE132/30H	32A
4RCBE140/30H	40A

NOTE: Heinemann and Quicklag are not Clipsal Registered Trademarks.

1-Pole, 1-Module, 240V

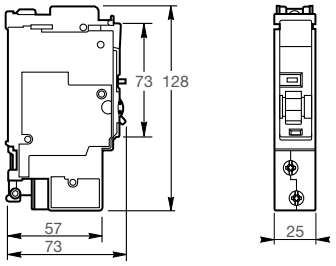
Standard-type, 6kA, 30mA, Quicklag

Catalogue No.	C-Curve
4RCBE110/30Q	10A
4RCBE116/30Q	16A
4RCBE120/30Q	20A
4RCBE125/30Q	25A
4RCBE132/30Q	32A
4RCBE140/30Q	40A

4RCBE110/30Q

Dimensions (mm)

4RCBE110/30Q



Main Switches

4 Series

Main switches

Clipsal offers an extensive range of high quality mains switches for residential, commercial and industrial applications. They are available in 40A to 100A, with 1, 2 and 3-pole versions, so you'll be able to find the ideal main switch for your next project.

All Clipsal Main Switches incorporate superior quality internal mechanisms and come with a highly visible ON/OFF toggle, which allows for quick location when isolation of power is required in an emergency.


CLIPSAL
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Main Switches

4 Series

Isolating Switches, Residential

Isolating switches are available in 1, 2 and 3 pole models to 100 amps.

Features and benefits:

- Cable automatically guided to the correct position: terminals with guard.
- Insulated terminals - IP20.
- Downstream by bi-connect comb busbar, except 100A version.
- Downstream/upstream by tunnel terminals.
- Manual control on front face by O-I lever.

1-Pole, 1-Module, 240V

Catalogue No.	
MSW140	40A
MSW180	80A
MSW1100	100A

MSW180

2-Pole, 2-Module, 415V

Catalogue No.	
MSW240	40A
MSW280	80A
MSW2100	100A

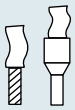
MSW280

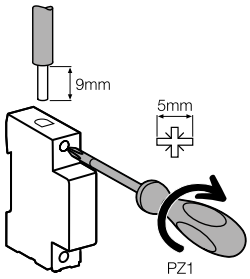
3-Pole, 3-Module, 415V

Catalogue No.	
MSW340	40A
MSW380	80A
MSW3100	100A

MSW380

Connection

Type	Rating	Tightening torque	Copper cables	
			Rigid	Flexible or ferrule
				
Switch	40 to 100A	3.5 Nm	≤ 50mm²	≤ 35mm²



Weight

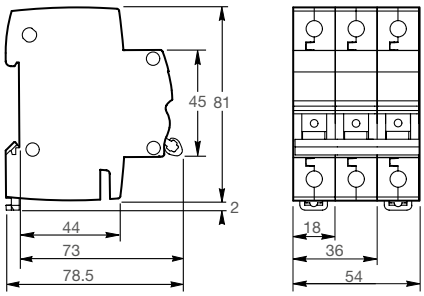
Isolator	
Type	**MSWxxxx**
1P	81g
2P	161g
3P	243g

Technical Data

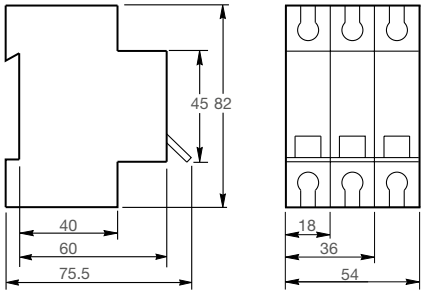
Main characteristics		40A	80A	100A
Insulation voltage (Ui)		1P 250V a.c. 2P, 3P 500V a.c.		
Pollution degree		3		
Power circuit				
Rated impulse withstand voltage (Uimp)		6kV		
Operating category		a.c. - 22A		
Permissible rated short-time withstand current (Icw)		1260A	1600A	2500A
Conditional rated short circuit current (Inc)		6 kA to AS/NZS 60947-3		
Rated short circuit closing current (Icm)		4.2kA		5kA
Using direct current		48V (110V with 2-poles in series)		
Additional characteristics				
Degree of protection	Device only	IP20		
	Device in modular enclosure	IP40		
Endurance (O-C)	Mechanical	50,000 cycles		
	Electrical	10,000 cycles		
Operation temperature		-20°C to 50°C		
Storage temperature		-40°C to 70°C		
Tropicalisation		Treatment 2 (relative humidity 95% at 55°C)		

NOTE: 100A main switches are not bi-connect.

Dimensions (mm) 40A & 80A



Dimensions (mm) 100A



Main Switches

4 Series

Isolating Switches, Industrial

Isolating switches are available in 1, 2 and 3 pole models to 100 amps.

Features and benefits

- Cable automatically guided to the correct position: terminals with guard.
- Insulated terminals - IP20.
- Downstream by biconnect comb busbar, except 100A version.
- Downstream/upstream by tunnel terminals.
- Manual control on front face by O-I lever.

1-Pole, 1-Module, 240V

Catalogue No.	
4PSW140	40A
4PSW180	80A
4PSW1100	100A

4PSW180

2-Pole, 2-Module, 415V

Catalogue No.	
4PSW240	40A
4PSW280	80A
4PSW2100	100A

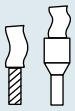
4PSW280

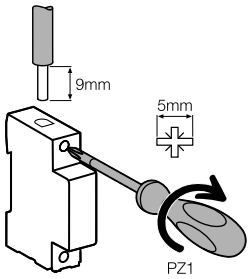
3-Pole, 3-Module, 415V

Catalogue No.	
4PSW340	40A
4PSW380	80A
4PSW3100	100A

4PSW380

Connection

Type	Rating	Tightening torque	Copper cables	
			Rigid	Flexible or ferrule
				
Switch	40 to 100A	3.5 Nm	≤ 50mm²	≤ 35mm²



Weight

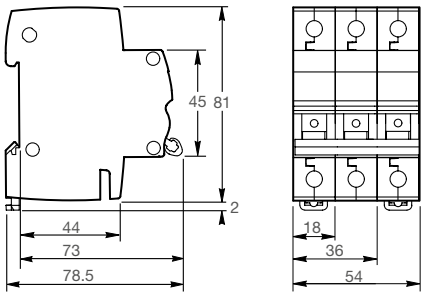
Isolator	
Type	**4PSWxxxx**
1P	81g
2P	161g
3P	243g

Technical Data

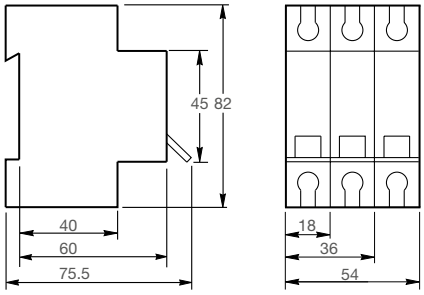
Main characteristics		40A	80A	100A
Insulation voltage (Ui)		1P 250V a.c. 2P, 3P 500V a.c.		
Pollution degree		3		
Power circuit				
Rated impulse withstand voltage (Uimp)		6kV		
Operating category		a.c. - 22A		
Permissible rated short-time withstand current (Icw)		1260A	1600A	2500A
Conditional rated short circuit current (Inc)		6 kA to AS/NZS 60947-3		
Rated short circuit closing current (Icm)		4.2kA		5kA
Using direct current		48V (110V with 2-poles in series)		
Additional characteristics				
Degree of protection	Device only	IP20		
	Device in modular enclosure	IP40		
Endurance (O-C)	Mechanical	50,000 cycles		
	Electrical	10,000 cycles		
Operation temperature		-20°C to 50°C		
Storage temperature		-40°C to 70°C		
Tropicalisation		Treatment 2 (relative humidity 95% at 55°C)		

NOTE: 100A main switches are not bi-connect.

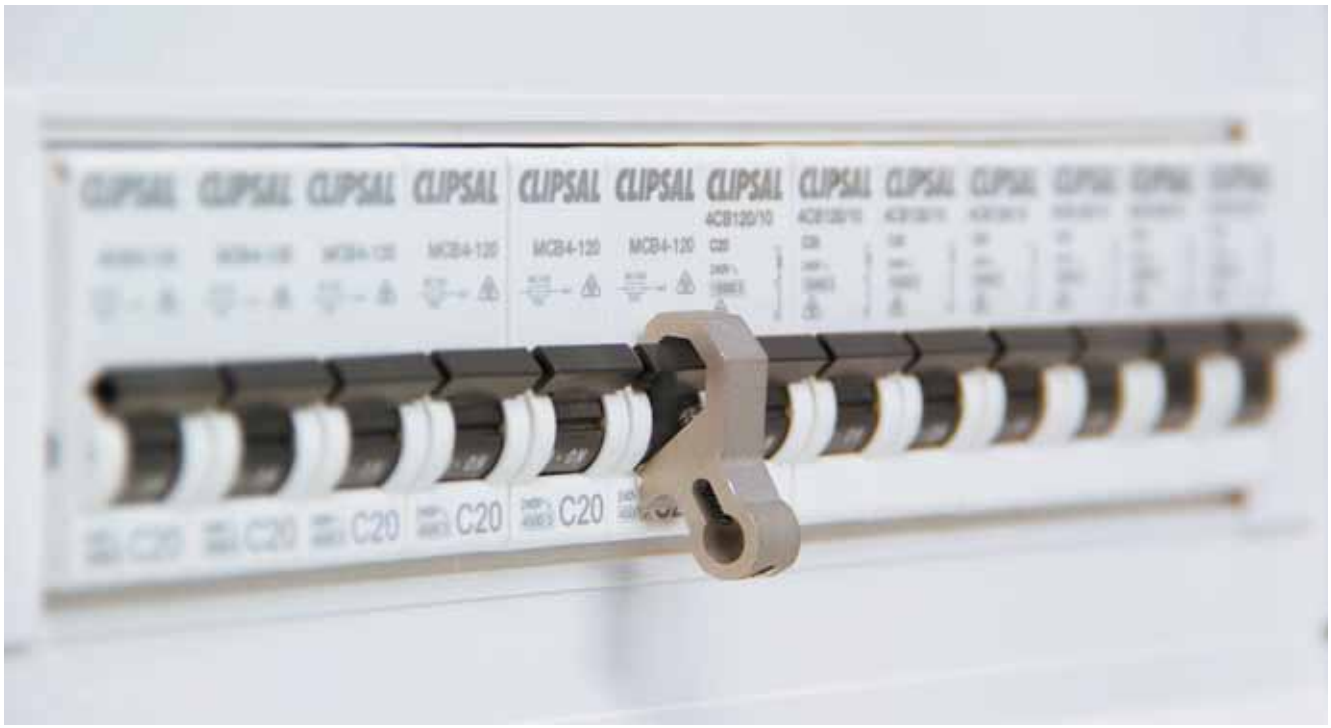
Dimensions (mm) 40A & 80A



Dimensions (mm) 100A



Accessories



Accessories

Clipsal offers a full range of innovative accessories to complement the extensive circuit protection range. This includes changeover switches, busbars, auxiliary contacts, shunt trip release units, socket outlets, contactors, overvoltage arrestors, mains rated filters, locking devices, terminals, testers and current measurement units.

Clipsal's range of busbars are available in 63A – 250A versions and have been specifically designed to make installations quicker and easier. For extra safety and peace of mind Clipsal offers a range of contactors for lighting and floor heating control, and overvoltage surge arrestors for protection of electrical equipment.


CLIPSAL
4BB4/12/3
IEC 60644-1
Ue=500V
80A T40°C
Made in GERMANY
CLIPSAL 4XT3
1 2 3
End caps mandatory

Accessories

4 Series

Changeover Switches

Six single-pole and one double-pole changeover switches are available, rated from 25 to 63 amperes.

Applications:

- Night, off, day switching of luminaries where daylight supplements internal lighting.
- Auto, off, manual switching of machines.
- Auxiliary, off, mains switching of small stand-by generators.

Incoming and outgoing terminals are screw down type and accommodate copper conductors up to 16mm².

1-Pole, 1-Module, 415V

Night, off, day changeover switch

Catalogue No.	
4PS25CO	25A
4PS40CO	40A
4PS63CO	63A

1-Pole, 1-Module, 415V

Auto, off, manual changeover switch

Catalogue No.	
4PS40COA	40A

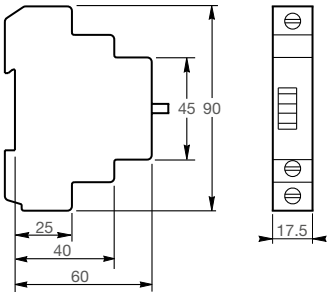
1-Pole, 1-Module, 415V

Auxiliary, off, manual changeover switch

Catalogue No.	
4PS40CAM	40A
4PS63CAM	63A

4PS25CO

Dimensions (mm)



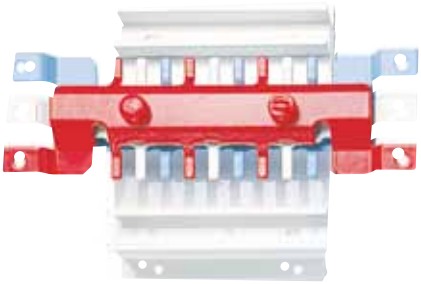
Busbar Chassis

The 4MBA Chassis System allows for the fitting of all 4 Series MCBs and combination MCB/RCD.

All busbar types can be bolted together to form one system. All are tested to AS/NZS 3439.1 and rated at 20kA for 0.1s.

3-Phase

Catalogue No.	Poles	Length (mm)
4MBA3/12	12	258
4MBA3/18	18	312
4MBA3/24	24	366
4MBA3/30	30	420
4MBA3/36	36	474
4MBA3/42	42	528
4MBA3/48	48	582
4MBA3/60	60	690
4MBA3/72	72	798
4MBA3/84	84	906



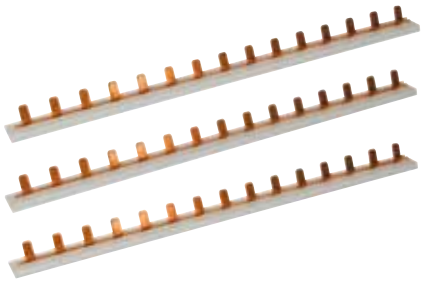
4MBA3/18

Comb-Type Busbars

Catalogue No.	Poles	Phase
4C6BBCR	6	1
4C11BBCR	11	1
4C17BBCR	17	1

Comb-Type Busbars

Catalogue No.	Poles	Phase	Current Rating
4BB1	56	1	80A
4BB1/24	24	1	80A
4BB2	56	2	80A
4BB3	56	3	80A
4BB5/26	26	1	100A
4BB5	Busbar connector 25mm conductor		



Comb-type busbars

Cog Rail Busbars

Catalogue No.	Poles	Phase	Current Rating
4BB4/12	12	1	80A
4BB4/18	18	1	80A
4BB4/57	57	1	80A
4BB4/12/2	12	2/1+N	80A
4BB4/18/2	18	2/1+N	80A
4BB4/57/2	57	2/1+N	80A
4BB4/12/3	12	3	80A
4BB4/18/3	18	3	80A
4BB4/57/3	57	3	80A
4BBTC1	Busbar 1-phase end cap		
4BBTC3	Busbar 2-phase - 3-phase end cap		

4BB4/12/2 Cog rail busbars

Accessories

4 Series

Auxiliary Contacts

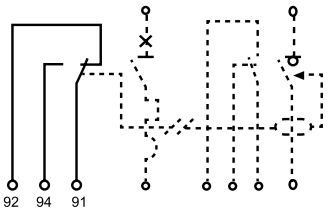
Auxiliary contacts to suit 6kA and 10kA MCB, RCD and MCB/RCDs.

3 Contacts, 1-Module (9mm)

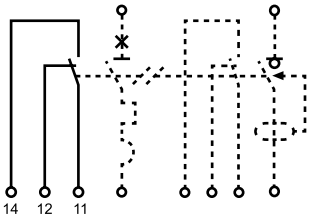
Catalogue No.	Description
A9N26927	Auxiliary contact alarm SD a.c. d.c. 3A 415V ∿
A9N26929	Auxiliary contact OC plus 1 SD and OF a.c. d.c. 3A 415V ∿

NOTE: Schneider Electric branding.

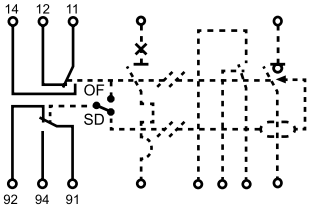
A9N26929



A9N26927 - SD fault finding switch



A9N26929 - OF + SD/OF changeover contact OFF Position



A9N26929 - OF + SD/OF changeover contact SD Position

Shunt Trip Release Units

The Shunt Trip Module makes it possible to remotely switch off a MCB mounted alongside. Shunt trip release to suit 4.5kA, 6kA and 10kA MCB. To trip the MCB, simply energise the terminals of the Shunt Trip Release Units. The coil of the shunt trip is de-energised once the switch is in the tripped position.

All Shunt Trip Release Units can be installed in the field. A minimum low voltage source of 90VA is required.

2 Contacts, 2-Module (9mm)

Catalogue No.	Description
A9N26946	MX+OF shunt release 110-415V a.c. 110-130V a.c.
A9N26947	MX+OF shunt release 48V a.c. 48V d.c.
A9N26478	MX shunt release 12/24V a.c. 12/24V d.c.

NOTE: Schneider Electric branding.

A9N26946

Accessories

4 Series

Socket Outlets

The 4SSO series DIN rail mounted socket outlet sockets are particularly useful when used in power supply applications such as temporary power on building sites, additional outlets in switchboards or meter enclosures. This range is available in both four and eight module wide units and features easy access to terminals for quick fit-off.

The 4SSO series also features extra strong mounting brackets for extra strength in aggressive temporary power supply applications. This coupled with the use of the reliable Clipsal 15 Series Mechanism, means that you can expect years of dependable service from these sockets.

New Switched Socket Outlets

Catalogue No.	Description
4SS015	250V 10A 3 pin socket outlet, 4 modules
4SS015D	250V 10A 3 pin socket double-pole, 4 modules
4SS015/15	250V 15A 3 pin socket outlet, 4 modules
4SS015D15	250V 15A 3 pin socket double-pole, 4 modules
4SS025	250V 10A 3 pin twin socket outlet, 8 modules
4SS025D	250V 10A 3 pin twin socket double-pole, 8 modules
4SS025/15	250V 15A 3 pin twin socket outlet, 8 modules
4SS025D15	250V 15A 3 pin twin socket double-pole, 8 modules

4SS015

4SS025D

Existing Switched Socket Outlets

Catalogue No.	Description
4PSO10	250V 10A 3 pin socket outlet, 2.5 modules
4PSO10D	250V 10A 3 pin socket double-pole, 2.5 modules
4PSO10DL	250V 10A 3 pin socket outlet double-pole with round Earth socket, 2.5 modules
4PSO15D	250V 15A 3 pin socket double-pole, 2.5 modules
4PSO20D	250V 20A 3 pin socket outlet double-pole, 2.5 modules
4PS31	Enclosure only accepts any 30 Series switch mechanisms, 2.5 modules

4PSO10

Accessories

4 Series

Power Range Contactors

Complementing the 4 Series is a range of contactors.

They are rated from 20A 1 and 2 module, through to 63A 4 pole 54mm devices. The 1 and 2 pole devices are ideal for hot water service control.

1 and 2-Pole, 1-Module, 240V

Catalogue No.	AC7a	AC6b	Ue	Uc	Contact N/O	Contact N/C	Consumption Holding
4CNT1	25	8.5 A	240	240	1	-	2.7VA
4CNT2	25	8.5 A	240	240	2	-	2.7VA
4CNT1/1NC	25	8.5 A	240	240	1	1	2.7VA
4CNT1AC24	25	8.5 A	240	24	1	-	3.8VA
4CNT2AC24	25	8.5 A	240	24	2	-	3.8VA

4CNT2

2-Pole, 2 Modules, 415V

Catalogue No.	AC7a	AC6b	Ue	Uc	Contact N/O	Contact N/C	Consumption Holding
4CNT4	25	8.5 A	415	240	4	-	2.7VA
4CNT2/2NC	25	8.5 A	415	240	2	2	2.7VA
4CNT4NC	25	8.5 A	415	240	-	4	2.7VA
4CNT3/1NC	25	8.5 A	415	240	3	1	2.7VA
4CNT4AC24	25	8.5 A	415	24	4	-	4.6VA

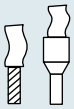
4-Pole, 3 Modules, 415V

Catalogue No.	AC7a	AC6b	Ue	Uc	Contact N/O	Contact N/C	Consumption Holding
4CNT4/40	40	15 A	415	240	4	-	6.5VA
4CNT4/63	63	20 A	415	240	4	-	6.5VA

Refer to page 90 for a.c. load characteristics.

4CNT4/40

Connection

Type	Rating	Length tripping	Circuit	Tightening torque	Copper cables	
					Rigid	Flexible or ferrule
						
PZ1 - 4mm	25A	9mm	Control	0.8 Nm	1.5-2.5mm: 2 x 1.5mm²	1.5-2.5mm: 2 x 2.5mm²
PZ2 - 6mm	40 A-63A	14mm		3.5 Nm	6-25mm²	6-16mm²
PZ1 - 4mm	-	9mm	-	0.8 Nm	1.5-2.5mm: 2 x 1.5mm²	1.5-2.5mm: 2 x 2.5mm²

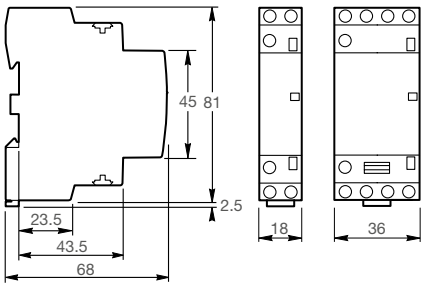
Technical Data

Main characteristics		
Voltage rating (Ue)	1P, 2P	240V a.c.
	4P	415V a.c.
Frequency		50Hz or 60Hz
Endurance (O-C)		
Electrical		100,000 cycles
Maximum number of switching operations a day		100
Additional characteristics		
Insulation voltage (Ui)		500V a.c.
Pollution degree		2
Rated impulse withstand voltage (Uimp)		2.5kV (4kV for 12/24/48V a.c.)
Degree of protection (IEC 60529)	Device only	IP20
	Device in modular enclosure	IP40
Operating temperature		-5°C to 60°C (1)
Storage temperature		-40°C to 70°C
Tropicalisation (IEC 60068-1)		Treatment 2 (relative humidity 95% at 55°C)
ELSV compliance (extra low safety voltage) for 12/24/48V a.c. versions		
The product conforms to the SELV (safety extra extra low voltage) requirements		

In the case of contactor mounting in a enclosure for which the interior temperature is in range between 50°C and 60°C, it is necessary to use a spacer between each contactor.

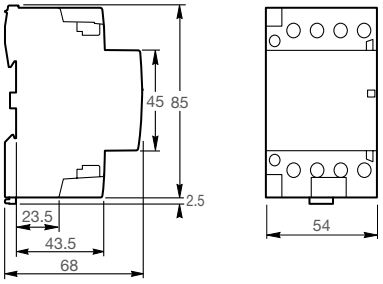
Dimensions (mm)

25 A



Dimensions (mm)

40/63 A



Accessories

4 Series

Installation (Relay) Power Range Contactors, Series Z7

These switching devices have been designed specifically for installation in modular distribution with or without doors. Innovative technology using a.c. magnets are used for switching the contactors. This reduces the level of audible noise, while ensuring reliability and high contact forces in a device utilising a small footprint. The benefits of these characteristics enable the contactors to meet the stringent application requirements on systems, office equipment and residential areas.

The installation (relay) contactors are suitable for 1-phase or 3-phase consumer units up to 63A. A vast range of these devices are available for applications in building management and control.

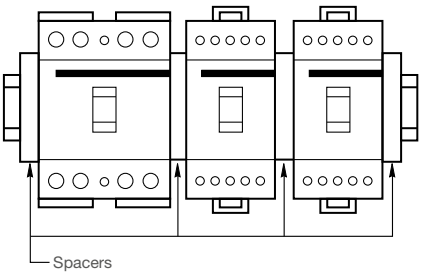
Use of power range contactors from 16 to 63 A

For automation needs in housing, tertiary and industrial sectors. The range of modular CT contactors are used for:

- power control of final circuits for housing and tertiary sectors:
  - lighting (luminous signs, shop windows, safety lighting, etc.)
  - heating, heat pumps, ovens
  - hot water for domestic use
  - small utility motors (pumps, fans, barriers, garage doors, etc.)
  - emergency stops and safety systems
  - air conditioning
- energy distribution control:
  - load shedding and restoration
  - source changeover, etc.

Use spacer for temperatures between 50 and 60ºC

When contactors are mounted in enclosures with an internal temperature of between 50°C and 60°C, a spacer must be placed between each contactor.



Characteristics on load types

Standard IEC 61095 applies to electromechanical contactors for domestic and similar purposes. It differs from standard IEC 60947.4 (designed for industrial applications) by specifying requirements relating to safety of persons and equipment in premises and corridors accessible to the general public.

Applications	Industrial: IEC 60947.4	Domestic: IEC 61095
Motor	AC3	AC7b
Heating	AC1	AC7a
Lighting	AC5a and b	AC5a and b

Accessories - Surge Protection

4 Series

Overvoltage Arresters

In response to customer demand, Clipsal is excited to introduce the comprehensive Overvoltage and Lightning Current Arrestor range.

The 970RM/3 Overvoltage Arrestor with plug in modules suits basic protection for multi phase requirements. The 970 Series is the perfect all in one solution unifying both lightning current arrestor and surge arrestor in the one unit.

This product incorporates ICE technology (Integrated, Co-ordinated, Encapsulated) which means less switchboard space, no additional de-coupling and fully coordinated with the power supply. Simple power supply connection means quicker installations.

1-Pole, 1-Module, 340V

Catalogue No.	Description
970	Overvoltage arrestor, 340V, In=15kA, Imax=40kA, 1-pole, 1M
970RM	Overvoltage arrester with removable module, 340V, In=15kA, Imax=40kA, 1pole, 1M
970RMT	Overvoltage arrester with removable module and aux/cont, 340V, In=15kA, Imax=40kA

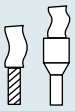
970RMT

3-Pole, 3-Module, 340V

Catalogue No.	Description
970RM/3	Overvoltage arrestor, 340V, In=15kA, Imax=40kA, 3-pole, 3M
970RM/120	Overvoltage arrestor, 340V, In=60kA, Imax=120kA, 1-pole, 2M

970RM/3

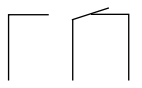
Connection

Type	Tightening torque	Copper cables	
		Rigid/semi rigid	Flexible or ferrule
			
Surge arrestor	2 Nm	2.5 to 25mm²	2.5 to 16mm²

Weight

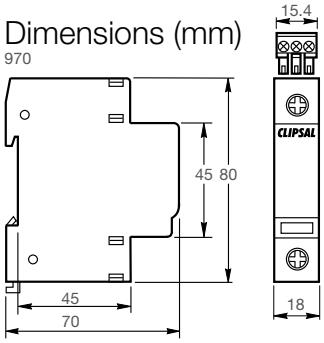
Surge arrestor	
Type	**970xxx or 970xxx/xxx**
1P	115g
2P	220g
3P	340g
4P	450g

Technical data

Main characteristics	970xxx	970xxx/xxx
Tested to	E DIN VDE 0675 Part 6/11.89 and Part 6/A1/03.96	IEC 61643-1 EN 61643-11 type 2
Maximum permanent operating voltage	Uc 340V~	
Nominal discharge current (8/20)	isn 15kA	In 60kA (8/20)
Maximum discharge current (8/20)	Imax 40kA	Imax 120kA
Protection level	Up ≤ 1.5kV	Up ≤ 2.1kV Note: Up ≤ 1.5kV (100kA)
Operating temperature range	υ -40°C to + 60°C	υ -25°C to + 60°C
Conductor cross sectional area	Min. 1.5mm² single/fine stranded max. 35mm² multi stranded. 25mm² fine stranded	Min. 2.5mm² single/fine stranded max. 35mm² multi stranded. 25mm² fine stranded
Backup fuse (only required if not already provided in the mains)	125A gL/gG	Fuse NH 63A gL/gG
Degree of protection	IP20	
Mounting	35mm DIN rail	
Remote alarm terminals	250V~ ≤ 1A 12V d.c.~ ≤ 10mA max 1.5mm² cable	12V ⎓ ≥ 10mA 250V ∿ ≤ 1A .5mm² → 1.5mm²  14 11 12

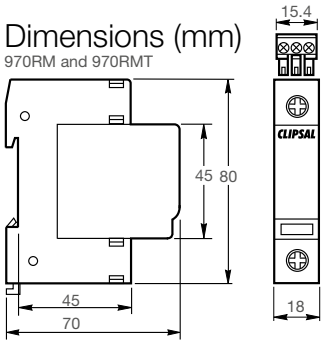
Dimensions (mm)

970



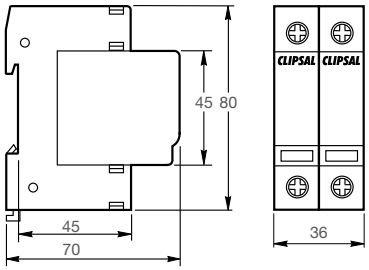
Dimensions (mm)

970RM and 970RMT



Dimensions (mm)

970RM/120



Accessories

4 Series

Mains Rated Filters

10A (970 MF10) and 20A (970MF20) Mains Rated Filters have been added to the 970 Series of Overvoltage Protection Devices to provide additional overvoltage protection to sensitive electronic equipment such as computers, DVD players, microwaves and televisions.

The 970MF10 and 970F20 work in conjunction with the Overvoltage Protection Devices by providing additional filtering to slow down the rate of rise of a voltage spike.

Whereas the Overvoltage Protection Devices typically clamp the voltage spike to values less than 1kV, the rate of rise of the voltage spike remains unchanged.

The additional filtering provided by the Mains Rated Filters considerably slows down the rate of rise to further protect electronic equipment.

2-Module, 250V

Catalogue No.	Description
970MF10	Mains rated filter, 10A

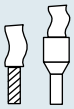
970MF10

4-Module, 250V

Catalogue No.	Description
970MF20	Mains rated filter, 20A

970MF20

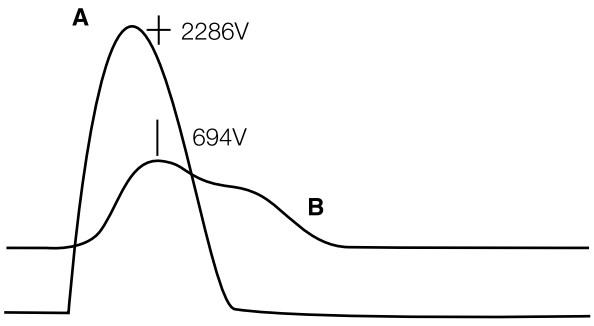
Connection

Rating	Tightening torque	Copper cables	
		Rigid/semi rigid	Flexible or ferrule
			
10 to 20	2 Nm	1.5 to 2.5mm²	1.5 to 2.5mm²

Technical Data (With 970 Surge Arrester)

Main characteristics	970MF10	970MF20
Maximum continuous operating voltage (Uc)	275Vrms	
Load current ILoad	10A	20A
Operating temperature	0-55°C	
Conductor size	1.5 - 6mm²	
Mounting	30mm DIN rail	
Let through at 3kA, 8/20µS	<800V	<720V
Rate of voltage rise at 20kA, 8/20µS	<100V/µS	<50V/µS
Let through at 3kA, 8/20µS	<820V	<720V
Rate of voltage rise at 20kA, 8/20µS	<120V/µS	<100/µS
Frequency bandwidth	<20kHz	
Test performance - typical		
Let through voltage		
6kV3kA, 8/20µS	811V	711V 700V
6kV20kA, 8/20µS	1109V	797V 750V
Rate of rise (dV/dt)		
6kV3kA, 8/20µS	6919V/µS	83.4V/µS 36.1V/µS
6kV20kA, 8/20µS	5378V/µS	106.9V/µS 49.8V/µS
Current pulse applied L to N		

Residual voltage



970 + 970MF10 Combination

Category B 6kV/3kA 8/20uS transient surge

A - Surge Current (500A/div)

B - Residual Voltage (200A/div)

Accessories

4 Series

Locking devices and terminals

Extension Terminal

Catalogue No.	Description
27060	Expanding terminal 35mm to suit 1 module MCBs and switches.

27060

RCD Neutral Terminal

Catalogue No.	Description
4XT3	3x16mm Neutral link to suit terminating RCD Neutrals.

4XT3

Locking Device

Catalogue No.	Description
4LD	Locking device for 4 Series circuit breakers, isolating switches and RCDs (lockable in ON and OFF position). Suits padlocks with shafts up to 6mm.

4LD

Locking Device

Catalogue No.	Description
4SWLD	Locking device for 4 Series 10kA circuit breakers, isolating switches and RCDs (lockable in ON and OFF position). Suits padlocks with shafts up to 5mm.

4SWLD

Locking Device

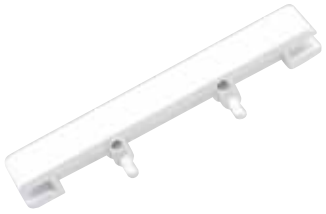
Catalogue No.	Description
27145	Locking device for the 1.5 module MCBs.

27145

Power Pole Filler Blanks

Pole Filler Blanks

Catalogue No.	Description
4F1	1/2 module 9mm.
4F8	6x1 modules wide, 4x1/2 modules wide.
4F6	6 modules wide. White. Universal. Suits metal switchboards.



4F1

4F8

4F6

Causes of Tripping

Tripping causes fall into three broad categories:

- Installation causes.
- Appliance causes.
- External causes.

Installation Causes:

1. Low impedance between Neutral and Earth

This is the most common cause of tripping and can be broken down into the following varieties:

- Second MEN point Neutral and Earth physically bonded together in a backyard shed or other secondary site.
- Exchanged Earth and Neutral wires are exchanged at the terminals of a GPO.
- Neutral to Earth short - by penetration of cable e.g. a nail driven through a Neutral connecting to Earth or through contact with foil insulation.
- Lowered impedance due to contamination of air gaps. e.g. bridging of air insulation gaps by insects, water or other contaminants, typically found in exposed terminals of junction boxes, batten holders, etc. This may also be seen as an Active to Earth fault.
- Neutral to Earth low impedance with Neutral voltage present. This fault, while being under the category of Neutral to Earth low impedance, is peculiar because the voltage present on the Neutral is likely to cause the RCD to trip, even with the load disconnected. **Note:** If no Neutral potential was present, nuisance tripping would not occur until the load current is drawn.

2. Cable Insulation Deterioration

This most commonly occurs in older insulation where VIR and TRS cables can exhibit residual current in excess of 20mA.

3. Crossed Neutrals

These occur where a Neutral from an unprotected circuit is used as the load 'return' from an Active, which is protected by an RCD or vise versa.

4. Incorrect wiring of the RCDs

This occurs when the RCD Neutral connections are taken from the wrong side, e.g. the Neutral is coming from the line side rather than the load side, yet the Active still comes through the correct load side.

Appliance causes

By far the most common cause of an appliance induced residual current occurs where the appliance has a reduced impedance value between Active and Earth or Neutral and Earth, often due to moisture.

Metal sheathed heating elements absorb moisture which can result in substantially reduced impedances and residual currents flowing when they are first energised.

Some typical appliances which develop these problems are refrigerator defrost elements, evaporative elements, stove elements, hot water services and washing machine heating elements.

Another possible cause is ‘tracking’, which can be caused by food particle contaminants in toasters and mini ovens, an accumulation of lint in irons and washing machines, and carbon or graphite dust or filings in power tools.

Accumulation of residual currents.

All appliances can have some minor leakage level. If a number of appliances are covered by one RCD the accumulative effect can cause the RCD to trip.

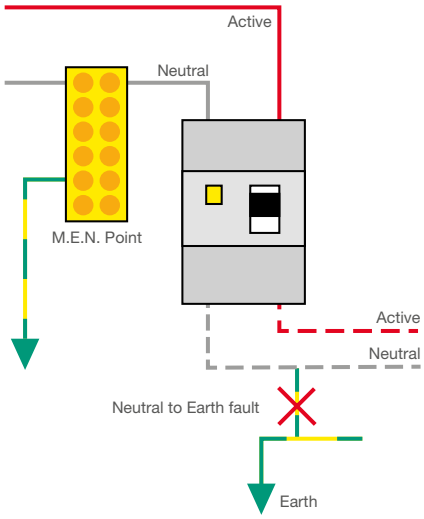
Special impedances

This can result from Earth and Neutral being bounced by capacitors, inductors or resistors in computer equipment or communications equipment, causing a residual current.

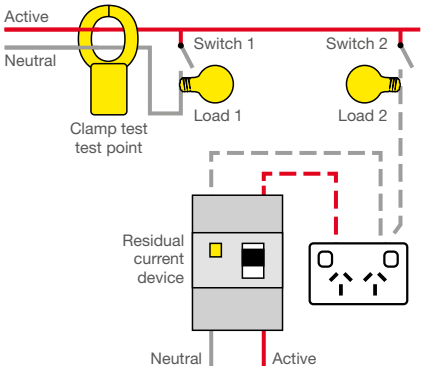
External causes

A lightning strike causing insulation breakdown and mains current to flow is the most likely cause of tripping from an external source.

Neutral to Earth fault causes trip



Exchanged (crossed) neutrals



Accessories

4 Series

Insulation and Continuity Tester

Insulation resistance tests provide a ready way of testing for leakage Earths in an installation.

To test by this method using a Clipsal 491 Insulation Tester:

1. Turn off the supply.
2. Disconnect main Earth (if MEN point is at consumer's Neutral link) and the main Neutral from the link.
3. Connect any suspect appliance (or test separately).
4. Test between the Load side of the main switch and the main Earth, and between the Neutral link and the main Earth.
5. If a low reading is obtained, remove the circuits that you are not intending to protect with the RCD and test again.
6. If the low reading persists, it will then be necessary to remove and test each circuit individually.

The drawback in using resistance tests is that the installation has to be at least partially shut down and disassembled while tests are carried out. There are times when this is inconvenient.

491

Digital Clamp Tester with Residual Current Measurement

A much simpler and easier way of checking an installation is to use an appropriate clamp tester. The Clipsal 489D Clamp Tester is one of the few meters available that will read down to a few milliamps.

1. Set function switch to 40mA scale.
2. Disconnect main Earth (if MEN point is at consumer's Neutral link).
3. Clamp the tongs around the incoming supply (Active and Neutral). Of course, if the MEN point is at the supply authority link, you will need to test downstream from that link.
4. If leakage is present, by opening each circuit in turn the offending circuit can be readily ascertained.

Similarly, the clamp tester can be used to locate the fault within the circuit without it being necessary to disassemble the wiring.

Appliances can also be readily checked by utilising the special adaptor supplied with every Clipsal 489D. It's simply a matter of plugging the appliance in via the adaptor, turning it on and reading any leakage with the clamp tester.

Remember, any standing leakage current not eliminated from circuits to be protected increases the apparent sensitivity of the RCD. That is, if you have 10mA standing leakage current, a 30mA RCD (normal tripping current @ 25mA) will then trip on a 15mA fault.

NOTE: Remember to turn off power supply when disconnecting cables and follow safety standards.

489D

RCD Tester with Digital Readout

Post installation testing is obviously vital and is definitely in the interests of good customer relations. Some statutory regulations require regular periods of checking and testing.

The objective is to test whether:

a) the RCD is actually providing protection on the required circuits

b) the RCD operates with a nominal residual current of 30mA flowing in the protected circuits

c) the test function of the RCD is operating.

The simplest method of testing an RCD once installed is to use an RCD tester - preferably one that gives an indication of the trip time of the RCD, such as a 486D or 486CD.

The tester is simply connected into one of the protected GPOs and the tester is operated according to the manufacturer's instructions.

This test should be continued on each protected sub-circuit.

(It is also very important to verify that other circuits are not inadvertently connected to the RCD.)

Testing with a 486CD or 486D in accordance with AS/NZS 3190 should determine:

1) RCDs should not trip at 50% or less of rated value

2) 10mA RCDs should trip at less than 40mS

3) 30mA and 100mA RCDs should trip at the rated value in less than 300 milliseconds.

(This may also be carried out at 2 or 5 times rated current, and trip in 150 or 40 milliseconds respectively.)

Important:

1) If a load is connected during testing, arcing may occur when the RCD is operated, which may cause distortion of disconnection time.

2) Single pole RCDs may be affected by motors operating as generators after disconnection, causing an apparent increase in the disconnection time.

When an RCD tester is not available, a 15 watt test lamp of about 60mA can be used to test that an RCD is operating on a particular circuit. This test closely simulates the operation of the test circuit of an RCD. (According to AS/NZS 3190, the test circuit must inject a leakage current 2.5 times the nominal current value of the RCD.)

Finally, it is essential to press the test button on the RCD to ensure it is operational.

486D

Accessories

4 Series

Spark-e-mate

The Clipsal Spark-e-mate performs comprehensive electrical wiring tests relevant to Australian and New Zealand Standards from socket outlets, to the switchboard.

Why waste your precious time finding the correct instrument to test installations? The Clipsal Spark-e-mate has you tested and covered. One instrument does it all.

Testing with Spark-e-mate is easy. Simply plug into outlet or Active, Neutral and Earth. Select a function. Then record and report the results.

493

Features and benefits:

Clipsal's Spark-e-mate can test for:

- Earth continuity.
- Insulation resistance.
- Polarity.
- Correct circuit connections.
- Earth fault loop impedance (without tripping RCDs).
- Residual current device (earth leakage detector or safety switch).
- Extension leads and power accessories.
- Supply voltage.
- Mains frequency.

Technical Data

Main characteristics	493
Enclosure	Hammond 1599HBK, ABS fire retardant rating UL94HB, IP-54 rated
Dimensions (H x W x D)	220mm x 110mm x 45mm.
Label	EBG180 autoflex textured satin polycarbonate, automotive grade
Holster	Santoprene thermoplastic vulcanizate rubber, PANTONE 115U (Yellow)
Operating Temperature Range	-10 to 50°C ambient
Storage Temperature Range	-20 to 70°C ambient
Humidity, Storage and Operating	To 98% non-condensing
Mean Time Between Failure	> 20 years.
Control Logic	PIC 18LF8722, 128K bytes internal program flash memory, 4K bytes RAM, 1K bytes EEPROM
Indicators	Graphical liquid crystal display 122 (H) x 64 (V) pixels
Connector	IEC mains socket
Power Lead	CAT# PS-4106 power cord mains plug to IEC320-C13. Other plugs to order.
Testing Criteria	AS/NZS 3000:2007, section 8 - verification
Earth Continuity Test	Earth impedance in powered mode derived from mains power. In unpowered mode from an internal battery. Range 0. to 15Ω. Display accuracy ±0.1Ω ±2%
Insulation Resistance Test	Active to Earth insulation resistance derived from an internally generated 250V d.c. or 500V d.c. -10%/+20% applied across a 1MΩ load. At 250V nominal range 20kΩ to 10MΩ and at 500V nominal 250kΩ to 20MΩ. Accuracy ±2% at 1MΩ decreasing to ±5% at extremes of range. Voltage accuracy ± 1V ± 2%
Polarity	Polarity Correct, A&N reversed, A&E reversed, no Neutral, no Earth
Correct Circuit Connections	Circuit checks OK, Earth hazard - load or short between Earth and live conductor, detect threshold of ≥70V a.c. potential on Earth with respect to surroundings detection method.
Earth Fault Loop Test	Current applied between Active and Earth from mains when available or internal battery when unpowered. (RCD should nottrip*1). Range 0 to 20Ω. Display accuracy ±0.1Ω ±2%
RCD Test	5, 10, 15, 30 and 150mA nominal between Active and Earth. Range 2 to 300ms trip time Display accuracy ±2ms
Mains Supply Indicator	RMS meter readout accuracy ±1V ±2%, 1Hz display resolution
Battery Condition Indicator	Battery symbol on the LCD, vertical bars indicate state
Field Programming	Bluetooth to RS232C optional, authorised partners only
Factory Programming	Via host computer (RS232C)
Nominal Power Requirement	230V a.c. ± 10.9%, 50Hz ± 12Hz (other voltages to order)
Abs. Minimum Power input	150V a.c.
Abs. Maximum Power input	300V a.c.
Power Consumption	0mA off, 30mA nominal, up to 150mA depending on test
Internal Batteries	6 x AA alkaline
Auto Turn-off	Backlight after 30 seconds, shutdown after 60 seconds
Unpacked Weight	610gms
Warranty	Two years
Quality Assurance Certification	ISO9001
RoHS	Compliant
Electrical Safety Compliance (non-prescribed)	AS/NZS3300, AS/NZS3017, AS/NZS3260 (AS/NZS60950), AS/NZS3100, AS/NZS3350.1, AS/NZS61010.1 category III
ACMA Compliance	Design 2000 Pty Ltd ACMA supplier's code N468
EMC Compliance	AS/NZS CISPR 22
Human Rights Australia	Privacy commissioner assent 89/328

Technical Information

4 Series

Technical Information

To assist you with circuit protection selection and identification Clipsal provide an extensive range of wiring options and technical tables. And to help find critical information, these tables are referenced in individual sub-sections.

These sub-sections include:

- On-site fault finding guide.
- Circuit protection trip unit variations.
- Circuit breaker limitation capacity.
- Tripping curves.
- Derating tables.
- Circuit supplementary protectors.
- Lighting, heating and small motor application categories.
- Circuit breaker selection.
- Fuse back-up protection.
- Power formulas and common conversion factors.

Installation and wiring options

There are a number of types of RCDs that provide overall protection to an installation. The installing electrician needs to decide which type is best suited to individual installations as they arise.

The following wiring options are provided to assist installers in choosing the right type of RCD necessary for the installation.

Installation and Wiring Options (continued)

Option 1: Multiple GPO and lighting circuits protected by two-pole RCD

This is the most basic option and is the minimum configuration which allows compliance to AS/NZS 3000 Wiring Rules.The two-pole RCD offers greater flexibility, but you do need an extra Neutral link.

If you are installing the RCD in a Clipsal Moulded Switchboard Enclosure you will find that all the additional links are already provided.

The Neutrals from the circuits to be protected are relocated to this protected link and an appropriate size tail is taken from the main Neutral link through the RCD and back to the protected link.

On the Active side, the RCD is placed in circuit between the load side of the main switch and the line side of the fuses or circuit breakers controlling protected circuits.

This type of installation is suitable for use on new or existing installations.

But simply installing an RCD is often only part of the solution. The electrical contractor with the new rules must have a duty of care when making recommendations to a customer. And there's a few things to consider before you can give the best advice.

For instance, a single RCD for everything in the house leaves the switch vulnerable to regular nuisance tripping, which means everything goes off at once - including the contents of the fridge. Not to mention the hazard of resetting the switch in the dark. Unsatisfied customers and annoying call-backs will almost certainly follow. An extension to the above circuit would be as follows:

- In retrofit installations, your choice of RCD may be partly determined by the physical size or available space on an existing switchboard panel, condition of existing wiring and existing protection devices such as fuses. In most cases the RCD can probably be fitted to the existing panel.
- In some instances, you may find it more convenient to remove old equipment and replace it with a compact, moulded switchboard to house all your new circuit protection devices.
- The customer may also like to take this opportunity of having a flush mounted moulded switchboard installed inside their facility. This provides your customer with the added benefits of security and convenience for re-setting devices in the event of circuit overloads or RCD tripping.

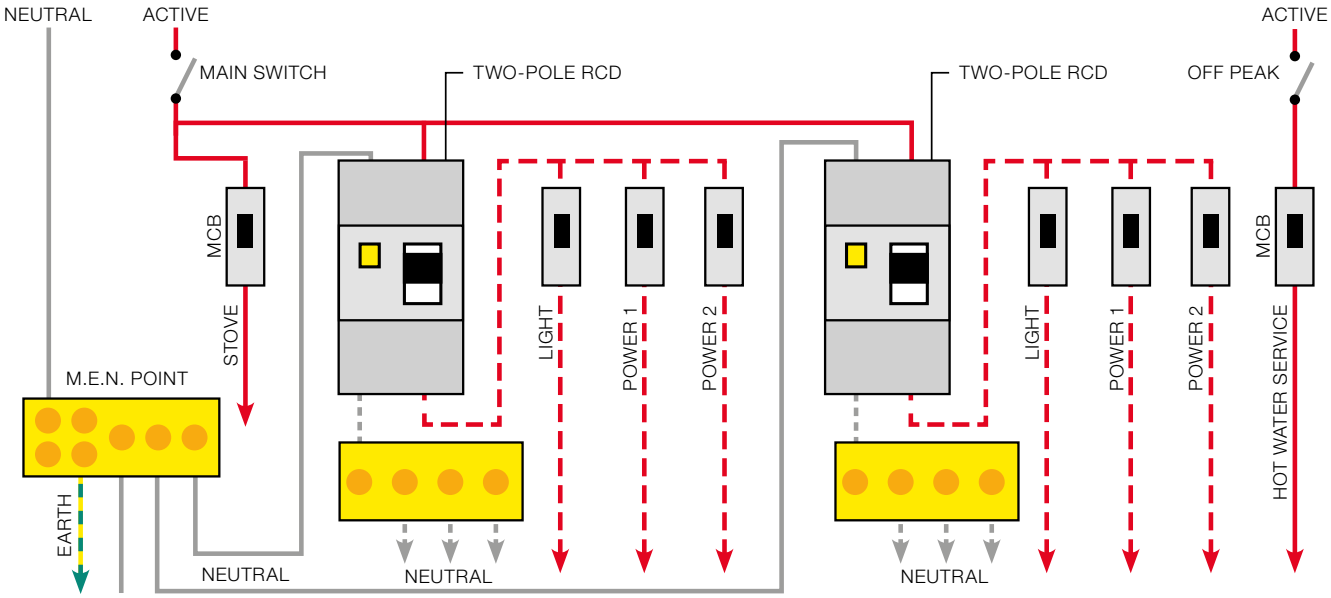
Benefits:

- Low cost.
- Easy installation.
- Allowance for additional circuits.

Disadvantages:

- A fault in any of the circuits will disconnect all including the lighting.
- Extra Neutral link is required.
- Accumulated leakage, meaning that all circuit leakages are added up and seen by one RCD.

Multiple GPO and lighting circuits protected by two pole RCD



WIRING LEGEND

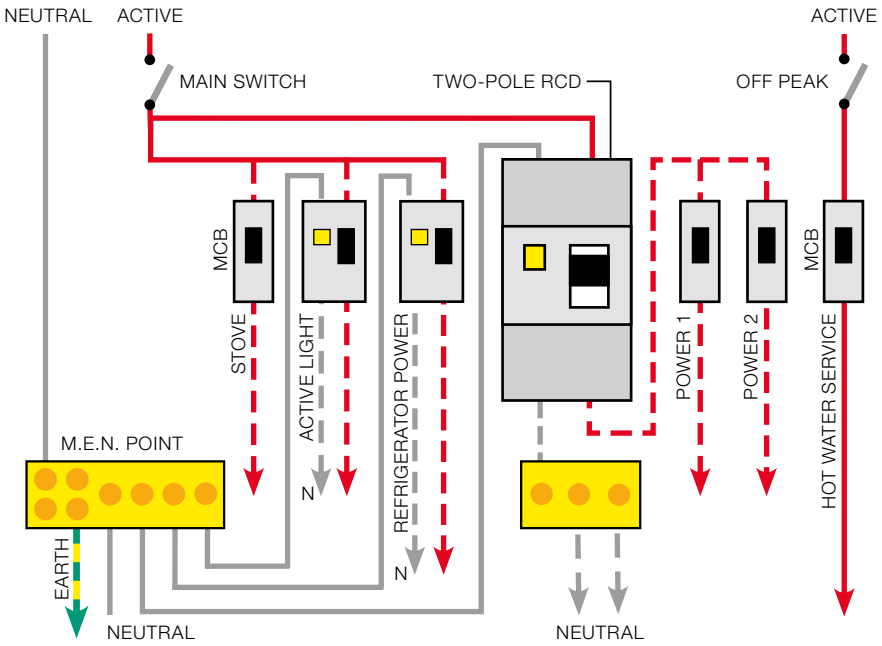
- Neutral connection (not Safety Switch protected)
- Neutral connection (Safety Switch protected)
- Active connection (not Safety Switch protected)
- Active connection (Safety Switch protected)
- Earth connection

Installation and Wiring Options (continued)

Option 2: Two-pole RCD and lighting and/or refrigerator combination MCB/RCD

A better option is to install an MCB/RCD combination on each light and/or refrigerator circuit and the remaining socket outlets on a common RCD. It's a cost-effective way of having safe, discriminating residual current protection.

Multiple GPO and lighting circuits protected by two-pole RCD and lighting combination MCB/RCD



Option 3: Two GPO circuits protected by four-pole RCD and one lighting circuit

When there are only two power circuits to be protected, a four-pole device may be the simplest installation.

Re route both Actives and Neutrals through the RCD. No other switchboard modifications are necessary. Even so, this system provides no discrimination and a fault in either circuit would disconnect all.

Additionally, there is no allowance for additional protected circuits as in Option 1. All accumulated leakage will be seen by this one RCD.

The current rating of the four-pole RCD must be not less than the largest over current protective device the unit is covering.

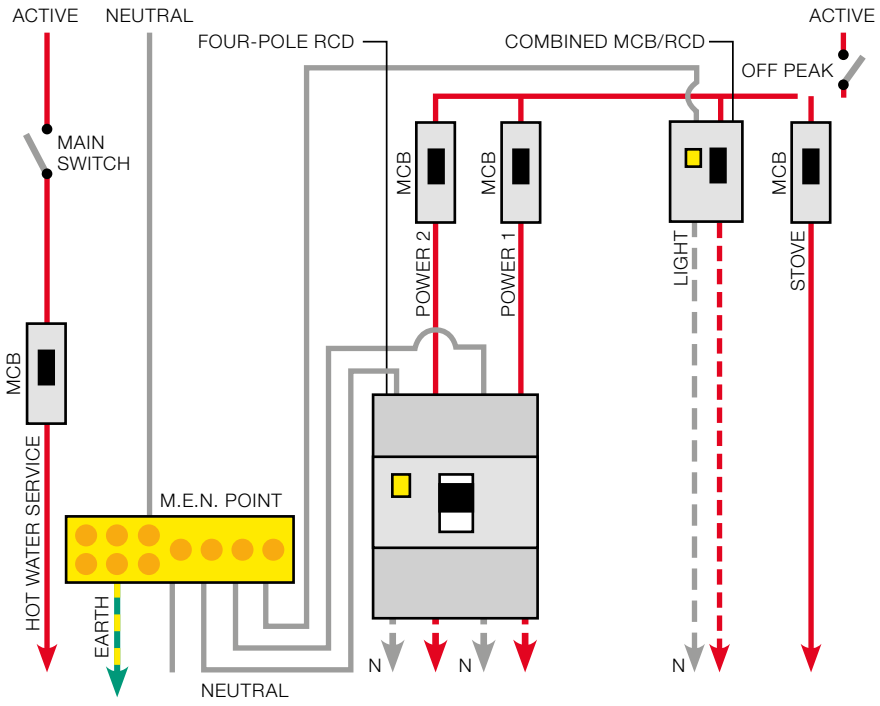
Benefits:

- Relatively low cost.
- Easy installation.

Disadvantages:

- No discrimination.
- A fault in either of the circuits will disconnect both circuits.
- No allowance for additional circuits.
- Accumulated leakage may cause the device to trip.

Two GPO circuits protected by four-pole RCD and lighting combination MCB/RCD



Installation and Wiring Options (continued)

Option 4: Individual GPO and lighting circuits protected by combined MCB/RCD

This option involves switchboard mounting a combined MCB/RCD for each GPO and lighting sub-circuit.

This is a cost effective way of providing reliable, discriminating residual current protection.

In addition, the elimination of separate fuses or the circuit breakers substantially reduces installation time and space requirements.

In the simplest of all installations, the combined MCB/RCD requires connection of the Active Neutral at both the line and load sides.

Clipsal provides a busbar chassis for direct connection of line side MCB/RCDs.

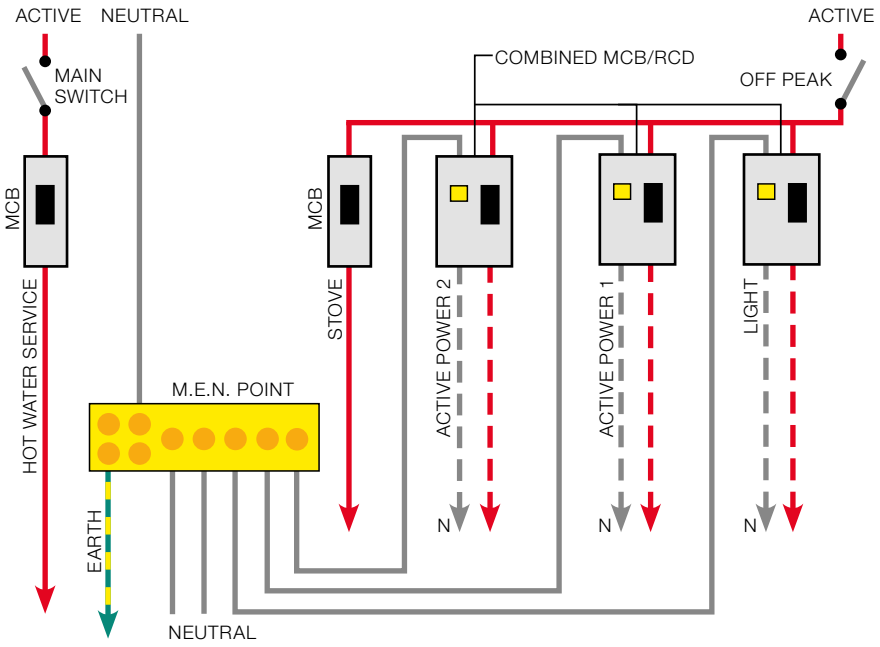
Benefits:

- Fast, easy installation.
- Good discrimination.
- Good resistance to accumulated leakage.

Disadvantages:

- Possibly higher material cost.

Individual GPO and lighting circuits protected by combined MCB/RCD



Option 5: Total installation protection using options 1, 2 or 3 with an additional S-Type (delayed) RCD

A 100mA or greater 'S' type delayed RCD can provide total installation protection when installed in series with the standard 30mA RCDs. This will provide personal protection of all GPO sub-circuits as required by AS/NZS 3000 Wiring Rules.

As with all RCD installations, the MEN point must occur on the line side of the S-type RCD.

Where a separate tariff is in use for hot water services, it is important that the hot water service Neutral be kept totally separate from both the S-type delay unit and the standard 30mA RCD.

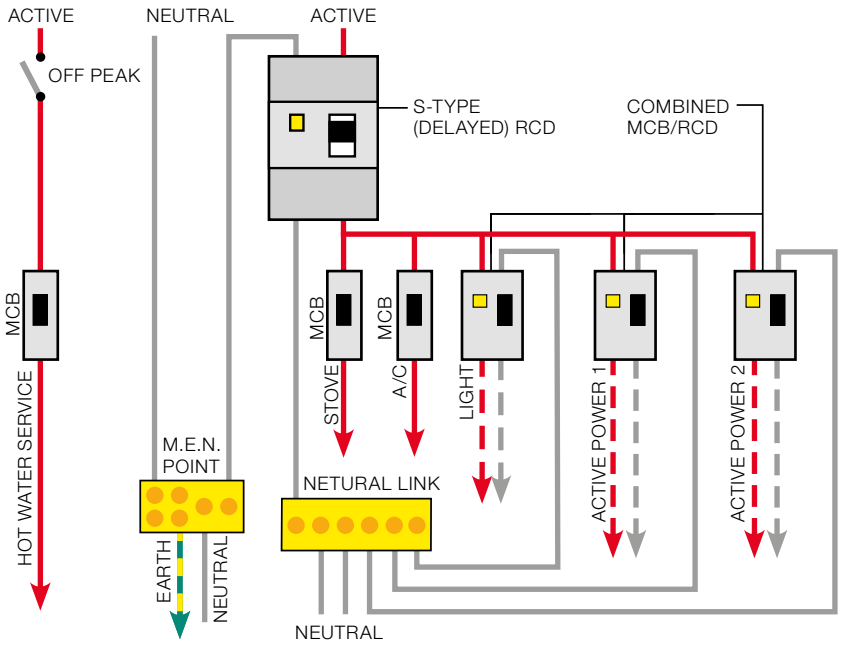
Benefits:

- Good discrimination.
- Additional protection to all property and installation equipment, especially against electrical fires.

Disadvantages:

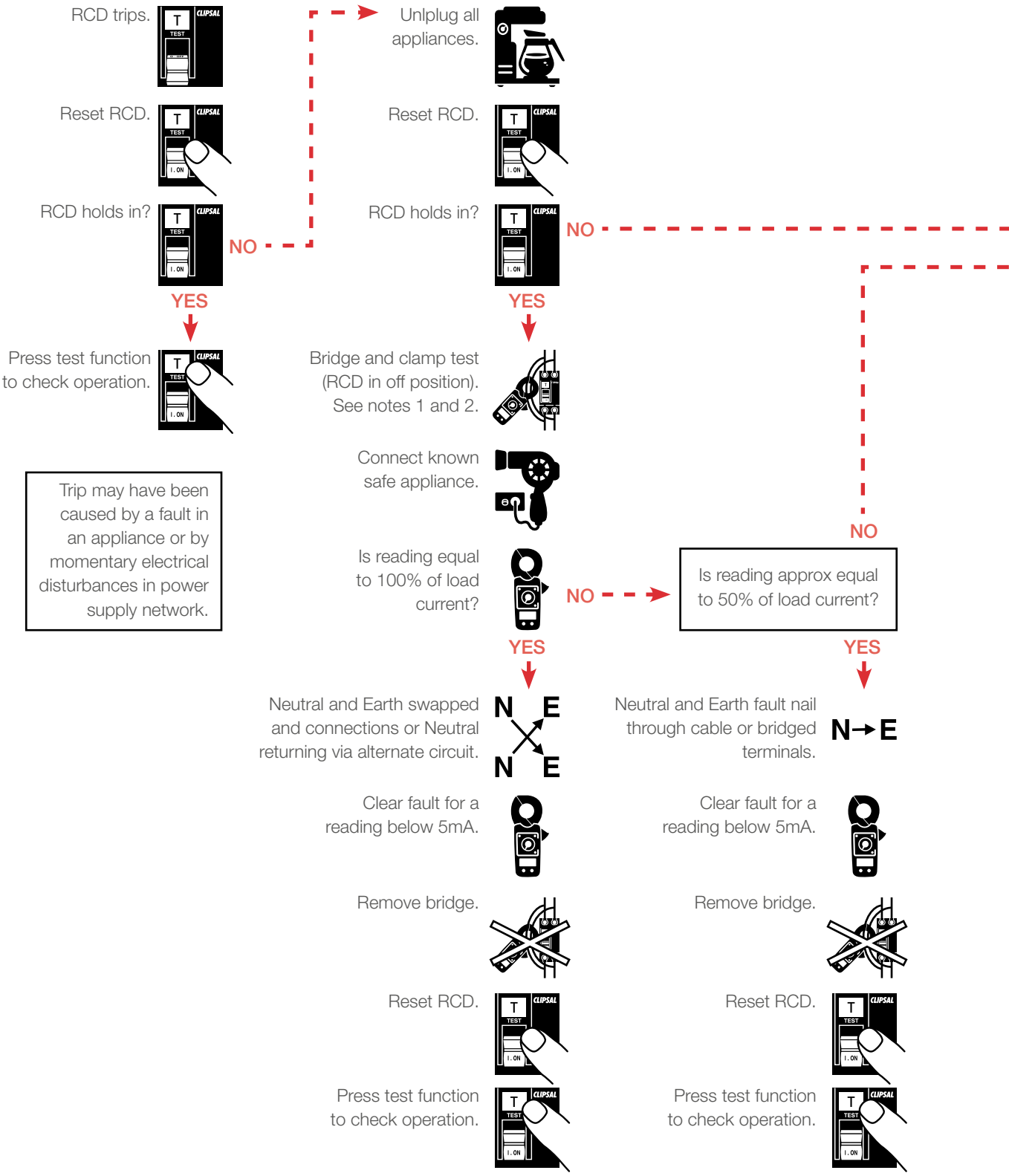
- May be a more complicated installation.

Total installation protection using any of options 1, 2 or 3 with additional S-Type (delayed) RCD



Electrcians On-Site Fault Finding Guide

When you arrive at a customer's house, talk to them and find out what they were doing when the RCD tripped.



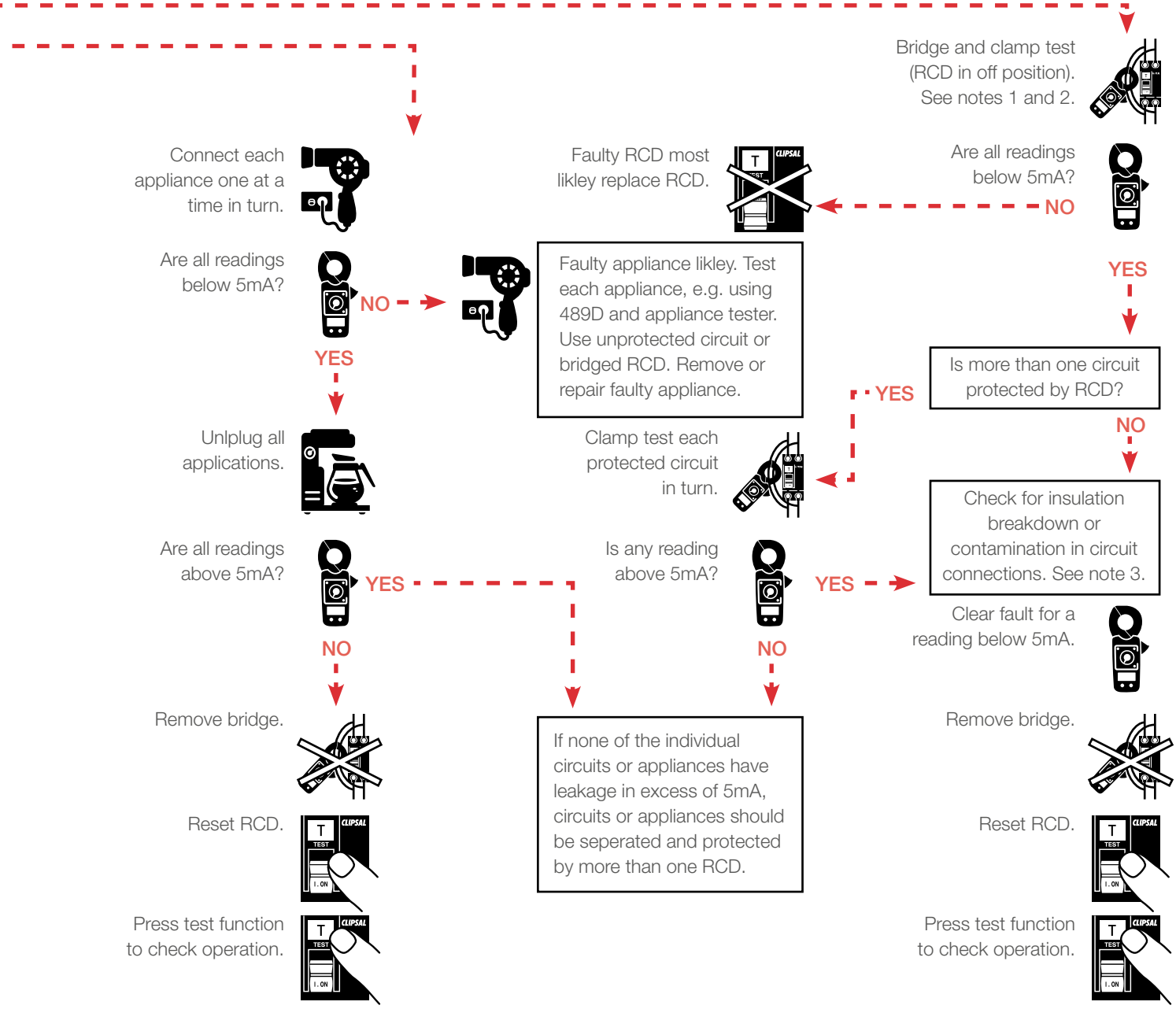
NOTE 1: Bridging of combination RCDs with over current protection, negates that function and may result in fusing the main fuse with faulty wiring. Note that in these instances, fault currents could be significantly higher and suitable precautions should be taken.

NOTE 2: Under no circumstances should the press to test function be utilised while an RCD is bridged.

NOTE 3: Insulation breakdown could be alternatively identified by the Clipsal 491 Insulation Tester.

Remember to test regularly

RCDs should be tested monthly by operating their inbuilt test button. You should remind the customer of this.

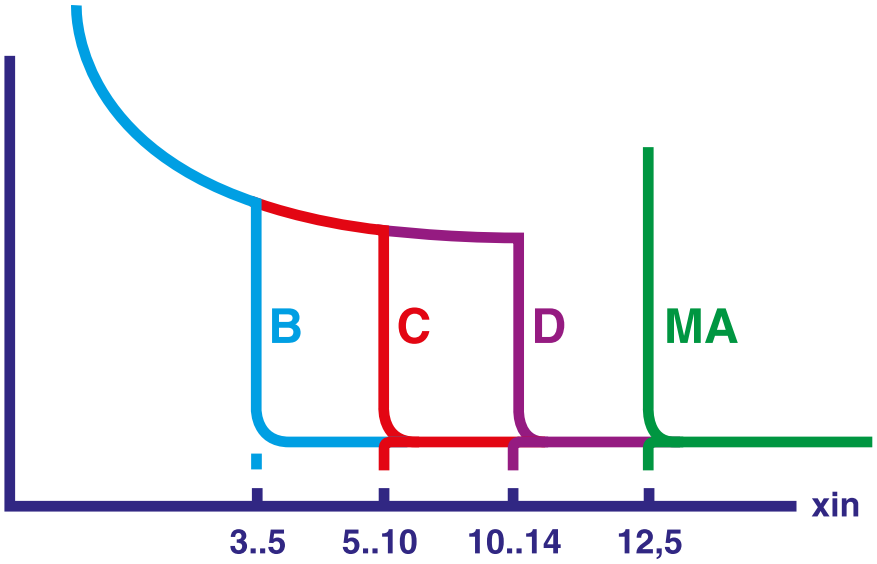


Technical Information

4 Series

Circuit Protection Trip Unit Variations

A choice of several curves. Whatever circuit has to be protected, a circuit breaker provides the perfect solution with a suitable curve.



B-Curve tripping
3 to 5 times the rated current (In); protection of generators, persons, very long cables.

C-Curve tripping
5 to 10 In; protection of circuits, general applications.

D-Curve tripping
10 to 14 In; protection of high surge circuits, welders, transformers, motors.

MA-Curve (magnetic only) tripping
12 In; protection of motor starters (+ thermal protection when combined with contactor).

Circuit Breaker Limitation Capability

The limitation capability of a circuit breaker is that characteristic whereby only a current less than the prospective fault current is allowed to flow under short circuit conditions.

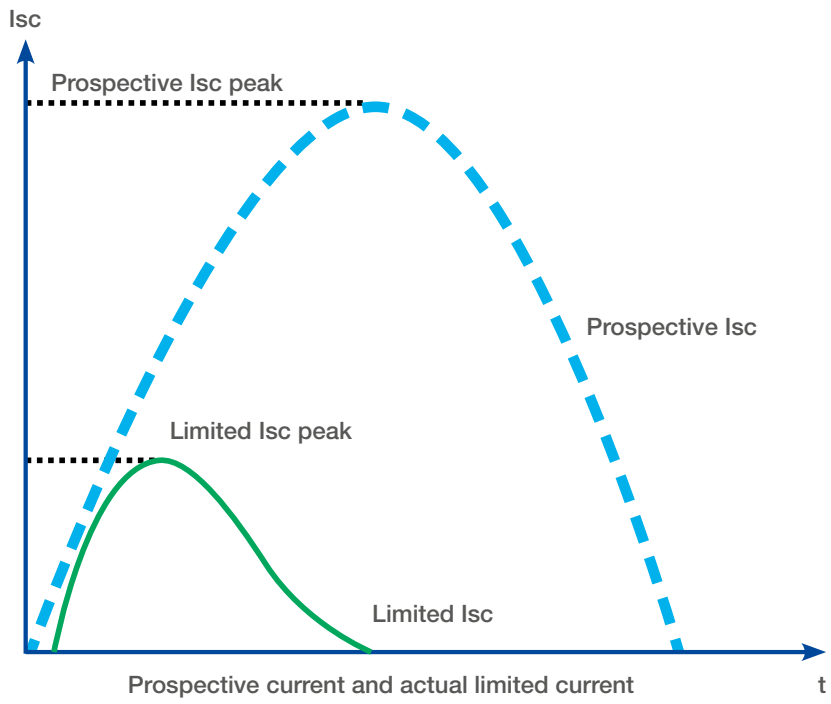
This is illustrated by limitation curves which give:

- the limited peak current in relation to the RMS value of the prospective short circuit current (the short circuit current being that current, which would flow continuously in the absence of protection equipment).
- the limited current stress in relation to the RMS value of the prospective shortcircuit current.
- current limiting capability.

The advanced design of the 4 Series range provides current limitation with far better protection than conventional circuit breakers. For example, on a 6A rating with a prospective short circuit of 5000A, the current will be limited at 350A or 7%.

Installation of current limiting circuit breakers offers several advantages:

- **Better network protection**
  Current limiting circuit breakers considerably reduce the undesirable effects of short circuit currents in an installation.
- **Reduced thermal effects**
  Cable heating is reduced, hence longer cable life.
- **Reduced mechanical effects**
  Electrodynamic forces reduced, thus electrical contacts are less likely to be deformed or broken.
- **Reduced electromagnetic effects**
  Measuring equipment situated near an electrical circuit less affected.



Technical Information

4 Series

Tripping Curves

C and D-curves, as in standard AS/NZS 60898

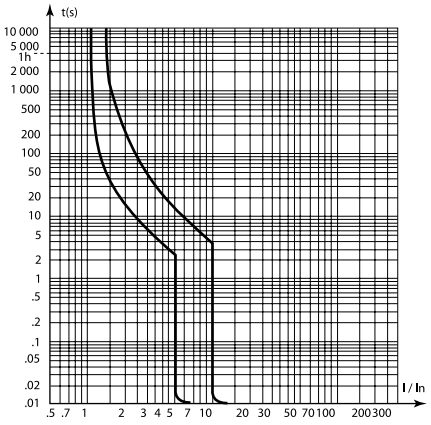
The operating range of the magnetic release is as follows:

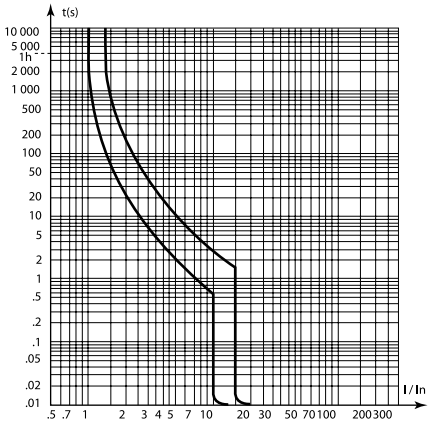
- For B-curve: between 3 In and 5 In
- For C-curve: between 5 In and 10 In
- For D-curve: between10 In and14 In.

The curves show the cold thermal tripping limits when poles are charged and the electromagnetic tripping limits with 2 charged poles.

Curves

MCB	MCB
According to AS/NZS 60898	According to AS/NZS 60898
Curve C	Curve D



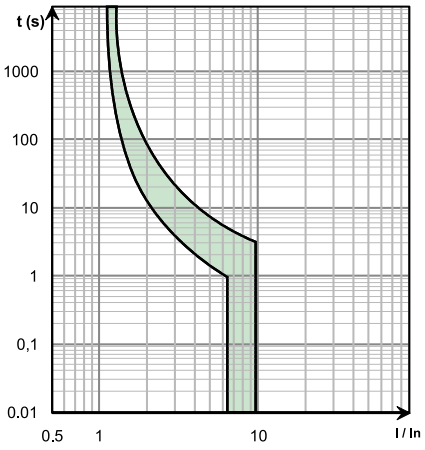


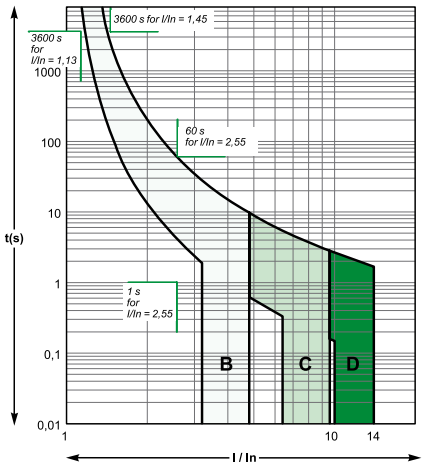
C-curve as in standard AS/NZS 60947.2:

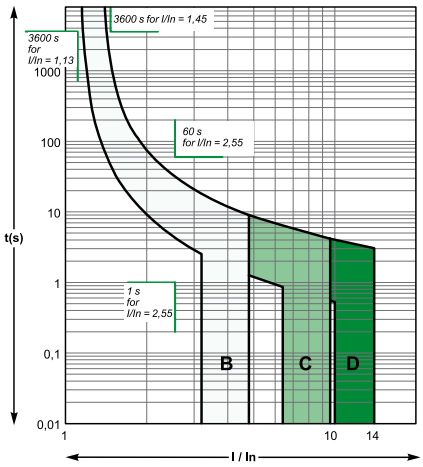
- The operating range of the magnetic release is as follows between 7 In and 10 In.
- The curves show the cold thermal tripping limits when poles are charged and the electromagnetic tripping limits with 2 charged poles.
- The curves are used without any derating.

Curves

MCB d.c.	MCB 1.5 module	RCBO
According to AS/NZS 60947.2	According to AS/NZS 60898 (reference temperature 30°C)	According to AS/NZS 60898 (reference temperature 30°C)
Curves C	Curves B, C, D	Curves B, C, D







Technical Information

4 Series

Thermal Derating Tables

MCB Deraiting Table

Deraiting (according AS/NZS 61009 - AS/NZS 60898). Torque 1,33 m/N <= 25A and 1,66 m/N >25A. Max torque of lugs MCB = 6m/N																		
Cal.	-25°C	-20°C	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
0.5A	0.64	0.63	0.62	0.6	0.59	0.58	0.57	0.55	0.54	0.53	0.51	0.5	0.49	0.47	0.45	0.44	0.42	0.4
0.75A	0.96	0.94	0.92	0.9	0.89	0.87	0.85	0.83	0.81	0.79	0.77	0.75	0.73	0.71	0.68	0.66	0.63	0.61
1A	1.24	1.22	1.2	1.18	1.16	1.14	1.11	1.09	1.07	1.05	1.02	1	0.98	0.95	0.92	0.9	0.87	0.84
2A	2.45	2.42	2.38	2.34	2.3	2.26	2.22	2.18	2.13	2.09	2.05	2	1.95	1.91	1.86	1.81	1.76	1.7
3A	3.86	3.79	3.72	3.64	3.57	3.49	3.42	3.34	3.26	3.17	3.09	3	2.91	2.82	2.72	2.62	2.51	2.41
4A	5.09	5	4.91	4.82	4.72	4.63	4.53	4.43	4.32	4.22	4.11	4	3.89	3.77	3.65	3.52	3.39	3.26
6A	7.47	7.35	7.22	7.1	6.97	6.84	6.71	6.57	6.43	6.29	6.15	6	5.85	5.69	5.53	5.37	5.2	5.02
8A	10.83	10.61	10.37	10.14	9.9	9.65	9.39	9.13	8.86	8.58	8.3	8	7.69	7.37	7.03	6.68	6.31	5.91
10A	13.36	13.09	12.82	12.54	12.25	11.95	11.65	11.34	11.02	10.69	10.35	10	9.64	9.26	8.86	8.45	8.02	7.56
13A	15.85	15.61	15.37	15.13	14.88	14.62	14.37	14.1	13.84	13.56	13.28	13	12.71	12.41	12.11	11.79	11.47	11.14
15A	19.3	18.95	18.59	18.22	17.85	17.47	17.09	16.69	16.28	15.87	15.44	15	14.55	14.08	13.59	13.09	12.57	12.03
16A	20.1	19.77	19.42	19.07	18.72	18.35	17.98	17.6	17.22	16.82	16.42	16	15.57	15.13	14.68	14.22	13.73	13.23
20A	24.9	24.49	24.08	23.66	23.24	22.8	22.36	21.91	21.45	20.98	20.49	20	19.49	18.97	18.44	17.89	17.32	16.73
25A	31.24	30.72	30.2	29.67	29.12	28.57	28.01	27.43	26.85	26.24	25.63	25	24.35	23.69	23.01	22.3	21.58	20.82
32A	39.84	39.19	38.53	37.86	37.18	36.49	35.78	35.05	34.32	33.56	32.79	32	31.19	30.36	29.5	28.62	27.71	26.77
40A	50.07	49.24	48.4	47.54	46.66	45.77	44.86	43.93	42.98	42.01	41.02	40	38.96	37.88	36.78	35.64	34.46	33.24
45A	57.36	56.35	55.32	54.27	53.2	52.11	50.99	49.85	48.68	47.49	46.26	45	43.7	42.37	40.99	39.56	38.08	36.53
50A	62.95	61.89	60.8	59.7	58.57	57.43	56.26	55.06	53.84	52.59	51.31	50	48.65	47.27	45.84	44.36	42.84	41.26
63A	80.67	79.22	77.75	76.26	74.73	73.17	71.57	69.94	68.27	66.56	64.81	63	61.14	59.22	57.24	55.19	53.06	50.84

MCB 1.5 Module Deraiting Table

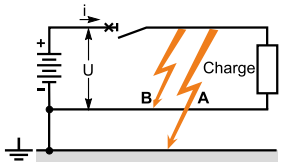
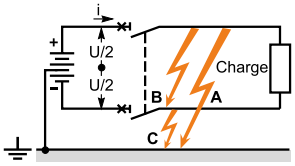
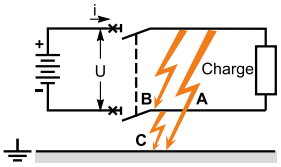
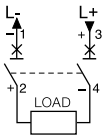
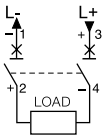
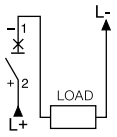
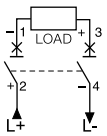
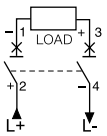
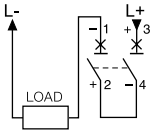
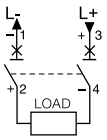
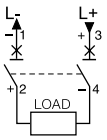
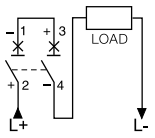
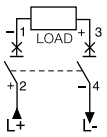
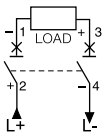
Deraiting table (AS/NZS 60989-1)																		
Rating	-25	-20	-15	-10	-5	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
10A	12.66	12.45	12.22	12.00	11.77	11.53	11.29	11.04	10.79	10.53	10.27	10	9.72	9.44	9.14	8.83	8.52	8.19
16A	19.09	18.83	18.57	18.30	18.03	17.75	17.47	17.19	16.90	16.60	16.31	16	15.69	15.37	15.05	14.72	14.38	14.03
20A	24.24	23.88	23.52	23.16	22.79	22.41	22.03	21.64	21.24	20.83	20.42	20	19.57	19.13	18.68	18.22	17.74	17.26
25A	30.46	30.00	29.54	29.07	28.59	28.11	27.61	27.11	26.60	26.08	25.54	25	24.44	23.87	23.29	22.69	22.08	21.45
32A	38.38	37.85	37.30	36.75	36.19	35.62	35.04	34.46	33.86	33.25	32.63	32	31.36	30.70	30.03	29.34	28.63	27.91
40A	49.07	48.32	47.55	46.77	45.98	45.17	44.35	43.52	42.67	41.80	40.91	40	39.07	38.12	37.14	36.14	35.11	34.05
50A	61.30	60.36	59.41	58.44	57.45	56.45	55.42	54.38	53.32	52.24	51.13	50	48.84	47.66	46.44	45.19	43.91	42.59
63A	77.46	76.26	75.04	73.80	72.53	71.25	69.94	68.61	67.25	65.87	64.45	63	61.52	60.00	58.44	56.84	55.19	53.49
80A	97.01	95.59	94.15	92.68	91.19	89.68	88.14	86.57	84.98	83.35	81.69	80	78.27	76.50	74.69	72.84	70.93	68.98
100A	122.61	120.73	118.82	116.87	114.90	112.89	110.85	108.77	106.64	104.47	102.26	100	97.69	95.32	92.89	90.39	87.82	85.18
125A	154.61	152.16	149.66	147.13	144.55	141.92	139.24	136.51	133.73	130.88	127.98	125	121.95	118.83	115.62	112.31	108.91	105.40

RCBO Deraiting Table

Deraiting table (AS/NZS 60947-2)																			
Rating	Curve	-25°C	-20°C	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
1A	B,C,D	1.66	1.62	1.59	1.55	1.51	1.47	1.43	1.39	1.35	1.30	1.26	1.21	1.16	1.11	1.06	1	0.94	0.88
2A	B,C,D	2.64	2.60	2.56	2.52	2.48	2.44	2.40	2.36	2.32	2.28	2.23	2.19	2.14	2.10	2.05	2	1.95	1.90
3A	B,C,D	3.97	3.91	3.86	3.80	3.74	3.68	3.61	3.55	3.49	3.42	3.36	3.29	3.22	3.15	3.07	3	2.92	2.85
4A	B,C,D	5.19	5.12	5.05	4.98	4.90	4.83	4.75	4.67	4.60	4.52	4.43	4.35	4.27	4.18	4.09	4	3.91	3.81
6A	B,C,D	7.42	7.34	7.25	7.16	7.07	6.98	6.89	6.80	6.70	6.61	6.51	6.41	6.31	6.21	6.11	6	5.89	5.78
10A	B	12.33	12.19	12.05	11.90	11.76	11.61	11.46	11.30	11.15	10.99	10.83	10.67	10.51	10.34	10.17	10	9.82	9.65
10A	C,D	12.85	12.68	12.51	12.34	12.16	11.98	11.80	11.61	11.42	11.23	11.03	10.84	10.63	10.43	10.22	10	9.78	9.56
13A	B	16.74	16.52	16.29	16.06	15.83	15.59	15.35	15.11	14.86	14.61	14.36	14.09	13.83	13.56	13.28	13	12.71	12.42
13A	C,D	16.92	16.69	16.45	16.21	15.97	15.72	15.47	15.22	14.96	14.69	14.43	14.15	13.87	13.59	13.30	13	12.70	12.38
16A	B,C	20.36	20.10	19.84	19.57	19.30	19.02	18.74	18.46	18.17	17.87	17.58	17.27	16.96	16.65	16.33	16	15.67	15.32
16A	D	20.51	20.24	19.97	19.69	19.41	19.13	18.84	18.54	18.24	17.94	17.63	17.32	17.00	16.67	16.34	16	15.65	15.30
20A	B	25.33	25.01	24.69	24.36	24.03	23.69	23.35	23.00	22.65	22.29	21.92	21.55	21.17	20.79	20.40	20	19.59	19.18
20A	C,D	25.65	25.31	24.97	24.62	24.27	23.91	23.55	23.18	22.81	22.43	22.04	21.65	21.25	20.84	20.42	20	19.57	19.12
25A	B,C,D	31.63	31.23	30.83	30.42	30.00	29.58	29.16	28.72	28.29	27.84	27.39	26.93	26.46	25.98	25.50	25	24.49	23.98
32A	B,C,D	41.06	40.52	39.97	39.42	38.85	38.28	37.70	37.11	36.51	35.90	35.28	34.65	34.01	33.35	32.68	32	31.30	30.59
40A	B,C,D	51.99	51.28	50.56	49.83	49.08	48.33	47.56	46.78	45.99	45.18	44.36	43.52	42.67	41.80	40.91	40	39.07	38.12

d.c. Circuit Supplementary Protectors for Feeders/ Distribution Systems. 4CBxxx/6DC C-Curve.

Poles Connected in Series

Network selection			
Type	**Earth**		**Isolated from Earth**
Source	Earthed polarity + or -	Earthed central point	Isolated polarities
Protected polarities	1 (1P isolation)	2	2
Diagrams (and type of faults)	Example: negative polarity to the Earth. 		
Selection of supplementary protector and pole connection			
24 V ≤ Un ≤ 250V	**Single-pole**	**Two-pole**	**Two-pole**
Diagrams (and type of faults)	Only if L+ polarity is Earthed		
Downstream connection			
250 V < Un ≤ 500V	**Two-pole**	**Two-pole**	**Two-pole**
Upstream connection			
Downstream connection			

Fault analysis (low Earth connection resistance)			
Fault A	• Isc maximum at U • Only protected polarity concerned • All the poles of the protected polarity must have a breaking capacity ≥ Isc max. at U	• Isc maximum at U/2 • Only positive polarity concerned • All the positive polarity poles must have a breaking capacity ≥ Isc max. at U/2	• Not relevant • The fault must be indicated by a permanent insulation monitor (PIM) and cleared (IEC/EN 60364)
Fault B	• Isc maximum at U • If one polarity (in this case positive) is protected: all the poles of this polarity must have a breaking capacity ≥ Isc max. at U • If two polarities are protected, to ensure isolation: all the protections of the two polarities must have a breaking capacity ≥ Isc max. at U	• Isc maximum at U • The 2 polarities are concerned • All the poles of the two polarities must have a breaking capacity ≥ Isc max. at U	• Isc maximum at U • The 2 polarities are concerned • All the poles of the two polarities must have a breaking capacity ≥ Isc max. at U
Fault C		• As for fault A • All the negative polarity poles must have a breaking capacity ≥ Isc max. at U/2	• As for fault A with the same requirements

Technical Information

4 Series

Lighting Application AC5a and AC5b Categories

- The following tables are relevant to all the contactors from the CT range, with or without manual control, for 230V single-phase lighting circuits.
- They indicate the contactor rating to be chosen according to the number and type of lamps to be controlled. As a guideline, maximum power is also given.

To obtain an equivalence on:

- Three-phase + Neutral circuits: multiply the number of lamps and the power indicated in the table by 3.
- Three-phase without Neutral circuits: multiply the number of lamps and the power indicated in the table by 1.7.

Lighting applications

230V single-phase circuit	Maximum number of lamps for a given rating. CT contactors		
Incandescent lamp - halogen gas	**25A**	**40A**	**63A**
40W	57	115	172
60W	45	85	125
75W	38	70	100
100W	28	50	73
150W	18	35	50
200W	14	26	37
300W	10	18	25
500W	6	10	15
1000W	3	6	8
12V halogen lamp (on ELV electromagnetic transformer)	**25A**	**40A**	**63A**
20W	23	42	63
50W	15	27	42
75W	12	23	35
100W	9	18	27
150W	6	13	19
26mm fluorescent tube (single parallel-corrected)	**25A**	**40A**	**63A**
15W	20	40	60
18W	20	40	60
20W	20	40	60
36W	20	40	60
40W	20	40	60
58W	15	30	43
65W	15	30	43
115W	7	14	20
140W	7	14	20
26mm fluorescent tube (single uncorrected)	**25A**	**40A**	**63A**
15W	30	70	100
18W	30	70	100
20W	30	70	100
36W	28	60	90
40W	28	60	90
58W	17	35	56
65W	17	35	56
115W	10	20	32
140W	10	20	32

230V single-phase circuit	Maximum number of lamps for a given rating. CT contactors		
26mm fluorescent tube (dual serial-corrected)	**25A**	**40A**	**63A**
2 x 18W	46	80	123
2 x 20W	46	80	123
2 x 36W	25	43	67
2 x 40W	25	43	67
2 x 58W	16	27	42
26mm fluorescent tube (4 tubes, serial connection)	**25A**	**40A**	**63A**
4 x 18W	23	46	69
Electronic ballast (1 x 26mm tube)	**25A**	**40A**	**63A**
18W	111	222	333
36W	58	117	176
58W	37	74	111
Electronic ballast (2 x 26mm tube)	**25A**	**40A**	**63A**
2 x 18W	55	111	166
2 x 36W	30	60	90
2 x 58W	19	38	57
Electronic compact lamp (low consumption)	**25A**	**40A**	**63A**
7W	200	400	600
11W	120	240	360
15W	88	176	264
20W	66	132	200
23W	57	114	171
Low pressure sodium vapour lamp (without correction)	**25A**	**40A**	**63A**
18W	34	57	91
35W	9	14	24
55W	9	14	24
90W	6	9	19
135W	4	6	10
180W	4	6	10
Low pressure sodium vapour lamp (with parallel correction)	**25A**	**40A**	**63A**
18W	21	40	60
35W	5	10	15
55W	5	10	15
90W	4	8	11
135W	2	4	6
180W	2	5	7
High pressure sodium vapour lamp (without correction)	**25A**	**40A**	**63A**
70W	12	20	32
150W	7	13	18
250W	4	8	11
400W	3	5	8
1000W	1	2	3
High pressure sodium vapour lamp (with parallel correction)	**25A**	**40A**	**63A**
70W	9	18	25
150W	9	18	25

Technical Information

4 Series

Heating Application AC7a and AC1 Categories

- The following table concerns all the contactors in the CT range, with or without manual control, for 230V single-phase and 400V three-phase heating circuits.
- It indicates the contactor rating to be chosen according to the power to be controlled and the number of operations a day.

Heating applications

Number of operations per day	Maximum power (kW) for a given rating. CT contactors		
230V heating	**25A**	**40A**	**63A**
25	5.4	8.6	14
50	5.4	8.6	14
75	4.6	7.4	12
100	4	6	9.5
250	2.5	3.8	6
500	1.7	2.7	4.5
400V heating	**25A**	**40A**	**63A**
25	16	26	14
50	16	26	14
75	14	22	35
100	11	17	26
250	5	8	13
500	3.5	6	9

Small Motor Application

- The following table concerns all the contactors in the CT range, with or without manual control, for 230V single-phase and 400V three-phase circuits.
- It indicates the contactor rating to be chosen according to the power of the motor to be controlled.

Small motor applications

Motor to be controlled	Maximum power (kW) for a given rating. CT contactors		
Single-phase motor with capacitor	**25A**	**40A**	**63A**
230V	1.4	2.5	4
Single-phase motor with capacitor	**25A**	**40A**	**63A**
400V	4	7.5	15

Technical Information

4 Series

Circuit Breaker Selection

For high efficiency motors (high inrush currents) please contact a Clipsal sales representative. See back cover for details.

For Direct On-Line

FLC AMPS	a.c.-3 kW	MCB		MCB 1.5 Module	
		C-Curve	D-Curve	C-Curve	D-Curves
1.1	0.37	4	4	10	10
1.5	0.55	4	4	10	10
1.8	0.75	6	4	10	10
2.6	1.1	6	6	10	10
3.4	1.5	10	6	10	10
4	1.5	10	10	16	16
5	2.2	16	10	16	16
6-7	3	20	16	20	16
8	3.7	20	20	25	20
9	4-4.5	25	25	25	25
10		25	25	32	32
11	5.5	32	25	32	32
12		32	32	40	40
13		32	32	40	40
14	7.5	40	32	40	40
15		40	40	40	40
16-17	9-9.2	40	40	50	50
18-19	10	50	50	50	50
20-22	11	63	50	63	50
23-24		63	63	63	63
25-28	15	63	63	80	63
29-32			63	80	80
33-38	18.5			80	80
39-44	22			80	80
45-52	25			100	100
53-56	30			100	100
57-60	34			125	
61-68	37			125	

For Star Delta, Auto Transformer and Resistor/Reactance

FLC AMPS	a.c.-3 kW	MCB		MCB 1.5 module	
		C-Curve	D-Curve	C-Curve	D-Curve
1.1	0.37	6	4	10	10
1.5	0.55	6	4	10	10
1.8	0.75	6	4	10	10
2.6	1.1	6	4	10	10
3.4	1.5	6	6	10	10
4	1.5	6	6	10	10
5	2.2	10	6	10	10
6-7	3	10	10	16	16
8	3.7	16	16	20	16
9	4-4.5	16	16	20	20
10		20	20	20	20
11	5.5	20	20	25	25
12		20	20	25	25
13		25	25	32	32
14	7.5	25	25	32	32
15		32	32	32	32
16-17	9-9.2	32	32	32	32
18-19	10	32	32	40	40
20-22	11	40	40	50	40
23-24		40	40	50	50
25-28	15	50	50	50	50
29-32		63	63	63	63
33-38	18.5	63	63	80	63
39-44	22			80	80
45-52	25			80	80
53-56	30			100	80
57-60	34			100	100
61-68	37			125	
69-72				125	
73-80	45			125	
81-100	55				

Technical Information

4 Series

4CBxxx/6DC Derating Table

The maximum permissable current in a device depends on the ambient temperature in which it is placed. Ambient temperature is the temperature inside the enclosure or switchboard in which the devices have been installed.

When several simultaneously operating devices are mounted side by side in a small enclosure, the temperature rise inside the enclosure causes a reduction in the current rating. A reduction coefficient of the order of 0.8 must therefore be allocated to the rating (already derated if it depends on the ambient temperature).

4CBxxx/6DC derating table

Derating (according to UL 1077 - CSA22.2 - UL489 - AS/NZS 60947-2 standards).																		
Temperature	-25°C	-20°C	-15°C	-10°C	-5°C	0°C	5°C	10°C	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
Ratings (A)																		
0.5	0.62	0.61	0.60	0.59	0.58	0.56	0.55	0.54	0.53	0.51	0.5	0.49	0.47	0.46	0.44	0.43	0.41	0.39
1	1.17	1.15	1.14	1.12	1.10	1.09	1.07	1.05	1.04	1.02	1	0.98	0.96	0.94	0.92	0.90	0.88	0.86
1.2	1.43	1.41	1.39	1.37	1.34	1.32	1.30	1.27	1.25	1.22	1.2	1.17	1.15	1.12	1.09	1.07	1.04	1.01
1.5	1.83	1.80	1.77	1.74	1.71	1.67	1.64	1.61	1.57	1.54	1.5	1.46	1.42	1.39	1.34	1.30	1.26	1.22
2	2.50	2.45	2.41	2.36	2.31	2.26	2.21	2.16	2.11	2.06	2	1.94	1.88	1.82	1.76	1.70	1.63	1.56
3	3.71	3.65	3.58	3.51	3.45	3.38	3.30	3.23	3.16	3.08	3	2.92	2.84	2.75	2.66	2.57	2.48	2.38
4	4.99	4.90	4.81	4.71	4.62	4.52	4.42	4.32	4.22	4.11	4	3.89	3.77	3.65	3.53	3.40	3.27	3.13
5	5.92	5.83	5.74	5.66	5.57	5.48	5.39	5.29	5.20	5.10	5	4.90	4.80	4.69	4.58	4.47	4.36	4.24
6	7.15	7.04	6.94	6.83	6.71	6.60	6.48	6.37	6.25	6.12	6	5.87	5.74	5.61	5.47	5.33	5.19	5.04
7	8.62	8.47	8.32	8.17	8.01	7.85	7.69	7.52	7.35	7.18	7	6.82	6.63	6.44	6.24	6.03	5.82	5.60
8	9.50	9.36	9.22	9.08	8.93	8.78	8.63	8.48	8.32	8.16	8	7.83	7.67	7.49	7.31	7.13	6.95	6.76
10	12.38	12.16	11.94	11.71	11.49	11.25	11.01	10.77	10.52	10.26	10	9.73	9.45	9.17	8.87	8.57	8.25	7.92
13	15.28	15.07	14.85	14.63	14.41	14.19	13.96	13.72	13.49	13.25	13	12.75	12.49	12.23	11.97	11.69	11.41	11.13
15	18.31	18.01	17.70	17.38	17.06	16.74	16.40	16.07	15.72	15.36	15	14.63	14.25	13.85	13.45	13.03	12.60	12.16
16	19.14	18.85	18.55	18.25	17.95	17.64	17.32	17.00	16.68	16.34	16	15.65	15.29	14.93	14.56	14.17	13.78	13.37
20	23.72	23.37	23.02	22.67	22.31	21.94	21.56	21.18	20.80	20.40	20	19.59	19.17	18.74	18.30	17.85	17.39	16.92
25	29.91	29.45	28.99	28.52	28.05	27.56	27.07	26.57	26.06	25.53	25	24.46	23.90	23.33	22.74	22.14	21.53	20.89
30	36.74	36.12	35.50	34.86	34.21	33.54	32.86	32.17	31.46	30.74	30	29.24	28.46	27.66	26.83	25.98	25.10	24.19
32	37.91	37.36	36.80	36.24	35.66	35.08	34.48	33.88	33.27	32.64	32	31.35	30.68	30.00	29.31	28.59	27.86	27.11
35	43.40	42.63	41.86	41.06	40.25	39.42	38.58	37.72	36.83	35.93	35	34.05	33.06	32.05	31.01	29.93	28.81	27.64
40	48.17	47.42	46.65	45.87	45.08	44.28	43.45	42.62	41.76	40.89	40	39.09	38.16	37.20	36.22	35.21	34.17	33.10
50	59.09	58.25	57.39	56.52	55.63	54.74	53.82	52.89	51.95	50.98	50	49.00	47.97	46.93	45.86	44.77	43.64	42.49
60	74.83	73.48	72.11	70.71	69.28	67.82	66.33	64.81	63.25	61.64	60	58.31	56.57	54.77	52.92	50.99	48.99	46.90
63	76.91	75.63	74.33	73.01	71.67	70.30	68.90	67.47	66.02	64.53	63	61.44	59.83	58.18	56.49	54.74	52.93	51.06

Common Conversion Factors

Quality	Non-SI Unit	Metric	Conversion Factors (Approximate) Non-SI To Metric (SI) Units	Metric (SI) to Non-SI Units
Length	Inch (in) Foot (ft) Yard (yd) Mile	Millimetre (mm) or Centimetre (cm) Centimetre (cm) or Metre (m) Metre (m) Kilometre (km)	1 in = 25.4mm 1 ft = 30.5cm 1 yd = 0.914m 1 mile = 1.61km	1 cm = 0.39in 1 m = 3.28ft 1 m = 1.09yd 1 km = 0.62 mile
Area	Square Inch (in^2) Square Inch (in^2) Square Foot (ft^2) Square Yard (yd^2) Acre Square Mile	Square Millimetre (mm^2) Square Centimetre (cm^2) Square Centimetre (cm^2) or Square Metre (m^2) Square Metre (m^2) Hectare (ha) Square Kilometre (km^2)	1 in^2 = 645mm^2 1 in^2 = 6.45cm^2 1 ft^2 = 929cm^2 1 yd^2 = 0.836m^2 1 acre = 0.405ha 1 Square Mile = 2.59km^2	1 mm^2 = 0.002in^2 1cm^2 = 0.155in^2 1 m^2 = 10.76ft^2 1 m^2 = 1.20yd^2 1 ha = 2.47 acres 1 km^2 = 0.387 sq. mile
Volume	Cubic Inch (in^3) Cubic Inch (ft^3) Cubic Yard (yd^3)	Cubic Centimetre (cm^3) Cubic Decimetre (dm^3) or Cubic Metre (m^3)	1 in^3 = 16.4cm^3 1 ft^3 = 28.3dm^3 1 yd^3 = 0.765m^3	1 cm3 = 0.06in^3 1 m3+ = 35.3ft^3 1 m3 = 1.31yd^3
Volume (Fluids)	Fluid Once UK (fl. oz UK) Pint UK (pt UK) Gallon UK (gal UK) Fluid Once US (Fl. oz US) Pint US (gal US) Gallon US (gal US)	Millilitre (ml) Millilitre (ml) or Litre (l) Litre (l) or Cubic Metre (m^3) Millilitre (ml) Litre (l) or Millilitre Litre	1 fl. oz (UK) = 28.4ml 1 pint UK = 568ml 1 gal UK = 4.55l 1 fl. oz (US) = 29.6ml 1 pint (US) = 473ml 1 gallon (US) = 3.79l	1 ml = 0.035 fl. oz (UK) 1 l = 1.76 pint (UK) 1 m^3 = 220 gallons (UK) 1 ml = 0.034 fl. oz (US) 1 l = 2.11 pint (US) 1 l = 0.264 gallon (US)
Mass	Ounce (oz) Pound (lb) Ton tael Catty Picul	Gram (g) Gram (g) or kilogram (kg) Tonne (t) Gram (g) Kilogram (kg) Kilogram (kg)	1 oz = 28.3g 1 lb = 454g 1 ton = 1.02 tonne 1 tael= 37.8g 1 catty = 0.605kg 1 picul = 60.50kg	1 g = 0.035oz 1 kg = 2.20lb 1 tonne = 0.984 ton 1 g = 0.026 tael 1 kg = 1.65 cattoes 1 kg = 0.017 picul
Force	Pound Force (lbf) Kilogram Force (kgf)	Newton (N) Newton (N)	1 lbf = 4.45N 1 kgf = 9.81N	1 N = 0.225 lbf 1 N = 0.102 kgf
Pressure	Pound Force per square inch (psi) Kilogram force per square centimetre (kgf/cm^2) Inch of water (in H_2O) Bar	kilopascal (kPa) kilopascal (kpa) Pascal (Pa) kilopascal (kPa)	1 psi = 6.86kPa 1 kgf/cm2 = 98kPa 1 in H2O = 249Pa 1 Bar = 100kPa	1 kPa = 0.145psi 1 kPa = 0.01kgf/cm^2 1 Pa = 0.004 in H_2O 1 kPA = 0.01 bar
Temperature	Fahrenheit temp. (F)	Celsius temp. (C)	°C = 5 (°F - 32)	°F = (9 x °C) + 32
Energy	British thermal unit (Btu) Therm Calorie (dietician)	Kilojoule (kJ) Megajoule (MJ) Kilojoule (kJ)	1 Btu = 1.06kJ 1 Therm =106MJ 1 Cal (dietician) = 4kJ	1 kJ = 0.948 Btu 1 MJ = 9.48 x 10 3 therm 1 kJ = 0.23 Cal (dietician)
Power	Horsepower (hp)	Kilowatt (kW)	1 hp = 0.746kW	1 kW = 1.34hp
Fuel Consumption	Mile per gallon (mpg)	Litres per 100 kilograms	(n) x mpg = 2821/100km	(n) x 1/100 km = 282

Technical Information

4 Series

Fuse Back-Up Protection

Fuse fault current limiters for 4 Series Circuit Breakers for fault levels up to 50kA at 415V.

MCBs Fuse Cascading Table

Fuse Backup Protection Table					
"Icc" (kA)	Upstream Fuse				
	BS88 or gG			HRC DIN Type	
	125A	160A	200A	160A	200A
63kA	4CBxxx/6 4CBxxx/10				
50kA		4CBxxx/6 4CBxxx/10	4CBxxx/6 4CBxxx/10	4CBxxx/6 4CBxxx/10	4CBxxx/6 4CBxxx/10

This table is based on test data and complies with the requirements for switchboards to AS/NZS 3439.1 (reference standards AS60947.2, AS/NZS60898). Refer to AS/NZS 3000:2007 wiring rules, Clauses 2.5.4.5(a) and 2.5.6.2 regarding requirement for back up protection and control. Fuse ratings are maximum sizes. Where 200A fuses and C60 MCB's are used in association, it is recommended that in the event of a fault where the fuses are blown, that the downstream MCB should be inspected.

Abbreviations

Abbreviations for multiples and sub multiples		
T	tera	10^{12}
G	giga	10^{9}
M	mega	10^{6}
K	kilo	10^{3}
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
µ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}

Power Formulas

Useful 3 - Phase formula	
kW =	$\frac{\text{Line Amps x Line Volts x 1.732 x P.F.}}{1000}$
kVA =	$\frac{\text{Line Amps x Line Volts x 1.732}}{1000}$
kW =	kV.A x P.F.
Electric motors	
Power Output =	Power Input x Efficiency
kW Output =	kW Input x Efficiency
kW Output =	$\frac{\text{1.732 x Line Volts x Line Amps x P.F. x Efficiency}}{1000}$
kV.A Input	$\frac{\text{1.732 x Line Volts x Line Amps}}{1000}$
Line Amperes =	$\frac{\text{1000 x kW Output}}{\text{Line Volts x 1.732 x P.F. x Efficiency}}$
Line Amperes=	$\frac{\text{1000 x kV.A Input}}{\text{Line Volts x 1.732}}$

The power factor is usually taken as 0.8 (as an all-round figure) but this varies with the speed and size of the motor.
The efficiency varies from 85% in small motors to 90% and over for large motors.

Technical Table

Measure	Symbol	Unit
Length	S	m
Area	A	m^2
Volume	V	m^3
Weight	m	kg
Density	P	kg/m^3
Time	t	s
Frequency	F	Hz
Rotary Speed	n	s^{-1}
Linear Speed	v	ms^{-1}
Acceleration	a	ms^{-2}
Power	F	N (Newton)
Pressure	P	Pa (Pascal)
Torque	M	Nm
Work	W	J (Joule)
Power	P	W (Watt)
Reactive Voltampere		Var
Voltampere		V.A
Current	I	A (Amper)
Operational Current	Ith	A
Conventional Enclosed	Ithe	A
Thermal Current		
Voltage	U	V (Volts)
Insulated Voltage	Ui	V
Operational Voltage	Ue	V
Resistance	R	(Ohm)
Impedance	Z	
Reactance	X	
Reluctance	S	A/Wb
Capacitance	C	F (Farad)
Quantity of Electricity	Q	C (Coulomb)
Magnetic Field Strength	H	A/m
Magnetic Flux	Ø	Wb (Weber)
Inductance	L	H (Henry)
Magnetic Flux Density	B	T (Tesca)
Temperature	t	°C (Celsius)
Illuminance	E	l x (Lux)
Luminance	L	cd/m^2
Luminous Flux	Ø	lm (Lumen)
Luminous Intensity	I	cd (Candela)

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4 Series

Notes

4 Series

CLIPSAL®

by Schneider Electric

Schneider Electric (Australia) Pty Ltd

33-37 Port Wakefield Road, Gepps Cross,
South Australia 5094

PO Box 132, Enfield Plaza,
South Australia 5085

Telephone: (08) 8161 0511
Facsimile: (08) 8161 0900
Email: plugin@clipsal.com.au
Internet: www.clipsal.com

National Customer Care Enquiries:
1300 2025 25

National Customer Care Facsimile:
1300 2025 56

International Enquiries
International Sales and Marketing
Email: export@clipsal.com.au

Schneider Electric (NZ) Ltd
38 Business Parade South, Highbrook,
East Tamaki, Manukau 2013,
NEW ZEALAND

Telephone: + 64 9 829 0490
Facsimile: + 64 9 829 0491
Internet: www.schneider-electric.co.nz

Customer Care
Freephone: 0800 652 999
Freefax: 0800 101 152
Email: sales@nz.schneider-electric.com
Internet: www.clipsal.co.nz

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