Designed & Manufactured by...

GREEN BROOK ELECTRICAL

10 mA

30 mA

Passive

Active

Inline

Portable

Socket

Weatherproof

A Guide to RCDs & Electrical Safety

PowerBreaker THE FIRST SINCE 1975

...Anything else is a compromise

In 1975 GreenBrook used its expertise in the design and manufacture of relays to produce the very first Residual Current Device to be totally housed within a 13A plug.

The product was given the name "PowerBreaker" and its use quickly spread within business and to the home. Today many millions of PowerBreaker products are protecting lives.

Contents

Passive

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PowerBreaker THE FIRST SINCE 1975

What is an RCD?

An RCD is a life-saving device that protects against dangerous electric shocks and reduces the risk of electrical fires. RCD stands for Residual Current Device. This is a sensitive switching device that quickly turns the electricity off when danger arises to reduce the risk of death or serious injury.

Why do we need RCDs?

Every year in the UK the Fire Brigade is called to over 10,000 incidents attributable to electrical faults. Half of these incidents are in the home and result in some 500 serious injuries and approximately twenty fatalities. Added to this, there are close to ten fatalities every year due directly to electric shocks; as well as a large number of serious injuries.

Residual Current Devices (RCDs) are electrical devices which when incorporated into an electrical installation, will provide the highest degree of protection against the risks of electrocution and fire caused by earth faults.

PowerBreaker Socket RCDs offer MFBL (Make First Break Last) technology, which is critical to avoid upstream RCD nuisance tripping at the consumer unit.

GreenBrook continues to develop high performance products for use in every situation, so that the name –PowerBreaker– remains eponymous with residual current devices and the protection of life.

Did you know....

- RCD is a generic term for all Residual Current Devices, which there are three types: Fixed, Portable and socket
- RCDs are available as both Active (***Requires* resetting** after power failure) & Passive (**Does not require resetting** after power failure)
- Point of supply and point of use all need RCD protection
- BSEN standards require RCDs to trip within 40 milliseconds at 5 x rated trip current
- The new generation of RCD Sockets by PowerBreaker will trip in less than 20 milliseconds
- The 17th Edition recommends use of RCDs for sockets as well as consumer units and circuits
- IET Wiring Regulations 415.1, 411.3.3, 522.6.202 & 522.6.203, 701.411.3.3, cover applications for RCDs
- RCDs detect very low earth leakage current, as low as 10 or 30 milli amperes depending on the model

Interesting Safety Facts....

- 13 million homes (50%) in the UK still have no RCD protection at all
- Approximately 10% of all fires are caused by electrical faults
- Many of these incidents could be prevented by using RCDs

Always ensure that suppliers can back up claims with authentic certification - ask to see their test certificate.

Why Choose PowerBreaker ?

• Easy to operate • Clear "on" indicator flag • Market Leader

Features	Benefits	Specific to
Less than 20m/s typical trip speed	Added safety in event of hazard	Complete Range
Conforms to the latest EMC/ low voltage directive	Fully compliant and acceptable by all specifying bodies and certifying authorities	
High intensity LED power on indicator	Clear visual indicator of power on	
Higher cosmetic standard of design	Less intrusive when installed	
100% in-house tested	More reliable & dependable	
- RoHS compliant - Full certification	Full confidence in product quality	
Captive terminal screws	Assists easy installation	
Compact depth	Will fit into 25mm back box	
Rated trip Current	30mA	
Rated trip Current	10mA - Super Sensitive	Switched Sockets & Spurs
Higher cosmetic standard of design/ Modern slim style	Modern appearance - blends in with existing standard sockets	White Sockets
Double earth terminals	Assists easy installation	Twin Sockets & Spurs
Metalclad treated	Resists rust & corrosion - product stays smarter	Metal Sockets and Spurs
Underside or rear entry for appliance cable	More versatile choices of appliance wiring	Metal Spurs
Adjustable cable clamp in accordance with BS1363-4	Safety clamps most cable sizes Cable size 0.5mm^2 - 1.5mm^2 Cable Dia 4.6 - 10.4mm	Spurs
Recessed buttons	Prevents unintended operation	Spurs

Passive RCDs - Typical Applications

- Household appliances such as refrigerators and freezers will return to their regular mode of operation as soon as the power supply resumes normal operation.

Active RCDs - Typical Applications

- Usually used for extension leads or outdoor equipment such as hedgetrimmers, where unexpected restarting of equipment could present a danger to the user in a power cut situation.

Range Specification Table

Passive - 30mA

Mechanically latched - **Does not require** resetting after power failure.

Part No	Description	Switched/ Unswitched	Passive 30mA	Finish
H22WPSAPN-C	Twin Socket	Unswitched	Passive	White
H22MPAPN-C	Twin Socket	Unswitched	Passive	Metalclad
K21SPA	Single Socket	Switched	Passive	White
K22SPA	Twin Socket	Switched	Passive	White
K21WPAPN-C	Single Socket	Switched	Passive	White
K22WPAPN-C	Twin Socket	Switched	Passive	White
K21MPAPN-C	Single Socket	Switched	Passive	Metalclad
K22MPAPN-C	Twin Socket	Switched	Passive	Metalclad
H92WPAPN-C	Fused Spur	-	Passive	White
H92MPAPN-C	Fused Spur	-	Passive	Metalclad

Super Sensitive - 10mA

Part No	Description	Switched/ Unswitched	Passive 10mA	Finish
K21WPAPN10-C	Single Socket	Switched	Passive	White
K22WPAPN10-C	Twin Socket	Switched	Passive	White
K21MPAPN10-C	Single Socket	Switched	Passive	Metalclad
K22MPAPN10-C	Twin Socket	Switched	Passive	Metalclad
H92WPAPN10-C	Fused Spur	-	Passive	White
H92MPAPN10-C	Fused Spur	-	Passive	Metalclad

Active - 30mA

Electrical latching - ***Requires* resetting** after power failure.

Part No	Description	Switched/ Unswitched	Active 30mA	Finish
K21WPAAN-C	Single Socket	Switched	Active	White
K22WPAAN-C	Twin Socket	Switched	Active	White
K21MPAAN-C	Single Socket	Switched	Active	Metalclad
K22MPAAN-C	Twin Socket	Switched	Active	Metalclad
H92WPAAN-C	Fused Spur	-	Active	White
H92MPAAN-C	Fused Spur	-	Active	Metalclad
J72A-C	Plug	-	Active	White
J02A-C	Adaptor	-	Active	White
J62-T	IP65 In-Line	-	Active	Orange
J62-Y	IP65 In-Line/110V	-	Active	Yellow

Super Sensitive - 10mA

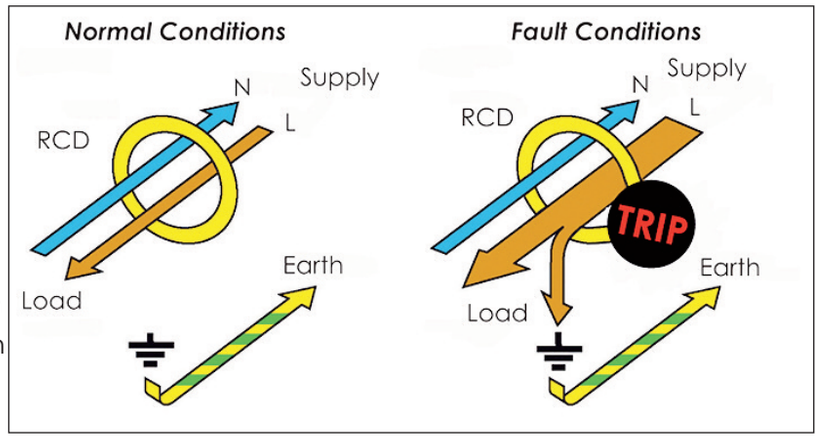
Part No	Description	Switched/ Unswitched	Active 10mA	Finish
K21WPAAN10-C	Single Socket	Switched	Active	White
K22WPAAN10-C	Twin Socket	Switched	Active	White
K21MPAAN10-C	Single Socket	Switched	Active	Metalclad
K22MPAAN10-C	Twin Socket	Switched	Active	Metalclad
H92WPAAN10-C	Fused Spur	-	Active	White
H92MPAAN10-C	Fused Spur	-	Active	Metalclad

How does an RCD work?

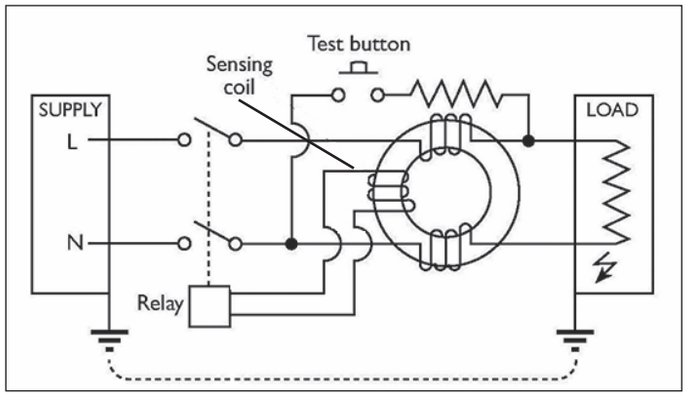
Principle of RCD Operation

An RCD protects by constantly monitoring the current flowing in the live and neutral wires supplying a circuit or an individual item of equipment.

Under normal circumstances, the current flowing in the two wires is equal. When an earth leakage occurs due to a fault in the circuit or an accident with the equipment, an imbalance occurs and this is detected by the RCD, which automatically cuts off the power before injury or damage can result.



A Simple RCD Circuit Diagram



To be effective, the RCD must operate very quickly at a low earth leakage current. Those designed to protect human life are engineered to trip out with an earth leakage current of 30mA within 200mS and at a higher earth current of 150mA, they will trip in less than 40mS. These limits are well inside the safety zone, within which electrocution or fire would not be expected to occur.

PowerBreaker has a typical trip speed of less than 20mS.

Principle of Shock Protection

Protection of persons and livestock against electric shock is a fundamental principle in the design of electrical installations in accordance with BS 7671: Requirements for electrical installations, commonly known as The IET Wiring Regulations 17th Edition. Use of the correct earthing system is an essential part of this process.

The 17th Wiring Regulations highlights two main areas of protection -

1. **Basic Protection** - An electric shock may arise from direct contact with live parts, for example, when a person touches a live conductor that has become exposed as a result of damage to the insulation of an electric cable.

2. **Fault Protection** - An electric shock may arise from indirect contact, for example, a fault results in the exposed metalwork of an electrical appliance, or even other metalwork such as a sink or plumbing system becoming live.

RCDs, provide the first and most important line of defence. They provide protection against faults under certain installation conditions where fuses and MCBs cannot achieve the desired effect.

Fuses and MCBs provide no protection against the electric currents flowing to earth through the body.

The effects of an Electric Shock

The effects of electricity on the human body, whilst not always sufficient serious to cause death, can still have a long term adverse effect on a persons health and cause psychological effects. Perception of an electric shock can be different depending on the voltage, duration, current, path taken etc. An electric shock can also cause external burns due to resistance to current. Internal burns are caused by high voltage shocks from the source (>500V to 1000V). Neurological effects can also occur when current causes interference with nervous control, especially over the heart and lungs. Another serious effect of an electric shock is Ventricular Fibrillation. It can be induced when a current as low as 60mA travels through the chest for a fraction of a second. Fibrillations are usually lethal because all the heart muscle cells move independently. Above 200mA, the muscle contractions are so strong that the heart muscles cannot move at all.

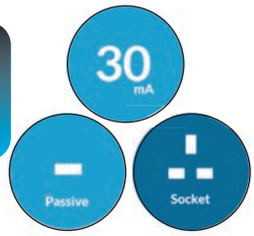
Muscle spasms can occur and can cause a person to be unable to release from a current source; if there is sufficiently high current. The 'let go' current is the maximum current that can cause the flexor of the arm to contract but still allows a person to release their hand from the current source.
The table below refers to adult people in good health at the time of the shock, but if the victim is a child or person in poor health, the effects can be more serious and the need for RCD protection is even greater.

The degree of risk depends not only on current, but also on time - the higher the current or the longer the time of shock, the greater the danger. In considering a 230V 50Hz AC supply, the following effects of current are typically observed.

Current	Effect
0 - 0.5mA	Generally this current is below the level of perception, resulting in no reaction.
0.5 - 5mA	Although no dangerous physiological effects, this current may produce a startle effect that results in injury due to falling etc.
5mA - 10mA	Same effect as above but in addition muscular reaction may cause inability to let go of equipment. Once current flow ceases letting go is then possible.
10mA - 40mA	Severe pain and shock as current value increases. At currents over 20mA the victim may experience breathing difficulties with asphyxia if current flow is uninterrupted. Reversible disturbance to heart rhythm and even cardiac arrest is possible at higher values of current and time.
40mA - 250mA	Severe shock and possibility of non-reversible disturbance to the normal cardiac cycle, referred to as Ventricular Fibrillation. The possibility of Ventricular Fibrillation increases as current and time increase. It is also possible to experience heavy burns at higher currents in addition to full cardiac arrest.

• Easy to operate • Faster Trip Speed • Tested to latest Standards

RCD Sockets - Unswitched 30mA
Passive

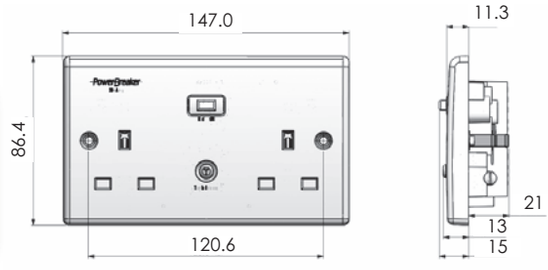


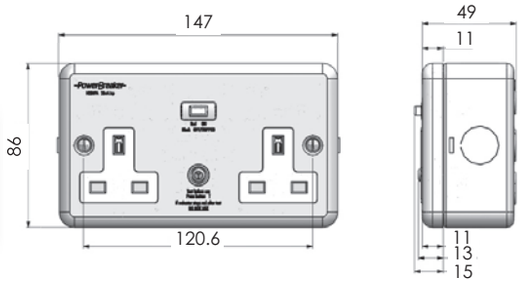
- Mechanically latched (does not need resetting after a power loss)
- High intensity LED power on indicator
- Twin earth terminals

Technical Data

Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	30mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Mechanical, no need to reset after power loss (Passive)
Responsive to	Pulsating DC earth faults
Conforms to	BS 7288:1990, Amd 1 and BS 1363-2:1995 Amd 1-3
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1995 inc A11:2003, A12:2005 & A2:2006

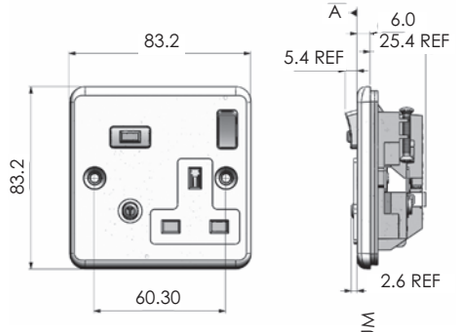
Part No	Description
H22WPSAPN-C	RCD Twin Socket Slim profile Scratch resistant urea front plate Fits standard 25mm back box
H22MPAPN-C	RCD Twin Socket Complete with metal backbox

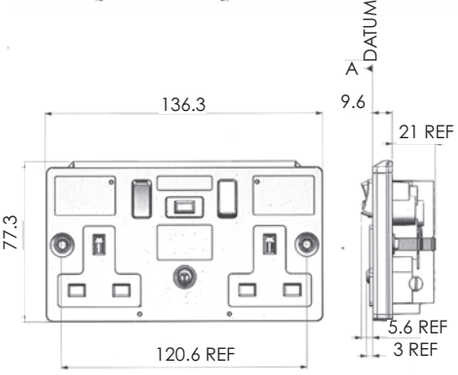




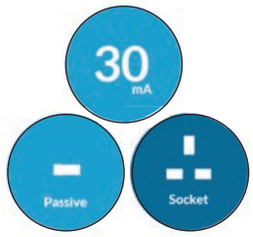
RCD Sockets - Switched Panel Mounting 30mA

Part No	Description
K21SPA	Panel Mounting RCD Single Switched Socket Moulded front plate Max Plate Thickness 2mm
K22SPA	Panel Mounting RCD Twin Switched Socket Moulded front plate Twin earth terminals Max Plate Thickness 2mm





RCD Sockets - Switched 30mA
Passive



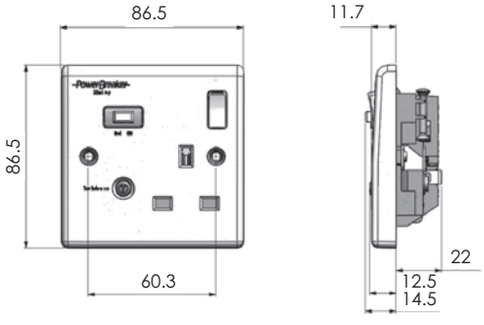
- Mechanically latched (does not need resetting after a power loss)
- High intensity LED power on indicator
- Individually switched socket outputs
- Twin sockets fitted with twin earth terminals

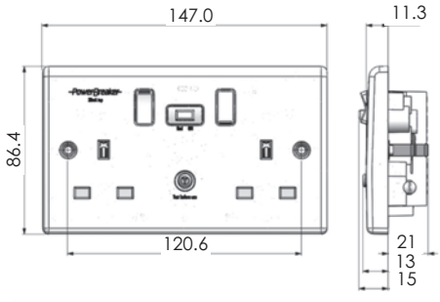
‘Make first break last contact – prevents nuisance tripping further upstream’

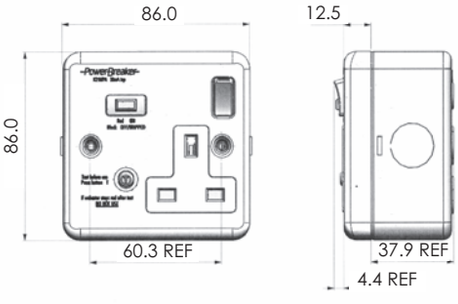
Technical Data

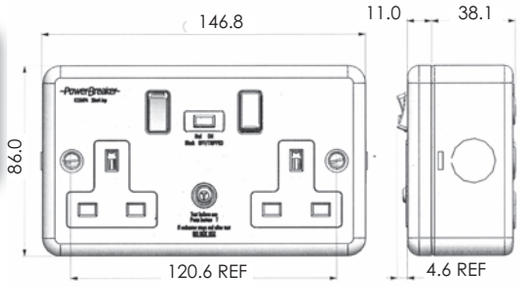
Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	30mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Mechanical, no need to reset after power loss (Passive)
Responsive to	Pulsating DC earth faults
Conforms to	BS 7288:1990, Amd 1 and BS 1363-2:1995 Amd 1-3
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

Part No	Description
K21WPAPN-C	RCD Single Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K22WPAPN-C	RCD Twin Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K21MPAPN-C	RCD Single Switched Socket Complete with metal backbox
K22MPAPN-C	RCD Twin Switched Socket Complete with metal backbox









RCD Fused Spurs - 30mA
Passive

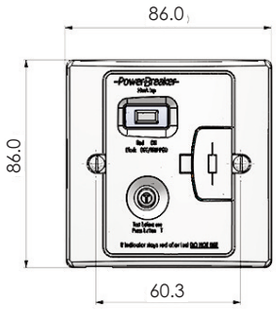
- Mechanically latched (does not need resetting after a power loss)
- High intensity LED power on indicator, clear visual indicator of power on
- Mechanical flag trip indicator
- Integral cord outlet and cable clamp
- Fuse holder can be locked out for safety
- Twin earth terminals

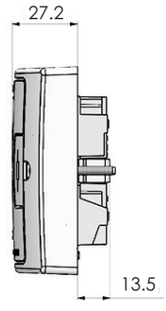
'Make first break last contact – prevents nuisance tripping further upstream'

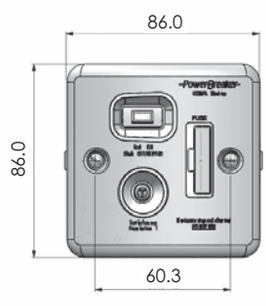
Technical Data

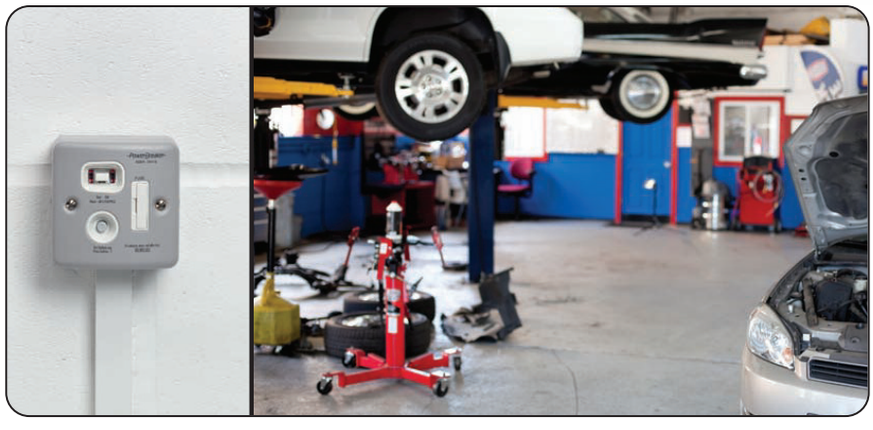
Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	30mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Mechanical, no need to reset after power loss (Passive)
Responsive to	Pulsating DC earth faults
Conforms to	BS 1363-4:1995 Amd 1, 2, 3 and BS 7288:1990 Amd 1
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

Part No	Description
H92WPAPN-C	RCD Fused Spur Scratch resistant urea front plate Fits 25mm standard back box
H92MPAPN-C	RCD Fused Spur Complete with metal back box

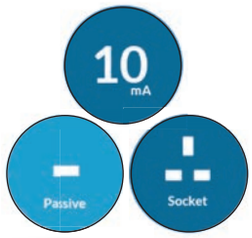








RCD Sockets - Switched 10mA
Passive



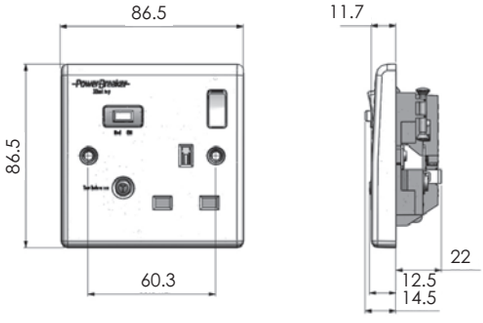
- Mechanically latched (does not need resetting after a power loss)
- High intensity LED power on indicator
- Individually switched socket outputs
- Twin sockets fitted with twin earth terminals

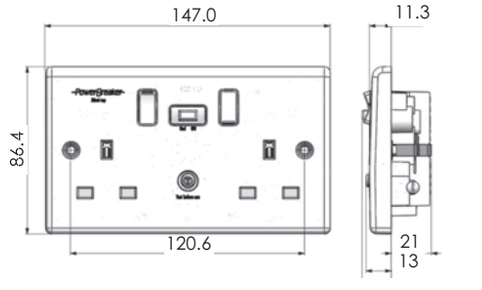
Technical Data

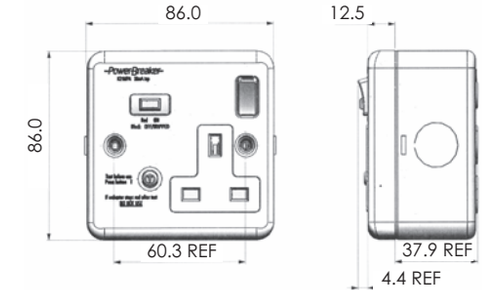
Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	10mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Mechanical, no need to reset after power loss (Passive)
Responsive to	Pulsating DC earth faults
Conforms to	BS 7288:1990, Amd 1 and BS 1363-2:1995 Amd 1-3
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

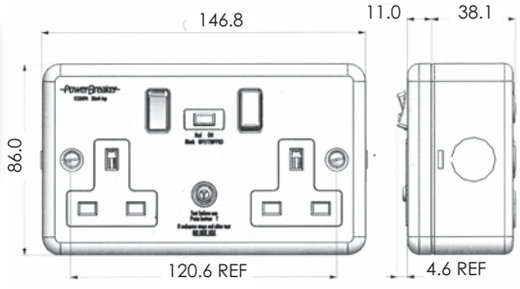
'Super Sensitive – 10mA'

Part No	Description
K21WPAPN10-C	RCD Single Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K22WPAPN10-C	RCD Twin Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K21MPAPN10-C	RCD Single Switched Socket Complete with metal backbox
K22MPAPN10-C	RCD Twin Switched Socket Complete with metal backbox









RCD Fused Spurs - 10mA
Passive

- Mechanically latched (does not need resetting after a power loss)
- High intensity LED power on indicator, clear visual indicator of power on
- Mechanical flag trip indicator
- Integral cord outlet and cable clamp
- Fuse holder can be locked out for safety
- Twin earth terminals

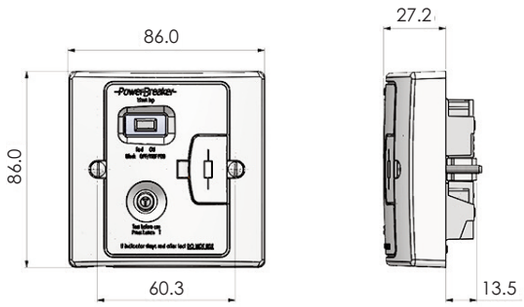
Technical Data

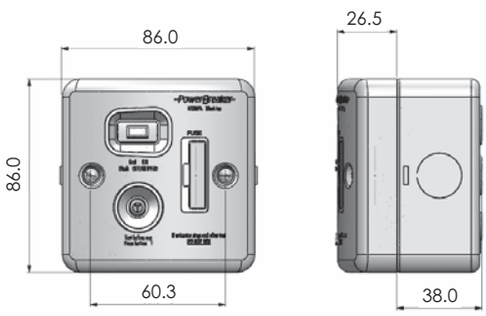
Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	10mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Mechanical, no need to reset after power loss (Passive)
Responsive to	Pulsating DC earth faults
Conforms to	BS 1363-4:1995 Amd 1, 2, 3 and BS 7288:1990 Amd 1
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

'Make first break last contact – prevents nuisance tripping further upstream'

'Super Sensitive – 10mA'

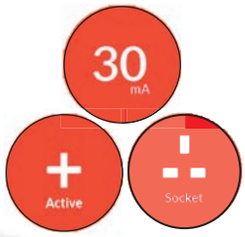
Part No	Description
H92WPAPN10-C	RCD Fused Spur Scratch resistant urea front plate Fits 25mm standard back box
H92MPAPN10-C	RCD Fused Spur Complete with metal back box



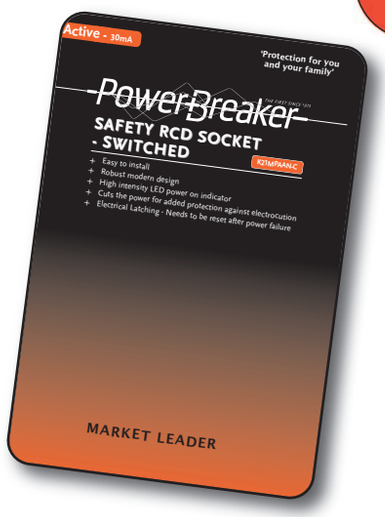


10mA trip current RCD gives a high level of protection - An Ideal application for Schools, Nurserys, Hospitals & outdoor areas

RCD Sockets - Switched 30mA
Active



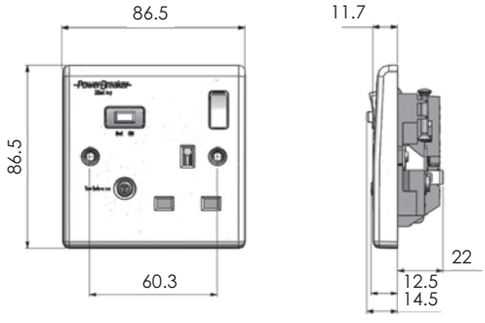
- Electrical latching - Needs to be reset after power failure
- High intensity LED power on indicator
- Individually switched socket outputs
- Twin sockets fitted with twin earth terminals

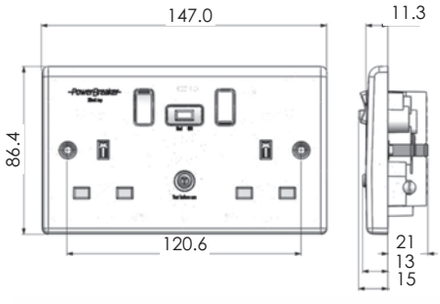


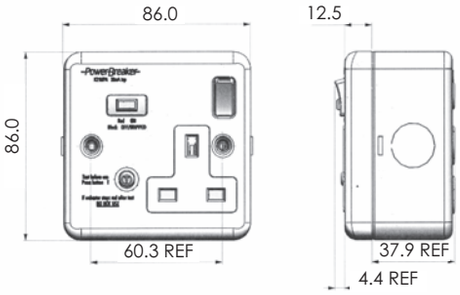
Technical Data

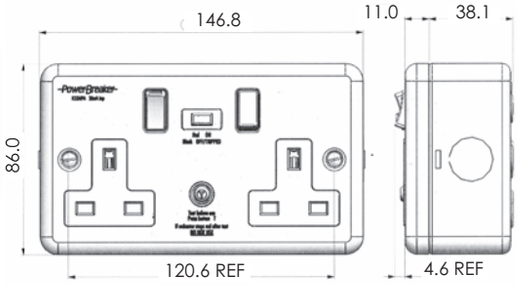
Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	30mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Electrical, needs to be reset after power failure (Active)
Responsive to	Pulsating DC earth faults
Conforms to	BS 7288:1990, Amd 1 and BS 1363-2:1995 Amd 1-3
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

Part No	Description
K21WPAAN-C	RCD Single Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K22WPAAN-C	RCD Twin Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K21MPAAN-C	RCD Single Switched Socket Complete with metal backbox
K22MPAAN-C	RCD Twin Switched Socket Complete with metal backbox









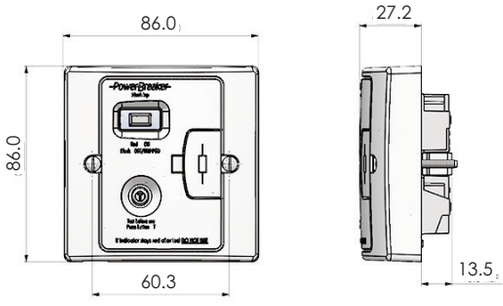
RCD Fused Spurs - 30mA
Active

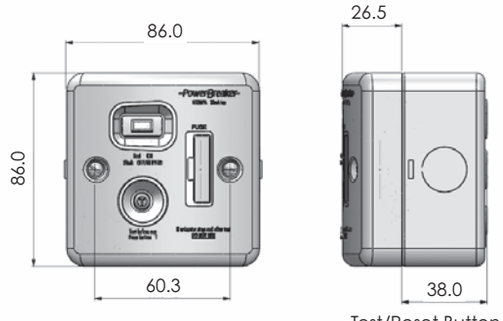
- Electrical latching - Needs to be reset after power failure
- High intensity LED power on indicator, clear visual indicator of power on
- Mechanical flag trip indicator
- Integral cord outlet and cable clamp
- Fuse holder can be locked out for safety
- Twin earth terminals

Technical Data

Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	30mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Electrical, needs to be reset after power failure (Active)
Responsive to	Pulsating DC earth faults
Conforms to	BS 1363-4:1995 Amd 1, 2, 3 and BS 7288:1990 Amd 1
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

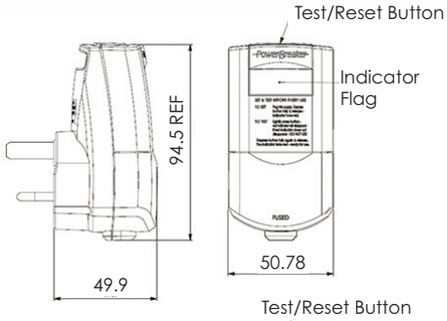
Part No	Description
H92WPAAN-C	RCD Fused Spur Scratch resistant urea front plate Fits 25mm standard back box
H92MPAAN-C	RCD Fused Spur Complete with metal back box

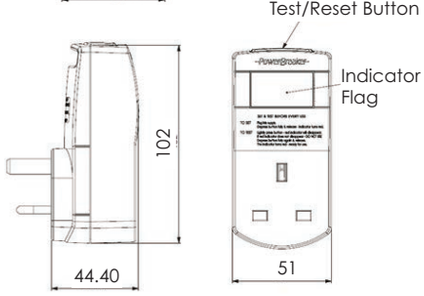




RCD Plug & Adaptor - 30mA

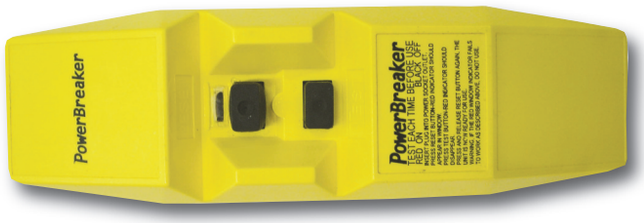
Part No	Description
J72A-C	RCD Plug Single button test/reset operation Large easy to see trip indicator Typical trip speed <40mS Conforms to: BS 7071:1992, EN 61543:1995
J02A-C	RCD Adaptor Single button test/reset operation Large easy to see trip indicator Typical trip speed <40mS Conforms to: BS 7071:1992, EN 61543:1995





RCD In-line - 30mA
Active

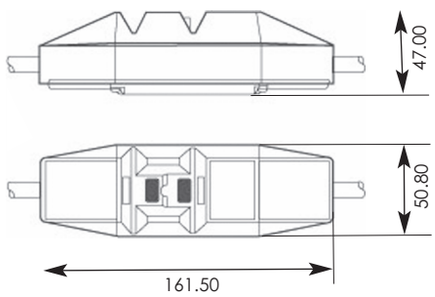
- Suitable for BS/European power supply systems
- Robust construction
- Mechanical flag to indicate contact position
- Double pole breaking
- Separate test and reset buttons

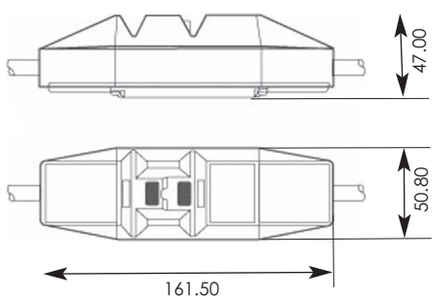


Technical Data

Rated trip current	30mA
Typical trip speed	<40mS
RCD contact break	Double pole
Latching	Electrical. Needs resetting after power loss (Active)
Responsive to	Pulsating DC earth faults
Conforms to	IEC 61540

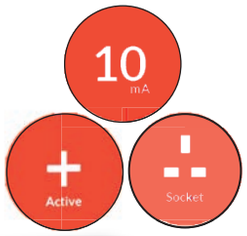
Part No	Description
J62-T	In-Line RCD Heavy Duty, IP65 Re-wirable terminals 230V AC 50Hz Max operating current 16A
J62-Y	In-Line RCD Heavy Duty, IP65 Re-wirable terminals 110V AC 50Hz Max operating current 16A





The J62 provides added personal protection against electrocution when using electrical equipment in adverse conditions, such as building sites, plant applications & industrial manufacturing.

RCD Sockets - Switched 10mA
Active



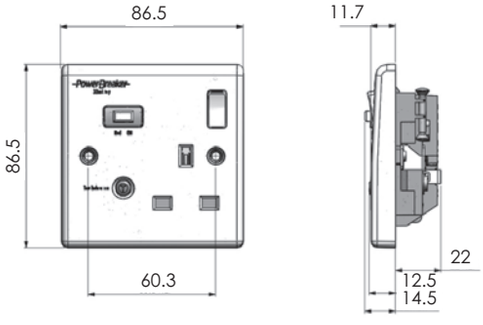
- Electrical latching - Needs to be reset after power failure
- High intensity LED power on indicator
- Individually switched socket outputs
- Twin sockets fitted with twin earth terminals

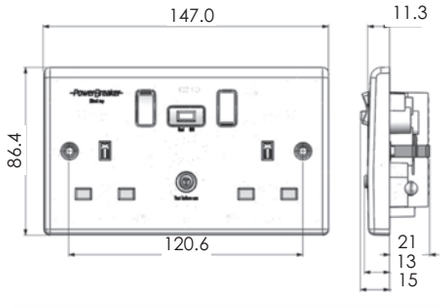
Technical Data

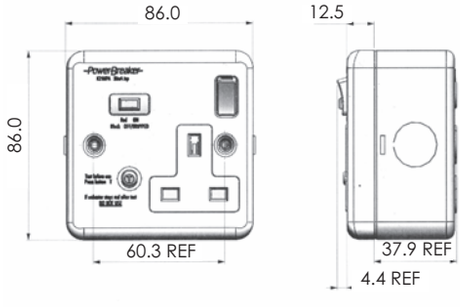
Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	10mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Electrical, needs to be reset after power failure (Active)
Responsive to	Pulsating DC earth faults
Conforms to	BS 7288:1990, Amd 1 and BS 1363-2:1995 Amd 1-3
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

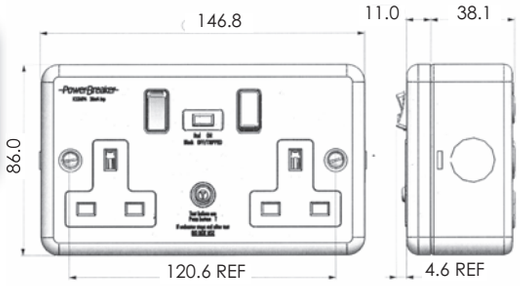
'Super Sensitive – 10mA'

Part No	Description
K21WPAAN10-C	RCD Single Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K22WPAAN10-C	RCD Twin Switched Socket Slim profile Moulded front plate Fits standard 25mm back box
K21MPAAN10-C	RCD Single Switched Socket Complete with metal backbox
K22MPAAN10-C	RCD Twin Switched Socket Complete with metal backbox









RCD Fused Spurs - 10mA
Active

10 mA

+ Active

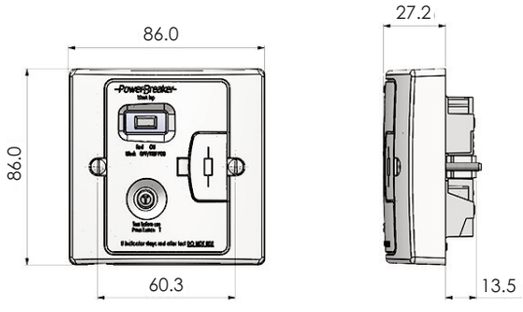
- Electrical latching - Needs to be reset after power failure
- High intensity LED power on indicator, clear visual indicator of power on
- Mechanical flag trip indicator
- Integral cord outlet and cable clamp
- Fuse holder can be locked out for safety
- Twin earth terminals

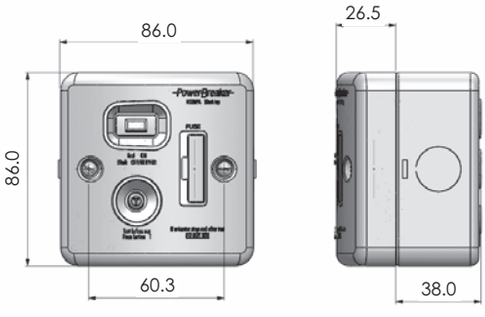
‘Super Sensitive – 10mA’

Technical Data

Voltage	230V AC ~ 50Hz
Max operating current	13A (13A inductive)
Rated trip current	10mA
Typical trip speed	Less than 20mS (typical)
RCD contact break	Double pole
Latching	Electrical, needs to be reset after power failure (Active)
Responsive to	Pulsating DC earth faults
Conforms to	BS 1363-4:1995 Amd 1, 2, 3 and BS 7288:1990 Amd 1
EMC Emissions	EN 55014-1:2006 & EN 55014-1:2000 inc A1:2001 & A2:2002
EMC Immunity	EN 61543:1996 inc A11:2003, A12:2005 & A2:2006

Part No	Description
H92WPAAN10-C	RCD Fused Spur Scratch resistant urea front plate Fits 25mm standard back box
H92MPAAN10-C	RCD Fused Spur Complete with metal back box





PowerBreaker PROTEKT

See the main GreenBrook Website www.greenbrook.co.uk for our IP66 Weatherproof Range incorporating ‘PowerBreaker’ RCD technology

Legislation & Code of Practice

Guidelines in the UK

Here in the UK, there is a growing body of legislation, regulations, codes of practice and recommendations which is accelerating the rate of adoption of RCDs and widening considerably their areas of application. The 17th Wiring Regulations dictates a trend which is clear and cannot be ignored.

Health and Safety at Work Act 1974

The Health and Safety at Work Act 1974 and the Electricity at Work Regulations 1989 are statutory documents and non-compliance constitutes a criminal offence.

Electricity at Work Regulations 1989

Because of the wide range of work covered by the regulations, the requirements are framed in general terms. However, the Memorandum of Guidance on the above regulations, a clear case is made for using RCDs as an additional safeguard for earthing (Reg 8). Also under clause 12 (isolation), it advises that the use of RCDs will meet the provision of isolation.

IET Wiring Regulations 2008 - Amendment 3 = 2015

Although BS 7671 (2008) (Other wise known as the 17th Edition IET Wiring Regulations) is a guidance document in the event of an accident, failure to comply could result in prosecution by the HSE. The HSE also accepts that compliance with BS 7671 also gives compliance with The Electricity at Work Act.

a) Fault Protection

Chapter 411.1 (ii) States that Fault protection is provided by protective earthing, protective equipotential bonding and automatic disconnection in case of a fault, in accordance with Regulations 411.3 to 411.6.

Chapter 411.4.7 confirms that if an RCD is used to provide fault protection, it is not necessary to undertake the disconnection calculations required for overcurrent devices. The values specified in Table 41.1 may be used. An RCD will always trip within 0.2 seconds.

b) Basic Protection

Chapter 411.1 (i) States that basic protection is provided by basic insulation of live parts or by barriers or enclosures, in accordance with section 416 or where appropriate, section 417 (Obstacles; placing out of reach)

c) Construction Site Installations

704.410.3.10 states that a circuit supplying a socket-outlet with a rated current up to and including 32A and any other circuit supplying handheld electrical equipment with rated current up to and including 32A shall be protected by:

i) Reduced low voltage (Regulation 411.8), or

ii)Automatic disconnection of supply (Section 411) with additional protection provided by an RCD having the characteristics specified in Regulation 415.1.1, or

iii) Electrical separation of circuits (Section 413), each socket-outlet and item of handheld electrical equipment being supplied by an individual transformer or by a separate winding of a transformer, or

iv) SELV or PELV (Section 414)

d) Caravans

Chapter 721.411.1 - States where protection by automatic disconnection of supply is used, an RCD or RCBO complying with BS EN 61008-1 or BS EN 61009 interrupting all live conductors shall be provided having the characteristics specified in Regulation 415.1.1, and the wiring system shall include a circuit protective conductor which shall be connected to:

i) The protective contact of the inlet, and
ii) The exposed conductive parts of the electrical equipment, and
iii) The protective contacts of the socket outlets

e) Swimming Pools

Chapter 702.55.1 states that in zones 0 and 1, it is only permitted to install fixed current using equipment specifically designed for use in a swimming pool, in accordance with the requirements of Regulations 702.55.2 and 702.55.4.

Equipment which is intended to be in operation only when people are outside zone 0 may be used in all zones provided that it is supplied by a circuit protected according to Regulation 702.410.3.4.

It is permitted to install an electric heating unit embedded in the floor, provided that it:

i) Is protected by SELV (Section 414), the source of SELV being installed outside zones 0, 1 and 2. However, it is permitted to install the source of SELV in zone 2 if its supply circuit is protected by an RCD having the characteristics specified in Regulation 415.1.1.

f) Agriculture and Horticultural Premises

Chapter 705.411.1 States that circuits supplying socket outlets shall be RCD protected.

g) Functional Testing of RCDs

'Regulation 612.13.1' - states that where protection and/or additional protection is to be provided by an RCD, the effectiveness of any test facility incorporated in the device shall be verified. Frequency of testing can vary between RCD types. Any Residual Current Devices (RCDs) should be operated by means of the test button at least monthly to ensure that they remain effective. The table below gives the required trip times to comply with BS 7071 for portable RCDs and BS 7288 for RCD Socket outlets.

Fault Current	0.5 x I_n	1 x I_n	5 x I_n
Trip Time	No trip permissible	<200mS	<40mS

Where 'I_n' is the rated trip current of the RCD in milliamps.

Health & Safety Executive

Where greater guidance is deemed necessary, the HSE issue notes to assist. The following are relevant but not comprehensive:

a) GS 50 (2014) - It is recommended that sockets being used by entertainers be RCD protected.

b) PM 32 (Nov 1990) - Safe Use of Portable Electrical Apparatus allows the use of RCD protection for portable electrical apparatus.

c) HSG 261 (2009) - Health and safety in motor vehicle repair and associated industries*-

Sockets for equipment in wet or damp environments must be protected by a residual current device (RCD) of 30 mA/40 ms specification or an earth-monitoring device in the electrical supply to the device. The RCD must be trip-tested at appropriate intervals.

d) HSG220 (2014) - Health and Safety in Care Homes*

- Calls for outdoor portable equipment to be protected by RCDs.

e) HS(G) 55 (1991) - Health and Safety in Kitchens and Food Preparation Areas*

Calls for RCD protection for pressure washing units and steam cleaners

f) HSE PM 29 I1995) - Electrical Risks from Steam/Water Pressure Cleaners*

Calls for portable equipment to be protected by an RCD

g) HS(G) 41 - Petrol Filling Stations*

174: Protective multiple earthing suggests that where part of a larger installation, a filling station should be provided with its own earth (TT installation). It should then have its own RCD protection.

200: Portable and transportable equipment. Where voltages above 10 volts are supplied an RCD rated 30mA should be provided.

216: General (Protection against electrical shock). All circuits feeding equipment on the forecourt must be disconnected in a time not exceeding 200mS in event of the occurrence of an earth fault.

*Note. As these are areas of increased risk, please refer to BS7671 (17th Edition) Regulation 411

Department of Education

(In Building Bulletin 76)

Maintenance of Electrical Services (1992) suggests:

- A higher standard of electrical protection can be achieved through the use of RCDs
- Safety features, such as RCDs are of paramount importance
- A policy of fitting RCDs in all halls in educational premises should be adopted, if to be used for public performances, etc.
- All external socket outlets and outlets which will supply equipment to be used outdoors should be protected by an RCD.
- Socket outlets in plant areas should be protected by RCDs

In areas used for drama performance: The entire power systems and stage lighting system (potentially one of the greatest sources of danger

of electrical shock in educational premises) should be protected by RCDs

BS 6396 Electrical Systems in Office Furniture and Office Screens

"It is preferred that multiple socket outlets are protected by an RCD"

BS 7036 Provision and Installation of Safety Devices for Automatic Power Operated Pedestrian Door Systems

"RCD protection should be provided so as to minimise electrical faults developing the risk of electrical shock and fires".

Brewers Society - guidance for licensees

While the guidance refers the reader to compliance with the Electricity at Work Regulations, it is relevant to point out that parts of licensed premises are areas of increased risk and reference should be made to BS 7671 (17th Edition), Regulation 411. The HSE document GS 50 may also be relevant.

Consumer Safety Unit

Business Innovation & Skills recognise that RCDs are an essential contribution to home safety. In previous consumer research with RCDs, it was estimated that 200 hospital related injuries and 25 deaths each year were caused by electrical currents. Combine this with the 5,000 fires that are started due to electrical fault, resulting in 20 deaths and 500 casualties, and the new regulations demonstrate the full potential of RCD protection.

IET Codes of practice for in-service inspections and testing of electrical equipment

The length of extension leads should not exceed the following:

Extension leads exceeding the above lengths should be fitted with a 30mA RCD manufactured to BS 7071.

Core area	Maximum length
1.25mm^2	12 metres
1.5mm^2	15 metres
2.5mm^2	25 metres

Cable reels must be used within their reeled or unreeled ratings as appropriate.

Product Liability

Manufacturers are required to ensure that their products are virtually foolproof to install and use. This takes particularly strong demands on electrical equipment manufacturers.

Most electrical accidents are caused by damaged or worn cables, or loose connections, and many electric appliances are now double-insulated, giving a limited degree of protection. The careless use of some equipment, such as lawnmowers, hedgetrimmers and power tools, however, can result in damage to their own cables. Appliances using water as a cleaning medium (e.g. floor scrubbers, washing machines and dish washers) can become live as a result of water spillage or leaks.

The increase in product liability legislation has already convinced some manufacturers to fit RCDs to their equipment as standard, or to offer them as accessories. This practice is likely to grow and companies which ignore the trend will do so at risk to the future of their business.

Conclusion

The use of RCDs in the UK is already widespread and is set to increase as installations are refurbished and designed to comply with the 17th Wiring Regulations and other relevant legislation. Having foreseen these trends some years ago, GreenBrook Electrical has developed new generation technology to secure its position as the leading UK supplier of RCDs. Not only does GreenBrook Electrical have a comprehensive range of RCDs, but several items present unique and innovative solutions to satisfy the users requirements.

Manufactured to the highest standards with strict quality control procedures, PowerBreaker© RCDs are designed for long, reliable life. Supported by a nationwide network of electrical wholesalers and unparalleled marketing programmes, these top quality products satisfy the needs of virtually every type of application.

In its commitment to the highest levels of customer service and user safety, GreenBrook Electrical continues to provide specialist advice regarding the installation and application of RCDs across the broad spectrum of industrial, commercial and domestic installations.

The 17th edition RCD Regulations

Regulation 415.1 *- Additional Protection by RCD*
If an RCD is used to provide additional protection, the RCD must have a rated residual operating current not exceeding 30mA, and an operating time not exceeding 40mS at 5 times the rated current.

Regulation 411.3.3 *- Socket Outlets*
The socket outlets up to 20A and the mobile equipment up to 32A for use outdoors in all types of installations, including commercial, domestic and industrial, will need to be protected by 30mA RCD, in accordance with Regulation 415.1 unless risk assessment can determine that it is not necessary.

Regulation 701.411.3.3 *- Locations containing a bath or shower*
It requires all low voltage circuits serving and all low voltage passing through zones1 and 2 not serving the location to be RCD protected.

Regulation 522.6.202 & 522.6.203 *- Cable concealed in walls or partitions*
It is required that cables that are concealed in a wall or partition (at a depth of less than 50mm) are protected by a 30mA RCD for all installations if other methods of protection, including the use of cables with either an earthed metallic covering or mechanical protection, are not employed.

Irrespective of the depth of buried cable, a cable concealed in a wall or partition, the internal construction of which includes metallic parts, other than metallic fixings such as nails/screws shall be provided with additional protection of RCD.

PowerBreaker Certification

All GreenBrook PowerBreaker RCDs are certified by the INDEPENDENT UK TEST HOUSE (NEMKO LTD) to comply to all the latest standards.

PowerBreaker THE FIRST SINCE 1975

'Have gone above and beyond the necessary standards ensuring your safety is our only priority'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TEST CERTIFICATE
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Dealer Stamp

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