

ROLECEV

TruePEN

PME Fault Detection

Rolec's TruePEN system provides customers with a safer and compliant electric vehicle charging solution, ensuring that current regulations are met. The built-in TruePEN PME fault detection allows for a cost-effective and quicker installation process, without the requirement for an earth electrode/rod.

*Safer by design*

# Why Rolec EV have developed TruePEN?

The inclusion of PEN fault detection within the IET Wiring Regulations allowed for a lower cost alternative to the ground rod and following this many PEN solutions quickly appeared.

However not all conform to regulations with High and Low voltage detection thresholds out of tolerance and only live and neutral being isolated.

(Some non-UK markets support High and Low voltage detection but this can be misinterpreted as PEN fault detection/protection)

We started our internal research and development to precisely meet the regulations and therefore implement a true PEN solution. On our path we confirmed repeatability and tolerance over the environmental operating range and tested electro-magnetic compliance to ensure safety is not compromised.



## No earth rod required

EV chargepoints with built-in PME fault detection, saving on installation time and costs.



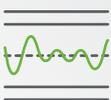
## Provides PME fault detection

Meets IET Wiring Regulations, conforming to high and low voltage detection thresholds.



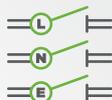
## Suitable for all home & business installations

Fitted within all Rolec EV chargepoints for safe installations at domestic and commercial locations



## Monitors 230V & 240V supplies

Automatically monitors the voltage on both supplies without the need for any manual dipswitch settings.



## Isolates Live, Neutral & Earth

If over-voltage or under-voltage occurs, L N & E are isolated within 5 seconds of detection.



## Saves on installation costs & time

PEN fault detection eliminates the need for costly and timely earth electrode installation.

# What is PME fault detection?

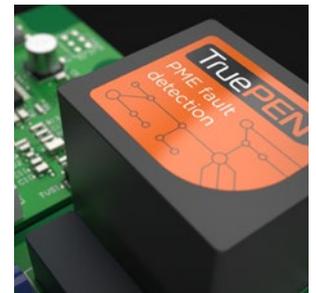
A Protective Multiple Earth (PME) system is wired in many UK premises. In a PME system, the building's earth wiring is connected to the neutral conductor at the mains supply connection point entering the property. The combined Protective Earth and Neutral (PEN) is then earthed multiple times on its route back to the sub-station. The low impedance path provided between neutral, and earth ensures RCDs fitted in the consumer unit reliably detect earth faults.

If an EV chargepoint is installed, it is connected to the same point, allowing the PEN conductor to provide connection back to earth.

A possible fault condition in a PME system occurs when, due to a break in the PEN conductor, appliances within the property appear to be dead. However, if a device is turned ON, the neutral will rise to the live potential, and so too will earth as this is also connected to the house neutral. Under this fault condition, RCDs no longer provide fault protection.

Inside the property, the danger is low as no potential difference exists between the live, neutral and earth conductors to do any harm. However, if a vehicle is connected to the chargepoint and earthed inside the property, this provides high risk of electric shock due to the potential difference between vehicle chassis and external ground. If a person stood on the ground touches the vehicle chassis, they could complete the earth's path to ground and experience an electric shock.

The 18th Edition of the IET Wiring Regulations (BS7671:2018) addressed this problem under clause 722.411.4.1 on the installation of EV chargepoints for domestic installations. Protecting a person in the event of this fault condition can be achieved by installation of an earth rod at the chargepoint, or through PEN fault detection and isolation of vehicle from home live, neutral and earth. The latter is often preferred due to low cost and easy fitment.



**TruePEN** is the low cost, labour effective solution to meeting regulatory requirements when fitted to a charge point to a PME system

# The TruePEN System

Following power on, TruePEN monitors the supply voltage for 5 seconds and determines if the voltage is within normal operating range. (No differentiation is necessary between 230V or 240V supply).

If out of limits a PEN fault condition is activated. To clear, the supply must return within normal operating limits, and may also require a power off/on cycle should the cause have been an over-voltage condition.

If within normal operating range TruePEN allows connection of live, neutral and earth to the vehicle, and continues to monitor the supply.

If the voltage drops below 207V and does not return for up to 5 seconds, a PEN fault condition is tripped and live, neutral and earth connections are removed from the vehicle.

However, a voltage dip could also cause the same fault condition. Therefore TruePEN continuously monitors the supply health and if it returns to within normal operating range, automatically allows reconnection of live, neutral and earth to the vehicle.

(The one-minute delay ensures no adverse oscillation on contactors in the event of vehicle load removal bringing the supply back within limits.)

The charge session can then resume without manual intervention and the EV driver is not inconvenienced.

If the voltage rises above 253V and does not return for up to 5 seconds, a PEN fault condition is tripped and live, neutral and earth connections are removed from the vehicle.

An over-voltage condition is potentially more likely to damage the vehicle so, for safety reasons, automatic recovery following an over-voltage is NOT provided and charging cannot resume until a manual reset is performed.

Following an over-voltage condition, EV drivers are advised to investigate as far as they are able to do so, the reasons for the over-voltage condition and to check their vehicle for correct operation.

Occasional over-voltage conditions may simply be caused by fluctuations in the supply but if they are frequent, the cause should be investigated by an appropriately qualified and experienced electrical engineer and/or the electricity supply company.



## Why choose TruePEN?

	TruePEN	Other Devices
Automatically monitors the supply voltage on both 230V & 240V supplies	✓	?
If an under-voltage of <207V or over-voltage of >253V occurs, Live, Neutral & Earth are isolated within 5 seconds	✓	?
After an under-voltage isolation, the PME fault detection automatically resets	✓	?
After an over-voltage isolation, on the grounds of safety, the PME fault detection requires a manual reset	✓	?



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The latest version of this publication can be downloaded at <https://www.rolecserv.com/downloads-ev-charging>

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Manufactured  
in the UK

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**ROLEC**EV

t: 01205 724754

e: [enquiries@rolecserv.co.uk](mailto:enquiries@rolecserv.co.uk)

[www.rolecserv.com](http://www.rolecserv.com)

