Pulsar Plus

Earthing Protection

Version	1.1
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Distribution	Non-restricted

Version history

Version	Date	Author	Changes
1.0	May 4th 2020	P. Górriz	First issue
1.1	May 19th 2020	P. Górriz	Review

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1. Scope

Wall Box Chargers, S.L., hereunder “Wallbox”, as Electric Vehicle Charging Station designer and manufacturer, designs and manufactures EVSEs and provides a platform to manage and monitor the Wallbox EVSEs.

This document describes and explains how the earthing protection feature, implemented in the Pulsar Plus charger, performs the protective actions mentioned in the BS 7671:2018.

2. Rationale

Wallbox, as a designer and manufacturer of EVSE, aims to provide the best charging experience under the believe that design is not a luxury and the principle that we innovate to make things simpler.

In the UK region, the PME system facilities are common on dwelling installation. In addition, the BS 7671:2018 states that under a PME earthing facility, no charging installation shall use this as an earthing arrangement unless protective means are provided, enumerated under the clause 722.411.4.1.

Afterwards, on February 1st, 2020, an amendment was released, adding more alternatives for protective measures.

3. Protective measures

Wallbox has designed and implemented a protective measure in line with the BS 7671:2018 amendment1:2020, under the clause 722.411.4.1(iv) which states:

Protection against electric shock in a single phase installation is provided by a device which electrically disconnects the vehicle from the live conductors of the supply and from protective earth in accordance with regulation 543.3.3.101 (ii) within 5 s in the event of the utilisation voltage at the charging point, between the line and neutral conductors, being greater that 253 V rms or less than 207 V rms. The device shall provide isolation and be selected in accordance with Table 537.4. Equivalent means of functionality could be included within the charging equipment. Closing or resetting of the device shall be possible only if the voltage between line and neutral conductors is in the range 207 to 253 V rms.

IMPORTANT NOTE: this charger perform as expected on single-phase installations only. A single-phase supply on a 3-phase installation is not permitted.

For further information regarding the installation of the Pulsar Plus, visit the *Wallbox Academy* under the following link.

4. Performance

As the amendment states, when the voltage between the line and the neutral surpasses a certain range, the charger shall trip and open any contactor or relay so any load below the charger is isolated (for example, the car).

4.1. Implementation

The measurement of the voltage between line and neutral was already present in the Pulsar Plus. In this variant, a set of limits controlled by software are applied according to the BS 7671.

To avoid any false negative, the tripping zone considers safe tolerances, resulting in the following:

Higher voltage acceptable	253 V
Tripping zone	≥ 248 V
Lower voltage acceptable	207 V
Tripping zone	≤ 212 V

This means that when the voltage measured by the chargers is within the tripping zone, it can trip in the following fashion: the closer to the limit the higher the probability to trip.

Of course, once the limit stated by the BS 7671 is reached, the charger always trips.

4.1.1. What happens when the charger is powered on?

Once it boots, the charger provides isolation; it awaits the voltage measures to be stabilized. Afterwards, it reads the voltage measurements for 4 seconds in a row and evaluates the results.

- If there are more reads within the allowed range, it is considered a safe scenario and the charger goes to ready mode and the halo turns green. Then the Protective Earth is connected to the charger and to the charging cable.
- On the contrary, it is considered a PEN fault scenario; the charger goes to error mode and the halo turns red.

4.1.2. What happens during runtime?

The charger is constantly evaluating the voltage between the line and the neutral. In slots of a second, the charger determines if it is under the PEN fault scenario or the safe scenario. Following the BS 7671:2018 amendment1:2020, the charger trips not after 5 seconds being in a PEN fault.

4.1.3. What happens when a PEN fault occurs?

If a PEN fault occurs and the charger trips, it is notified by turning the halo's colour red.
If so, the charger stays in error mode until someone manually resets de charger. This action can be done

1. by powering off and on the charger
2. with the myWallbox App or
3. through the myWallbox portal

The restart can be done remotely for point 2 and 3, only if the charger is connected online.

5. Service

For further questions or doubts contact us at:

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