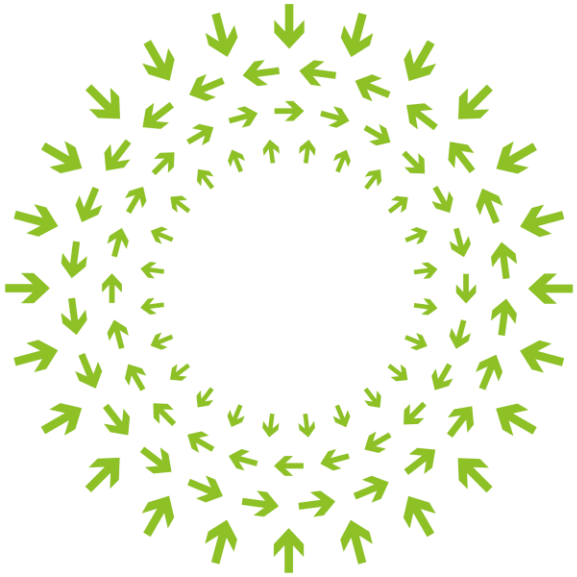

OPEN

Compute Project

OCtoPower Smart PDU

Rev. 0.92

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2. Scope

This document defines the technical specifications for 2CRSI's AC power distribution units used in the Open Compute Project "Rack & Power".

3. Overview

2CRSI has developed a new **power distribution unit** for the Open Compute Project with the implementation of a **current monitoring solution.** There are two symmetrical PDU installed on the rear frame side of the OCP Open Rack. Each one is equipped with a current monitoring module that allow the data center to monitor the exact power consumption of each AC input and even each power line (L1, L2, L3).

There are two model of each AC PDU (left and right):

- EU model:
  - Input: 400Vac RMS 3-phase WYE, 5 wires (L1, L2, L3, Neutral, Ground)
  - Outputs: 3x 230Vac RMS 1-phase, 3 wires (L1, Neutral, Ground)
- US model:
  - Input: 208Vac RMS 3-phase WYE, 4 wires (L1, L2, L3, Ground)
  - Outputs: 3x 120Vac RMS 1-phase, 3 wires (Line to line and Ground)

4. Rack compatibility

These PDU are designed to be compatible with the Open Rack Standard specification V1.2

5. Physical overview

Figure 1: OCP Open Rack V1 with two PDU (EU model)

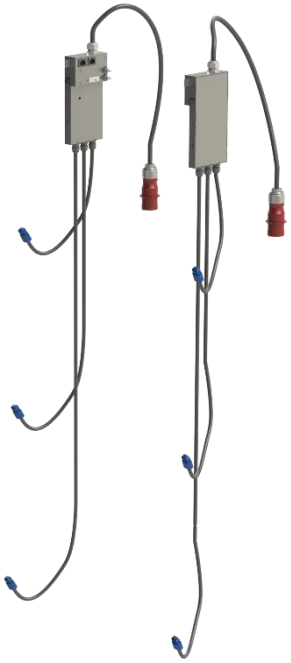


Figure 2: Two PDU (EU model)

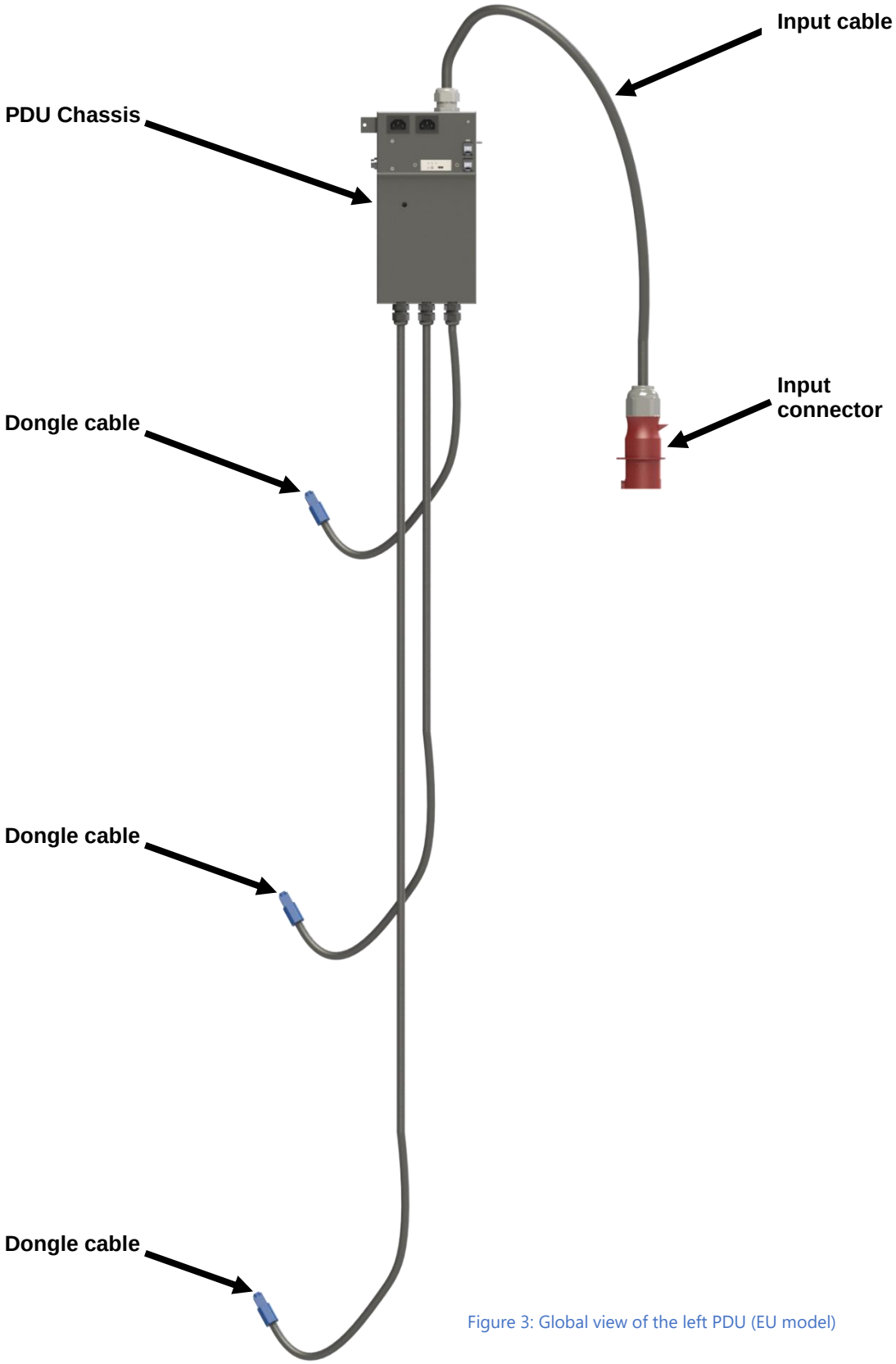


Figure 3: Global view of the left PDU (EU model)

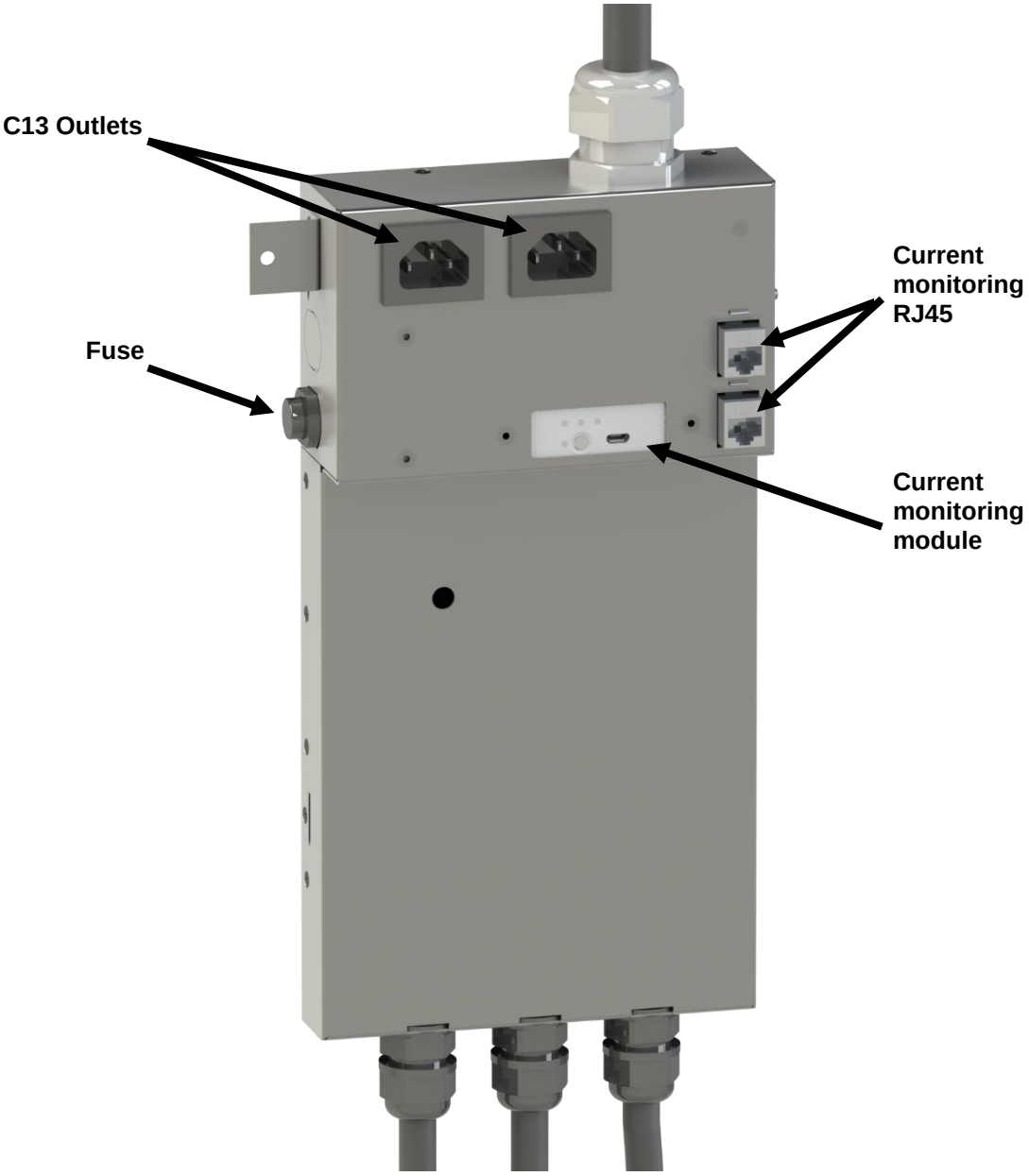
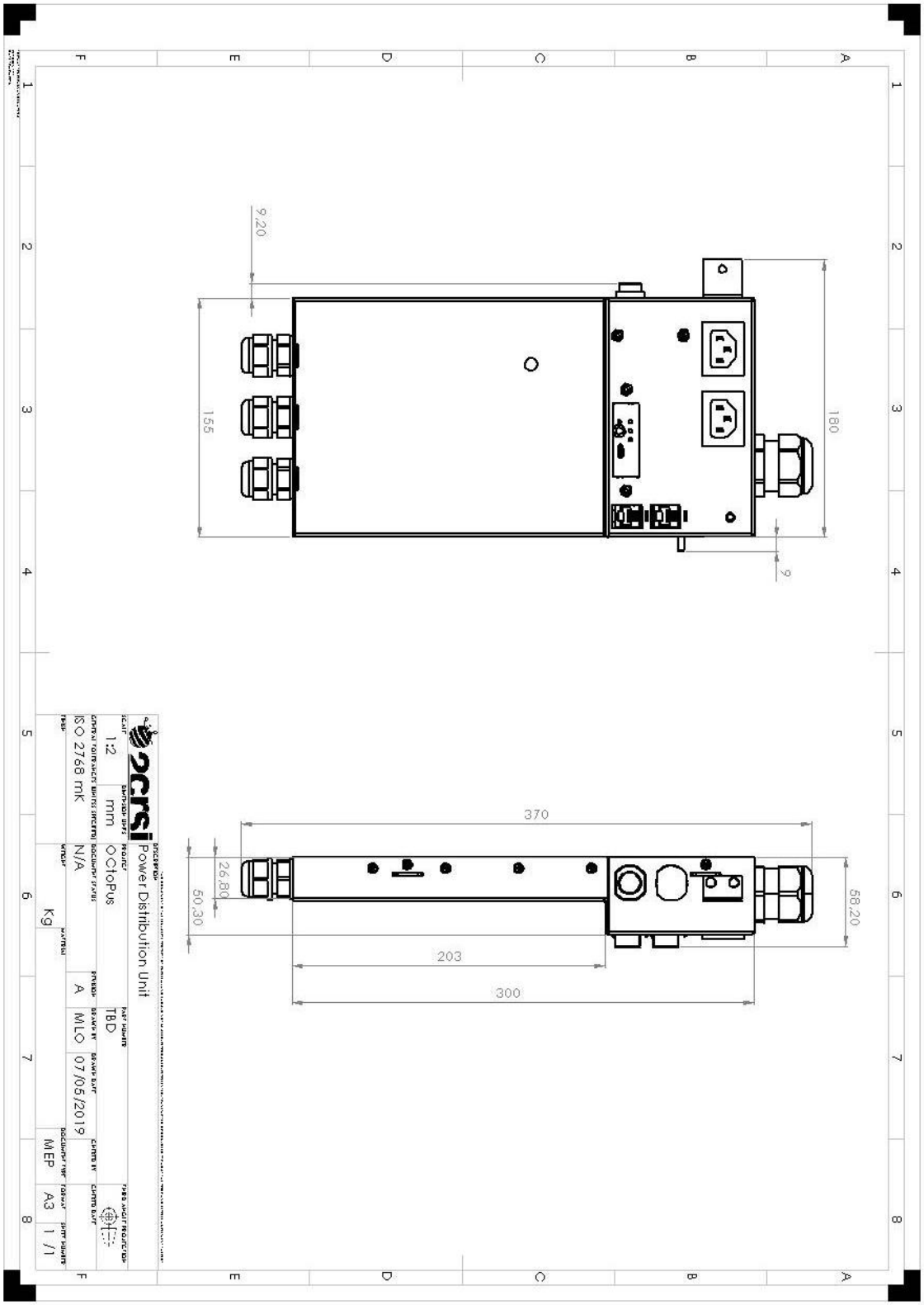


Figure 4: Detailed view of the left PDU (EU model)


9.20
155
180
9
370
26.80
50.30
58.20
203
300
Power Distribution Unit
OCtoPus
TBD
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ISO 2768 mK
N/A
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A
MLO
07/05/2019
MEP
A3
1 /1

6. Input

1.1. Input for EU and US model

	EU	US
Input voltage	400Vac, 50 ~ 60 Hz	208Vac, 50 ~ 60 Hz
Wiring	3 phases WYE	3 phases WYE
Input current per phase	32A at 40°C ambient temp.	TBDA at 30°C ambient temp.
Connector	IEC 309 5 pole 32A plug	TBD
Cable	6mm², 5 conductors, 450Vac	16mm², 5 conductors, 450Vac
Cable length	4 meters	4 meters

1.2. Grounding Scheme

The ground wire, available at the input AC plug inside the PDU, is directly connected to the ground terminal block. From this terminal block, the ground is connected, using a dedicated cable, to the chassis using a threaded stud and a nut. The dongle cables and outlets are also connected to this ground terminal block.

7. Outputs

The 5-wires of a three-phase system are normally named as follows:

- Line1 (L1) is denominated X (US) and R (EU)
- Line2 (L2) is denominated Y (US) and S (EU)
- Line3 (L3) is denominated Z (US) and T (EU)
- The neutral is denominated W (US) and N (EU)
- The ground is denominated G or GND

1.3. Dongle cables for EU and US model

There are 3 dongle cables per PDU.

	EU	US
Input voltage	230Vac, 50 ~ 60 Hz	208Vac, 50 ~ 60 Hz
Wiring	1 phase per dongle cable	2 phases per dongle cable
Input current per phase	30A at 50°C ambient temp.	30A at 50°C ambient temp.
Connector	3 contacts specific connector[1]	3 contacts specific connector[1]
Cable	6mm², 3 conductors, 450Vac	6mm², 3 conductors, 450Vac
Cable length	TBD meters	TBD meters

3 contacts specific connector[1]: Dongles cable are terminated by a 3 contacts connector from POSITRONIC.

Housing ref: PLB3W3F0050/AA
Contact ref: FC610N2/AA

1.4. C13 outlets

There are two C13 AC outlet on EU and US left PDU.

There is one C13 AC outlet on EU and US right PDU.

	EU	US
Input voltage	230Vac, 50 ~ 60 Hz	208Vac, 50 ~ 60 Hz
Wiring	1 phase per outlet	2 phases per outlet
Max current[2]	10A	10A
Connector	IEC 60320-3 C13	IEC 60320-3 C13

Max current[2]: 10A max total, for the single socket or for the pair.

8. Fuses

Each AC outlet is protected by one or two fuses depending on the model of PDU, EU or US.

Fuse specification: 10A, 300V

For EU left PDU, the two outlets are protected by one fuse. One phase cable is connected to one outlet then the power is distributed from this outlet to the other outlet.

For EU right PDU, the single outlet is protected by one fuse.

For US left PDU, the two outlets are protected by two fuses. Two phase cable are connected to one outlet then the power is distributed from this outlet to the other outlet. Two fuses are protecting theses 2 outlets.

For US right PDU, the single outlet is protected by two fuses. Each AC line connected to the connector is connected to a fuse.

9. Power terminal blocks

Each wire coming from the main input cable is connected to its own power terminal block.

For US model, there is no neutral wire nor neutral power terminal block.

	EU	US
Line 1	x	x
Line 2	x	x
Line 3	x	x
Neutral	x	
Ground	x	x

10. Power monitoring

1.5. Overview

Altogether, the DIRIS Digiware system is designed for monitoring and reporting electrical energy by offering a range of functions for measuring voltage, current, power, energy and power quality. It can be used to jointly analyze single-phase and three-phase loads. DIRIS Digiware is an innovative concept based on centralizing the voltage measurement by a dedicated DIRIS Digiware U module and the current by dedicated DIRIS Digiware I or S modules. The voltage and current measurements are interconnected by the Digiware bus. On DIRIS Digiware S modules, three current inputs are available enabling one or several loads to be monitored simultaneously. Several modules may be connected to the Digiware bus. This approach offers the possibility of characterizing a high number of loads from a single voltage tap.

1.6. Deployment

Each PDU is equipped with a 3-phase current sensor that measure the current consumption on each AC phase (L1, L2, L3), for each rack and each power input.

A single voltage sensor integrated to the electrical installation of the datacenter is needed for each power feed. It can work both 3-phase (Delta) and 3-phase+neutral (Wye) systems. Based on the voltage measurement, each current sensor can provide a real power reading and optional quality metrics (frequency, out of phase, cos(phi), THD, harmonics measurement, etc.)

In order to use 2CRSI's OCtoPower Smart PDU, it is mandatory to deploy the full DIRIS Digiware package. This package includes one Display (D-xx) or one communication module (C-xx), a voltage tap (U-xx) and a 24V power supply (P15).

Whenever the power consumption is higher than 15 W or the distance is greater than 100 m, a DIRIS Digiware C-32 repeater is required. In a DIRIS Digiware system, a maximum of 2 repeaters may be used.

The following schematic shows the connections between DIRIS Digiware S-xxx module (circled in red), included in the power distribution unit made by 2CRSI, and the other components of a full DIRIS Digiware system.

Please see the "DIRIS Digiware S Instruction Manual" for full information on DIRIS Digiware system deployment.

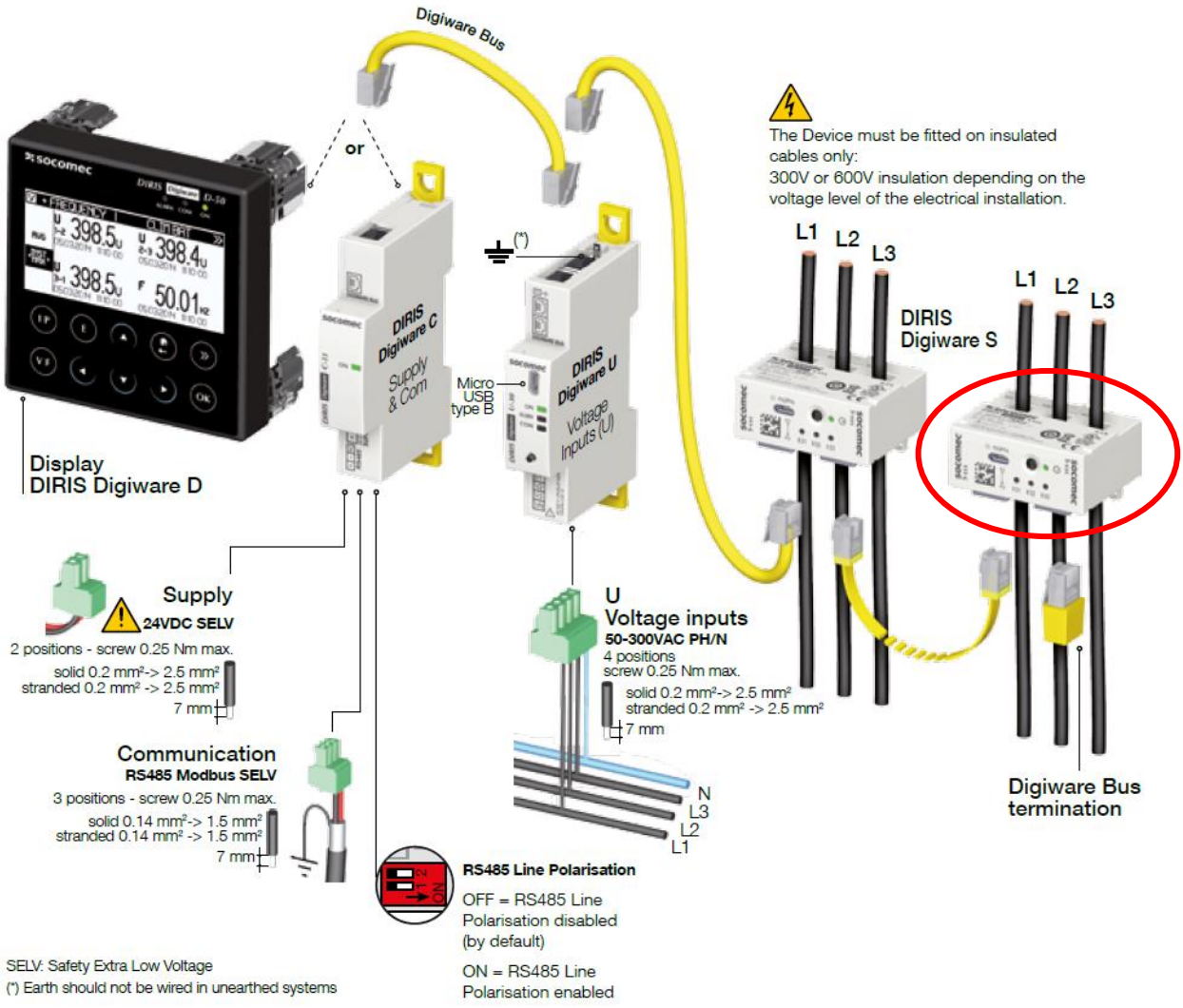

Figure 6: DIRIS Digiware S connection schematic