



# USER MANUAL

## CSP1+ High Accuracy Model: SCC20-VB

### Mains Powered CT Current Sensor with P1 output

Copyright © XEMEX

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the publisher.

**E** [info@xemex.eu](mailto:info@xemex.eu)  
**T** +32 (0)3 201 95 95  
**F** +32 (0)3 201 95 99  
**W** [www.xemex.eu](http://www.xemex.eu)

**NL** Burgemeester Burgerslaan 40  
5245 NH 's-Hertogenbosch  
**BE** Metropoolstraat 11a  
B2900 Schoten

**BTW** 0458.522.364  
**OND. NR.** 458.522.364  
**IBAN** BE56 1735 0211 4388  
**BIC-SWIFT** RABO NL2U

---

## DOCUMENT INFO

Version: 1.3  
Status: Final  
Version date: 25/10/2024  
Filename: User manual - CSP1+ High Accuracy  
Number of pages: 17

---

## HISTORY CHANGES

| VERSION | DATE     | DESCRIPTION  |
|---------|----------|--|
| 1.0     | 05/06/23 | Initial version                                      |
| 1.1     | 05/07/23 | Adjustment For Compliance                            |
| 1.2     | 10/07/23 | Adjustment For Compliance                            |
| 1.2     | 18/07/24 | Adjustment in settings                               |
| 1.3     | 01/10/24 | Delta network (3-fase / 3-wire) wiring diagram added |
|         |          |  |

## TABLE OF CONTENTS

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>INTRODUCTION .....</b>                       | <b>4</b>  |
| 1.1      | Scope .....                                     | 4         |
| 1.2      | Target group .....                              | 4         |
| 1.3      | Intended usage .....                            | 4         |
| 1.4      | Technical assistance .....                      | 4         |
| 1.5      | Used symbols.....                               | 4         |
| 1.6      | Safety precautions:.....                        | 5         |
| <b>2</b> | <b>TECHNICAL DESCRIPTION .....</b>              | <b>6</b>  |
| <b>3</b> | <b>TECHNICAL SPECIFICATIONS .....</b>           | <b>7</b>  |
| 3.1      | Environmental conditions .....                  | 7         |
| 3.2      | Mains Power Interface .....                     | 7         |
| 3.3      | Metering Interface .....                        | 7         |
| 3.4      | P1 Interface .....                              | 8         |
| 3.5      | P1 Cable Specifications.....                    | 8         |
| 3.6      | User Interface .....                            | 9         |
| 3.6.1    | PWR - POWER Status LED – Yellow LED .....       | 9         |
| 3.6.2    | CS – Current Sense status LED – Green LED ..... | 9         |
| 3.6.3    | P1 – P1 port status LED – Red LED .....         | 9         |
| 3.7      | Screw terminals .....                           | 10        |
| 3.7.1    | CT terminals .....                              | 10        |
| 3.7.2    | AC terminal.....                                | 10        |
| 3.8      | AC Wiring requirements .....                    | 10        |
| 3.9      | Wire stripping .....                            | 10        |
| 3.10     | P1 port properties .....                        | 11        |
| 3.10.1   | Physical LAYER properties .....                 | 11        |
| 3.10.2   | Application LAYER properties.....               | 11        |
| 3.11     | Example P1 output telegram .....                | 12        |
| <b>4</b> | <b>INSTALLATION INSTRUCTIONS .....</b>          | <b>13</b> |
| 4.1      | Guidelines for safety and installation .....    | 13        |
| 4.2      | Mounting .....                                  | 13        |
| 4.3      | Install / Wiring procedure .....                | 13        |
| 4.3.1    | Important Wiring Notes .....                    | 15        |
| 4.4      | P1 – USB Cable Connection (optional).....       | 16        |
| <b>5</b> | <b>OPERATING INSTRUCTIONS .....</b>             | <b>17</b> |
| 5.1      | Circuit-breaker / overcurrent protection .....  | 17        |
| 5.2      | Ventilation requirements .....                  | 17        |
| <b>6</b> | <b>CLEANING .....</b>                           | <b>17</b> |
| <b>7</b> | <b>LIFTING AND CARRYING.....</b>                | <b>17</b> |
| <b>8</b> | <b>MAINTENANCE AND SERVICE .....</b>            | <b>17</b> |

## 1 Introduction

### 1.1 Scope

This manual is applicable to CSP1+, a 230 V AC powered Current Sensor with P1 output. It describes the specifications, installation and operation of the product. Please read this document carefully before installation and operating.

### 1.2 Target group

The installation and the operation of this device and any maintenance must be carried out by a qualified person in accordance with specific local standards and safety regulations.

### 1.3 Intended usage

The CSP1+ is only to be used for measuring the direction of electrical current and shall operate within the specified values only.

### 1.4 Technical assistance





In case technical assistance is needed, contact Xemex NV:

XEMEX NV  
Metropoolstraat 11a  
B-2900 Schoten  
Belgium

E-mail: [support@xemex.eu](mailto:support@xemex.eu)

### 1.5 Used symbols

Following symbols are used in this document and/or are marked on the product:

|   |  |
|---|--|
|  | Alternating current                    |
|  | Three-phase alternating current        |
|  | Caution, possibility of electric shock |
|  | Caution                                |

## 1.6 Safety precautions:



### **DANGER — HAZARDOUS VOLTAGES**

**WARNING** - These installation/servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

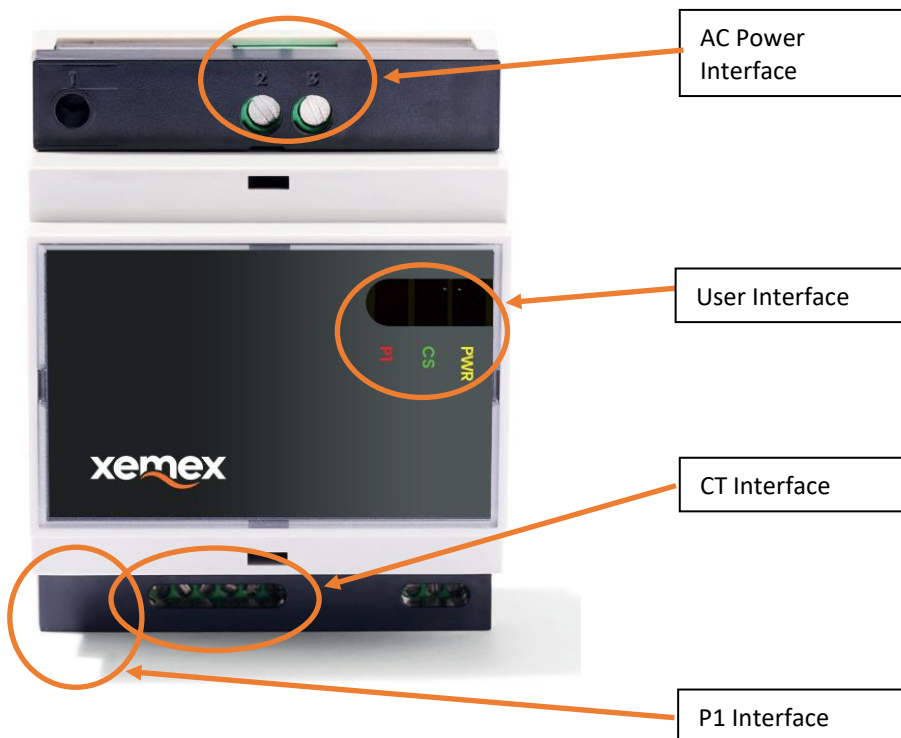
Always adhere to the following checklist:

1. Only qualified personnel or licensed electricians should install the Xemex CSP1+. The mains voltages of 120 Vac to 600 Vac can be lethal!
2. Follow all applicable local and national electrical and safety codes.
3. Install the CSP1+ in an electrical enclosure (panel or junction box) or in a limited access electrical room.
4. Verify that circuit voltages and currents are within the proper range for the meter model.
5. Use current transformers (CTs) with built-in TVS with a dielectric strength of at least 3.5KV 50Hz 1min and a work voltage of 660V. Do not use current output (ratio) CTs such as 1 amp or 5 amp output CTs: they will destroy the meter.
6. Ensure that the CTs are placed behind fuses or circuit breakers.
7. Equipment must be disconnected from the HAZARDOUS LIVE voltages before access.
8. Before applying power, check that all the wires are securely installed by tugging on each wire.
9. Do not install the CSP1+ where it may be exposed to temperatures below  $-25^{\circ}\text{C}$  or above  $60^{\circ}\text{C}$ , excessive moisture, dust, salt spray, or other contamination. The meter requires an environment no worse than pollution degree 2 (normally only non-conductive pollution; occasionally, a temporary conductivity caused by condensation must be expected).
10. Do not drill mounting holes in the device. Click the module on a DIN Rail instead.
11. If the CSP1+ is installed incorrectly, the safety protections may be impaired.
12. The CT clamps need to be clamped around insulated wires. No bare wires are allowed to be in contact or close proximity of the clamp.

## 2 Technical description

The Xemex CSP1+ device is a Current Transformer current metering device with a P1 output. It has following interfaces:

- Mains Power Interface (AC)
- P1 Communication Interface (according DSMR4 and SMR5)
- User Interface
- Current Transformers (CT) Interface



The CSP1+ measures the RMS current values of the three current transformer values and their respective power direction over a period of 1 second.

At the end of the measurement cycle the new RMS values are sent out as a P1 message.

This process continuously repeats every second.

## 3 Technical specifications

### 3.1 Environmental conditions

|                       |   |
|-----------------------|---|
| Protection class      | II  |
| Overvoltage class     | III   |
| Operating temperature | -25 °C - +60 °C   |
| Storage temperature   | -30 °C - +85 °C   |
| Relative humidity     | < 75 % year's average at 21 °C<br>< 95 % less than 30 days/year, at 25 °C |
| Pollution Degree      | 2   |
| Altitude              | < 2000m   |
| Application area      | Residential, Indoors in suitable meter cabinet                            |

### 3.2 Mains Power Interface



**DANGER**  
Risk of serious injuries or death and/or at least product damage!

|                              |                          |
|------------------------------|--------------------------|
| Connector:                   | Screw terminal connector |
| Voltage range:               | 230 AC, -10%, +10%       |
| Frequency:                   | 50Hz                     |
| Rating Power:                | 1W                       |
| Rating amperage:             | 10 mA                    |
| Max cable length:            | 3 meter                  |
| Cable location:              | indoor                   |
| Reverse polarity protection: | yes                      |



Attention: Polarity is important. For single-phase and three-phase star (wye) connections, make sure to connect the Neutral line (N) and the Phase 1 line (L1) to the corresponding terminals. For Delta network connections, please refer to Chapter 4 of this installation manual for specific instructions.

### 3.3 Metering Interface



Use current transformers (CTs) with built-in TVS with a dielectric strength of at least 3.5KV 50Hz 1min and a work voltage of 660V. Do not use current output (ratio) CTs such as 1 amp or 5 amp output CTs: they will destroy the meter. The CT-related information in this manual is based on SCT010-B13 CT clamps. It's recommended to use these CTs, or equivalent CTs sold by Xemex. Ensure that the CTs are placed behind fuses or circuit breakers.

|                     |   |
|---------------------|---|
| Connector           | Screw terminal connectors for max 3 Current Transformers  |
| Measuring principle | Current measurement by Current transformer  |
| Current range       | 1A* ... 40A (if CT ratio = 2000)<br>*measured currents smaller than 1A will have a larger deviation |
| CT ratio            | 2000 (default)  |
| Input impedance     | 40 Ohm  |
| Current Accuracy    | Typically <5 % at 23 °C   |
| Max Cable length    | 1 meter   |

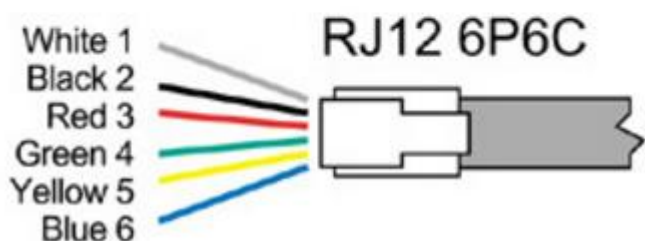
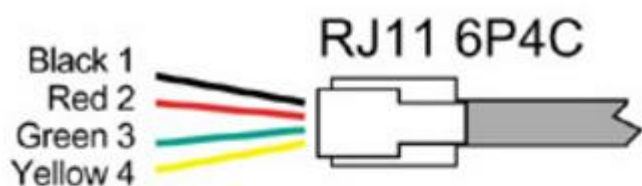
### 3.4 P1 Interface

|                   |                                    |
|-------------------|------------------------------------|
| Protocol          | P1 protocol conform DSMR4 and SMR5 |
| Max cable length: | 3 meter                            |
| Cable location:   | indoor                             |
| Connector         | RJ12 – 6 pin                       |
| Pin definition    |                                    |

| Pin # | Signal name  | Description        | Remark                 |
|-------|--------------|--------------------|------------------------|
| 1     | +3.7V        | +3.7V power supply | Power supply line      |
| 2     | Data Request | Data Request       | Input                  |
| 3     | Data GND     | Data ground        |                        |
| 4     | n.c.         | Not connected      |                        |
| 5     | Data         | Data line          | Output. Open collector |
| 6     | Power GND    | Power ground       | Power supply line      |

### 3.5 P1 Cable Specifications

Use a 4-wire or 6-wire cable. On one end the cable should be foreseen with a RJ11 of RJ12 connector.





## 3.6 User Interface

### 3.6.1 PWR - POWER Status LED – Yellow LED

The PWR LED is a yellow LED that will light up from the moment the CSP1+ device gets power. If after installation, the LED doesn't light up you should check the mains power.

| LED status | Explanation                 |
|------------|-----------------------------|
| OFF        | CSP1+ device is not powered |
| ON         | CSP1+ device is powered     |

### 3.6.2 CS – Current Sense status LED – Green LED

The current indicator LED is a green LED that gives an indication of the actual current. This LED starts blinking with a period of 1 second. The LED will be on for 25 ms per cumulated current in ampere.

So, if for example the cumulated current for L1, L2 and L3 is 10A, the LED will be on for 200msec and off for 800msec. If the total current exceeds 40A, the LED will be continuously on.

| LED status      | Explanation   |
|-----------------|---|
| OFF             | No current measured or no CT connected                                |
| Blinking (1sec) | Cumulated measured current < 50A. Value determines how long LED is on |
| ON              | Cumulated measured current >= 50A                                     |

### 3.6.3 P1 – P1 port status LED – Red LED

The P1 port indicator LED is a red LED that will light up if the request line on the P1 interface is set to a high state. For this is it necessary that the C1P1 device is connected to the charge point.

| LED status | Explanation  |
|------------|--|
| OFF        | P1 not connected or request line is low                    |
| Blinking   | Charge point requests P1 data by toggling the request line |
| ON         | Request line is continuously in high state                 |



Attention. Most P1 slave devices keep the request line continuously high. This will result the LED to directly light up after connecting the RJ-cable and stay on. The charge point will not keep the request line high. After reception of a P1 message, the charge point will put the line low to process the message. This will make the P1 LED blink with the frequency the charge point puts the request line in high state.

### 3.7 Screw terminals

#### 3.7.1 CT terminals

|                    |             |
|--------------------|-------------|
| Model number:      | 284391-3    |
| Pitch:             | 3.5 mm      |
| Connection Method: | Screw Clamp |
| Current Rating:    | 12 A        |
| Voltage Rating:    | 300 V       |
| Wire Gauge Min:    | 30 AWG      |
| Wire Gauge Max:    | 14 AWG      |

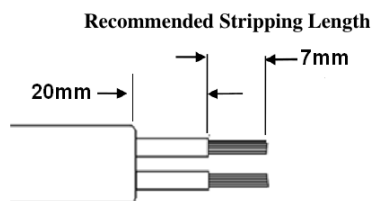
#### 3.7.2 AC terminal

|                    |         |
|--------------------|---------|
| Model number:      | 1868076 |
| Pitch:             | 7.62 mm |
| Connection Method: | Screw   |
| Current Rating:    | 32 A    |
| Voltage Rating:    | 500 V   |
| Wire Gauge Min:    | 24 AWG  |
| Wire Gauge Max:    | 10 AWG  |

### 3.8 AC Wiring requirements

For AC connections, use stranded or solid wires as prescribed according to best practices in the EU. In this manual solid wires with a section of 2.5mm<sup>2</sup> is used.

### 3.9 Wire stripping



## 3.10 P1 port properties

### 3.10.1 Physical LAYER properties

- Baud rate = 115200
- Line setting = 8N1
  - 8 data bits
  - No parity
  - 1 stop bit

### 3.10.2 Application LAYER properties

Only a limited set of registers available on the P1 output information is filled in by the CSP1+ device. The other registers are returned with value 0 or empty for compatibility reasons with the message format defined in DSMR4 and SMR5.

The table below shows the limited set of registers that are filled in:

| Value                                    | OBIS reference | Attribute  | Class ID      | Value Format          | Value Unit |
|--|----------------|------------|---------------|-----------------------|------------|
| Header information                       | -              | -          | -             | Manufacturer specific |            |
| Version information for P1 output        | 1-3:0.2.8.255  | 2<br>Value | 1<br>Data     | S2, tag 9             |            |
| Instantaneous current L1 in A resolution | 1-0:31.7.0.255 | 2<br>Value | 3<br>Register | F3(2,2), tag 18       | A          |
| Instantaneous current L2 in A resolution | 1-0:51.7.0.255 | 2<br>Value | 3<br>Register | F3(2,2), tag 18       | A          |
| Instantaneous current L3 in A resolution | 1-0:71.7.0.255 | 2<br>Value | 3<br>Register | F3(2,2), tag 18       | A          |
| Total active power import                | 1-0:1.7.0.255  | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Total active power export                | 1-0:2.7.0.255  | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Active power import L1                   | 1-0:21.7.0.255 | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Active power import L2                   | 1-0:41.7.0.255 | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Active power import L3                   | 1-0:61.7.0.255 | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Active power export L1                   | 1-0:22.7.0.255 | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Active power export L2                   | 1-0:42.7.0.255 | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |
| Active power export L3                   | 1-0:62.7.0.255 | 2<br>Value | 3<br>Register | F5(3,3), tag 18       | kW         |

Datagram is sent by default once each second.

### 3.11 Example P1 output telegram

XM5XMXCQA0000008879

```
1-3:0.2.8(40)
0-0:1.0.0(000101010000W)
0-0:96.1.1(45303030303030303030303030303030)
1-0:1.8.1(000000.000*kWh)
1-0:2.8.1(000000.000*kWh)
1-0:1.8.2(000000.000*kWh)
1-0:2.8.2(000000.000*kWh)
0-0:96.14.0(0001)
1-0:1.7.0(16.560*kW)
1-0:2.7.0(00.000*kW)
0-0:96.3.10(1)
0-0:96.7.21(00000)
0-0:96.7.9(00000)
1-0:99.97.0(0)(0-0:96.7.19)
1-0:32.32.0(00000)
1-0:52.32.0(00000)
1-0:72.32.0(00000)
1-0:32.36.0(00000)
1-0:52.36.0(00000)
1-0:72.36.0(00000)
0-0:96.13.1(XMX_P1CS_V05)
0-0:96.13.0()
1-0:32.7.0(230.0*V)
1-0:52.7.0(230.0*V)
1-0:72.7.0(230.0*V)
1-0:31.7.0(024.56*A)
1-0:51.7.0(024.56*A)
1-0:71.7.0(024.56*A)
1-0:21.7.0(05.520*kW)
1-0:41.7.0(05.520*kW)
1-0:61.7.0(05.520*kW)
1-0:22.7.0(00.000*kW)
1-0:42.7.0(00.000*kW)
1-0:62.7.0(00.000*kW)
!19D6
```

## 4 Installation instructions

### 4.1 Guidelines for safety and installation



This installation guide must be consulted in all cases when manipulating parts which are marked with the Caution symbol.  
The installation and the operation of this device and any maintenance must be carried out by a qualified person in accordance with specific local standards and safety regulations.



Caution: never open the secondary circuit of a Current Transformer while current is flowing through the primary circuit!  
If the secondary circuit is opened when primary current is flowing, then the voltage will go to a very high value, possibly causing electrical arcing and/or electrical shock to service personnel. Therefore CT's with internal TVS must be used.



The current transformer clamps are not allowed to be clamps around bare wire. The wire needs to fulfill at least basic insulation requirements with regards to legal safety requirements.

Failing to obey the "Guidelines for safety and installation", the guarantee no longer applies.

### 4.2 Mounting

Mount the device in a DIN rail cabinet.

CT clamps max range will be halved when used with the CSP1+. This is related to the HW of the device and will make the accuracy (of the halved max range) much more accurate.

### 4.3 Install / Wiring procedure

Please follow this installation sequence for single-phase

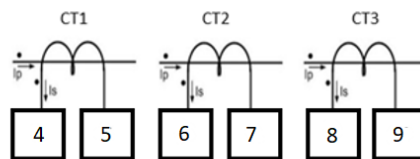
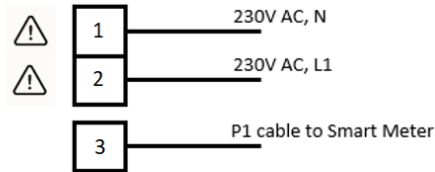
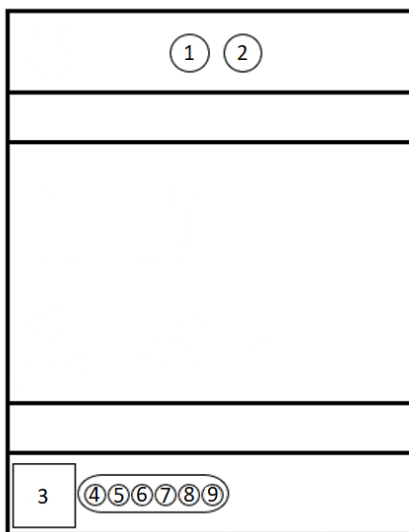
1. Connect N and L1 to the mains power supply.
2. Connect CT clamp onto CSP1+ device. The arrow of the CT clamp must follow Grid to Load.
3. CT clamp wires need to be attached with the RED wire to 4, and WHITE wire to 5.
4. Connect P1 port.

Please follow this installation sequence for three-phase star connection:

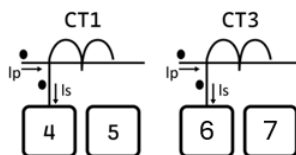
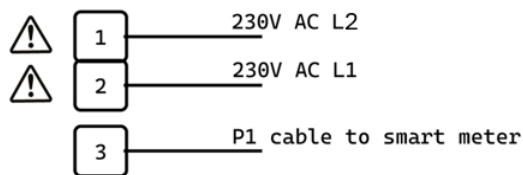
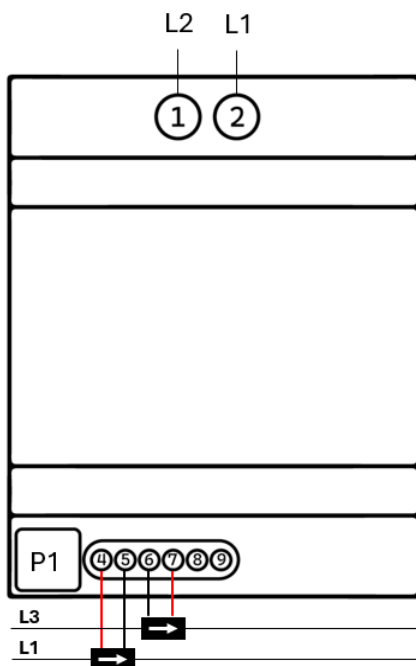
1. Connect N and L1 to the mains power supply.
2. Connect CT clamps onto L1 and L3 into the CSP1+ device. The arrow of the CT clamp must follow Grid to Load.
3. CT1 needs to be attached with the RED wire to 4, and WHITE wire to 5, while CT3 wires need to connect with WHITE to port 6 and RED to port 7.
4. Connect P1 port.

Please follow this installation sequence for Delta network connection:

1. Connect L2 and L1 to the mains power supply.
2. Connect CT clamps onto L1 and L3 into the CSP1+ device. The arrow of the CT clamp must follow Grid to Load. CT1/CT2/CT3 needs to be attached with the RED wire to 4/6/8, and the WHITE wire to 5/7/9 respectively.
3. Connect P1 port.



1: Star-connection



2: Delta-connection

### 4.3.1 Important Wiring Notes

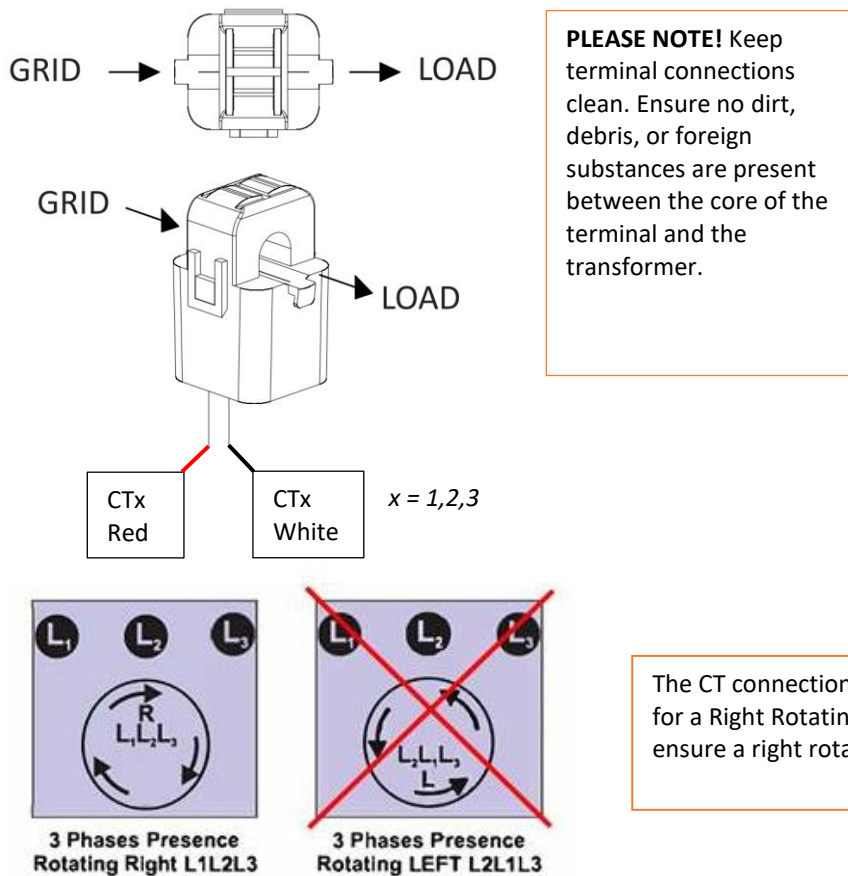
#### AC connections:

Do not exchange N (terminal 1) with L (terminal 2) . The power direction (import versus export) is derived from the AC connection. When the AC connection is reversed the device will not measure the grid currents/power correctly.

#### CT Connections:

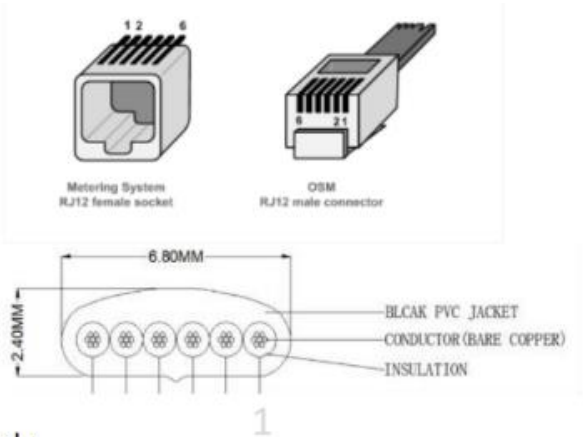
CT clamps max range will be halved when used with the CSP1+. This is related to the HW of the device and will make the accuracy (of the halved max range) much more accurate.

CT clamps must be installed as follows:



4.4 P1 – USB Cable Connection (optional)

Along with the CSP1+ module, a P1-USB cable is optional. This cable supports a USB type A connection on one side and a P1 RJ12 connection on the other.



\*Picture above for reference only

Technical Parameters

|                 |            |
|-----------------|------------|
| Connection Type | USB Type A |
| Cable length    | 2.5m       |
| Working Voltage | 5V         |

Pin configuration and functions

| Number | Color  | Description                  |
|--------|--------|------------------------------|
| 1      | Blue   | +5V power supply             |
| 2      | Yellow | Data Request, connect to +5V |
| 3      | Green  | Data GND                     |
| 4      | Red    | NC                           |
| 5      | Black  | Data line                    |
| 6      | White  | Power GND                    |



## 5 Operating instructions

### 5.1 Circuit-breaker / overcurrent protection

An external circuit breaker / overcurrent protection must be used in the installation. This circuit breaker / overcurrent protection must be suitably located and easily reached. Furthermore, it must be marked as the disconnection device for the CSP1+.

The overcurrent protection should have following ratings:

- 230/400 VAC
- 16 A

### 5.2 Ventilation requirements

Ensure that the device is not covered with tape or sealed airtight during normal operation. Adequate air circulation must be always maintained around the device.

## 6 Cleaning

Clean the unit with a dry cloth and no detergent.

## 7 Lifting and carrying

Use care when lifting and carrying the product.

## 8 Maintenance and Service

There are no serviceable parts inside.

**End Of Document.**