



USER MANUAL

CSP1 1.0

CT Current Sensor with P1 output

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HISTORY CHANGES

VERSION	DATE	DESCRIPTION
1.0	28/05/21	Initial version
1.1	01/02/23	Updated default interval to 1 second
1.2	20/02/23	Added Electrical Wiring schemes for 1 phase w/wo current direction

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1 Introduction

1.1 Scope

This manual is applicable to CSP1 1.0, a CT 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 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

Tel: +32 201 95 95
E-mail: 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
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION
	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.

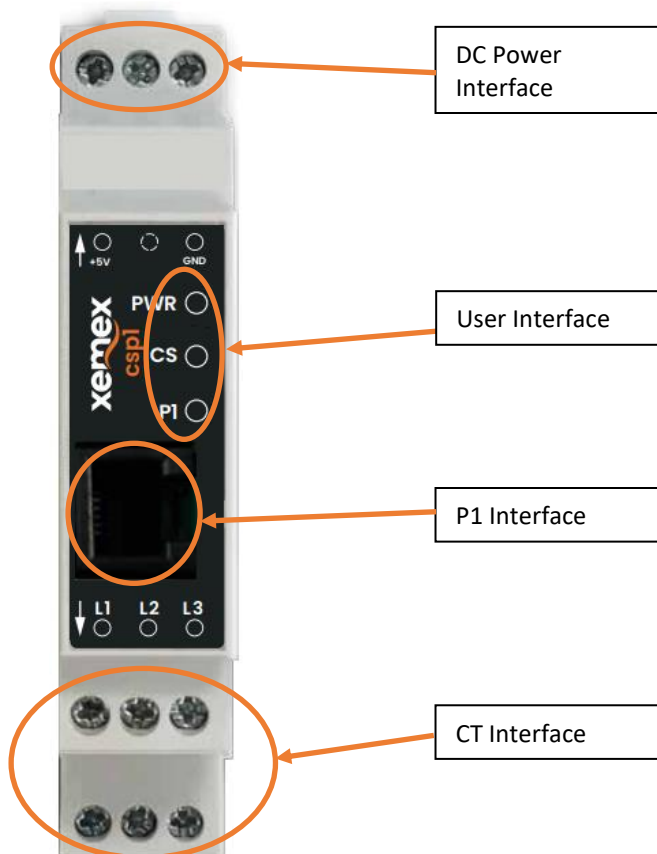
Always adhere to the following checklist:

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°C or above 75°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.

2 Technical description

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

- DC Power Interface
- 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 inputs 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
Operating temperature	-25 °C - +75 °C
Storage temperature	-40 °C - +85 °C
Relative humidity	< 75 % year's average at 21 °C < 95 % less than 30 days/year, at 25 °C
Pollution Degree	2
Altitude	< 2000m
Application area	Residential, Indoors in suitable meter cabinet

3.2 DC Power Interface



DANGER
Use SELV power supply only!
Risk of serious injuries or death and/or at least product damage!

Connector	Screw terminal connector for 0V and +5V DC
Voltage range:	5V DC, -10%, +10%
Max current consumption:	50 mA
Max cable length:	3 meter
Cable location:	indoor + outdoor
Reverse polarity protection:	yes



Attention: polarity is important. The GND wire of the power adapter has a white marking and has to be connected to the GND pin on the module. The other wire needs to be connected to the +5V pin. The pin in the middle is not used.

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.
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 ... 80A (if CT ratio = 2000)
CT ratio	2000 (default)
Input impedance	20 Ohm
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 + outdoor
 Connector RJ12 – 6 pin
 Pin definition

Pin #	Signal name	Description	Remark
1	+5V	+5V 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

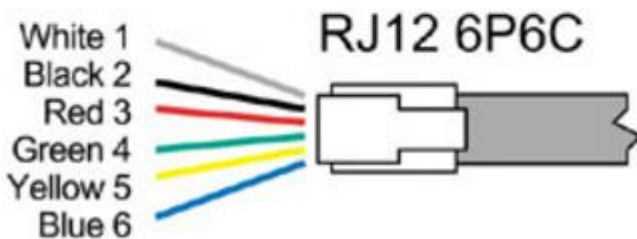
3.5 P1 Cable Specifications

Use a 4-wire or 6-wire cable depending if you use the +5V of the charge point or not. On one end the cable should be foreseen with a RJ11 of RJ12 connector.



Do not use 6-wire cable in combination with the +5V power adapter! This will generate a conflict between the power adapter and the 5V of the charge point.

See [Appendix A](#) for more information



3.6 User Interface

3.6.1 Power indicator 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 and power adapter.

3.6.2 Current indicator LED

The current indicator LED is a yellow 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 20 msec 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 50A, the LED will be continuously on.

3.6.3 P1 port indicator

The P1 port indicator LED is a yellow 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.



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

Single-deck terminal block - Right side - Pitch 5mm - 3 poles

GENERAL INFORMATION

pitch:	5 mm
housing height:	15,30 mm
housing depth:	9.5 mm
dimensional class:	medium
wire section:	2.5 mm ² / 14 AWG
clamp opening size:	2.7 × 2.7 mm
wire stripping:	max 7 mm
operating temperature:	-40°C + +130°C

ELECTRICAL CHARACTERISTICS

current:	16A
voltage:	250V
test voltage:	2 kVrms/60s

MECHANICAL CHARACTERISTICS

screw:	M3
max. torque:	0.5 Nm / 4.5 in.lbs

APPROVALS DATA

	EN 60998-1	-	UL 1059
current:	16A	-	15A factory / 15A field
voltage:	250V	-	300V
wire section:	2.5mm ²	-	14+30AWG
torque:	0.5Nm	-	4.5Lb-in
FILE:	CA02.01614	-	E178356

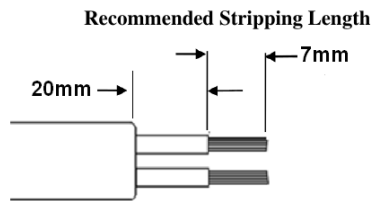
MATERIALS

housing:	PA - UL 94 V0
screw:	Galvanized steel
clamp/spring:	Nickeled copper alloy
terminal:	Tin-plated copper alloy

AVAILABLE COLOURS

		(STD)					
other colours:							upon request

3.8 Wire stripping



3.9 P1 port properties

3.9.1 Physical LAYER properties

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

3.9.2 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 Value	1 Data	S2, tag 9	
Instantaneous current L1 in A resolution	1-0:31.7.0.255	2 Value	3 Register	F3(0,0), tag 18	A
Instantaneous current L2 in A resolution	1-0:51.7.0.255	2 Value	3 Register	F3(0,0), tag 18	A
Instantaneous current L3 in A resolution	1-0:71.7.0.255	2 Value	3 Register	F3(0,0), tag 18	A

Datagram is sent by default once each second.

3.10 Example P1 output telegram

XM55MXCQA0000008879

```

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(00.000*kW)
1-0:2.7.0(00.000*kW)
0-0:17.0.0(000.0*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()
1-0:31.7.0(024*A)
1-0:51.7.0(024*A)
1-0:71.7.0(024*A)
1-0:21.7.0(00.000*kW)
1-0:41.7.0(00.000*kW)
1-0:61.7.0(00.000*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.

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.

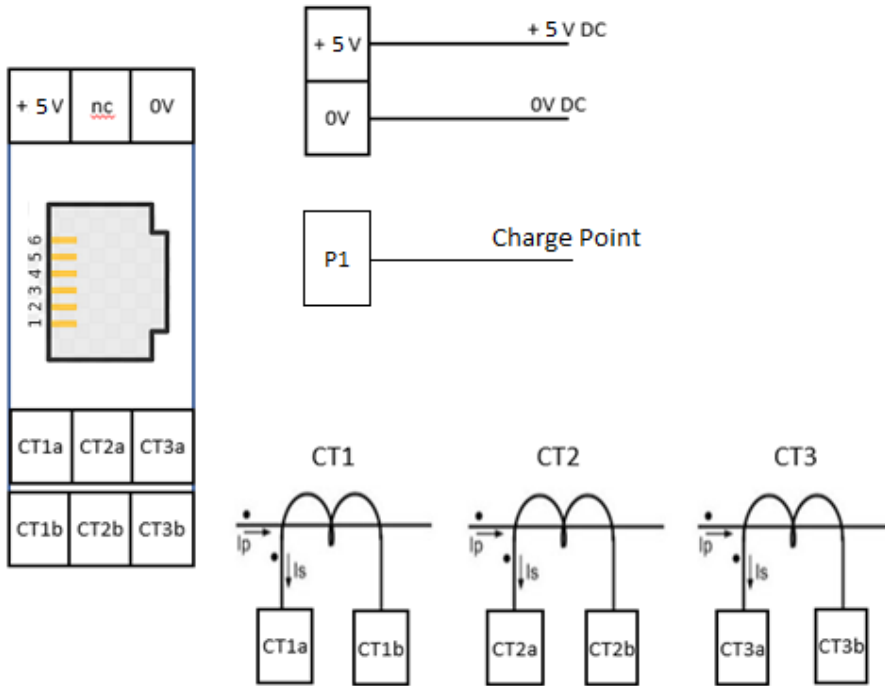
4.3 Install procedure

Please follow this installation sequence:

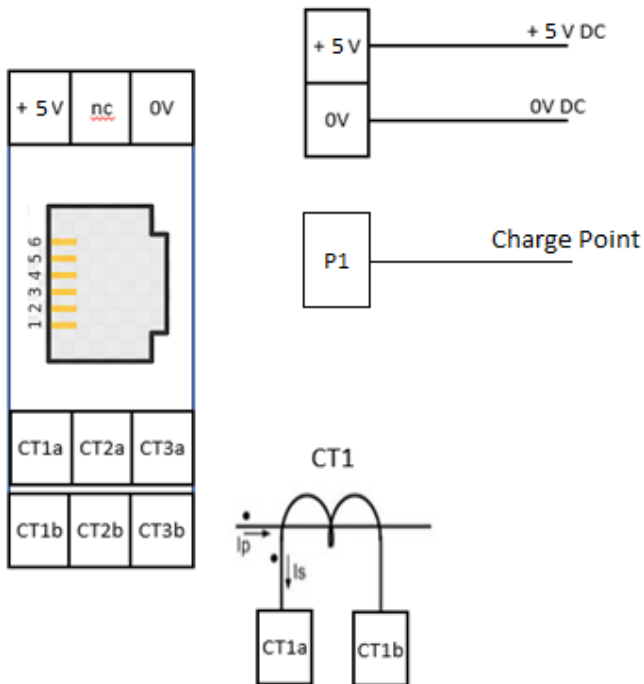
1. Connect power adapter (if used)
2. Connect CT wires onto CSP1 device. The polarity of the wires is only of importance when the direction of the current needs to be determined (4.4.3).
3. Connect P1 port with the charge point

4.4 Electrical wiring

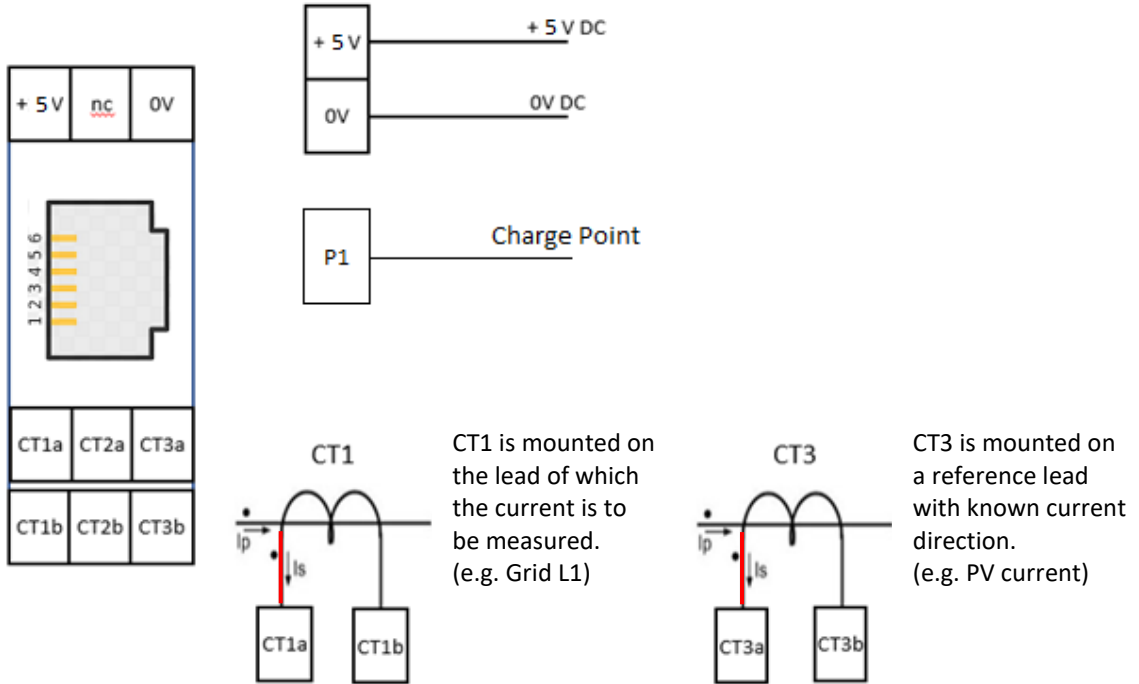
4.4.1 CSP1 3-phase measurement



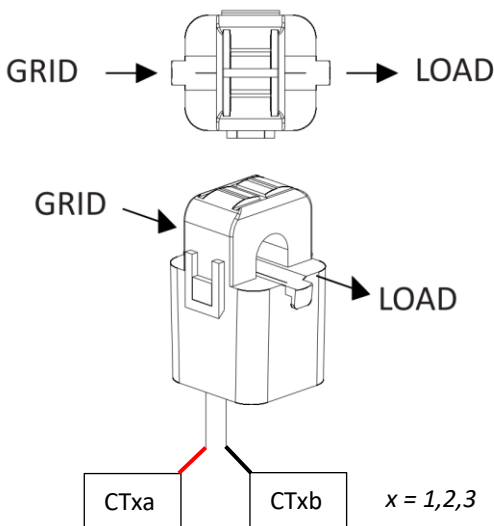
4.4.2 CSP1 1-phase measurement



4.4.3 CSP1 1-phase with current direction measurement (Only available for FW >V07 and proper configuration)



CT Connections:



PLEASE NOTE! Mount the CT terminals correctly on the mains connection.

PLEASE NOTE! Do not reverse the polarity of the CT-wires.

If the CT terminals or connections are reversed, the device will not measure the current direction correctly.

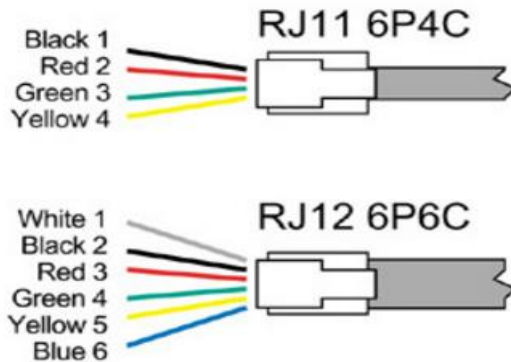
4.5 Charge Point connection

If the Charge point its own 5V power supply (on the P1 connector), it would be possible to use the +5V of the charge point to power the Xemex P1 current measuring device. In this case the external power adaptor for the P1 current measuring device would not be needed.



When connecting a charge point to a DSMR4/SMR5 e-meter, the P1 power supply of the e-meter (which also has a 5V power supply) would conflict with the charge point power supply. So, it is not allowed to connect pin 1 (+5V) between the 2 devices.

This is done, by using an RJ11 connector instead of an RJ12. As illustrated in the figure below, RJ11 and RJ12 are pin compatible. With this difference that RJ11 only has 4 pins, and does not connect pin 1 (+5V) and 6 (GND).



So if you want to use the 5V power supply of the charge point to power the P1 current measuring device, the connection cable between both devices has to be made with a 6 wire cable with an RJ12 connector.

5 Operating instructions

After installation and applying DC power the device starts automatically measuring the RMS current values flowing through the connected current transformers.

A connected P1 master can request these values by setting the request line of the CSP1 device to a high state.

The CSP1 device gives visual feedback by its 3 Status Indicator LEDs.
For detailed explanation of LED functionality, [see 3.6](#)

5.1 PWR - POWER Status LED – Yellow LED

LED status	Explanation
OFF	CSP1 device is not powered
ON	CSP1 device is powered

5.2 CS – Current Sense status LED – Yellow LED

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

5.3 P1 – P1 port status LED – Yellow LED

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

6 Cleaning

Clean the unit with a slightly damp cloth and mild detergent.

7 Lifting and carrying

Use care when lifting and carrying the product.

8 Maintenance and Service

There are no serviceable parts inside.

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