USER MANUAL

CSP1

CT Current Sensor with P1 output

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VERSION	DATE	DESCRIPTION
1.0	01/01/2025	First Version
1.1	30/06/2025	Refinement of Technical Information

Table Of Content

1. Introduction

Thank you for purchasing this CSP1 current sensor. Xemex has a wide product range of devices. We have introduced a variety of meters and converters. For more information on other products visit our website at Home - Xemex | Smart Energy Communicator or contact our sales department on sales@xemex.eu.

The Xemex CSP1 module is ideal for P1 based Active Load Balancing applications in EV charging installations where no DSMR compliant smart meter is available.

The Xemex CSP1 module is a CT current meter with a DSMR4.2 P1 output in a Din rail housing used for Active Load Balancing in EV charging applications. It measures the current consumption/production of the household. Real time current values are made available to the EV charger via P1 messages. With this information the charge point can calculate the current capacity which is available for charging a car.

Up to 3 CT clamps can be connected to the CSP1 device. These CT clamps can be installed around the power lines without disturbing the installation. The CSP1 can be used for both, single phase or poly phase installations.

1.1. Scope

This manual is applicable to the CSP1, a 5V DC 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

A qualified person in accordance with specific local standards and safety regulations must be responsible for the installation, operation and maintenance of the CSP1.

1.3. Intended usage

The CSP1 is only to be used for measuring the amount of electrical current and shall work within the specified values only. The CSP1 informs the EV charging point or any other device with a P1 input port about the amount of current going through the wire being measured.

1.4. Used symbols

The 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 hazard of electric shock.
	Caution

1.5. Abbreviations and acronyms

V AC:	AC-voltage
V DC:	DC-voltage
EV:	Electrical Vehicle
(D)SMR:	(Dutch) Smart Meter Requirements
LED:	Light Emitting Diode
HTTP:	Hypertest Transfer Protocol
UI:	User Interface

1.6. Safety precautions

Always adhere to the following checklist:

1. Only qualified personnel or licensed electricians should install the Xemex CSP1. The mains voltages of 120 V AC to 600 V AC can be lethal!
2. Follow all applicable local, national electrical and safety codes.
3. Install the CSP1 device 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 (transient voltage suppressor) with a dielectric strength of at least 3.5 kV 50 Hz 1 min and a work voltage of 660V.
   Only use Xemex approved CT clamps with an input:output of 80A:40mA (CT ratio = 2000(default))
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. Do not install the CSP1 where the temperatures can be below –25°C or above 75°C, excessive moisture, dust, salt spray, or other contamination. The device requires an environment no worse than pollution degree 2 (normally only non-conductive pollution; an occasionally temporary conductivity caused by condensation must be expected).
9. Do not drill mounting holes in the device. Click the module on a DIN Rail instead.
10. When the CSP1 is installed incorrectly, the safety protections may be impaired.

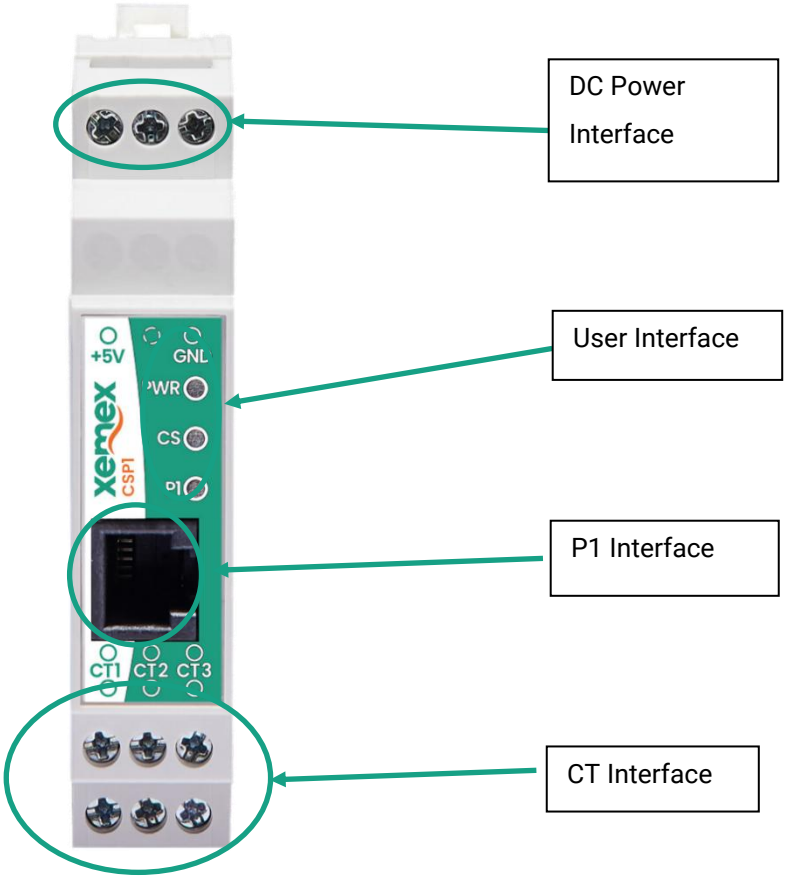
1.7. Certifications

Date	Accreditation Centre	IP Code	Kind
2023-07-04	Kiwa	EN 55032:2015 + A11:2020 EN 61326-1:2013 EN 61326-1:2021* EN 61010-1:2010/AMD1:2016 EN 61010-1:2010/A1:2019 EN 61010-2-030:2017 * Not yet harmonized	Class B Class B Class B

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.

2.1. 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

2.2. 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
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.

2.3. 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.

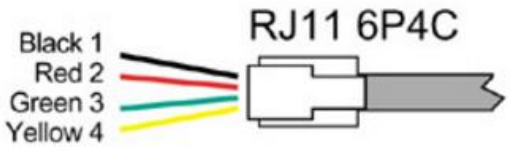
Connector	Screw terminal connectors for max 3 Current Transformers
Measuring principle	Current measurement by Current transformer
Current range	1A ... 80A (if CT ratio = 2000)
CT ratio	2000 (default)
Input impedance	20 Ohm
Accuracy	Typically <5 % at 23 °C
Max Cable length	15 meter

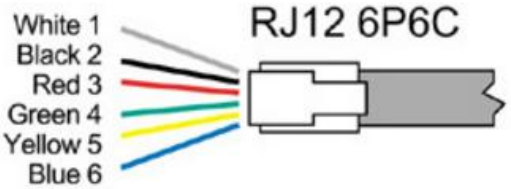
2.4. P1 Interface

2.4.1. 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.





2.4.2. Physical LAYER properties

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	+5V	+5V power supply	Power supply line
2	Data Request	Data Request	Input
3	Data GND	Data ground	Ground
4	n.c.	Not connected	
5	Data	Data line	Output. Open collector
6	Power GND	Power ground	Power supply line

2.4.3. P1 Telegram Structure

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 (SMR5.0) and ends with a checksum.

2.4.4. Example P1 output telegram

/XMX5XMXCQA0000023305

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_V06)
0-0:96.13.0()
1-0:31.7.0(008*A)
1-0:51.7.0(014*A)
1-0:71.7.0(014*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)
!8EAB

2.5. User Interface

2.5.1. 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.

2.5.2. 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.

2.5.3. 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.

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. Installation instructions

3.1. 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.

3.2. Mounting

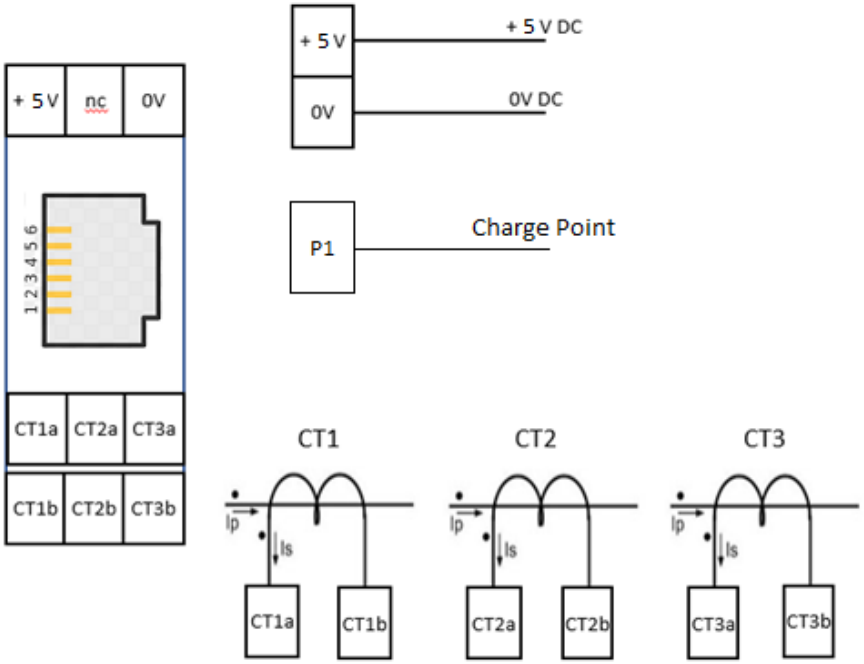
Mount the device in a DIN rail cabinet.

3.3. Install / Wiring procedure

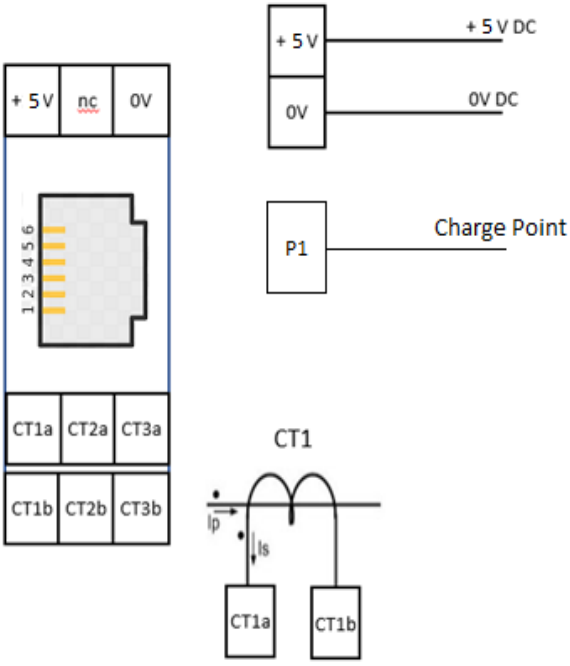
Please follow this installation sequence:

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 (**Fout! Verwijzingsbron niet gevonden.**).
3. Connect P1 port with the charge point

3.4. CSP1 3-phase measurement

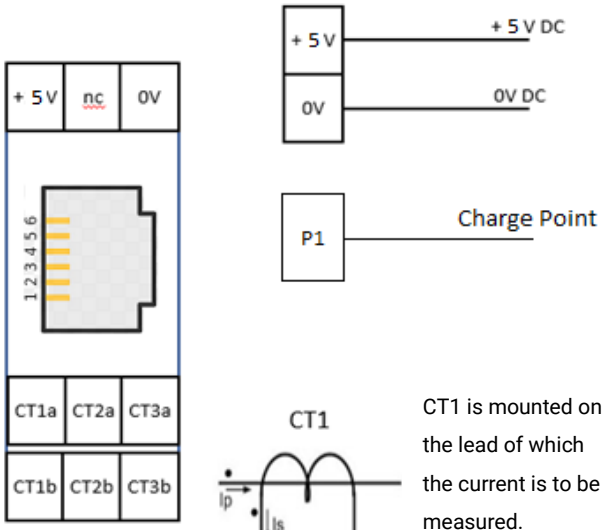


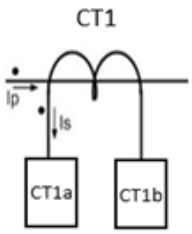
3.5. Single phase measurement



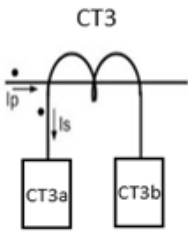
3.6. Single phase with current direction measurement

(Only available for FW V07 and proper configuration)





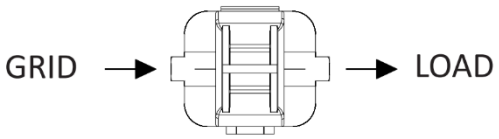
CT1 is mounted on the lead of which the current is to be measured.
(e.g. Grid L1)



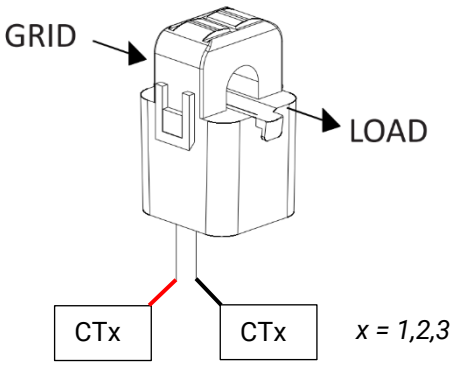
CT3 is mounted on a reference lead with known current direction.
(e.g. PV current)

3.7. Important Wiring Notes

CT clamps must be installed as follows:



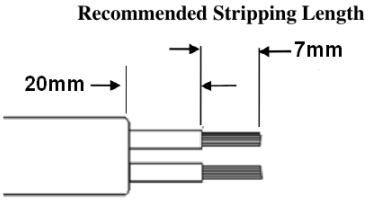
PLEASE NOTE! Mount the CT terminals correctly on the mains connection.



x = 1,2,3

3.8. Wire stripping

Each wire should be stripped bare from one end over the length of 7mm. The secondary insulation (individual insulation over each individual wire may be visible up to 20mm from the end. After those 20mm, the second insulation (around all wires) should be present at all times.



4. Maintenance and Service

There are no serviceable parts inside.
Clean the unit with a dry cloth if needed.
Use care when lifting and carrying the product.

5. Software

The CSP1 does not require any additional software for installation, configuration, or operation.
All necessary settings, including the CT ratio (default 2000:1), measurement logic, and communication parameters, are preconfigured during production.

As a result, the device is completely plug-and-play and ready for use once properly installed physically.

6. Accessories

6.1. CT Clamp

CT Clamps are always included in the CSP1 kit. The number of clamps depend on a 1- or 3-phase kit. These clamps can also be purchase separately. Always request clamps with an input/output of 80A:40mA. For any deviations please contact Xemex in advance.

7. Troubleshooting

Issue/fault	Possible Cause	Solution
PWR LED is off	No power supply	If powered via P1: - Ensure a 6-wire cable is used with power on pin 1 (+5V) and pin 6 (GND). - If the P1 cable is longer than 3 meters, use a 4-wire cable and connect a 5V DC power adapter. If powered via external adapter: make sure a 4-wire RJ11 cable is used without power on the P1 port. Avoid dual power sources!
CS LED is off	No CT connected or no current flowing	- Check that the current transformers (CTs) are correctly connected (see section 3.3). - Verify that current is actually flowing through the CT's primary circuit. - Only use CTs with TVS protection, dielectric strength ≥ 3.5kV, and working voltage 660V.

P1 LED is off	No connection to charge point, or request line is low	- Check the P1 cable (RJ11 or RJ12) and its physical connection.
		- Make sure the charge point is active and requesting data.
		- Use the correct cable:
		  ○ 6-wire RJ12 when CSP1 is powered by the charge point.
		  ○ 4-wire RJ11 when using an external power adapter.

No data at the charge point	Incorrect cable Protocol mismatch Power supply conflict	- Confirm that RJ11 is used when an external adapter is connected. - Verify the charge point uses the correct settings: baud rate 115200, 8 data bits, no parity, 1 stop bit (8N1). - Make sure there is no dual power supply active (via P1 and adapter).
Zero or missing values in P1 telegram	Improper P1 connection CT connection issue Requested register not supported	- Check the wiring and polarity of the CTs. - Ensure all cables are within the maximum length of 3 meters. - Note that the CSP1 only provides a limited set of registers in the P1 output (see section 2.4.2). All unsupported registers will return 0 or be empty—this is expected behaviour.

8. Decommissioning and Disposal

The procedure for disconnecting and removing the device is described below.

Guidelines for safety precautions in section 1.6 must be followed without fail.

8.1. Decommissioning / Unwiring procedure

Please follow this sequence for uninstalling the device.

1. Disconnect the P1 cable by pressing down the on the latching tab and gently pulling the P1 cable out of the jack.
2. Unscrew the screws on terminals CT1,CT2 and CT3 and remove the CT cables.
3. Unscrew the screws on +5V terminal and ground terminal and remove the cables.
4. Unmount the device from the dinrail by inserting a flat-tip screwdriver into the DIN release clip and pull down the clip.
5. Swing the device out and upwards to remove the device.

8.2. Disposal

For the disposal of the device observe the local disposal and environmental protection regulations in effect without fail.

Based on the data specified in environmental certificate ISO 14001, the components used in the device are largely separable and can therefore be taken to the relevant disposal or recycling point.

Components	Disposal
Printed circuit boards	Electronic waste: disposal according to local regulations.
Metal parts	Sorted and taken to collective materials disposal point.
Plastic components	Sorted and taken to recycling (regranulation) plant.

9. Technical Support

9.1. Technical Support Contact Information

For any technical issues or inquiries, our dedicated support team is available to assist you. Please use the following contact methods to reach out for assistance:

9.2. Email Support:

For general inquiries, troubleshooting, or technical assistance, please email our support team at: support@xemex.eu Please provide a detailed description of the issue, serial number, along with any relevant screenshots or error messages to expedite the resolution process.

9.3. Phone Support:

If you prefer to speak directly with a technician, you can reach us at:
+32 32 01 95 95
Our phone support is available Monday to Friday within regular business hours. If your request falls outside of business hours, please leave a ticket throughout our support portal.

9.4. Support Portal:

For access to FAQs, troubleshooting guides, and ticket submission, visit our dedicated support portal at: https://xemex-support.freshdesk.com/nl/support/home

9.5. Social Media:

For any non technical related information visit us via our official social media channels:
Website: www.xemex.eu
Linkedin: https://www.linkedin.com/company/xemex/posts/?feedView=all