CPIM1000

ChargePoint® Networked Charging Station

Integrated Meter Guide

DANGER: RISK OF SHOCK. Before working with this equipment, disconnect the power to the CPIM1000 Integrated Meter. Follow standard practice and local code to de-energize the applicable circuit and lock out/tag out the disconnect before proceeding. Use a multimeter to test that power is off. Keep power off for this circuit until the work scope is completed. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN SERIOUS INJURY OR LOSS OF LIFE.

IMPORTANT: You must be a licensed electrician and complete online training to become a ChargePoint approved installer, and to get a login for ChargePoint. If you do not complete this training, you will be unable to complete the installation process.
To complete online training and become a certified installer, refer to ChargePoint University at: chargepoint.com/installers.

CAUTION: Do not use power tools during installation or servicing. Over-torquing can damage the equipment.

WARNING: Do not install or service the charging station in inclement weather. If you work in rain or wind, you must use a weather-proof shelter that covers all boxes and components.

IMPORTANT: The CPIM1000 is not repairable in the field and does not contain any user-serviceable parts. In case of any error, the CPIM1000 opens internal relays and interrupts the flow of energy.

For assistance, go to chargepoint.com/support and find your region's technical support number.

CPIM1000 Integrated Meter

The CPIM1000 Integrated Meter is a multifunctional meter intended for use in the field of e-mobility. It uses a backlit LCD to communicate cumulative active energy and two LED pulse outputs to communicate energy steps. The CPIM1000 contains two AC meters, each with its own measuring unit measuring active energy. Accordingly, the display shows two cumulative energies and there is one pulse LED on each side, left and right. The complete device is supplied by the L1-N Input on the right side (top view). If this supply is not provided, the built-in relays remain open and a current flow is not possible.

Installation

The CPIM1000 Integrated Meter is built into CP6000 charging stations. The meter slides downward into the station pedestal housing and connects to a power plate. The meter connects to the power plate with plug-in connectors. User seals must be applied on the connection surface from the power plate to the meter. The left and right side output connectors with attached cables are plugged in and secured. User seals must also be applied on the output connector screws.

Metering Logic

CPIM1000 Integrated Meter current is measured using a current transformer and is transmitted through an A/D converter to a micro controller. Voltage is measured using a ground referenced measurement before it is transformed to a micro controller.

The sample rate is 3.90625 kHz and the energy update rate is 2x mains rate (100 Hz or EU, 120 Hz for US). At sample rate, V*I is accumulated, at energy update rate, the accumulated V*I values are converted to energy.

Fault Detection

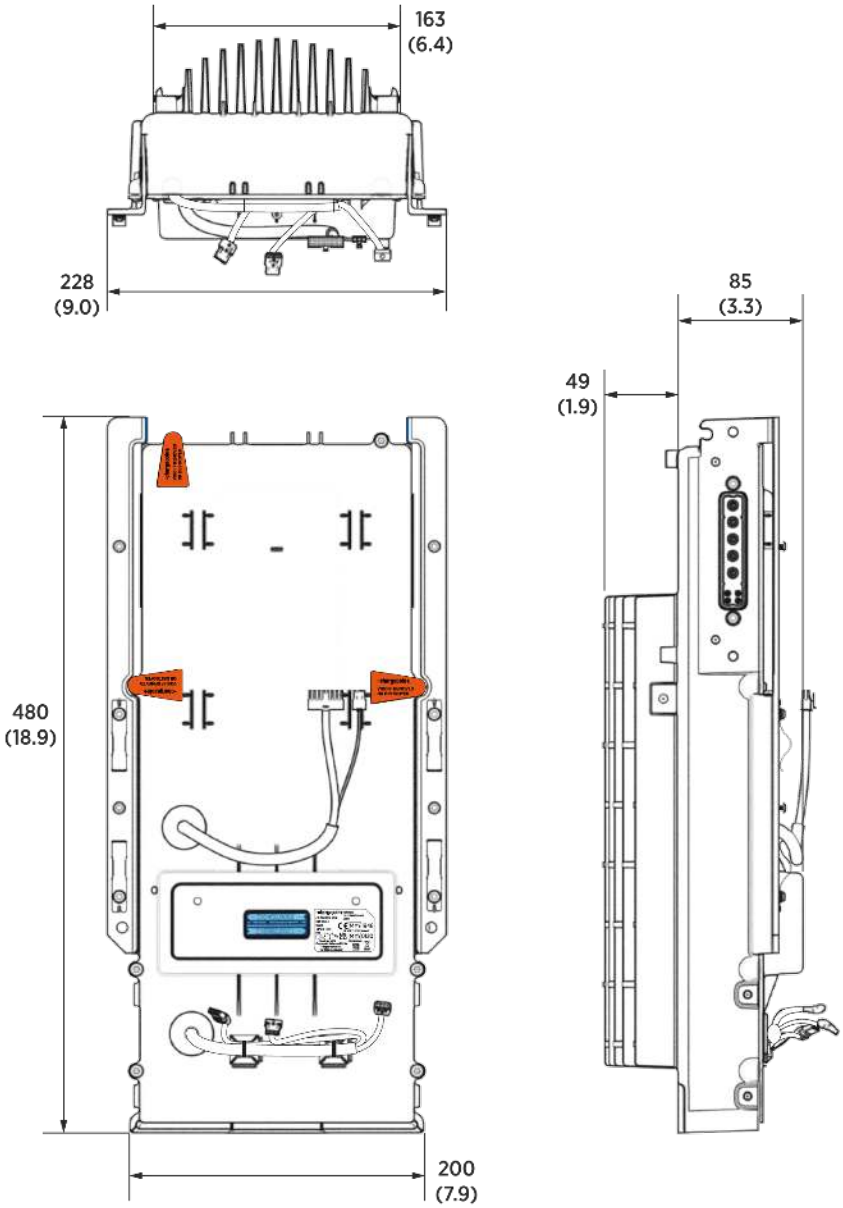
In "meter mode" the operating faults have no affect on operations. The only faults that will prevent operation are those that occur on start up:

- Failure to exit boot loader, generally caused by a bad code image loaded into flash. The LCD displays "-CHARGEPOIN+".
- Initializing, caused by a MCP3914 failure. The unit will not transfer energy.

If these failures do occur, the meter must be disconnected from the main power supply by a certified ChargePoint technician. The hardware needs to be replaced.

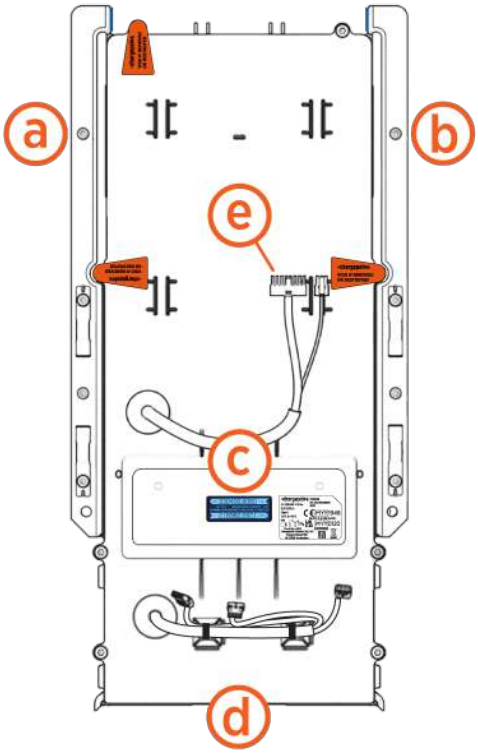
Dimensions

Note: Images are not to scale. Measurements appear in metric units (mm), followed by imperial equivalents (inches).



Main Connectors

a. Left side output main connector
b. Right side output main connector
c. Backlit LCD display with pulse LEDs
d. Power input connector (includes two sets of main inputs)
e. CAN bus (The pins on the CAN bus are reserved.)



Integrated Meter Display

The LCD displays six digits before and four digits after the comma or decimal. The unit measure is kWh.

a. Left side impulse LED (20000 imp/kWh)
b. Backlit information LCD
c. Right side impulse LED (20000 imp/ kWh)

Backlit Information LCD

Common Information Readouts:

a. Left side flags
b. Overall software version
c. Right side flags
d. Overall software hash

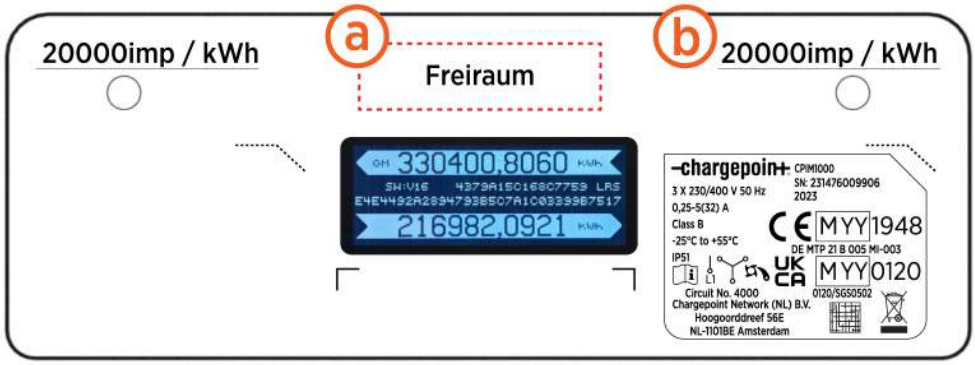
Legally Relevant:

e. Left side cumulative energy reading
f. Legally Relevant Software (LRS) hash
g. Right side cumulative energy reading

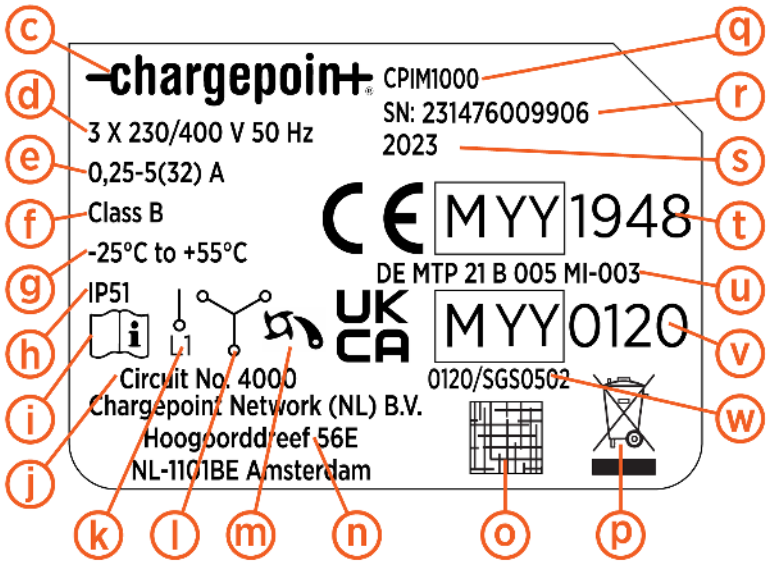
MID Type Label

Circuit Number: 4000 : Standard: DIN 43856:1989-09

a. Space for calibration mark
b. Impulse constant



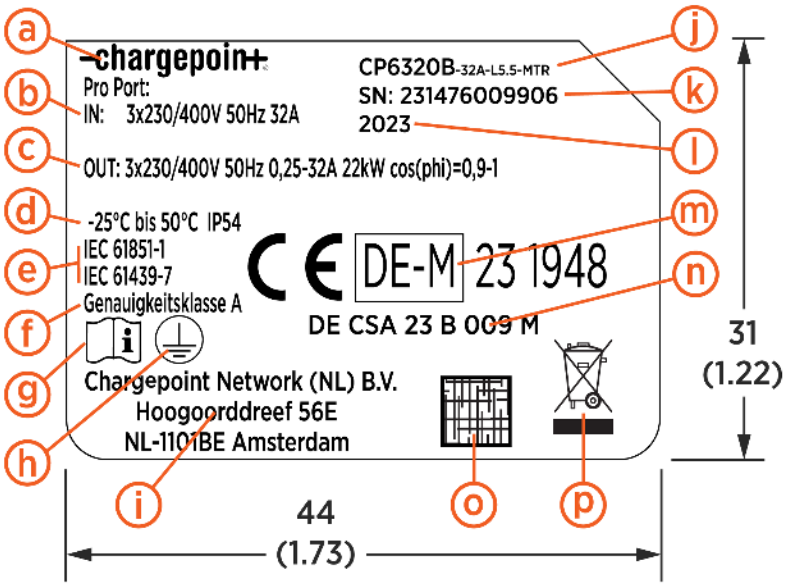
MID/MIR label includes the following:



c. Customer logo
d. Reference voltage and frequency
e. Meter current values
f. Accuracy class
g. Temperature rating
h. IP rating
i. Existence of a manual
j. Number for circuit diagram
k. Symbol for one phase
l. Symbol for three phase
m. Symbol for escapement mechanism
n. Company address
o. QR code with serial number
p. WEEE waste symbol
q. Type number
r. Serial number
s. Year of manufacture
t. CE marking, MID metrology marking, number of the notified body for MID
u. MID certificate number
v. UKCA marking, MIR metrology marking, number of the notified body for MIR
w. MIR certificate number

Note: Images are not to scale. Measurements appear in metric units (mm), followed by imperial equivalents (inches).

Three phase Eichrecht type labels include the following:



a. Manufacturer logo
b. Nominal electrical input parameters per port
c. Nominal electrical output parameters per port
d. Temperature rating / IP rating
e. Applicable standards
f. Accuracy class
g. Icon, documentation
h. Icon, class I equipment
i. Company address
j. Product type designation
k. Serial number
l. Year of manufacture
m. CE marking, Eichrecht metrology marking, number of the notified body for Eichrecht (Module D)
n. Certificate number
o. QR code with serial number
p. WEEE waste symbol

See Eichrecht-Compliant Type Designations for more details.

Data Protection

The energy data is computed and stored inside the STM32G4xx micro controller. The micro controller does not provide a mechanism for accessing this data other than via the meter firmware. The meter firmware does not provide a mechanism for updating the energy data from an external interface. The meter firmware can be updated during production or if the seal is removed, but a secure boot mechanism is used to prevent unsigned and unauthorized firmware.

Components of the CP6000 have self destructive tamper proof labels applied by the manufacturer in several locations (a) and (b). Components of the CP6000 also have self destructive tamper proof labels applied by users in some locations (c).

* VOID IF REMOVED OR DESTROYED

** VOID IF REMOVED OR DESTROYED

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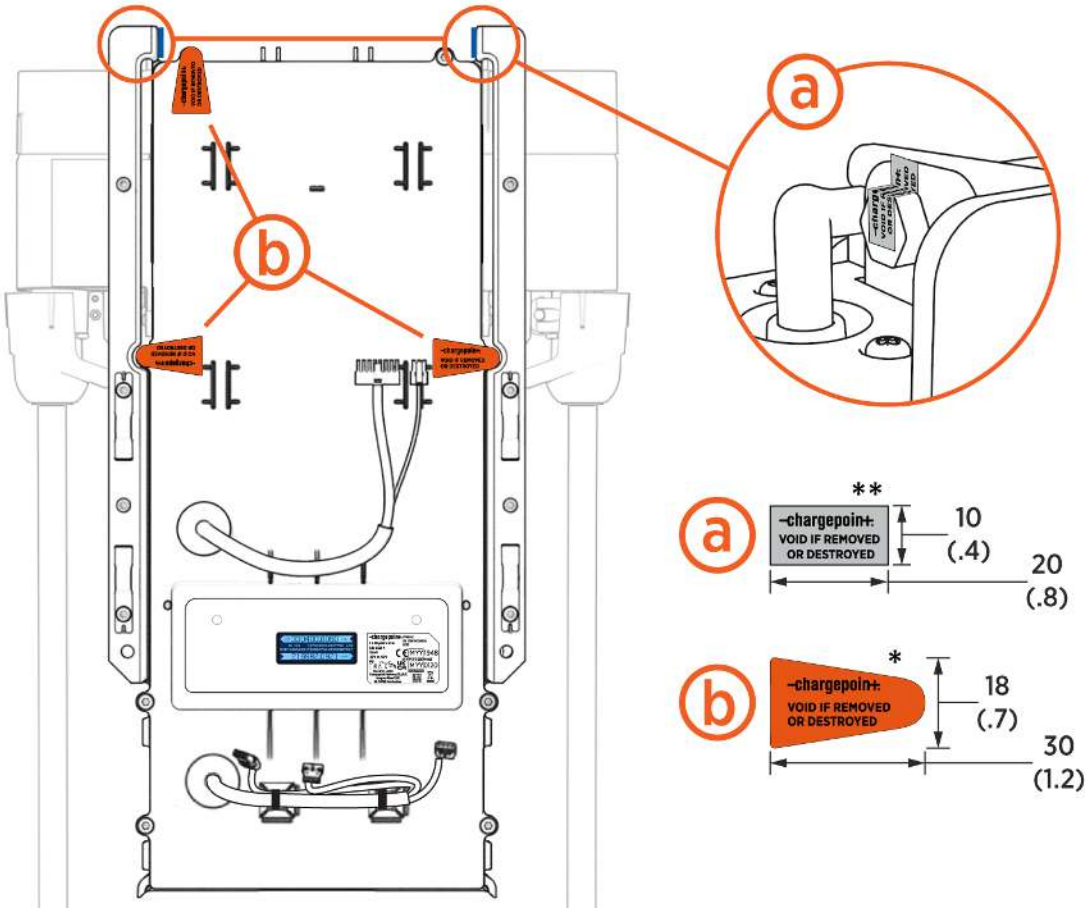

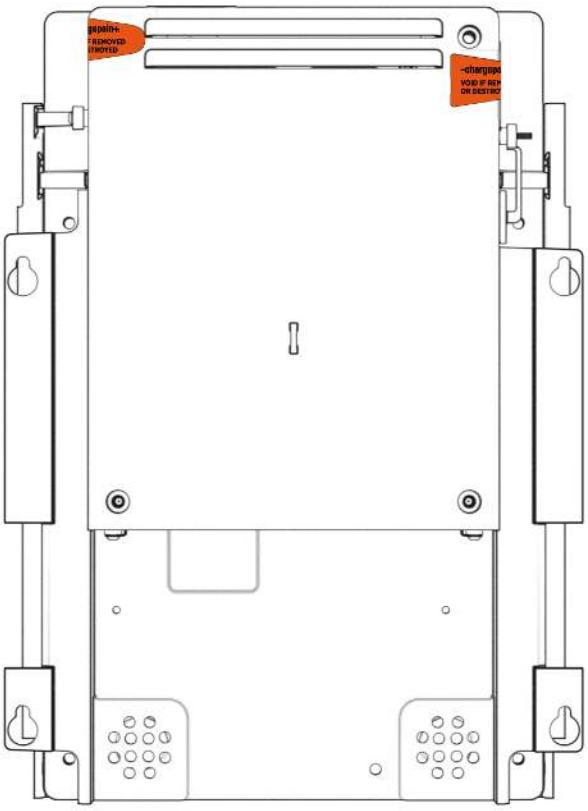


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OR DESTROYED
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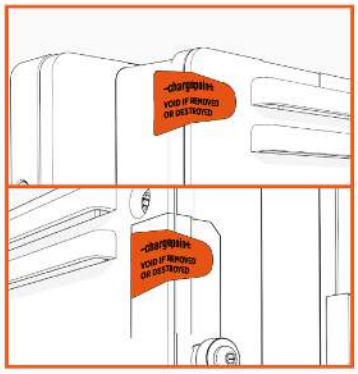
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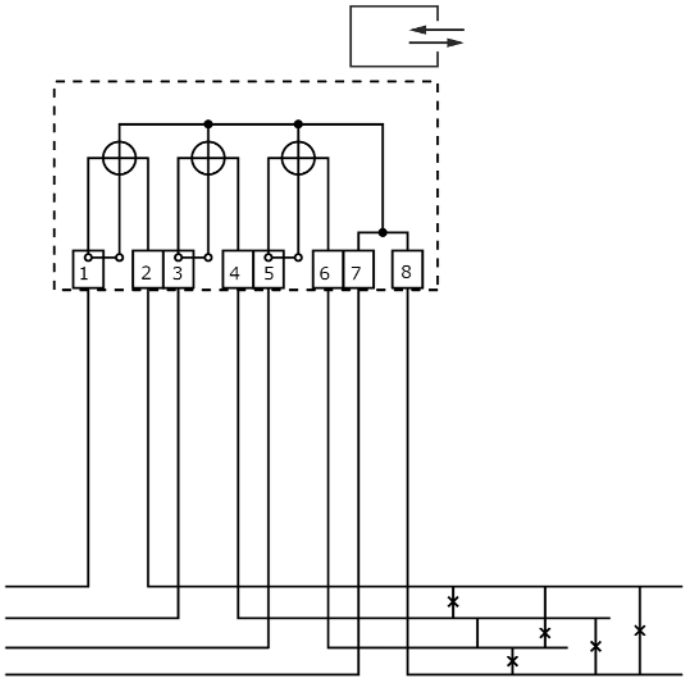
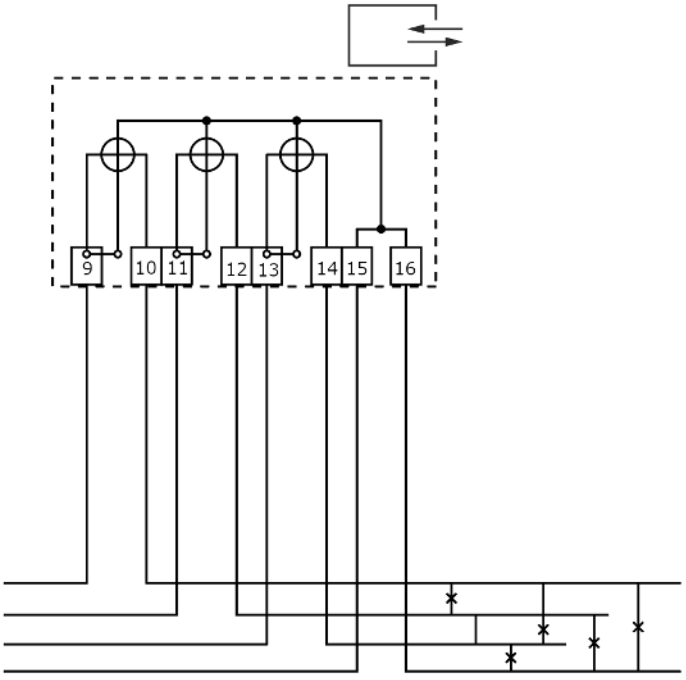
CPIM Meter Voltage and Current Circuitry

Description: Circuit number 4000 per standard DIN 43856:1989-09.

Left meter



Right meter



CPIM Interface Descriptions

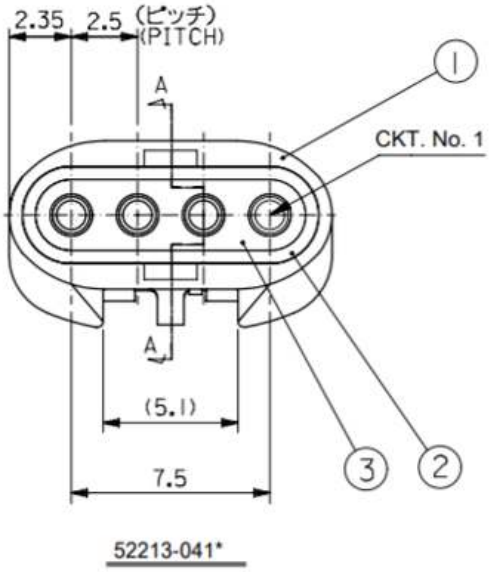
The CPIM Integrated Meter includes LED, LCD, and CAN bus interfaces. This section describes the PCBA connector interfaces including interface type (protocol), connector type, pin assignment, and whether or not the connector is accessible externally or for test only,

Integrated Meter Wiring Diagram

1. L1 input - Left
2. L1 output - Left
3. L2 input - Left
4. L2 output - Left
5. L3 input - Left
6. L3 output - Left
7. Neutral input - Left
8. Neutral output - Left
9. L1 input - Right
10. L1 output - Right
11. L2 input - Right
12. L2 output - Right
13. L3 input - Right
14. L3 output - Right
15. Neutral input - Right
16. Neutral output - Right
17. PE input - Left
18. PE output - Left
19. PE input - Right
20. PE output - Right
21. Relays

IMPORTANT: L1 and Neutral must be connected for this meter to work.

Holster Connectors

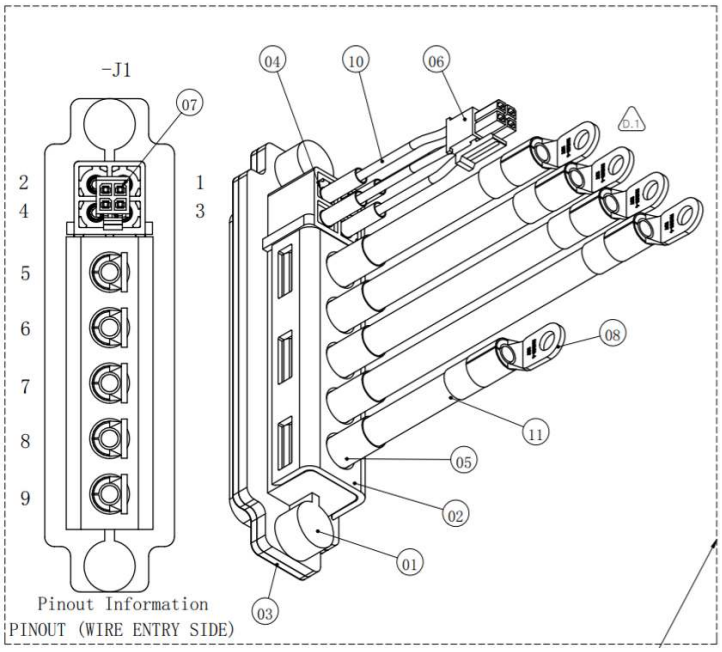


Pin P1R (Right)	Destination	Signal Name	Description
1	AC, P1 14	MTR_RIGHT_DRV2	Motor drive output (+13.5V or -13.5V)
2	AC, P1 13	MTR_LEFT_DRV2_RIGHT_DRV1	Motor drive output (+13.5V or -13.5V)
3	AC, P1 8	MTR_RIGHT_SNS	Motor sense feedback (digital)
4	AC, P1 18	GND	Motor sense feedback (digital) GND

Pin P1L (Left)	Destination	Signal Name	Description
1	AC, P1 11	MTR_LEFT_DRV2	Motor drive output (+13.5V or -13.5V)
2	AC, P1 12	MTR_LEFT_DRV2_RIGHT_DRV1	Motor drive output (+13.5V or -13.5V)
3	AC, P1 7	MTR_LEFT_SNS	Motor sense feedback (digital)
4	AC, P1 6	GND	Motor sense feedback (digital) GND

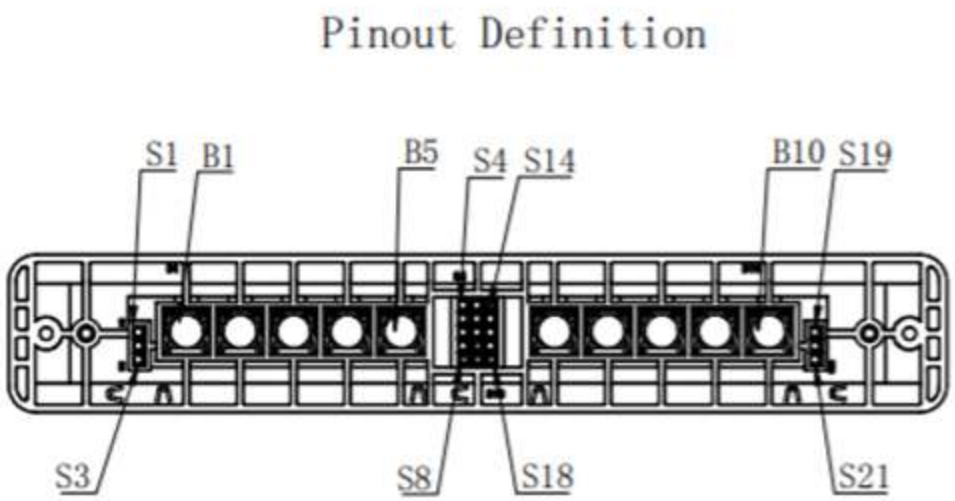
Pin P2 (Led)	Destination	Signal Name	Description
1	AC, P1 15	LED_DOWNLIGHT_DRV	White LED drive output (13.5V)
2	AC, P1 16	LED_LEFT_EVIDENT	Red LED drive output (3.3V)
3	AC, P1 17	LED_RIGHT_EVIDENT	Red LED drive output (3.3V)
4	AC, P1 19	GND	LED drive reference GND output

SEVB Signal Cable Connector (J1)



Pin	Signal	Description
1	No connect	
2	+48 return	Connected to Ground inside meter
3	Pilot	1kHz PWM input/output for EVSE function
4	+48 V	48 V power supply output
5	L3	Phase 3
6	L2	Phase 2
7	L1	Phase 1
8	Neutral	Neutral
9	Ground	

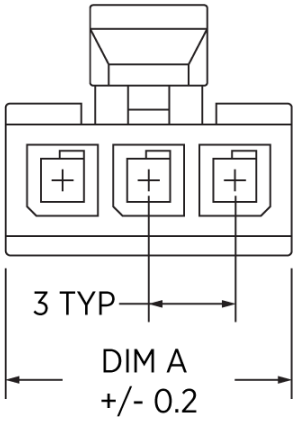
Power Plate - Blindmate (J7)

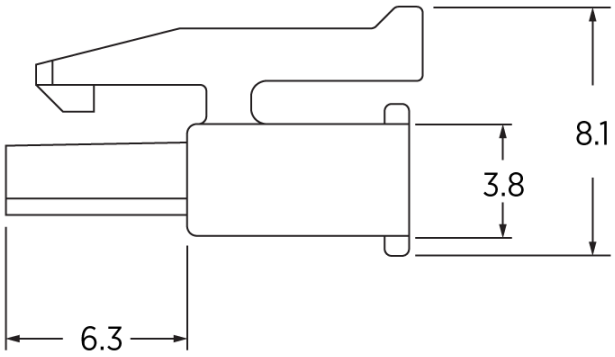


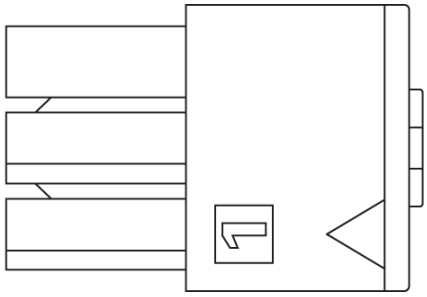
Pin	Signal	Description
S1, S2, S3	MOV GND	Left side SPD (Surge Protective Device) disconnect. Connect to GND to enable SPD, leave disconnected to disable SPD.
S4, S5	LEFT TEMP	Left power path external temperature sensor input. Connect thermistor between S4 and S5.
S6, S7	RIGHT TEMP	Right power path external temperature sensor input. Connect thermistor between S6 and S7.
S8	Spare	No connection
S9, S10	AMBIENT TEMP	Ambient external temperature sensor input. Connect thermistor between S9 and S10.
S11	ID 1	External strapping pin to select operating region. ID1 shorted to GND -> EU region selected.
S12	ID 2	External strapping pin to select operating region. ID2 shorted to GND -> NA region selected.
S13	GROUND	Ground internally shorted to B1, B10, and heatsink.
S14	SHUNT LEFT	External shunt trip connection for safety function. Connect left side RCCB shunt trip device between S14 and S15.
S15	+48 V SHUNT LEFT	External shunt trip connection for safety function. Connect left side RCCB shunt trip device between S14 and S15.
S16	SHUNT RIGHT	External shunt trip connection for safety function. Connect right side RCCB shunt trip device between S16 and S17.
S17	+48 V SHUNT RIGHT	External shunt trip connection for safety function. Connect right side RCCB shunt trip device between S16 and S17.
S18	Spare	No connection

Pin	Signal	Description
S19, S20, S21	MOV GND	Right side SPD (Surge Protective Device) disconnect. Connect to GND to enable SPD, leave disconnected to disable SPD.
B1	GND	Mains earth/ground connection
B2	LEFT AC C	Left side line 3 input.
B3	LEFT AC D	Left side neutral input.
B4	LEFT AC A	Left side line 1 input.
B5	LEFT AC B	Left side line 2 input.
B6	RIGHT AC B	Right side line 3 input.
B7	RIGHT AC A	Right side line neutral input.
B8	RIGHT AC D	Right side line 1 input.
B9	RIGHT AC C	Right side line 2 input.
B10	GND	Mains earth/ground connection

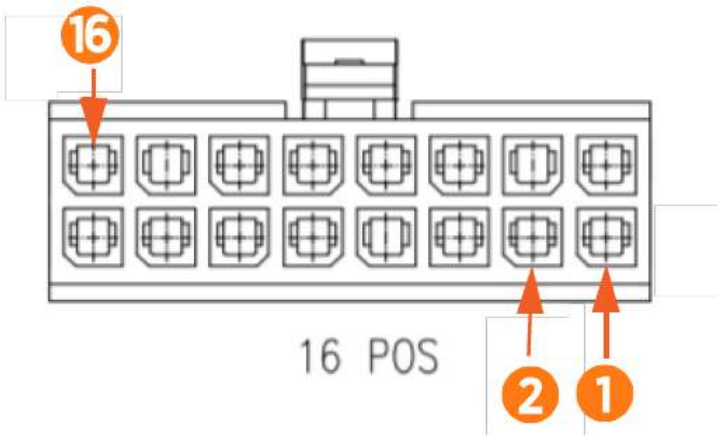
UCB Connectors







Pin197-08	Destination	Signal Name	Description
1	AC, J1 2	Ground	Ground output to auxiliary device.
2	NC		
3	AC, J1 1	UCB +48 V	48 V power supply output to aux device



Pin197-02	Destination	Signal Name	Description
1	NC		
2	NC		
3	NC		
4	NC		
5	NC		
6	NC		
7	NC		
8	NC		
9	NC		
10	AC, P1 20	Can High	Can bus for inter-communication.
11	AC, P1 10	Can Low	Can bus for inter-communication.
12	NC		
13	NC		
14	NC		
15	NC		
15	NC		

Technical Specifications

CPIM1000 Integrated Meter complies with the following standards:

EN 50470-1:2006
EN 50470-3:2006
REA 6-A
PTB-A 50.7

General Features

Connectors	See "Input Connectors" on page 4 and "Input Connectors" on page 4
Protection grade	IP51

Environmental Specifications

Power	Self-powered (via measured voltage)
Consumption	<3 W, <10 VA (per port, multifunctional meter)
Ist	0.02 A
Imin	0.25 A
Itr	0.5 A
Iref	5 A
Imax	32 A
Uref	3 phase 230/400V AC or 1 phase 230V AC 400V AC phase-to-phase 230V AC phase-neutral, neutral connection mandatory
Fref	50 Hz
Accuracy class	Active energy: Class B (EN50470-3)

Additional Environmental Specifications

Working temperature	-25° C to 55° C Note: LCD performance degraded at <-10° C
Storage temperature	-40° C to 80° C
Mechanical environment	Class M1 - 2014/32/EU - Measuring Instrument Directive Class M1 - UK SI2016 No. 1153 - Measuring Instruments Regulations
Electromagnetic environment	Class E2
Application field	Indoor meter
Electrical protection	Class I
Storage and operating humidity	5% - 95% RH at 50° C, non-condensing for up to two years

LED Specifications

Pulse weight	20000 imp / kWh
Color	Red

Output Specifications

Pulse output	Proportionate to measured active energy (EN62052-31)

Minimum Number of Pulses for Repeatability Testing (per EN 50470-3)

Imin	5
Itr	15
Iref	100
Imax	300

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