Shelly Pro 3EM

Device identification

- Device name: **Shelly Pro 3EM**
- Device model: **SPEM-003CEBEU120**
- Device SSID: **ShellyPro3EM-XXXXXX**

Short description

Shelly Pro 3EM (The Device) is a DIN rail mountable three-phase energy meter. Enhanced with all the gen2 firmware flexibility and LAN connectivity, it provides professional integrators with additional options for end-customer solutions. It can work standalone in a local LAN and/or Wi-Fi network, or it can also be operated through cloud home automation services through MQTT, HTTP, and WebSocket. All inbound connections support TLS.

The Device reports accumulated energy as well as instantaneous voltage, current, active, and apparent power per phase in real time. It stores data in non-volatile memory that can be retrieved for a period of up to 60 days in 1-minute intervals.

The Device has a real-time clock to keep the correct time if the connection to an SNTP server is lost.

Shelly Pro 3EM can be accessed, set up, and monitored remotely by the User, as well as the Device can access and communicate with an automation system, as long as they are in the same network infrastructure.

The Device has an embedded Web Interface which can be used to monitor and control the device, as well as adjust its settings.

⚠**NOTICE!** The Device does not have a built-in relay. Contactor control is provided using a Shelly Pro Addon attached to the Shelly Pro 3EM.

Features

- 4 Quadrant measurement
- DIN rail mounting
- Multiple connection types
- Current transformer connection
- Phase sequence error detection* (option)
- Channel-to-channel calibration**
- No load threshold***
- Optical pulse indication of energy usage
- Real-time clock
- Data logs

- Accuracy Class B (IEC 62053-21)
- Photovoltaic ready

* The Device has phase sequence error detection circuits. This detection works on phase voltages and considers only the zero crossings. The regular succession of these zero-crossing events is Phase A followed by Phase B followed by Phase C. If the sequence of zero-crossing events is, instead, Phase A followed by Phase C followed by Phase B, then a `phase_sequence` error is reported when the *Phase sequence error detection* option is enabled.

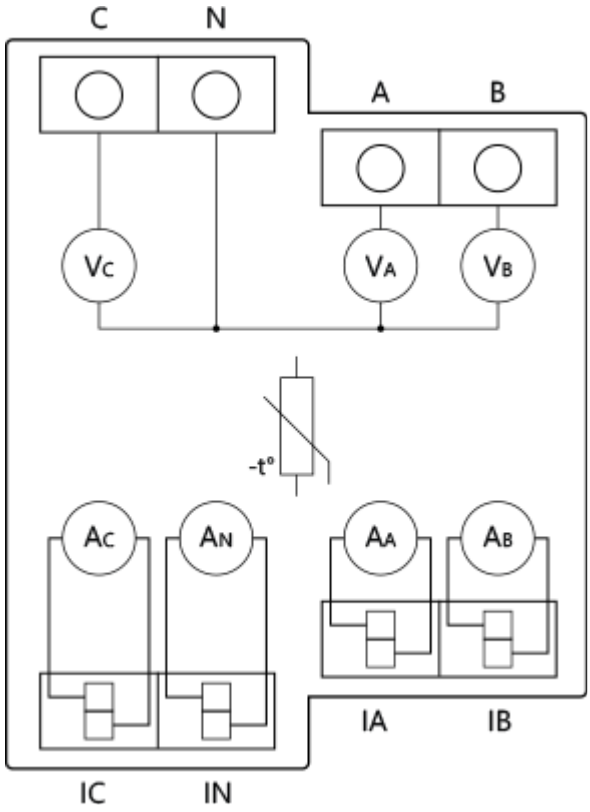
** At least 500 W load is required for each channel.

*** In case the total load for the three channels drops below 30 VA per channel the measured power level will be displayed, but no consumed energy will be accumulated to the energy statistics and a `No load threshold` notification will be displayed in the Device web interface and the mobile application.

Main applications

- Residential
- MDU (Multi Dwelling Units - apartments, condominiums, hotels, etc.)
- Light commercial (small office buildings, small retail/restaurant/gas station, etc.)
- Industrial (factories, power plants, water processing, refineries, etc.)
- Agricultural (farms, barns, silos, etc.)
- Government/municipal
- University/college

Simplified internal schematics



Device electrical interfaces

Inputs

- 4 line inputs on screw terminals: 3 **L** and 1 **N**
- 4 current transformer inputs: 3 for **L** current measurements and 1 for **N** current measurement

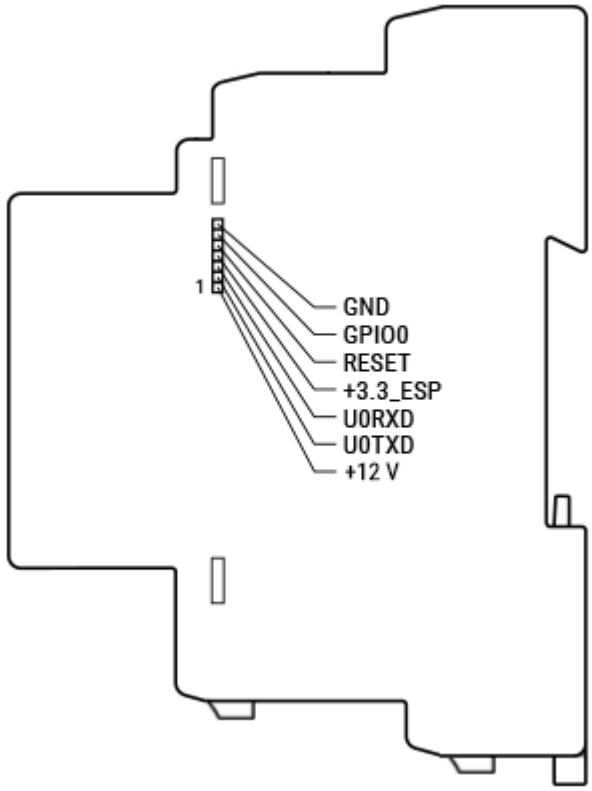
Ethernet port

- 1 RJ45 connector

⚠**CAUTION!** Plug in or unplug the LAN cable only when the Device is powered off! The LAN cable connector must not be metallic in the parts touched by the user to plug in or unplug the cable.

Add-on interface

- Shelly proprietary serial interface



⚠**CAUTION!** High voltage on the add-on interface when the Device is powered!

Connectivity

- Wi-Fi
- Ethernet
- Bluetooth

Each connectivity option can be enabled or disabled by the user.

Safety features

- Internal temperature sensing and reporting

Supported load types

- Resistive (incandescent bulbs, heating devices)
- Capacitive (LED light drivers, capacitor banks, electronic equipment, motor start capacitors)

- Inductive (transformers, fans, refrigerators, air-conditioners)

User interface

Inputs

- One tactile dome button
    - Press briefly to toggle the state of the relay in the attached Shelly Pro 3EM Switch Add-on.
    - Press and hold for 5 sec to activate Device AP.
    - Press and hold for 10 sec to factory reset.

Outputs

- LED indication
    - Power: Red light if the power supply is connected.
    - Wi-Fi (varies):
        - Blue light if in AP mode.
        - Red light if in STA mode, and not connected to a Wi-Fi network.
        - Yellow light if in STA mode, and connected to a Wi-Fi network. Not connected to Shelly Cloud or Shelly Cloud disabled.
        - Green light if in STA mode, and connected to a Wi-Fi network and the Shelly Cloud.
        - The LED will be flashing Red/Blue if OTA update is in progress.
    - LAN: Green light if LAN is connected.
    - Count: Red light will be flashing when the Device is measuring energy according to settings with frequency dependent on the energy flowing through the measured circuit.

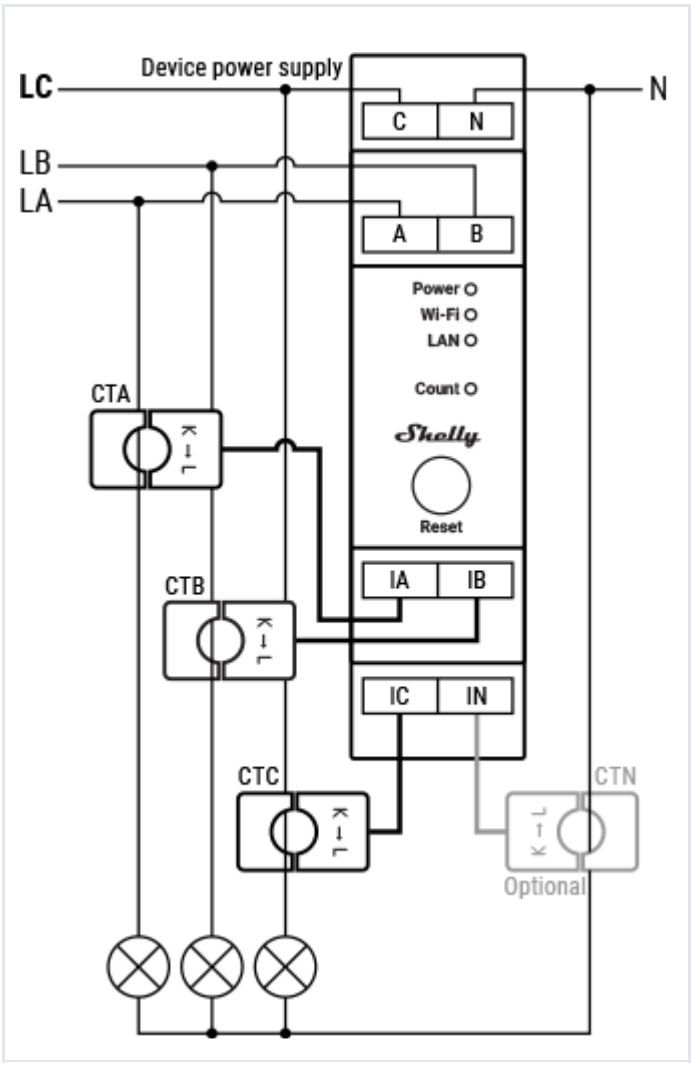
Specifications

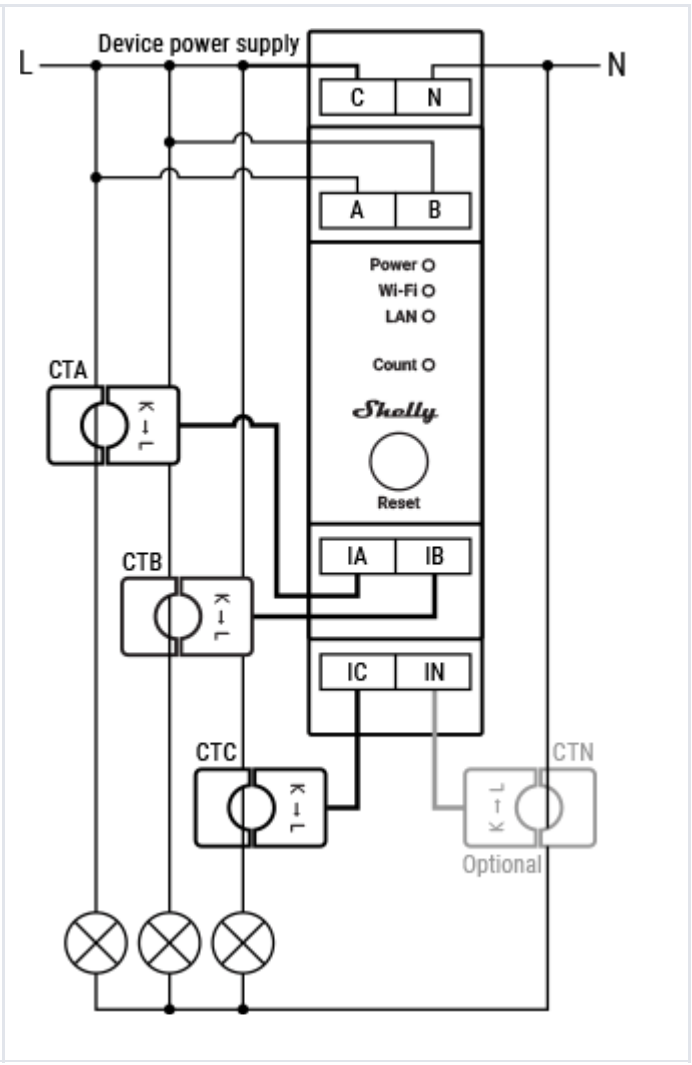
Type	Value
Physical	
Size (HxWxD):	94x19x69 ±0.5 mm / 3.70x0.75x2.71 ±0.02 in
Weight:	62 ±1 g / 2.19 ±0.05 oz
Mounting:	DIN rail
Screw terminals max torque:	0.4 Nm / 4.43 lbin
Conductor cross section:	0.5 to 2.5 mm² / 20 to 14 AWG (solid, stranded, and bootlace lugs)
Conductor stripped length:	6 to 7 mm / 0.24 to 0.28 in
Shell material:	Plastic
Color:	White
Environmental	
Ambient temperature:	-20 °C to 40 °C / -5 °F to 105 °F
Humidity:	30 % to 70 % RH
Max. altitude:	2000 m / 6562 ft
Electrical	
Power supply voltage AC:	100 - 260 V, 50/60 Hz
Power supply voltage DC:	N/A
Power consumption:	< 3 W
Sensors, meters	

Internal-temperature sensor:	Yes
Voltmeters (RMS for each phase):	100 - 260 V
Voltmeters accuracy:	±1 %
Ammeters (RMS via CT for each phase and the Neutral):	0 - 120 A
Compatible CT	CT 120A
Ammeters accuracy:	±1 % (2 - 120 A), ±2 % (1 - 2 A), ±5 % (0 - 1 A)
Power and energy meters:	• Active and apparent power • Active and apparent energy • Power factor • Fundamental active and fundamental reactive energy
Channel-to-channel calibration minimum load	500 W per channel
No load threshold:	30 VA per channel
Measurement data storage:	At least 60 days of 1 min data resolution
Data export:	• CSV for PQ recorded values • JSON format export through RPC
Radio	
RF band:	2400 - 2495 MHz
Max. RF power:	<20 dBm
Wi-Fi protocol:	802.11 b/g/n

Wi-Fi Range:	Up to 30 m / 100 ft indoors and 50 m / 160 ft outdoors (Depends on local conditions)
Bluetooth Protocol:	4.2
Bluetooth Range:	Up to 10 m / 33 ft indoors and 30 m / 100 ft outdoors (Depends on local conditions)
MCU	
CPU:	ESP32-D0WDQ6
Flash:	16 MB
Firmware capabilities	
Webhooks (URL actions):	20 with 5 URLs per hook
Scripting:	Yes
MQTT:	Yes
CoAP:	No

Basic wiring diagrams





Legend

Terminals		Wires	
A	Phase A input	**LA**	Phase A live (110-240 V) wire
B	Phase B input	**LB**	Phase B live (110-240 V) wire
C	Phase C and power supply input	**LC**	Phase C live (110-240 V) wire
N	Neutral terminal	**L**	Mono-phase live (110-240 V) wire

IA	Phase A current transformer input	**N**	Neutral wire
IB	Phase B current transformer input	**Current transformers**	
IC	Phase C current transformer input	**CTA**	Phase A current transformer
IN	Neutral current transformer input	**CTB**	Phase B current transformer
		CTC	Phase C current transformer
		CTN	Neutral current transformer

Troubleshooting

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Components and APIs

- This device
- All Shelly devices and services

Compliance

- Shelly Pro 3EM multilingual EU declaration of conformity.pdf
- Shelly Pro 3EM 120A UK PSTI ACT Statement of compliance.pdf

Printed user guide

- Shelly Pro 3EM multilingual printed user and safety guide.pdf