User Manual

Smart Connect P1/A1

and

Smart Connect TIC

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Xemex
info@xemex.eu
+32 (0)3 201 95 95
www.xemex.eu

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

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VERSION	DATE	DESCRIPTION
1.0	04/07/2025	First Official Version
1.1	23/07/2025	IP address for Web Interface adjusted
1.2	28/07/2025	Added an explanation to the Web Interface connection methods.
1.3	18/08/2025	Update Smart Connect connection URL
1.4	2/10/2025	Xemex Layout and make official release
1.5	18/11/2025	Add launch date Xemex broker and add API endpoint.
1.6	10/12/2025	Added Wi-Fi example to API endpoint and specified an unshielded UTP Ethernet cable (minimum CAT5e).
1.7	28/04/2026	Added a note to section 1.2 and introduced section 5.4.
1.8	02/06/2026	Extend Modbus register map and MQTT field descriptions
1.9	23/07/2026	Add Xemex Broker / Enny portal section, clarify MQTT broker certificate requirements
1.10	09/09/2026	Various clarifications (no functional changes)
1.11	23/10/2026	Added Diagnostics section, mqtt:// support, M-Bus gas meter values (Modbus/MQTT) and security enhancements.

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1. Introduction

Thank you for purchasing this Smart Connect P1/A1/TIC. 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.

1.1. Smart Connect P1/A1

The Xemex Smart Connect P1/A1 is a compact module that converts Dutch and Belgian Smart Meter P1/A1 messages into Modbus TCP or MQTT. It supports DSMR 4.2+ in the Netherlands and the E-MUCS standard in Belgium. The Smart Connect also features a P1/A1 output port to replicate the original message, allowing other P1/A1 devices to remain functional.

It connects to the Smart Meter via an RJ12-to-RJ12 cable and is typically powered through the meter's P1/A1 port. In specific cases where this is insufficient (see section 2.5 Power input), an external USB-C power supply can be used.

1.2. Smart Connect TIC

The Xemex Smart Connect TIC is a compact module that converts French Smart Meter TIC messages into Modbus TCP or MQTT. It is compliant with the *Enedis-NOI-CPT_54E V3 (2018)* standard. It connects to the meter via a dual-pin TIC port and functions as a Modbus TCP slave over Ethernet, enabling communication with a Modbus master.

Powered by an external USB-C supply, the Smart Connect features a multicolour backlit button for user interaction, using colour codes to indicate operational status.

Note: *Some meter registers and values may not be available depending on the smart meter configuration and contractual setup (e.g. feed-in/export agreements). Please ensure that the TIC port of the grid meter is configured in* ***Standard mode****, as* ***Historic mode is not supported****.*

1.3. Target group

The installation and configuration of the Smart Connect P1/A1/TIC must be carried out in accordance with applicable local standards and safety regulations. The reader of this document is expected to be familiar with common electronics terminology and to have basic knowledge of analogue and digital electronic systems and similar products.

1.4. Intended usage

The Smart Connect is intended for receiving and processing A1, P1 or TIC telegrams from compatible smart meters and making the resulting data available via Modbus TCP and/or MQTT. The main function of the software is to serve as a communication bridge between a residential smart meter and an external system, such as an energy management system, monitoring system or other application that processes this data.

The Smart Connect is used by, among others, the following target groups:

- **EV charger manufacturers and installers**
  The Smart Connect enables a direct peer-to-peer connection to an EV charger, so live smart meter data can be used for dynamic load balancing and grid stability. This lets installers integrate charging stations more intelligently and safely, without complex network configuration.
- **Energy suppliers and grid operators**
  Because the dongle continuously exposes real-time consumption data via Modbus TCP and MQTT, energy suppliers and grid operators can use this information for monitoring, reporting and supporting flexible energy services. The splitter function also makes it possible to share the same data stream with multiple systems.
- **PV installers and battery systems**
  For solar energy and home batteries, the Smart Connect supplies the live consumption and feed-in data that allows batteries and micro-inverters to control intelligently. This optimises self-consumption and makes storage or feed-in more efficient - ideal for installers with a larger installed base.
- **EMS and smart home providers**
  Support for Modbus TCP and MQTT means the dongle integrates easily into energy management systems and home automation. The forwarding and splitter functions allow multiple applications to use the same P1 data simultaneously, giving EMS vendors flexibility and scalability.
- **Commercial real estate and SMEs**
  Companies with multiple installations or charging points gain insight into energy consumption through the Smart Connect and can connect several devices (e.g. chargers, EMS, dashboards) to a single smart meter. This makes it a scalable solution for energy monitoring and efficient consumption in business environments.

1.5. 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, possible hazard of electric shock.
	Caution

1.6. Abbreviations and acronyms

V AC:	AC-voltage
V DC:	DC-voltage
EV:	Electrical Vehicle
(D)SMR:	(Dutch) Smart Meter Requirements
E-MUCS:	Extended Multi-Utility Companion Specification
TCP:	Transmission Control Protocol
DNS:	Domain Name System
mDNS:	Multicast Domain Name System
DHCP:	Dynamic Host Configuration Protocol
TIC:	Télé-Information Client
LED:	Light Emitting Diode
HTTP:	Hypertext Transfer Protocol
JSON:	JavaScript Object Notation
USB:	Universal Serial Bus
UI:	User Interface
API:	Application Programming Interface
IP:	Internet Protocol
MQTT:	Message Queuing Telemetry Transport
SSID:	Service Set Identifier
TLS:	Transport Layer Security
UTP:	Unshielded Twisted Pair
STP:	Shielded Twisted Pair

1.7. Safety precautions

Always adhere to the following checklist:

1. Only qualified personnel or licensed electricians should install the Xemex Smart Connect P1/A1/TIC.
2. Follow all applicable local, national electrical and safety codes.
3. Install the Smart Connect P1/A1/TIC 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. Equipment must be disconnected from the Hazardous live voltages before access.
6. Before applying power, the installer must check that all the wires are securely fixed by tugging on each wire.
7. Do not install the Smart Connect P1/A1/TIC in locations where the ambient temperature can fall outside the range of 0 °C to +45 °C, or where there is 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).
8. Do not drill mounting holes in the device. Click the module on a DIN Rail instead.
9. When the Smart Connect P1/A1/TIC is installed incorrectly, the safety protections may be impaired.

1.8. Regulatory Compliance

This product is CE marked in accordance with Directive 2014/53/EU, the Radio Equipment Directive (RED), as confirmed in the EU Declaration of Conformity.

The EU Declaration of Conformity covers the applicable requirements for health and safety, electromagnetic compatibility, radio spectrum use, cybersecurity and RoHS, including the relevant harmonised standards.

This product is manufactured in consideration of the applicable requirements of Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

The full EU Declaration of Conformity is available upon request from the manufacturer.

2. Technical specifications

The Smart Connect P1/A1 is multifunctional and contains:

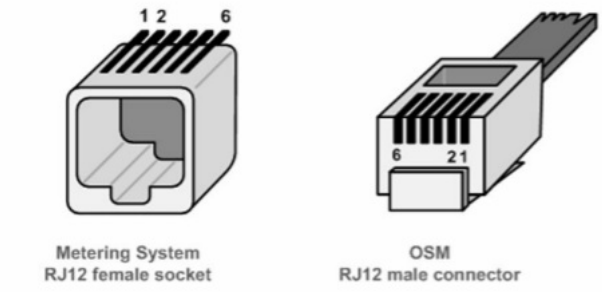
- 1 x RJ45 Output:
  Supports 10/100BASE-T Ethernet via Ethernet PHY
- 1 x USB-c Power Supply
- 2 x RJ12
  One input and one output (P1 ext.)
- Built-in Wi-Fi
- 1 x multi-coloured LED
- 1 x Button

The Smart Connect TIC is multifunctional and contains:

- 1 x RJ45 Output:
  Supports 10/100BASE-T Ethernet via Ethernet PHY
- 1 x USB-c Power Supply
- 1 x Phoenix 2-pin female connector
- Built-in Wi-Fi
- 1 x multi-coloured LED
- 1 x Button

2.1. RJ12 - P1/A1 in P1/A1 ext.

The P1 ext port works as an A1 or P1 splitter device in case the additional Smart Connect needs access to the data (such as Homewizard or Homey). When using the P1/A1 ext port, extra power must be supplied by a USB-C power supply. An exact copy of the P1/A1 in is given through this connection.



2.2. Télé-Information Client (TIC)

The TIC connector follows the Specifications from Enedis-NOI-CPT_54E V3 (2018). The power pin is not used.

2.3. LED

This section describes the behavior of the multi-colored LED. The table below shows the LED states of the Smart Connect during normal operation. Other LED behavior can be found in *section 7 Trouble Shooting.*

State	Color	Pattern	Description
Off	-	-	Module not powered
Powerup	Red	Continuous	Module booting
Normal Operation	Green	Continuous	Smart Connect receives P1/A1/TIC data; Network is connected and configured. Providing Modbus TCP or MQTT data.
AP mode	Blue	Blinking	Module in AP mode

2.4. Button

The Button has the following characteristics when pressed:

Action	Description
Momentary press (< 2 seconds)	Soft reset, reconnect to network
Hold (5 seconds)	AP mode, only available when the device is in factory defaults state.
Hold (>10 seconds)	Reset to factory defaults

2.5. Power input

The table below describes when an external USB-C power supply should be used.

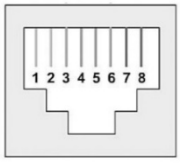
Usage	No	Yes
P1/A1 IN (SMR 5.x)	✓	
P1/A1 IN (DSMR 4.2)		✓
P1/A1 OUT		✓
TIC IN		✓

USB-c power when not purchased from Xemex, needs to fulfil the following criteria:

Description	Min	Typ	Max	Unit	Remarks
Voltage Range	4,5	5	5,5	[V DC]	
Ripple voltage			100	[mV]	Maximum input ripple
Input current			2.0	[A]	Including maximum current needed when using P1 ext.
Input power			3	[W]	According to the EU USB-C norm

2.6. RJ45 – ethernet port

Use an **unshielded twisted pair (UTP)** Ethernet cable, minimum CAT5e. Shielded (STP/FTP) cables are not supported. The connector contains small LEDs, according to IEEE 802.3 specification.



RJ45 connector – orientation

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: Do not open the housing of the Smart Connect P1/A1/TIC. The device contains no user-serviceable parts. Opening the housing may result in electric shock, damage to the device, or compromise its safety and functionality.

Failing to obey the ”Guidelines for safety and installation”, the warranty no longer applies.

3.2. Mounting

Mount the device on a flat, vertical surface using the two screw holes on the side of the device. Ensure the device is securely fastened to avoid movement or vibration during operation. The device should be installed indoors, away from direct sunlight, moisture, or excessive dust.
Maintain a minimum clearance of 5 cm around the device for ventilation and cable management.

3.3. Electrical wiring

The device is equipped with the following ports:

P1/A1 Ports (RJ12)

The device includes both a P1/A1 input and a P1/A1 output port using RJ12 connectors.

The P1/A1 input port is designed to connect to a smart meter in accordance with DSMR specifications. Use a suitable RJ12 cable and connect it with care. Ensure proper orientation of the connector and avoid bending or damaging the pins. See section 2.1 for technical specifications.

The P1/A1 output port allows for the connection of a second P1/A1 device (daisy-chaining). This function requires USB-C power to be connected in order to supply sufficient power to both the smart meter and the additional P1/A1 device. See section 2.5 for more information.

TIC Cable

The TIC interface uses a 2-wire straight signal cable with a solid core. This cable is intended exclusively for the French Télé-Information Client interface and is not compatible with P1/A1 wiring. Ensure correct polarity during installation. Refer to section 6 for cable specifications.

USB-C Port

This port provides power to the device. It is mandatory to connect a USB-C power supply when using the P1/A1-OUT function. Refer to section 2.5 for power specifications. Always use certified USB-C power supplies and cables to ensure safe and reliable operation.

RJ45 Ethernet Port

Used for network connectivity via a standard **unshielded twisted pair (UTP) Ethernet cable, minimum CAT5e**. **Shielded (STP/FTP) cables are not supported.** Ensure a stable connection to a switch, router, or directly to a charging station. For pin configuration and electrical specifications, refer to section 2.6.

4. Maintenance and Service

There are no serviceable parts inside. Clean the unit with a dry cloth.

5. Software

5.1. Configuring Through the Web Interface

To ensure proper communication between the Smart Connect P1/A1/TIC and your local network, you may need to configure the network settings through the built-in web interface.
This section explains how to access the Smart Connect interface and adjust Ethernet, Wi-Fi, and MQTT settings as needed.

5.1.1. Connect to the Smart Connect

First commissioning: initial setup

The Smart Connect can be commissioned in two different ways:

- Option A: Ethernet (wired connection)
- Option B: Wi-Fi (Access Point mode)

Option A - Ethernet Connection

1. Use the A1/P1 cable provided with the Smart Connect, connecting one end to the device and the other to the P1/A1 port of your smart meter.
2. Connect the Smart Connect to the network using a UTP Ethernet cable.
3. Wait for it to boot. By default, it requests an IP address via DHCP.

If no DHCP server is found, the Smart Connect assigns itself a link-local (APIPA) address in the 169.254.x.x range for easier provisioning.

Option B – Wi-Fi Connection (Access Point Mode)

1. Use the A1/P1 cable provided with the Smart Connect, connecting one end to the device and the other to the P1/A1 port of your smart meter.
2. If the Smart Connect is in factory default state, press and hold the button for 5 seconds until the LED starts blinking blue.
    - The device is now in Wi-Fi Access Point (AP) mode.
3. When in AP mode, the Smart Connect broadcasts its own Wi-Fi network:
    - SSID: SC-xxxxxxxxxxxx
    - Password: (unique WPA2 key, printed on the sticker -> login: xxxxxxxx)
    - IP range: 192.168.71.x (Smart Connect acts as DHCP server)
4. Connect your smartphone or laptop to this Wi-Fi network.

5.1.2. Open the web interface

On a device that is on the same local network, open any web browser and navigate to one of the following:

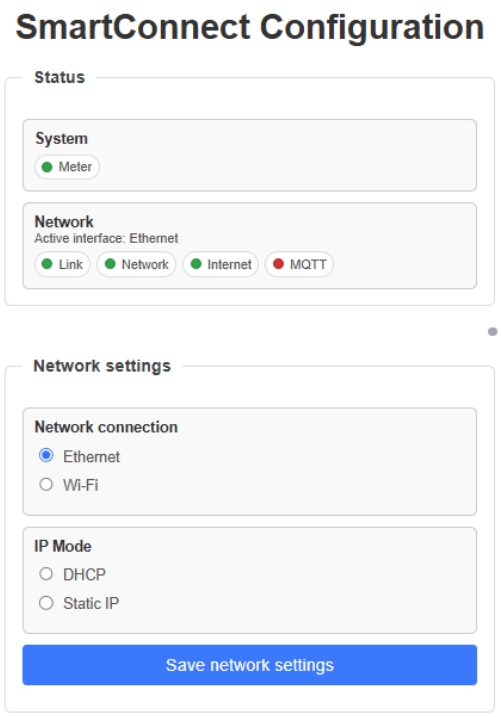
1. http://smart-connect.local
   - Works for direct connections (Wi-Fi hotspot or Ethernet-to-Ethernet).
   - Requires mDNS support on the client device (Windows 10+, macOS, iOS, Linux).
   - This URL cannot be used directly for the secure configuration environment but provides a link to it.
2. http://smart-connect
   - Works if the Smart Connect has obtained an IP address from your router via DHCP.
   - Does not work when directly connected (AP or hotspot mode).
3. Direct IP address
   - Example: http://169.254.164.254 (link-local) or the DHCP-assigned IP.

5.1.3. Configure Network Settings

Once connected to the Smart Connect's web interface (e.g., http://smart-connect.local or its assigned IP address), you can configure how the Smart Connect communicates with your network.

Choose Connection Type

- Option A: Ethernet (wired)
- Option B: Wi-Fi Client (wireless)



Only one connection type can be active at a time. Switching from Ethernet to Wi-Fi will disable the Ethernet interface, and vice versa.

Option A: Ethernet

1. Choose IP Configuration Mode:
   - DHCP (Dynamic IP Address)
     The Smart Connect automatically requests an IP address from your router
   - Static IP (Manual IP Address)
     Use when you require a fixed IP (for example, when directly connected to an EV charger or industrial controller).
2. If using Static IP, enter:
   - IP Address (e.g., 192.168.10.101)
   - Subnet Mask (typically /24 = 255.255.255.0)
   - Gateway (router or EV charger IP)
   - DNS Server (can be the same as the gateway)
     Tip: If directly connected to an EV charger, enter the charger's IP for both Gateway and DNS.
3. Click Save.
4. Reboot the Smart Connect.

Option B: Wi-Fi Client

If using Wi-Fi instead of Ethernet, the Smart Connect must be configured to connect to the customer's local wireless network.

1) Enter Wi-Fi Network Details *
   - SSID (Wi-Fi network name)
   - Password (Wi-Fi network password , WPA2-PSK only)
2) Choose IP mode (see "Option A: Ethernet" above for DHCP or Static IP).
3) Click Save.
4) Reboot the Smart Connect.

After a successful Wi-Fi connection, AP mode is automatically disabled.

** Note: The Smart Connect supports only 2.4 GHz Wi-Fi networks (802.11 b/g/n). 5 GHz networks are not supported.*

The smart connect does not support IPv6. Ensure that the network or charger communicates over IPv4 only.
If DHCP fails (e.g., no response after 3 attempts), the smart connect will automatically assign itself a link, local IP address in the range 169.254.x.x to allow configuration without internet.

5.1.4. Network behaviour

- **Hostname:** smart-connect-<serial number>
  This name may appear in your router's device list.
- **MAC addresses:** Unique per device, printed on the sticker.
- **DHCP client:** By default, the Smart Connect requests an IPv4 address via DHCP.
  - If no DHCP server is found (after 3 attempts), it falls back to a local IP in the range 169.254.x.x.
  - IPv6 is not supported.
- **mDNS:** The Smart Connect responds to smart-connect.local.
  - Supported on Windows 10+, macOS, Linux, iOS.
  - Redirects to the secure configuration page.
- **Wi-Fi Access Point Mode (AP Mode):**
  - Out of the box, and after a factory reset action, the Smart Connect starts in access point mode if the button is pressed for 5 seconds (LED will start blinking blue).
  - SSID: SC-<serial number>
  - Password: printed on device sticker (random WPA2 key).
  - Encryption: WPA2-PSK.

5.1.5. Configure MQTT Settings (Optional)

The Smart Connect supports secure MQTT communication to transmit real-time energy data and receive remote commands such as firmware updates. MQTT settings can be configured via the web interface or the HTTP-API. Follow these steps to configure the MQTT connection:

MQTT Connection

- **Protocol**: MQTT over TLS
  (mqtts://, recommended) or unencrypted MQTT (mqtt://, trusted networks only)
- **Default broker**: mqtts://broker.xemex-cloud.eu:8883
- **Site**: Optional identifier for the installation

Xemex Broker & Enny Portal

The Xemex Broker, in conjunction with the Enny portal, has been available since Q3 2026. This provides direct energy insights from Smart Connect via the Enny portal, without the need for any additional configuration.

Authentication

1. **Mutual TLS (mTLS) — Default & Recommended**
    - The Smart Connect uses its built-in device certificate to authenticate with the broker.
    - The certificate's CN field contains the Smart Connect's serial number.
    - The broker validates the Smart Connect automatically using trusted root CAs.
    - Note: Correct date and time are required; otherwise MQTT will not work.
2. **Username & Password (Optional)**
    - This method can be used with your own broker, for both TLS (mqtts://) and unencrypted (mqtt://) connections.
    - Username and password can be set via the **web UI** or the **HTTP-API**.

      ***Note**: when using mqtts://, your own broker must use a valid SSL certificate signed by a recognized public CA. Local or self-signed certificates are not supported.*

Data Transmission (Smart Connect → Broker)

The Smart Connect publishes data to the broker via MQTT under the following sub-topics:

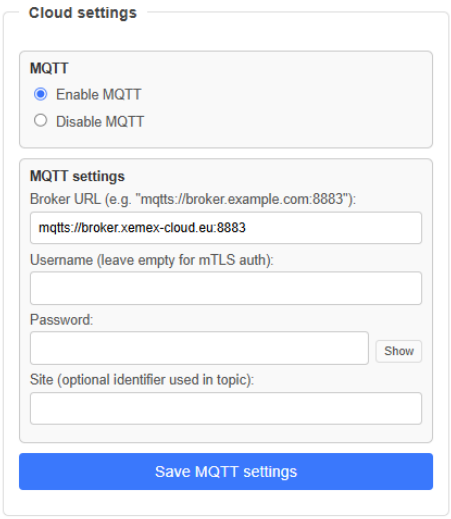
- *devices/<site>/smart-connect/<serial>/data/device_info*
    - Published at startup and once every 24 hours.
    - Contains general device information.
- *devices/<site>/smart-connect/<serial>/data/power_instant*
    - Published every time a new P1/A1/TIC telegram is received and parsed.
    - Contains instantaneous values (voltage, current, power, reactive power) per phase, plus the cumulative energy import/export meter readings (E_IMPORT, E_EXPORT), and additional electrical measurement and power quality data.
- *devices/<site>/smart-connect/<serial>/data/device_counters*
    - Published once per hour.
    - Contains diagnostic and operational counters (e.g. uptime, gateway/internet connectivity, telegram processing statistics, MQTT statistics, and memory usage).

General notes:

- Fields not available in the telegram are omitted from the message.
- Each message includes a timestamp in UTC Unix epoch format.

Configuration via Web Interface

1. Log in to the Smart Connect's web interface.
2. Go to **MQTT Settings**.
3. Choose whether to use the default Xemex Cloud broker "mqtts://broker.xemex-cloud.eu:8883" or enter your own broker address (mqtts:// or mqtt://).
4. If required, provide Username and Password (only for custom brokers).
5. Click **Save MQTT Settings**.
6. Reboot the Smart Connect to establish the MQTT connection.



5.2. HTTP Configuration API

The Smart Connect provides an HTTP-based API for configuration and firmware management.

5.2.1. Authentication

Access to the API requires Basic Authentication.

- **Username:** user
- **Password:** printed on the device label (Login: xxxxxxxx)

Only one user session is allowed at a time.

5.2.2. Endpoints

The API supports the following endpoints:

Endpoint	Methods	Description
/api/v1/config	GET, PATCH	Retrieve or modify device configuration parameters
/api/v1/firmware	GET, POST	Retrieve firmware version and status, or trigger a FW update
/api/v1/status	GET	Retrieve current device status information
/api/v1/reset	POST	Soft reset, reconnect to network
/api/v1/telegram	GET	Retrieve the P1 telegram from the device. Also accessible via the web interface (Diagnostics → View last telegram).

5.2.3. Status Endpoint

The "**/api/v1/status**" endpoint allows reading the device configuration via HTTP requests.

GET – Read Status

A GET request returns information of the Smart Connect as a JSON object.

This includes network settings (Ethernet and Wi-Fi), MQTT configuration, and the Modbus meter type.

Example GET response:


```
{
  "MeterType": "PhoenixContact-EMPro",
  "DefaultNetIf": "WiFi",
  "Ethernet": {
    "IpMode": "Static",
    "StaticIPv4": {
      "IpAddress": "192.168.10.101",
      "Netmask": "24",
      "Gateway": "192.168.10.1",
      "DNS": "192.168.10.1"
    }
  },
  "WiFi": {
    "IpMode": "DHCP"
  },
  "MQTT": {
    "Broker": "mqtts://broker.xemex-cloud.eu:8883",
    "Site": "site",
    "Username": "username",
    "Password": "password"
  }
}
```


PATCH – Update Configuration

A PATCH request is used to update one or more configuration parameters.

Only the specified fields are changed — all other settings remain unchanged.

Example PATCH request (update MQTT configuration):

```
{
  "MQTT": {
    "Broker": "mqtts://broker.xemex-cloud.eu:8883",
    "Site": "site-new",
    "Username": "user-new",
    "Password": "newpassword"
  }
}
```

Example PATCH request (update Wi-Fi configuration):

```
{
    "DefaultNetIf": "WiFi",
    "WiFi": {
        "ConnectionData": {
            "WiFiSSID": "XemexTesting",
            "WiFiPassword": "Xem3x123"
        },
        "IpMode": "DHCP"
    }
}
```

5.3. Modbus TCP/IP

The Smart Connect P1/A1/TIC acts as a bridge between a smart meter and third-party systems: it reads the meter via the P1/A1/TIC port and then makes the live electrical measurements available via Modbus TCP/IP (port 502) and/or MQTT. This makes it possible to use the data for control purposes (for example by charging stations, energy management systems, inverters, or battery systems) as well as for energy monitoring and insight.

5.3.1. General information

- Protocol: Modbus TCP/IP
- Port: 502 (default Modbus TCP port)
- IP Address: Assigned via DHCP or configured statically (see section 5.1.3 Configure Network Settings)
- Maximum Connections: Only one TCP client connection is supported at a time
- Unit Identifier (Slave ID): Ignored — the Smart Connect responds regardless of Unit ID
- Register Update Frequency:
    - SMR 5.0+: Every 1 second
    - DSMR 4.2: Every 10 seconds

5.3.2. Function codes

The Modbus TCP/IP interface supports the following function codes:

- 0x03: Read holding registers
- 0x04: Read input registers

Both function codes return the same data. The Smart Connect does not distinguish between holding and input registers.

5.3.3. Register Map

The Smart Connect emulates a **Phoenix Contact EMPro** meter (EEM-MA370 & EEM-MA371).

Register Address (Hex)	Length	Unit	Data Type	Description
0x8006	2	V	Float32	Phase voltage L1 (U1)
0x8008	2	V	Float32	Phase voltage L2 (U2)
0x800A	2	V	Float32	Phase voltage L3 (U3)
0x800E	2	A	Float32	Current L1 (I1)
0x8010	2	A	Float32	Current L2 (I2)
0x8012	2	A	Float32	Current L3 (I3)
0x8016	2	W	Float32	Total active power
0x8018	2	VAR	Float32	Total reactive power
0x801A	2	VA	Float32	Total apparent power
0x801C	2	-	Float32	Total power factor
0x801E	2	W	Float32	Active power L1
0x8020	2	W	Float32	Active power L2
0x8022	2	W	Float32	Active power L3
0x8024	2	VAR	Float32	Reactive power L1
0x8026	2	VAR	Float32	Reactive power L2
0x8028	2	VAR	Float32	Reactive power L3
0x802A	2	VA	Float32	Apparent power L1
0x802C	2	VA	Float32	Apparent power L2
0x802E	2	VA	Float32	Apparent power L3
0x8100	2	Wh	Float32	Total active energy demand[1]
0x8106	2	Wh	Float32	Total active energy delivery[1]
0x8C00	2	VAR	Float32	Total reactive demand
0x8C02	2	VAR	Float32	Total reactive delivery
0x8C04	2	VAR	Float32	Reactive demand L1
0x8C06	2	VAR	Float32	Reactive delivery L1
0x8C08	2	VAR	Float32	Reactive demand L2
0x8C0A	2	VAR	Float32	Reactive delivery L2
0x8C0C	2	VAR	Float32	Reactive demand L3
0x8C0E	2	VAR	Float32	Reactive delivery L3
0x8C10	2	VARh	Float32	Reactive energy Q1
0x8C12	2	VARh	Float32	Reactive energy Q2
0x8C14	2	VARh	Float32	Reactive energy Q3

0x8C16	2	VARh	Float32	Reactive energy Q4
0x8C18	2	-	Float32	Voltage dips L1
0x8C1A	2	-	Float32	Voltage dips L2
0x8C1C	2	-	Float32	Voltage dips L3
0x8C1E	2	-	Float32	Voltage swells L1
0x8C20	2	-	Float32	Voltage swells L2
0x8C22	2	-	Float32	Voltage swells L3
0x8C24	2	-	Float32	Voltage interruptions
0x8C26	2	-	Float32	Long voltage interruptions
0x8C28	2	W	Float32	Total active power demand
0x8C2A	2	W	Float32	Total active power delivery
0x8C2C	2	W	Float32	Active power demand L1
0x8C2E	2	W	Float32	Active power delivery L1
0x8C30	2	W	Float32	Active power demand L2
0x8C32	2	W	Float32	Active power delivery L2
0x8C34	2	W	Float32	Active power demand L3
0x8C36	2	W	Float32	Active power delivery L3

[1] *In previous releases, these values were incorrectly displayed in kWh. Since release V5.1.x, this has changed to Wh.*

Data Format: IEEE 754 Floating Point (32-bit, 2 Modbus registers per value)
Byte Order: Big Endian per register, with word-swapped register order (also known as "Big Endian, Word Swap" or "AB CD → CD AB")

The registers are **updated automatically** each time a new telegram is received on the P1/A1/TIC interface.

When multiple registers are read in a single request, all returned values are guaranteed to originate from the **same telegram**, ensuring consistent snapshots.

Data availability: If no valid telegram has been received yet, or the last telegram is older than 15 seconds, every read request on the registers in this section (including the Gas / M-Bus block) is answered with Modbus exception 0x06 (Server Device Busy) instead of returning stale or zero values.

Missing values: If a value is not included in a valid telegram (e.g. L2/L3 on a single-phase meter, or reactive values on a meter that does not report them), the corresponding register reads 0.

Gas / M-Bus channel registers

In addition to the electricity registers above, up to 4 M-Bus channels (e.g. a gas meter) are available in a separate register block with decimal addresses.

Register Address (Dec)	Length	Unit	Data Type	Description
785	1	-	UInt16	mbus1 – Device type
786	1	-	UInt16	mbus2 – Device type
787	1	-	UInt16	mbus3 – Device type
788	1	-	UInt16	mbus4 – Device type
789 – 836	48	-	ASCII	mbus1 – Equipment ID (serial number)
837 – 884	48	-	ASCII	mbus2 – Equipment ID (serial number)
885 – 932	48	-	ASCII	mbus3 – Equipment ID (serial number)
933 – 980	48	-	ASCII	mbus4 – Equipment ID (serial number)
981 – 987	7	-	ASCII	mbus1 – Last reading timestamp
988 – 989	2	L	UInt32	mbus1 – Last reading value
990 – 996	7	-	ASCII	mbus2 – Last reading timestamp
997 – 998	2	L	UInt32	mbus2 – Last reading value
999 – 1005	7	-	ASCII	mbus3 – Last reading timestamp
1006 – 1007	2	L	UInt32	mbus3 – Last reading value
1008 – 1014	7	-	ASCII	mbus4 – Last reading timestamp
1015 – 1016	2	L	UInt32	mbus4 – Last reading value

Data Format: UInt16 / UInt32 and ASCII (2 characters per register, high byte first)
Byte Order: Big Endian, high word first (standard Modbus, no word swap – unlike the electrical register block above)

Timestamp: DSMR format YYMMDDhhmmssX (X = S for summer time, W for winter time).
Value: meter reading in litres (m³ × 1000).

If a channel is not present in the telegram (e.g. no gas meter connected), device type and value read 0, and equipment ID and timestamp read as all-zero registers.

5.3.4. Protocol-Specific limitations

DSMR 4.2 (Netherlands/Belgium)

- Data is updated every 10 seconds (compared to 1 second for SMR 5.0+).
- Voltage information is not available — voltage values will return 0 in Modbus.

TIC (France)

- Active power per phase cannot be negative. When power is exported to the grid:
    - Total active power will show a negative value (as expected).
    - Per-phase active power will return 0 W, even if export is occurring on that phase.

These limitations are due to the DSMR and TIC protocol specifications and are not caused by the Smart Connect itself.

5.4. MQTT Configuration

5.4.1. MQTT Topic Structure

The Smart Connect publishes MQTT messages under several metric topics. power_instant is published whenever a new P1/A1/TIC telegram is received and successfully parsed; device_info is published at startup and once every 24 hours; device_counters is published once per hour.

The general topic structure is:
devices/<site>/smart-connect/<serial>/data/<metric>

Where:

- <site> is the configured site identifier
- <serial> is the Smart Connect serial number
- <metric> identifies the type of data being published

Each payload is formatted as a JSON object and includes a timestamp in UTC Unix epoch format.

Power Metrics (power_instant)

The power_instant metric provides real-time electrical measurements — including instantaneous power, voltage, current and power factor values, as well as cumulative energy counters and interruption/voltage-event counts — derived from the P1/A1/TIC interface. A message is sent whenever a new telegram from the P1/A1/TIC interface is received and successfully parsed. Values not present in the received telegram are omitted from the payload.
If M-Bus devices (e.g. a gas meter) are connected, the payload also contains an mbusN object per channel (N = 1–4); see the table below.

devices/<site>/smart-connect/<serial>/data/power_instant

Example Payload


```
{
  "ts": 1792134000,
  "P": 2450,
  "P+": 2600,
  "P-": 150,
  "E_IMPORT": 12548320,
  "E_EXPORT": 84520,
  "l1": {
    "U": 231.4,
    "I": 5.2,
    "P": 1200,
    "P+": 1250,
    "P-": 50,
    "Q": 120,
    "Q+": 130,
    "Q-": 10,
    "S": 1205.98,
    "VSAGS": 2,
    "VSWELLS": 0
  },
  "l2": {
    "U": 230.8,
    "I": 3.8,
    "P": 850,
    "P+": 900,
    "P-": 50,
    "Q": 90,
    "Q+": 100,
    "Q-": 10,
    "S": 854.75,
    "VSAGS": 1,
    "VSWELLS": 0
```

```
  },
  "l3": {
    "U": 232.1,
    "I": 1.9,
    "P": 400,
    "P+": 450,
    "P-": 50,
    "Q": 40,
    "Q+": 50,
    "Q-": 10,
    "S": 401.99,
    "VSAGS": 0,
    "VSWELLS": 1
  },
  "Q": 250,
  "Q+": 280,
  "Q-": 30,
  "EQ1": 125000,
  "EQ2": 45000,
  "EQ3": 12000,
  "EQ4": 8000,
  "PF": 0.99,
  "S": 2462.72,
  "PFAIL": 3,
  "LPFAIL": 1,
  "mbus1": {
    "TYPE": 3,
    "ID": "GAS12345678",
    "TS": 1792133940,
    "VAL": 125430
  }
}
```

Field	JSON type	Description
ts	number	Timestamp (UTC Unix epoch)
P	number	Total active power in Watts (negative = delivery to grid)
P+	number	Total active power demand in Watts
P-	number	Total active power delivery in Watts
E_IMPORT	number	Total active energy demand (sum of all tariffs) in Wh[1]
E_EXPORT	number	Total active energy delivery (sum of all tariffs) in Wh[1]
U12	number	Line-to-line voltage U12 in Volts. Only present when L1, L2 and L3 voltages are all ≥ 310 V (delta grid); l1.U/l2.U/l3.U are then omitted
U31	number	Line-to-line voltage U31 in Volts. Only present when L1, L2 and L3 voltages are all ≥ 310 V (delta grid); l1.U/l2.U/l3.U are then omitted
U32	number	Line-to-line voltage U32 in Volts. Only present when L1, L2 and L3 voltages are all ≥ 310 V (delta grid); l1.U/l2.U/l3.U are then omitted
Q	number	Total reactive power in VAR
Q+	number	Total reactive power demand in VAR
Q-	number	Total reactive power delivery in VAR
EQ1	number	Reactive energy Q1 in VARh
EQ2	number	Reactive energy Q2 in VARh
EQ3	number	Reactive energy Q3 in VARh
EQ4	number	Reactive energy Q4 in VARh
PF	number	Total power factor, derived from P and S (negative = delivery to grid)
S	number	Total apparent power in VA, derived from P and Q; always present
PFAIL	number	Number of power failures in any phase (count)
LPFAIL	number	Number of long power failures in any phase (count)
l*n*	object	Metrics object for phase *n* (l1, l2, l3)
l*n*.U	number	Phase voltage in Volts for l*n*; omitted if ≥ 310 V (implausible per-phase value)

l*n*.I	number	Current in Amperes for l*n*
l*n*.P	number	Active power in Watts for l*n* (negative = delivery to grid)
l*n*.P+	number	Active power demand in Watts for l*n*
l*n*.P-	number	Active power delivery in Watts for l*n*
l*n*.Q	number	Reactive power in VAR for l*n*
l*n*.Q+	number	Reactive power demand in VAR for l*n*
l*n*.Q-	number	Reactive power delivery in VAR for l*n*
l*n*.S	number	Apparent power in VA for l*n*, derived from P and Q
l*n*.VSAGS	number	Voltage dips count for l*n*
l*n*.VSWELLS	number	Voltage swells count for l*n*
mbusN	object	M-Bus channel N (mbus1–mbus4); omitted when the channel is not present in the telegram
mbusN.TYPE	number	Device type of channel N (e.g. 3 = gas, 7 = water)
mbusN.ID	string	Equipment ID (serial number) of channel N
mbusN.TS	number	Timestamp of the last reading of channel N (UTC Unix epoch)
mbusN.VAL	number	Last reading value of channel N in litres (m³ × 1000); omitted when the reading cannot be parsed as a number

[1] *In previous releases, these values were incorrectly displayed in kWh. Since release V5.1.x, this has changed to Wh.*

Periodic status message (device_counters)

The device_counters metric provides periodic diagnostic and runtime statistics of the Smart Connect device. It is intended for monitoring device health and P1/A1/TIC telegram parsing status.

devices/<site>/smart-connect/<serial>/data/device_counters

Example Payload

```
{
  "uptime": 1048405,
  "boot_timestamp": 1791089601,
  "gw_ping_pass": 104382,
  "gw_ping_fail": 0,
  "internet_ping_pass": 104243,
  "internet_ping_fail": 139,
  "telegrams_pass": 1048402,
  "telegrams_fail": 2,
  "telegrams_frame_fail": 0,
  "mqtt_event_errors": 0,
  "mqtt_event_connect": 8,
  "mqtt_send_pass": 1053118,
  "mqtt_send_fail": 3,
  "heap_free": 114644,
  "heap_min_free": 95648,
  "heap_largest_free": 106496,
  "heap_failed_allocs": 0,
  "last_reset_reason": "POWERON",
  "reset_fault_count": 72,
  "total_boot_count": 74,
  "reset_watchdog_count": 0
}
```

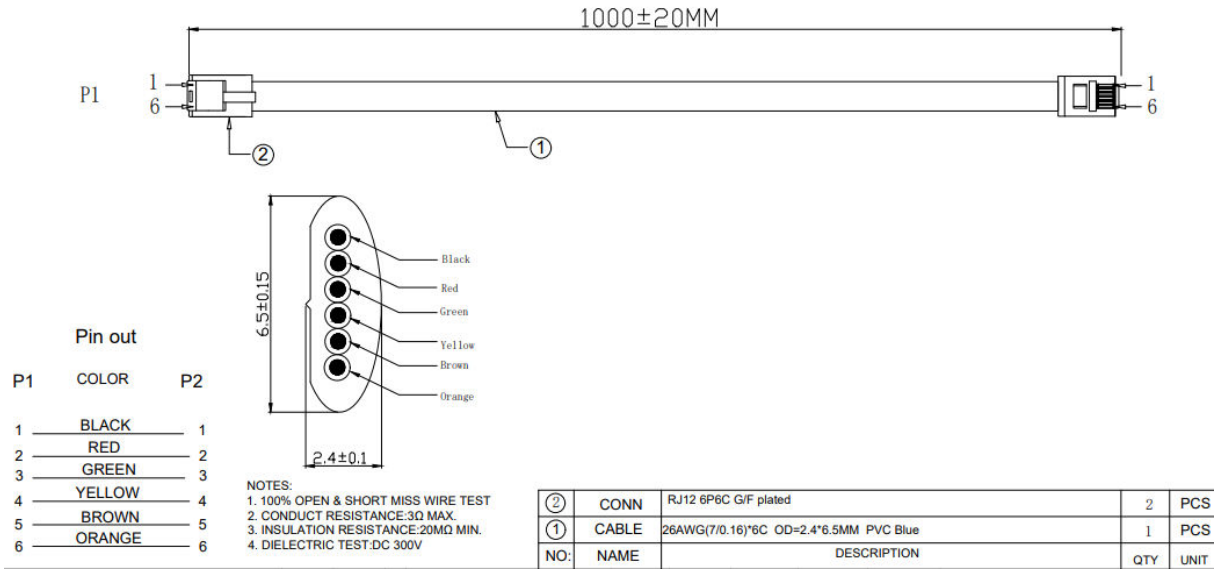

6. Accessories

External Power supply

An external power supply can be connected to the Smart Connect on its USB-C interface.
For the specific requirements to which an external power supply should comply see section: 2.5 Power input. It can also be purchased from Xemex (Article 530-333).

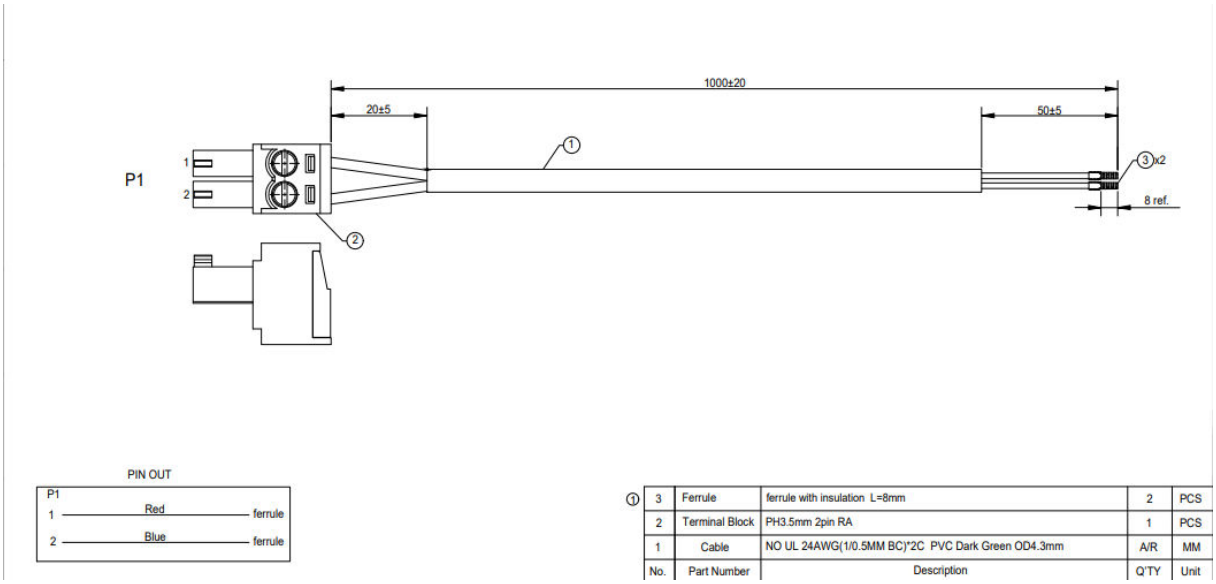
P1 Cable

The straight P1 cable with a length of 1 meter can be purchased from Xemex (Article 520-035) or sourced by yourself according to the following specification:



TIC Cable

The TIC cable with a length of 1 meter can be purchased from Xemex (Article 520-036) or can be sourced according to the following specification:



7. Trouble Shooting

Issue/fault	Possible Cause	Solution
No LED light	- No power via P1 (only available on SMR 5) - Faulty USB adapter or RJ12 cable	- Connect USB-C power (required for DSMR 4.2) - Use a reliable 5V USB power adapter and check RJ12 cable for damage
LED blinking red/green (1Hz) = No P1 data	- Incompatible smart meter (DSMR < 4.2) - Incorrect or damaged RJ12 cable - P1 port not activated	- Use DSMR 4.2 or higher only - Ensure RJ12 is a straight-through cable with right pin out and check for damage - Request activation of P1 port from grid operator
LED blinking blue/red(1Hz) = no P1 data	- P1 data is missing - Smart Connect in AP mode	- configure Wi-Fi - Use DSMR 4.2 or higher only - Ensure RJ12 is a straight-through cable with right pin out and check for damage - Request activation of P1 port from grid operator
LED blinking green/blue (1Hz) = P1 data OK, but no network connection	- Smart Connect is in AP mode (not yet connected to a Wi-Fi network)	- Connect to the Smart Connect's AP and configure Wi-Fi
LED blinking green/orange (1Hz) = No IP address	- No network connectivity - Faulty or incorrect Ethernet cable - No IP via DHCP	- Test cable with a laptop or switch - Check that the router provides DHCP and optionally set static IP via web interface (/config)
LED blinking red/orange (1Hz) = No data and no IP	- Both P1 data and network connection are missing	- Follow solutions from the two rows above
LED changes color continuously	- Smart Connect is initializing	- Wait for startup to complete (LED should turn green)
Smart Connect crashes or restarts often	- Unstable power supply - Overload on P1_OUT	- Use a stable USB power source (5V 1A+) - Avoid powering external devices via P1_OUT
EV charger not receiving data	- Smart Connect and charger not on same subnet - Incorrect network configuration - Wrong TCP port used	- Ensure both devices are on the same local network - Check IP settings via /config - Verify that Modbus TCP port 502 is used

Voltage reads as zero	- DSMR 4.2 does not support voltage values	- No issue. This is normal behavior for DSMR 4.2 meters

8. Decommissioning and Disposal

Please follow this sequence for uninstalling the device.

1. Disconnect the P1 cable by pressing down on the latching tab and gently pulling the P1 cable out of the jack.
2. Disconnect the Ethernet cable by pressing down on the latching tab and gently pulling the Ethernet cable out of the jack.
3. If connected remove the power cable from the device.

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

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:

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.

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.

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

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

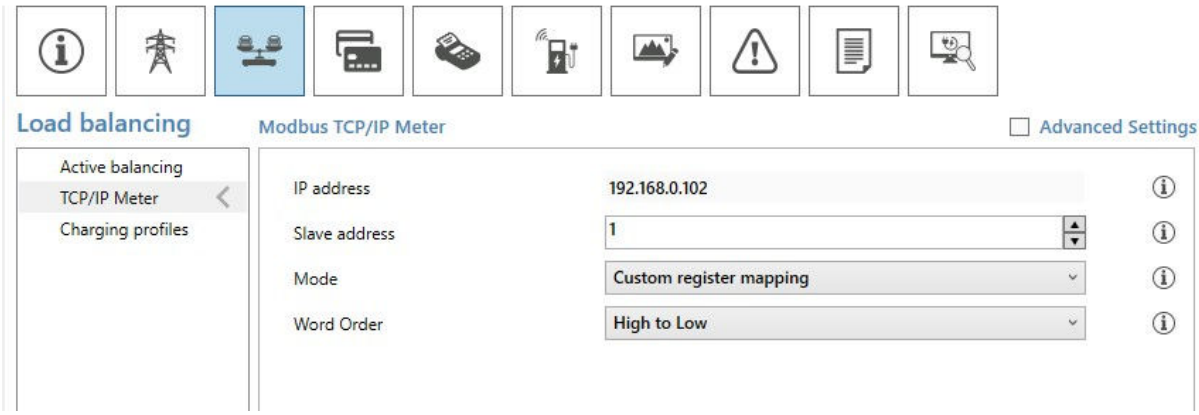
Appendix I: Settings in the Alfen ACE installer

To integrate the Smart Connect with the Alfen ACE charger, the Alfen ACE installer software must be configured to read energy data via Modbus TCP. Follow the steps below to complete the configuration.

Step 1: Configure the TCP/IP Meter

In the Alfen ACE installer, navigate to Load balancing → TCP/IP Meter. Enter the following settings:

- IP address: enter the IP address of the Smart Connect (e.g. 192.168.0.102)
- Slave address: 1
- Mode: Custom register mapping
- Word Order: High to Low

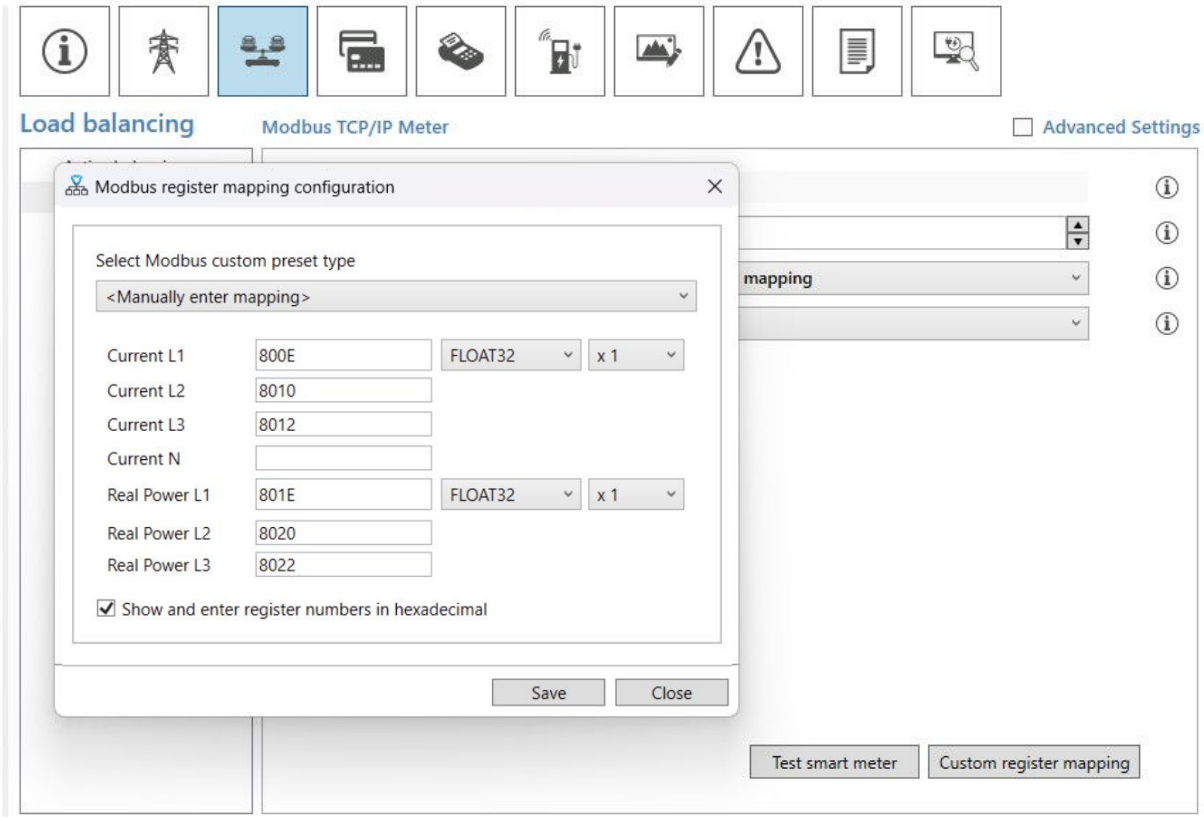


Step 2: Configure the Modbus Register Mapping

Click Custom register mapping to open the Modbus register mapping configuration dialog. Select <Manually enter mapping> as the preset type and enable “Show and enter register numbers in hexadecimal”. Enter the following register values:

- Current L1: 800E | FLOAT32 | x 1
- Current L2: 8010
- Current L3: 8012
- Real Power L1: 801E | FLOAT32 | x 1
- Real Power L2: 8020
- Real Power L3: 8022

Click Save to confirm the register mapping, then click Test smart meter to verify the connection.


Load balancing
Modbus TCP/IP Meter
Advanced Settings
Modbus register mapping configuration
Select Modbus custom preset type
<Manually enter mapping>
Current L1
800E
FLOAT32
x 1
Current L2
8010
Current L3
8012
Current N
Real Power L1
801E
FLOAT32
x 1
Real Power L2
8020
Real Power L3
8022
Show and enter register numbers in hexadecimal
Save
Close
mapping
Test smart meter
Custom register mapping