User Manual

Smart P1/A1 Connect

And

Smart TIC Connect

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1.0		

TABLE OF CONTENT

1. Introduction

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

The Xemex P1 Smart Connect is a compact module that converts Dutch and Belgian Smart Meter P1 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 output port to replicate the original message, allowing other P1 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 port. In specific cases where this is insufficient (see POWER REQ), an external USB-C power supply can be used.

1.2.   TIC Smart Connect:

The Xemex TIC Smart Connect is a compact module that converts French Smart Meter TIC messages into Modbus TCP or MQTT. It is compliant with the *Enedis-NOICPT_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. The Modbus memory map is configurable through selectable templates during setup.

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

1.3.   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 P1/TIC Smart Connect. It is assumed that the reader of this document is familiar with common electronics terminology, and has knowledge of analogue and digital electronic designs and similar products.
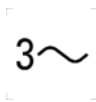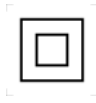
1.4.   Intended usage

The Smart Connect is only to be used for receiving a A1, P1, or TIC telegrams and distributing the specified values. The main function of the software is to serve as a bridge from a residential smart meter to Modbus TCP or MQTT server to be used for monitoring data, or controlling devices.

The Smart Connect supports the following Use-Cases:

- **Real-time energy consumption insight**
  Access up-to-date smart meter data for monitoring, reporting, and integration with smart home or EMS dashboards.
- **Automatic EV charger control**
  Use P1 data to dynamically manage when and how much electric vehicle charging occurs, enabling load balancing and grid stability.
- **Battery and solar system management**
  Optimize home battery charging/discharging and PV micro-inverter operation based on real-time consumption and feed-in data.
- **MQTT integration for flexible IoT connectivity**
  Publish smart meter data via MQTT to seamlessly connect with IoT platforms, energy managers, or home automation systems.

1.5.   Used symbols

The following symbols are used in this document and/or are marked on the product:

∿	Alternating current
3∿	Three-phase alternating current
▣	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION

	Caution, possibility 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 Device
mDNS:	Multicast Domain Name Device
DHCP:	Dynamic Host Configuration Protocol
TIC:	Télé-Information Client
LED:	Light Emitting Diode
HTTP:	Hypertest Transfer Protocol
JSON:	JavaScript Object Notation
USB:	Universal Serial Bus
UART:	Universal Asynchronous Receiver-Transmitter
UI:	User Interface

1.7. Safety precautions

Always adhere to the following checklist:

1. Only qualified personnel or licensed electricians should install the Xemex P1/TIC SMART CONNECT.

2. Follow all applicable local, national electrical and safety codes.

3. Install the P1/TIC SMART CONNECT 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 P1/TIC SMART CONNECT 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).

8.   Do not drill mounting holes in the device. Click the module on a DIN Rail instead.

9.   When the P1/TIC SMART CONNECT is installed incorrectly, the safety protections may be impaired.

1.8.   Certifications

Date	Accreditation Centre	IP Code	Kind

2. Technical specifications

RJ45 Female Socket
USB-c socket
RJ12 Female Socket

The Smart A1/P1 Connect 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.)

- Build-in Wi-Fi

- 1 x multicolored LED

- 1 x Button

RJ45 Female Socket
USB-c socket
Phoenix 2-pin Female connector

The Smart TIC Connect 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

- Build-in Wi-Fi

- 1 x multicolored LED

- 1 x Button

2.1.   RJ12 - P1 in / P1 ext.

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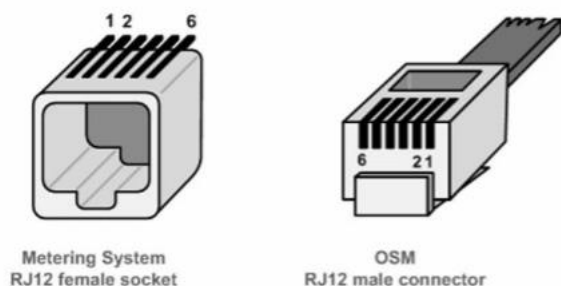
2.2.   Télé Information Client (TIC)

The TIC connector follows the Specifications from *Enedis-NOI-CPT_54E*. 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 *the Troubleshooting section*.

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

2.4.　　Button

The Button has the following characteristics when pressed:

Action	Description
Momentary press (< 4 seconds)	Soft reset, reconnect to network
Hold (>4)	Reset to factory defaults

2.5.　　Power input

The table below describes in which case P1 Power is sufficient or an external USB-C power supply should be applied.

Usage	P1 in	P1 in + P1 out	TIC
P1 Power	✓ (DSMR5)		
USB-C Power	✓ (DSMR4.2)	✓	✓

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

Description	Min	Typ	Max	Unit	Remarks
Voltage Range	4,5	5	5,5	[VDC]	
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

The connector is shielded and contains small LEDs, according to IEEE 802.3 specification.
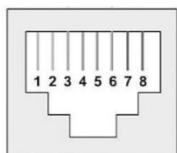
RJ45 connector – orientation

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: 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 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 Ports (RJ12)

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

The P1 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 2.3.2 for technical specifications.

The P1 output port allows for the connection of a second P1 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 device. See section 2.2.2 for more information.

USB-C Port

This port provides power to the device. It is mandatory to connect a USB-C power supply when using the P1-OUT function. Refer to section 2.2.7 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 Ethernet cable (minimum CAT5e). Ensure a stable connection to a switch, router, or directly to a charging station. For pin configuration and electrical specifications, refer to section 2.3.1.

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 P1/TIC Smart Connect 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's interface and adjust the ethernet, Wi-Fi, and MQTT configuration as needed.

Connect to the Smart Connect

First commissioning: initial setup

1. If the Smart Connect is in its factory default state or has been reset, it will automatically start in Wi-Fi Access Point mode.
2. Plug the Smart Connect into the network with an Ethernet cable. And wait for it to boot. The LED is red during start-up.
3. After booting up, the dongle starts in Wi-Fi Access Point mode:
   a. SSID: energy-dongle-xxxxxxxxxxxx
   b. Password: unique WPA2 key (see sticker 'login')
   c. IP range: 192.168.71.x (the dongle hands out IP addresses)
4. Connect your smartphone or laptop to the dongle's Wi-Fi network.

Alternative

1. Plug the Smart Connect into the network with an Ethernet cable.
2. Wait for it to boot. By default, it requests an IP address via DHCP.
3. If no DHCP server is found, the Smart Connect assigns itself a link-local (APIPA) address in the 169.254.x.x range.

Open the web interface

On a device that is on the same local network, open any web browser.

   a. Browse to one of the following:
      i. http://energy-Smart Connect.local
      ii. http://energy-Smart Connect
      iii. Or the current IP address (e.g. http://169.254.164.254)

Energy Dongle Configuration

Network settings

Network connection
- ○ Ethernet
- ○ Wi-Fi

[Save network settings]

Cloud settings

MQTT
- ● Enable MQTT
- ○ Disable MQTT

MQTT settings

Broker URL (e.g. "mqtts://broker.example.com:8883"):

Username (leave empty for mTLS auth):

Password:

Site (optional identifier used in topic):

[Save MQTT settings]

Reboot

[Reboot dongle]

Once connected to the dongle's web interface (e.g., http://energy-dongle.local or its assigned IP address), follow the steps below to configure the network:

1) Choose Connection Type

a) Option A: Ethernet (wired connection)

b) Option B: Wi-Fi Client (wireless connection to existing Wi-Fi network)

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

Choose IP Configuration Mode:

1. DHCP (Dynamic IP Address)

The dongle automatically requests an IP address from the local DHCP server (typically the router). This is the default and recommended method for most setups.

2. Static IP (Manual IP Address)

Use this when you need a fixed IP address, for example when connecting the dongle directly to an EV charger or industrial controller.

3. Enter Static IP Details (if applicable)

If you select Static IP, the following fields must be completed:

a. IP Address , The fixed IP address for the dongle (e.g., 192.168.10.101)

b. Subnet Mask , Typically set as 24 (equivalent to 255.255.255.0)

c. Gateway , The IP address of the router or EV charger the dongle is connected to

d. DNS Server , The IP address of the DNS server (can be same as the gateway IP)

Tip: If the dongle is directly connected to an EV charger (without a router), enter the charger's IP address as both the Gateway and DNS server.

4. Click on 'Safe'

5. Reboot Dongle

Option B: Wi-Fi Client (Station Mode)

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

1) Enter Wi-Fi Network Details

   Provide the following:

   a) SSID (Wi-Fi network name)

   b) Password (Wi-Fi network password)

   Once saved, the dongle will attempt to connect to this network. The Wi-Fi Access Point mode will be disabled automatically after a successful connection. Make sure the Wi-Fi network uses WPA2-PSK encryption, as this is supported by the dongle.

2) Make sure that DHCP is active

3) Click on 'Safe'

4) Reboot Dongle

> ⚠ The dongle 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 dongle will automatically assign itself a link-local IP address in the range 169.254.x.x to allow configuration without internet.

Configure MQTT Settings (Optional)

The dongle 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 configuration API. Follow these steps to configure the MQTT connection:

1) Ensure that "Enable MQTT" is selected

2) Enter the desired Broker URL the dongle should connect to. The URL must start with mqtts:// to enforce TLS encryption.

   a) Default broker (Xemex Cloud):

   `mqtts://cloud.xemex.eu:8883`

   If using a custom broker (e.g., local server or third-party platform), ensure it supports MQTT over TLS (port 8883).

3) Authentication

You can authenticate with the broker using one of two methods:

    a) Mutual TLS (mTLS) – Default & Recommended

        i) The dongle uses its built-in device certificate (CN = serial number) to authenticate to the broker. The broker verifies the client using a trusted Certificate Authority (CA) provided by the dongle vendor. Requires correct system time — see section about Time Synchronization.

    b) Username & Password (Optional)

        i) Enter Username and Password fields. These credentials can be configured via the web UI or API.

4) Site identifier

The Site ID is an optional but recommended field to help identify where each dongle is installed.

It appears in MQTT topic structure:

    a. devices/<site>/energy-dongle/<serial>/data/...

    b. Default value: "unknown-site" if not set

5) Click "Save MQTT settings" to store any changes.

5.2. Modbus TCP/IP

The A1/P1/TIC dongle acts as a bridge between a smart meter and an EV charging station or energy management system by exposing live electrical measurements over **Modbus TCP/IP** on port 502. This service becomes available on the IP address obtained via DHCP or configured statically during setup.

For further explanation of the Modbus protocol, refer to the official Modbus Application Protocol Specification v1.1b3.

General information

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

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 dongle does not distinguish between holding and input registers.

Register Map

The dongle emulates a **Phoenix Contact EMPro** meter.

Register Addres (Hex)	Lenght	Unit	Data Type	Description
0x8006	2	Volt	Float32	Line voltage L1 (U1)
0x8008	2	Volt	Float32	Line voltage L2 (U2)

0x800A	2	Volt	Float32	Line voltage L3 (U3)
0x800E	2	Ampere	Float32	Current L1 (I1)
0x8010	2	Ampere	Float32	Current L2 (I2)
0x8012	2	Ampere	Float32	Current L3 (I3)
0x8016	2	Watt	Float32	Total active power
0x801E	2	Watt	Float32	Active power L1
0x8020	2	Watt	Float32	Active power L2
0x8022	2	Watt	Float32	Active power L3

⚠️ Data Format: IEEE 754 Floating Point (32-bit, 2 Modbus registers per value)

Byte Order: Big Endian (most systems; verify with Modbus client)

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

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

Protocol-Specific limitations

DSMR 4.2 (Netherlands/Belgium)

- Data is updated every 10 seconds (compared to 1 second for DSMR 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 dongle itself.

6. Accessories

External Power supply

An external power supply can be connected to the Dongle on its USB-C interface.

For the specific requirements to which an external power supply should comply see chapter: Power Input.

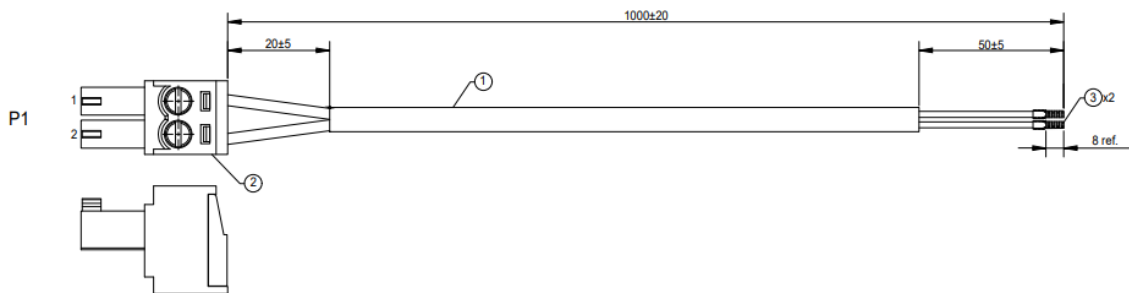It can also be purchased from Xemex (Article 530-333).

P1 Cable

The 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:
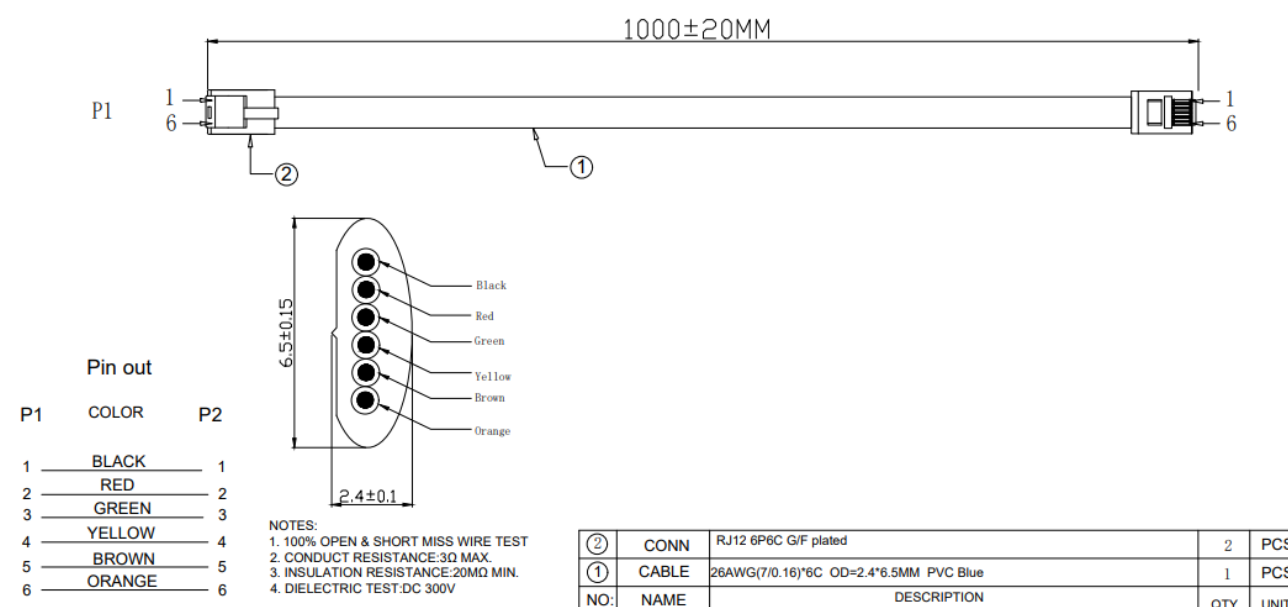
TIC Cable

The P1 cable with a length of 1 meter can be purchased from Xemex (Article 520-036) or sourced by yourself according to the following specification:

PIN OUT

P1		
1	Red	ferrule
2	Blue	ferrule

	No.	Part Number	Description	Q'TY	Unit
①	3	Ferrule	ferrule with insulation L=8mm	2	PCS
	2	Terminal Block	PH3.5mm 2pin RA	1	PCS
	1	Cable	NO UL 24AWG(1/0.5MM BC)*2C PVC Dark Green OD4.3mm	A/R	MM
	No.	Part Number	Description	Q'TY	Unit

7. Trouble Shooting

Issue/fault	Possible Cause	Solution
No LED light	- No power via P1 (only available on DSMR5) - Faulty USB adapter or RJ12 cable	- Connect USB-C power (required for DSMR4.2) - 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 green/orange (1Hz) = No IP address	- No network connectivity - Faulty or incorrect Ethernet cable - No IP via DHCP	- Check signal strength (Wi Fi analyser) - 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 the on the latching tab and gently pulling the P1 cable out of the jack.
2. Disconnect the Ethernet cable by pressing down the 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