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# TSE-MBTCP

## Insulated gateway

## User manual

**TSEMBTCP-GB-00-04-A**

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## GENERAL INFORMATIONS

This instruction manual is an integral part of the Insulated gateway and must always be available for consultation whenever necessary.

- The Insulated gateway, here following also called "product" or “component”, described in this manual, has been designed and constructed for operation by personnel instructed in its use. Such instruction must impart sufficient knowledge of the machine and the maneuver/maintenance operations required during use to ensure operation in conditions of complete safety.
- All personnel trained to operate with the machine must read this manual carefully in all its parts and thoroughly understand its content.
- It is very important that personnel be informed of the general safety rules required to ensure the protection of personnel, the product and the surrounding environment.
- Only the correct use of the component in accordance with the instructions provided can ensure long-term, efficacious operation in complete safety for the users and the component itself.
- EL.CO. S.r.l. reserves the right to make any formal or functional changes at any time without prior notice.
- The electrical installation where the component will be installed must comply with the safety regultions in force.
- EL.CO. S.r.l. and its legal representatives do not assume any responsibility for any damage to people, things or animals deriving from violation, misuse, wrong or otherwise not in accordance with the instrument features.
- This documentation is protected by copyright. Translations, re-issues and copies of this manual even in only partial and/or other form are prohibited without the previous written consent of EL.CO. S.r.l.

## INTENDED USE

The Insulated gateway TSE-MBTCP must be used in the following applications only:

- Conversione from ModBus-TCP to ModBus-RTU or ModBus ASCII;
- Protection against interferences in an industrial enviroment.

Every use of the component for purposes other than those indicated will be considered inappropriate use and therefore harmful. EL.CO. S.r.l. will not be responsible in any way for damage to property or persons that might occur due to an improper use.

## Addressees of the manual

- This manual has been prepared for all authorised users qualified for the use of the Insulated gateway.
- All such users must carefully read and comprehend the contents of this manual. Such content must be respected during all operations with the component.
- This manual is an integral part of the machine to which it refers and must be conserved for the latter’s entire working life.
- In case of transfer or sale of the machine, this manual and all its related or enclosed documentation must be delivered together with the machine

## WARRANTY

EL.CO. S.r.l. issues the Warranty Certificate valid 12 months from the date of purchase. The following conditions invalidate the terms of Warranty provided bya EL.CO. S.r.l.:

- Inappropriate use of the product or use of the productother than that described in *INTENDED USE;*
- Use of the product by unauthorised or untrained personnel.
- Partial or total failure to comply with these instructions;
- Defective electric power supply;
- Pollution from outside the component;
- Unauthorised modifications or repairs.

## DESCRIPTION OF THE INSULATED GATEWAY TSE-MBTCP

The Insulated gateway TSE-MBTCP is a gateway that allows to connect ModBus-RTU devices on a RS485 network to an Ethernet network based on ModBus-TCP. The Ethernet to RS485 communication is done through a virtual communication port. The Ethernet communication speed is settable to 10 Mbit/s or 100 Mbit/s. Through a Telnet interface it’s possible to configure the device parameters (IP address, subnet mask, etc.). The communication ports support both Master and Slave, so a TCP master can manage RTU slaves, and a RTU master can manage TCP slaves. The 1500 Vca insulation between input, output and power supply is obtained by the use of pulse transformers (which are not affected by aging as optocouplers) on the data line and a DC/DC converter insulated on power supply. On the front of the device there is a push-button: holding it down for more than 10 seconds, the device will return to the factory default setting. The device is fully compatible with the applicable requirements for the CE Mark and is housed in a rugged plastic enclosure, 22.5 mm thickness, suitable for DIN rail mounting.

- Standard network interface Ethernet 10/100 with TCP/IP protocol
- ModBus TCP Slave and ModBus RTU Master
- Telnet configuration
- Push-button on front for restore initial configuration

- Speed up to 250 kbps
- Communication over RS485 2-wire serial line
- Power supply 10…28 Vdc and 11…24 Vac
- Distance up to 1200 m
- Low power consumption
- Galvanic insulation 1500 Vrms on the 3-ways
- Led indicator for Power ON, Ethernet status, RS485 RX and TX
- Side Ethernet RJ45 connector and removable side RS485 terminals
- Simplified installation with DIN rail mounting
- EMC compliant to EN 50022 and EN 50035

## Area of use

- Energy, Control boards, Food industry

## Applications

- Energy
- Water treatment
- Telecontrol
- Building automation

## TECHNICAL DATA INSULATED GATEWAY TSE-MBTCP (TYPYCAL TO 25 °C IN NOMINAL CONDITIONS)

| | |
|---|---|
| POWER SUPPLY | 10…28 Vdc; 11…24 Vac (50/60 Hz)<br>Protection against polarity reversal 40 Vdc max |
| CONSUMPTION | <70 mA @ 24 Vdc |
| SWITCHING TIME | <50 µs |
| INSULATION | 1500 Vrms 1 minute on the 3-ways |
| NETWORK INTERFACE | Ethernet 10/100 (T/TX Base) |
| PROTOCOL | ModBus-TCP |
| ETHERNET SIDE CONNECTION | shielded RJ45 |
| RS485 SIDE CONNECTION | screw terminals pitch 5.08mm |
| TRANSMISSION SPEED | from 75 to 250000 bps |
| DISTANCE/SPEED | 0,6 km @ 38,4 Kbps |
| | 0,9 km @ 19,2 Kbps |
| | 1,2 km @ 9,6 Kbps |
| | 2 km @ 4,8 Kbps |
| | 3 km @ 2,4 Kbps |
| | 7 km @ 1,2 Kbps |
| LINE IMPEDANCE | Typical 120 Ohm |
| NUMBER of CONNECTABLE TERMINALS in RS485 | 32 max (multipoint) |
| WORKING TEMPERATURE | -20 °C…+70 °C |
| STORAGE TEMPERATURE | -40 °C…+85 °C |
| HUMIDITY | 0…90% non condensing (0-100% with epoxy resin on demand) |
| ENCLOSURE | ITALTRONIC |
| MATERIAL | Self-extinguishing plastic |

| | | |
|---|---|---|
| DEGREE of PROTECTION | IP 20 | |
| WEIGHT | 100 grams approx. | |
| CONNECTIONS | Screw terminals and cables until to 2.5 $mm^2$ (AWG10) | |
| DIMENSIONS (W x H x T) in mm | 101 x 119 x 22.5 | |
| MOUNTING | on DIN rail T35 according to EN 50022 | |
| EMC (for industrial environments) | EN 50081-2 and EN 50082-2 | |

## Overall dimensions (mm)

Figure 1- Overall dimensions

## INSTALLATION

The device is suitable for DIN rail mounting in vertical position. For reliable and long-lasting working time follow the following guidelines:

- Do not obstruct the ventilation slots with raceways or other objects close to them;
- Avoid the devices mounting above equipments generating heat;
- Install the device in a place without vibrations.

## Connection diagram

The Insulated gateway TSE-MBTCP can be connected in a point-to-point or multipoint network, in RS485 configuration (half duplex). The multipoint network provides for a maximum of 32 terminals connected on a maximum distance of 1.2 km at a transmission speed of 9600 bps. In the wiring diagrams is shown a point-to-point network master-slave connection (2-wire type). The same connections between master and slave can be used in a multipoint network, with the connection of the second slave and subsequents that starts from the terminals of the slave before (daisy chaining).

The device can be powered with DC voltage (10 to 28 Vdc) or AC voltage (11 to 24 Vac).

| | |
|---|---|
| ⚠ | Don't pass wires near cables of power installations like inverters, motors, induction furnaces and similar. |

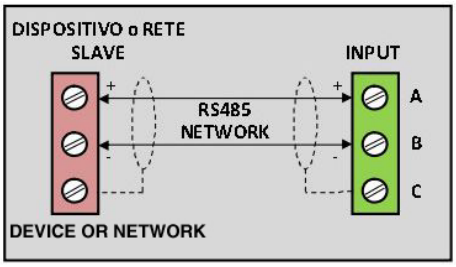


Figure 2- Interface RS 485

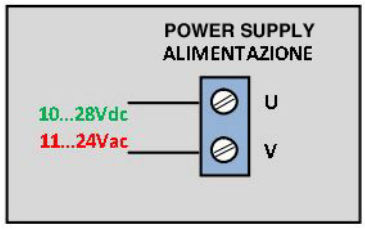


Figure 3- Power supply

Figure 4- Ethernet interface

### The Modbus protocol

The ModBus-RTU protocol, widespread in standard fieldbus, is ideal to manage, in an efficient and reliable system, a plan with a large number of variables. Thanks to this standard, it is possible to interface the TSE series directly to most PLCs and SCADA packages on the market with the possibility to connect, on the same network, these modules together with different devices (PLC, Operator Panels, CNC machines, etc. …).

The ModBus-TCP protocol retains the characteristics of robustness of the ModBus-RTU and leaves to the TCP/IP protocol the error handling and correction and the segmentation/routing of packets. The speed of the network can be considerably increased by the typical bandwidth of the Ethernet connections (10/100 Mbps) and the connection between Master and Slave, due to a "star" layout rather than a "bus".

## Use

Also refer to *Connection diagram* and related pictures.

- The device must be powered with a DC or AC voltage applied between the terminals U and V.
- The RS485 interface is connected to the terminals B and C, while the screen (not mandatory) is connected to terminal A.
- The Ethernet interface is connected through the RJ45 connector.
- The input and output connections must be made according to what is stated in the “Connections” section.

## Led indicators

| | | |
|---|---|---|
| PS (power supply) - Led BLU | ON | Power supply OK |
| | OFF | Device not powered |
| | Flashing | Restore initial conditions of configuration |
| EH (Ethernet) – Led GREEN | ON | Ethernet link |
| EH (Ethernet) – Led YELLOW | ON/Flashing | Ethernet activity |
| Rx e Tx (RS485) – Led YELLOW | ON/Flashing | Communication |
| | OFF | Slave device or network doesn’t communicate |

## HOW TO ORDER

The device is supplied with the following default parameters:

- IP Address: 10.10.10.42
- Subnet Mask: 255.255.255.0
- Baud Rate: 9600
- ModBus Type: ModBus RTU

Different configurations can be set by the end user.

On the front of the device there is a push-button: holding it down for more than 10 seconds the blue led will begin to flash and the device will be restored to the factory default setting of the TCP/IP interface (IP address and Subnet Mask). This procedures restore the device to the initial factory settings (10.10.10.42 …), not to a previous set configuration.

At the order stage is possible to ask for a specific configuration without additional costs.

How to ask the pre-configuration:

TSE-MBTCP-<IP address>-<subnet mask>-<baudrate>-<ModBus type>

Example: TSE-MBTCP-192.168.1.100-255.255.255.0-38400-RTU