

UNIT CENTRALIZATOR LM50-TCP+



The **LM50-TCP+** is an instrument equipped with 50 voltage-free digital inputs. Through these inputs, using a master communications software, the user can detect the logical state of the inputs (open or closed contact), or otherwise know the number of impulses or manoeuvres received by an outside impulses emitter (energy, water, gas meter, etc). The recorded parameters are shown in the following variables table (see section 2.3.-).

The purpose of this document is to be a user and operation manual for LM50-TCP+. It can be downloaded from CIRCUTOR's website: www.circutor.es

Warning: Before performing any maintenance operations, connection modifications, repairs, etc., the unit must be disconnected from the power supply. If you suspect an operational fault in the unit or in its protection system, remove the unit from service. The design of the unit makes it easy to replace in the event of a fault.

1.- DESCRIPTION

The electronic meters have an impulses output that is proportional to the recorded power. The **LM50-TCP+** is a unit centralizator, equipped with 50 digital inputs (opto-coupled) for reading the impulses coming from the meters for electric power, water, gas, etc. The value of these impulses is associated with 50 memory records, stored in a non-volatile memory. Each record has 32 bits (4 bytes), so it can be counted up to FFFF FFFF hexadecimal, i.e., a total of 4,294,967,295 impulses. When a memory record reaches this value, the meter is reset back to zero. The minimum duration of the status change of the digital input must be of 50 ms. The minimum time between two successive impulses must also have a minimum duration of 50 ms. This represents a maximum sampling frequency of 10 Hz.

2.- COMMUNICATION

For reading or writing the 50 internal records, the device is equipped with a 10BaseT/100BaseTX self-detectable Ethernet communication port. The device has an internal webpage from which the user can define the network protocol used to communicate with the management software. The network protocols that are available and integrated in the device are: **UDP**, **TCP** and **Modbus/TCP** and to a completely configurable port (with the exception of Modbus/TCP that uses port 502 by default). The device attends to the Modbus/RTU communication protocol (in TCP and UDP mode) and Modbus/TCP. In addition to the Ethernet connection, the device is fitted with an RS485 expansion bus, in order to behave like an RS485/Ethernet gateway. A maximum of 31 Modbus/RTU slave devices can be connected to this bus.

2.1.- Ethernet addressing

As the connection from the device to the master communication system is made using an IP connection, the addressing parameters must be set. The setup mode will either by the assignment of a fixed IP, or by setting a DHCP name.

2.1.1.- Ethernet addressing assignment

For setting up the IP addressing in any of the available formats, run program **IPSetup.exe** that is supplied with the equipment.

2.1.2.- Fixed IP assignment

To assign the fixed IP address enter the **MAC** address shown on the indelible side label attached to the device with a format of the type 00:26:45:XX:XX:XX. In the **Address** field enter the IP address; do the same with the (**Netmask**) and the (**Gateway**) port if necessary. After entering the device settings, press **Setup** to send the configuration to the equipment.

2.1.3.- DHCP IP assignment

To assign the DHCP name, activate this option by means of the upper right-hand date and select **On**. Once the setup fields have been enabled, enter the **MAC** address that can be seen on the indelible side label attached to the device with a format of the type 00:26:45:XX:XX:XX. In the **Address** field, enter a temporary free IP address that is within the working range of your computer. In **Host Name** enter the DHCP name to be assigned to the machine. Optionally, the user may even set the parameters of the **ClientID** field. The device's default **VendorID** is **circutor**.

2.2.- Setup webpage

Once connected to the Local Area Network (LAN), and the IP address or the DHCP name have been set up, the machine has an internal webpage where all the parameters relating to the network protocols and communication speeds of the RS485 bus, can be set up. To access this internal webpage, it is sufficient to use a conventional Internet browser and enter the IP address or the name assigned to the device (for example <http://172.16.4.130>)

2.2.1.- IP address or DHCP name

By means of the internal webpage, the user can make any change to the **DHCP** name or to the **IP** address previously assigned to the device, and even change the http setup access port.

2.2.2.- Network protocol

The equipment can be connected to the master communications system by means of three types of network protocol and to a configurable (**TCP**, **UDP** or **Modbus/TCP**) port. In the case of the Modbus/TCP protocol the modification of the port will remain disabled, staying fixed at **502**.

2.2.3.- Setup of the RS485 serial bus

The communications parameters of the RS485 expansion bus are totally configurable for transmission speed (from 4800 bps to 115.2 kbps), parity (none, odd or even) and stop bit (1 or 2). Only devices that work with the Modbus/RTU protocol and a peripheral number other than 1 can connect to this slave port.

2.2.4.- Setting the setup password

Password can be activated to enable the edition password. In case to use, the access user is "admin" and the setup password introduced.

2.2.5.- Device information

The firmware version and the machine address of the device are shown on the lower part.

Information	
Version	1.0
MAC	00:26:45:00:00:01

2.2.6.- Save changes

Once any change has been made to the aforementioned sections, the information must be saved using the "Save Setup" option. If you wish to return to the default setup, select "Load default setup".



2.3.- Modbus memory map

Modbus Address	Variable
0000	Bits 15...0 – Status of inputs 1 to 16 (Binary)
0001	Bits 15...0 – Status of inputs 17 to 32 (Binary)
0002	Bits 15...0 – Status of inputs 33 to 48 (Binary)
0003	Bits 15...0 – Status of inputs 49 to 50 (Binary)
0080	Value of the meter assigned to input 1
0082	Value of the meter assigned to input 2
0084.....00DE	2 bytes per input value (from 2 to 48)
00E0	Value of the meter assigned to input 49
00E2	Value of the meter assigned to input 50
0578	Shows the version of the equipment. The format is the following "V1.10" in ASCII values and the last byte is always 0.
0579	
057A	
2710	Serial number, always starts with 900 XXX XXX
2711	

2.3.1.- Modbus functions

(HEX) function	Description
03/04	Reading of input records
10	Writing of several records

2.3.2.- Reading of Modbus records

(HEX) function	Description	Example
AAAA	Reading starting address	0082
BBBB	Number of records	0002

Example of the reading command relating to the value of the record belonging to digital input 2 (0082Hex).

```
Tx: 01 04 AAAA BBBB CRC
Rx: 01 04 04 0000 0000 CRC
```

2.3.3.- Writing of Modbus records

(HEX) function	Description	Example
AAAA	Reading starting address	0082
BBBB	Number of records	0004
CC	Number of bytes sent	08
DDDD DDDD	Value of each record	0000 0064 ...

Example of writing command for digital inputs 2 and 3, recording a value of 100 and 200 in each of them (0000 0064 and 0000 00C8 Hexadecimal)..

```
Tx: 01 10 AAAA BBBB CC DDDDDDDD DDDDDDDD CRC
Rx: 01 10 0082 0004 CRC
```

3.- MBUS testing software

The **LM50-TCP+** device is supplied with MSDOS software which has the main purpose of testing the communications with the device. The software, just like the device setup, can work with different networking protocols and to a specific port. Its name is **MBUS**.

To use the program, save the *mbus.exe* file to a folder that can be accessed from MSDOS and use this application paying attention to the networking protocol requirements set up in the device.

3.1.- Warnings

To start communication with the **LM50-TCP+** device, ensure that the equipment is powered on and connected to the Local Area Network (LAN) from which the sending of the Modbus frames will be made. Similarly, check that your computer or Ethernet network does not have a firewall or a security system that could prevent the said network protocols and the ports set up in the device from working.

Below, examples are shown in italics of the sending of Modbus commands using the different network protocols (UDP/TCP/ModbusTCP).

3.2.- UDP Communications (u)

With the **LM50-TCP+** device set up for the UDP protocol and a specific port (*in the example 10001*), an example of sending the Modbus command is shown below.

Example of the reading command relating to the value of the record corresponding to digital input 2 (0082Hex).

```
c:\>mbus u172.16.4.130 p10001 010400820002 ↵
010400820002      CRC
0104040000000000      CRC      100.00%
```

where: 172.16.4.130 LM50-TCP+ IP address
10001 LM50-TCP+ UDP port
100% Response OK

3.3.- TCP communication (t)

With the **LM50-TCP+** device has been set up for the TCP protocol and a specific port (*in the example 10001*), an example of sending the Modbus command is shown below.

Example of the reading command relating to the value of the record corresponding to digital input 2 (0082Hex).

```
c:\>mbus t172.16.4.130 p10001 010400820002 ↵
010400820002      CRC
0104040000000000      CRC      100.00%
```

where: 172.16.4.130 LM50-TCP+ IP address
10001 LM50-TCP+ TCP port
100% Response OK

3.4.- Modbus/TCP communication (x)

With the **LM50-TCP+** device set up for the Modbus/TCP protocol and port 502, an example of sending the Modbus command is shown below.

Example of the reading command relating to the value of the record corresponding to digital input 2 (0082Hex).

```
c:\>mbus x172.16.4.130 p502 010400820002 ↵
1F1000000006010400820002      CRC
1F100000000701040400000000      CRC      100.00%
```

where: 172.16.4.130 LM50-TCP+ IP address
502 Modbus/TCP port
100% Response OK

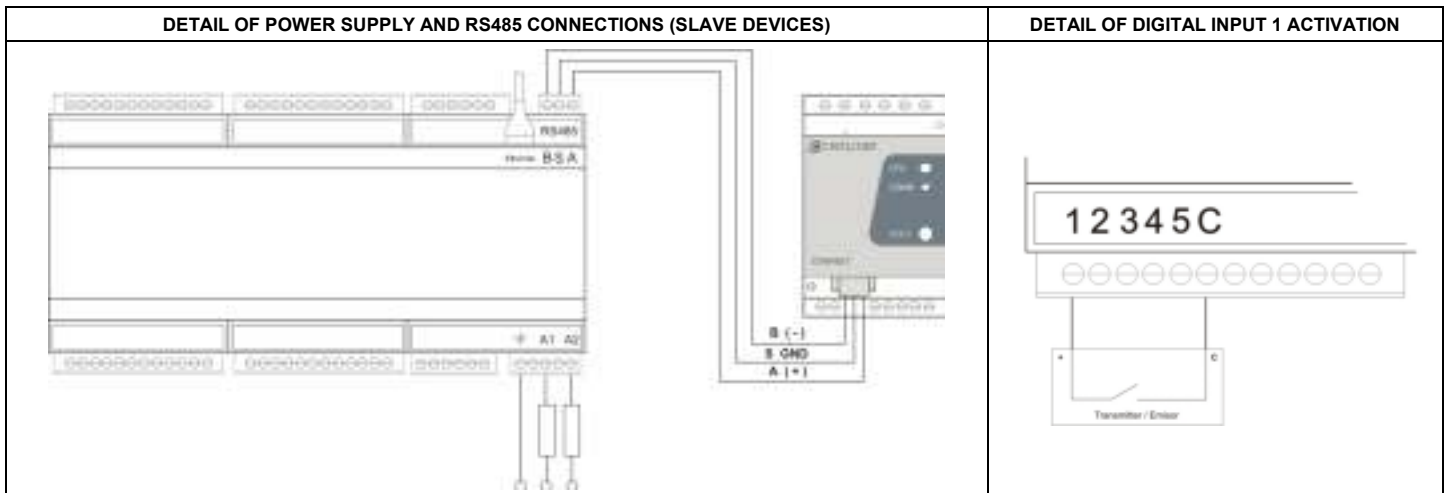
3.5.- Power Studio Scada software

CIRCUTOR provides the PowerStudio software, from which all the data coming from the **LM50-TCP+** device can be viewed in real-time. Download it from www.circuitor.com.

4.- TECHNICAL SPECIFICATIONS

Power circuit: - Single-phase (phase – neutral) A1 – A2 : - Frequency: - Maximum consumption: - Working temperature: - Water content (non-condensing):	85...265 VAC / 120...374 VDC 47...63 Hz 5 ...8 V·A -10+ 60 °C 5 95%	Inputs features: - Type: - Maximum activation current: - Minimum Ton / Toff:	Free of opto-insulated voltage (dry contact) 50 mA 50 ms / 50 ms
Mechanical features: - Case material: - Degree of protection of the equipment: - Dimensions (mm): - Weight: - Maximum operating height:	UL94 - V0 self-extinguishing plastic IP 20 158.2 x 57.75 x 90 mm (8 modules) 320 grams 2,000 metres	LED symbols: - Power - RX in blinking - TX in blinking - FULL/HALF (Ethernet) - ACTIVITY - 10M/100M - LINK	Equipment power supply and CPU activity Activity in the receipt of RS485 frames Activity in the emission of RS485 frames Green: Full Duplex connection / Yellow: Half Duplex Activity in the Ethernet port Green: Speed 100 Mbps / Yellow: 10 Mbps A physical connection has been made with the Ethernet network
Network interface: - Type: - Connector: - Network protocols:	Ethernet 10BaseT / 100BaseTX self-detectable RJ45 TCP / UDP / MODBUS TCP / HTTP	Safety: Installation category Class III / EN61010 Protection against electric shock with class II double insulation. The equipment must be connected to a power supply circuit protected with type gI fuses as per IEC 269 or type M, with values comprised between 0.5 and 1A. It must be fitted with a circuit breaker switch or an equivalent device, in order to be able to disconnect the equipment from the power supply grid. The minimum section of the power supply cable shall be of 1mm ² .	
Serial interface: - Type: - Transmission speed (configurable): - Data bits: - Parity: - Stop bit	RS485 three wires (A/B/S) 4800, 9600, 19,200, 34,800, 57,600, 115,200 bps 8 No parity, odd, even 1 / 2	Standards: IEC 60664, VDE 0110, UL 94, EN61010-1, EN55011, EN 61000-4-2, EN 61000-4-3, 61000-4-11, EN 61000-6-4, EN 61000-6-2, EN 61000-6-1, EN 61000-6-3, EN 61000-4-5 EC	

5.- CONNECTIONS



6.- TECHNICAL SERVICE

If you have any doubts about the operation of the unit or any malfunction, contact our service staff at CIRCUTOR, SA
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