Meter Centraliser
Alarm Centraliser Unit

LM50-TCP

(Code M31521)

INSTRUCTION MANUAL

(M9813380120-A)

1.- BASIC INSTRUCTIONS

1.1.- Checks on receipt.

This manual assists in the installation and handling of the LM50-TCP equipment in order that the best results may be obtained from it. On receipt of the equipment check the following:

(a) The equipment corresponds to the specifications in your order.
(b) Check that the equipment has not been damaged during delivery.
(c) Check that it has the correct *instruction manual.

1.2.- Connection instructions 

To use the LM50-TCP it is vital that those persons installing or handling it follow the safety usual precautions as well as the individual warnings in this instruction manual.

2.- TCP50-ALARM DESCRIPTION

Many electrical meters have a pulse output proportional to the energy measured. The El LM50-TCP is an energy meter centraliser with 50 inputs (opto-coupled) for reading these pulses. Theirs values are stored in the memory.

The LM50-TCP has a total of 50 potential free inputs associated to 50 memory recordings. Each recording is 32 bits (4 bytes) and therefore can meter up to a maximum of FFFF FFFF hexadecimal, i.e. up to a total of 4,294,967,295 pulses. When it reaches this amount the next pulse returns the internal meter to zero and the metering starts again. For each of the LM50-TCP recordings, zero on the meter will start from the time when the meter is connected to the centraliser.

The minimum length of the pulse or status change must be 50 ms and the minimum time between two successive pulses has to be 50 ms. This represents a maximum frequency of 10 Hz.

It has a 10BaseT/100Base TX Ethernet communications port, for reading and writing the LCM50-TCP's 50 meters via a management application that can generate connections with a UDP or TCP System Protocol. In order to do so a **MODBUS ©** communications protocol is used. It has functions that read and return the different meters to zero.

The equipment acts as a communications bridge, because it has a BUS485 output to connect with field equipment. This BUS can be connected to up to a total of 31 RS485 pieces of equipment.

3.- INSTALLATION AND START-UP

This manual contains information and warnings that must be followed by the user to ensure the safe operation of the equipment and to maintain it in a safe condition.

For normal operation, it must not be used until is finally located on the electrical board

If the equipment is used in a way not specified by the manufacturer, the safety of the equipment may be compromised.

When it is likely that a loss of protection has occurred (for example visible damage) the equipment must be disconnected from the supply. In this event please contact a qualified service representative.

3.1.- INSTALLING THE EQUIPMENT

Before connecting the equipment, check the following:

a.- Supply voltage:

- Power Supply V AC (Single phase): 85…240 V AC.
- Frequency: 47…63 Hz
- Supply Tolerance: +20% / -20%
- Consumption: 6 W

b.- Operating Conditions:

- Operating temperature: 0 to 50 ºC
- Operating humidity: 25 to 80 % RH

c.- Safety: Designed for category II installations according to EN61010.

Installation: 

The equipment is installed on a DIN rail. All connections must remain within the electrical board.

It must be remembered that once the equipment is connected, the terminal may be dangerous when touched and opening the covers or removing pieces may access parts that are dangerous when touched. The equipment must not be used until it is fully installed.

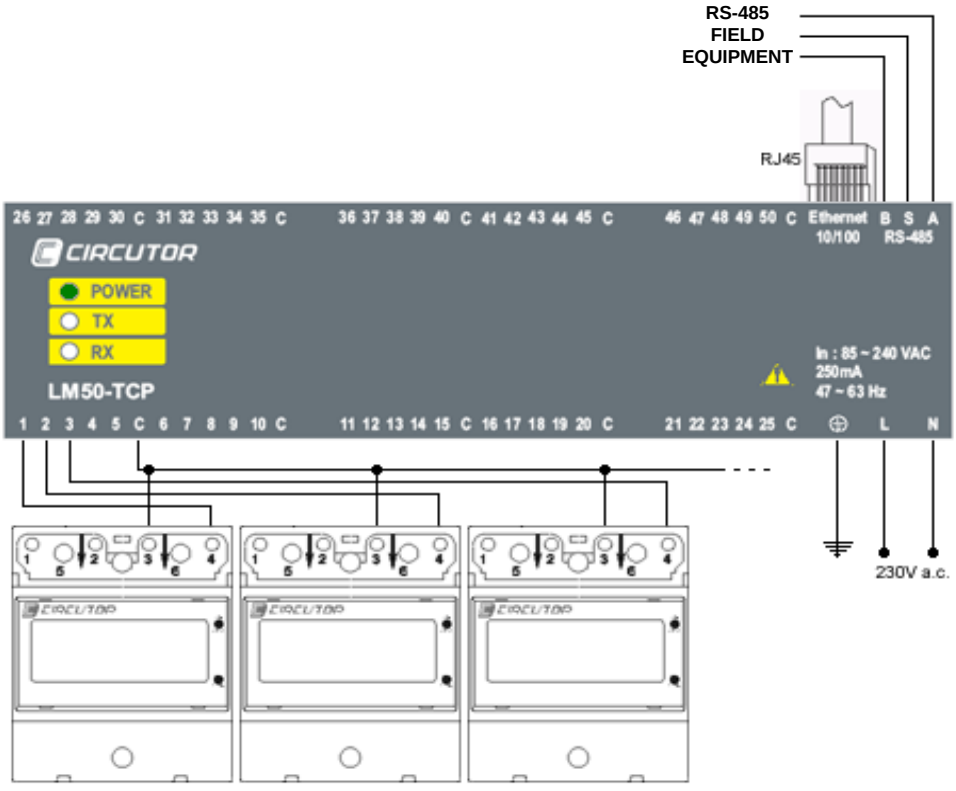
The equipment must be connected to a supply circuit protected by gl type fuses (IEC 269) or M type fuses between 0.5A and 2A. An earth leakage switch or similar device must be fitted to disconnect the equipment from the supply system. The supply circuit and voltage measurement are to be connected using a minimum 1 mm diameter cable.

3.2.- TERMINAL DESCRIPTION OF OUTPUT/INPUT AND FRONT OF THE BOX:

L N Terminals	Power supply 85…240 V AC.
Earth Terminal	Earth.
C Terminals	Common for each group of five inputs.
1…50 Terminals	50 inputs (free of potential) for pulses or statuses.
Ethernet 10/100	Ethernet communications input (RJ45 connector).
A B S Terminals	BUS RS485 extension (field equipment's Bus).

POWER LED	Green LED; equipment's power and operation are correct.
TX LED	Yellow LED; when flashing shows that the equipment is transmitting data to the Ethernet port.
RX LED	Yellow LED; when flashing shows that the equipment is receiving data from the Ethernet port.

3.3.- ELECTRICAL DIAGRAM (example with the MK-63 meter):

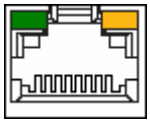


3.4.- CONNECTING THE LM50-TCP TO THE MASTER UNIT / APPLICATION.

Connect the equipment's power supply, 230V AC (+ 20 % / -20 %), to the terminals marked L N and GND.

The equipment is connected with an Ethernet cable with the *master unit* or computer where the application is located. It must not be connected by a RS485 BUS, which will then convert the signal to RS232.

Connection to the master system is done via Ethernet cable with four woven mesh pairs. One end is connected to the LM50-TCP device (marked as Ethernet 10/100) and the other to the system's electronics (hub or switch) on the corporate system.



Where direct connection with a computer or device with Ethernet input is required, the wires in the Ethernet cable must be specially adapted for such communication.

STANDARD ETHERNET CABLING		
1-Orange	--	1-Orange
2-Orange/White	--	2-Orange/White
3-Green	--	3-Green
4-Blue	--	4-Blue
5-Blue/White	--	5-Blue/White
6-Green/White	--	6-Green/White
7-Brown	--	7-Brown
8-Brown/White	--	8-Brown/White

DIRECT ETHERNET CABLING		
1-Orange	--	1-Green
2-Orange/White	--	2-Green/White
3-Green	--	3-Orange
4-Blue	--	4-Blue
5-Blue/White	--	5-Blue/White
6-Green/White	--	6-Orange/White
7-Brown	--	7-Brown
8-Brown/White	--	8-Brown/White

3.5.- RS485 COMUNICATION WITH FIELD EQUIPMENT.

As well as acting an excellent Meter Centraliser and Alarm Centraliser, the LM50-TCP also has the function to operate as a communications bridge with other RS485 equipment installed in the field. For the proper working of this equipment, it must communicate using the following communications parameters.

RS485 EOUIPMENT	
Bauds	19.200
Parity	No
Bits	8
Stop Bits	1
Peripheral	Different to 1

The LM50-TCP has number 1 as a peripheral. Therefore no other equipment installed in the field and connected by this bridge can have the same number.

Connecting the BUS RS485 with field equipment:

LM50-TCP	Peripheral 2	Peripheral 3	Peripheral n
A	A	A	A
B	B	B	B
GND	GND	GND	GND

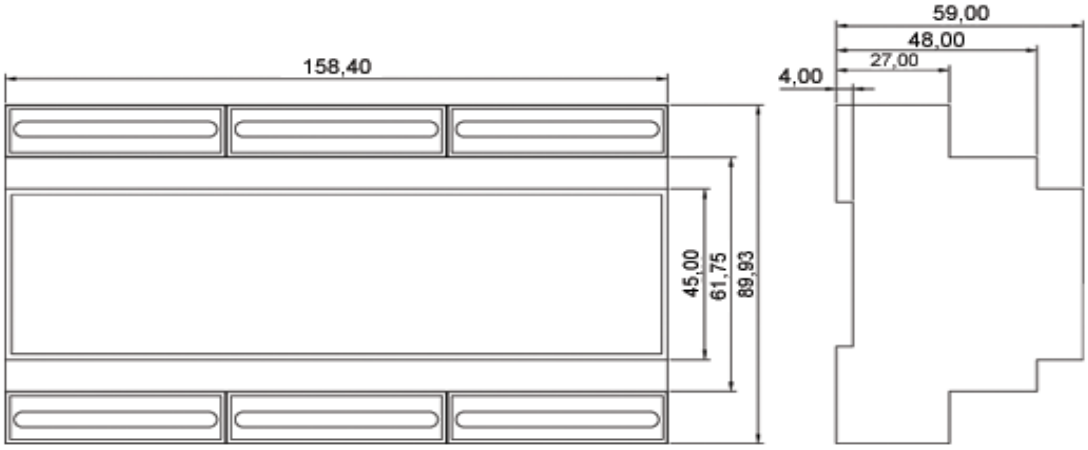
A maximum total of 31 pieces of equipment may be connected to the BUS RS485.

The LM50-TCP has the factory peripheral number 1 and this number cannot be changed in any way.

There is no problem when there is more than one LM50-TCP in the same installation, because the IP address for each item will be different. Therefore every piece of equipment can be identified.

The cabling for the RS485 BUS, is done with a three wire, woven mesh communications cable with a maximum distance between the PC and the last peripheral of 1,200 metres.

Mechanical Sizes:



4.- TECHNICAL FEATURES

Power supply circuit:	
Power supply:	Single phase 230V AC
Voltage tolerance:	+20/-20 %
Frequency:	47…63 Hz
Consumption:	6W
Operating temperature:	0 to 50º
Digital inputs:	50 contact inputs – 50 mA max.
Assembly features:	
Type of casing	Self-extinguishing plastic modules
Mounting:	Symmetrical DIN 46277 profile (EN 50022) coupling
Casing front:	Lexan front
Terminals:	IP20
Sizes:	158.4x60x89.93 mm
Weight:	390 grams
Safety:	Category II, EN-61010

Isolating voltage between casing surround and any terminal: 2500V 50Hz 1min
Isolation between inputs/outputs group and the power supply input: 1 Gohm
Isolation between the input group and the casing surround: 1Gohm

Standards: IEC 60664, VDE 0110, UL 94, IEC 801, EN 50081-1, EN-61010-1, EN 50082-1

5.- SAFETY ADVICE

The installation rules described in sections INSTALLATION AND START UP AND TECHNICAL FEATURES must be taken into account.

Once connected, the terminals may be dangerous when touched and opening the covers or removing parts may access parts that are dangerous when touched. This equipment is supplied in good working order.

6.- MAINTENANCE

The LM50-TCP does not require any special maintenance. Any adjustment, maintenance or repair to the open equipment is to be avoided. If it cannot be avoided it must be undertaken by someone qualified and well informed of the necessary action.

Before any modification to the connections, maintenance or repair, the equipment must be disconnected from the supply.
When any operational or protection fault is suspected the equipment must be withdrawn from service and any accidental connection must be avoided.

7.- TECHNICAL SERVICE

In the event of any equipment failure or any operational queries please contact the technical service of CIRCUTOR S.A.

CIRCUTOR S.A. – After sales Service
Vial Sant Jordi, s/n
08232 - Viladecavalls
tel - 93 745 29 00
fax - 93 745 29 14
e-mail : central@circutor.es

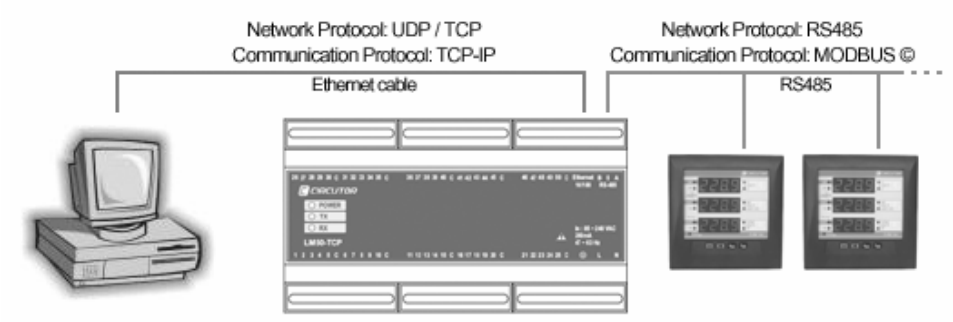
APPENDIX A.- LM50-TCP COMMUNICATIONS

A.1.- DESCRIPTION OF THE COMMUNICATIONS

The LM50-TCP may be connected to a computer or master application via its Ethernet communication input. By using this system, data centralisation may be achieved for n pieces of LM50-TCP equipment at one single point at the same time.

Each LM50-TCP will be identified plus its peripheral number (number 1) from the IP assigned to it by the *EDSetup* software.

The equipment may transmit data using the UDP or TCP (selectable) System protocol and TCP-IP communications protocol and also by the LM50-TCP itself to the other installed field equipment (if they exist) using the RS485 system protocol and **MODBUS©** communications protocol.

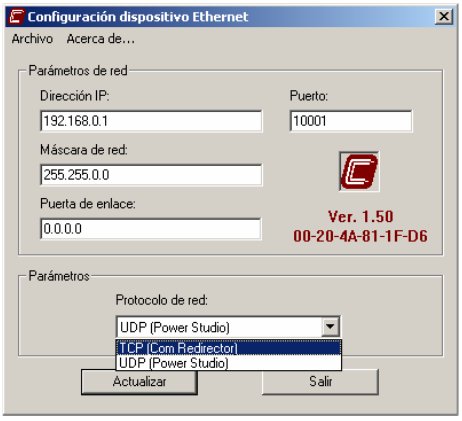


Before starting to communicate with the equipment an IP address must first be assigned to it. This will identify it within the corporate system (LAN).

A.2.- ASSIGNING THE IP ADDRESS

To be able to assign an IP address to the equipment and therefore identify it within the Corporate Ethernet System (LAN), the *EDSetup* must be run. This may be found on the *Extras* diskette.
When running the software, the following screen appears, where the following data is to be entered.

To assign the IP address to the peripheral, the *machine address* must be known (also known as the "MAC ADDRESS"). This machine address appears on the unremoveable label attached to the side of the equipment.
Once the IP address to be assigned (which must be supplied by the System Administrator) and the equipment's machine address are entered, click on set.



Once the IP address has been assigned to the equipment, all Equipment System Parameters are confirmed:

- IP address (again).
- System Mask.
- Gateway, in the event of peripheral connection via an external system.
- Communications port (this will depend on the System protocol used UDP/TCP).

The most suitable System Protocol for the LM50- TCP to use with the master application or PC (UDP / TCP) is selected from this screen.

- UDP System Protocol:

  If this communications protocol is selected, the master application must be able to generate UDP communications network, to naturally include Modbus communications network within the message. The communications port for this type of communications is not critical and therefore the port number may be left as the standard port given by the EDSetup software as a default (10001).
  An MSDOS *(MBUS)* program is on the *Extras* diskette. This will be able to test and verify that the equipment is operating correctly by requesting the different recordings via communications.

  Example (Status Request on input number 1):

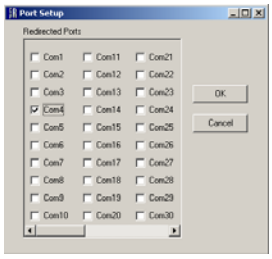
  ```
  C:\>MBUS u192.168.0.1 p10001 c 010400000002
  ```

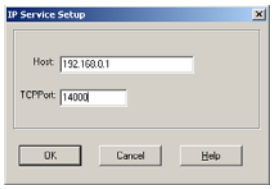
  - 192.168.0.1 is entered, this is the device's IP address.
  - 10001 is the Local Port previously entered.
  - 010400000002 is the Modbus Record (peripheral number 1, reading function 4, initial recording 0 (hexadecimal) and two bytes are requested (hexadecimal)).
  - The variable **c**, means the continuous request from the network (to end, click on Enter).

➢ TCP System Protocol:

The Com Port Redirector software must be installed when selecting the TCP communications protocol. This software allows the PC or master application to use the IP address of the LM50-TCP as though it were a physical COM port on the computer. This creates a communications tunnel, making a transparent connection between both peripherals.

- Start installing and running the Com Port Redirector software from the disk supplied with the equipment. Once it is installed the Com Port Redirector located in *Start\Programs\Com Redirector\Configuration* is run.





Clicking on *Com Setup* and selecting the virtual series port/s to be created. Once created click on “ok” (different virtual ports are created, one per piece of equipment, depending on the number of LM50-TCP’s installed).

Then the “Add IP” button is clicked for each virtual port created. In *Host* the IP for each of the installed equipment is assigned. In TCPPort com port 11000, units are entered less than the assigned Local port in the LM50-TCP; i.e. a local port must be assigned to the LM50-TCP that may vary between 14000 and 14009. Then a Local port varying between 3000 and 3009 is assigned in the Com Port redirector.

- Therefore if Local Port 14003 is assigned to the LM50-TCP, in TCPPort, 3003 must be entered as Local port. Then OK is clicked.

- To avoid unwanted disconnections or disconnections from the amount of traffic, the communication tunnel reconnection options are enabled from the *Port Settings* option. The following is selected when the setting screen is opened:

  i. *Timeout Reconnect.*
  ii. *Reconnect*

- After setting this last option, all information is then saved by clicking the *Save* button. The machine is restarted so that the ports become active. From now on any application operating via series ports will have the virtual ports set in the software available.

  Example (Setting the virtual port address):

  COM4 --- IP 192.168.0.1

- After having followed these steps, the virtual ports will automatically open when there is any application that makes use of the computer’s series ports, thus making them available to the software.

APPENDIX B.- MODBUS© COMMUNICATIONS PROTOCOL

The equipment will have two operating modes: input status reading and pulse meter.

Input status reading

The equipment has four internal records to inform on the status of the inputs. In order to indicate that the input is activated the bit for that input is set on one. If the input is deactivated this bit is set on zero.

Pulse meter mode

The equipment has one meter for each digital input for this mode, i.e. a total of 50 inputs. Each record will be 32 bits, so it can count a total of 4 294 967 295 (FFFFFFFF hexadecimal) pulses for each channel.

MODBUS FUNCTIONS

FUNTION 4: Reading of n words (16bits-2bytes). This function is used to read the status of the internal recordings (4X references).

EXAMPLE OF A REQUEST FOR HEXA-DECIMAL RECORDINGS:

- **010400000002 (CRC)**
  - 01 Peripheral 1
  - 04 Reading Function
  - 0000 Hexa-Decimal Recording (Start address of the recordings that have been read)
  - 0002 Hexa-Decimal Recording (Number of recordings requested by the master)
  - CRC (16 bits)

For the above example, the equipment will send the following response:

- **01040401020304 (CRC)**
  - 01 Peripheral 1
  - 03 Reading Function
  - 04 Number of 8 bit recording sent
  - 0102 Recording 40001
  - 0304 Recording 40002
  - CRC (16 bits)

FUNCTION 6: Preset the value in a single internal recording (4X reference).

EXAMPLE OF WRITING A HEXA-DECIMAL RECORDING:

- **010600800002 (CRC)**
  - 01 Peripheral 1
  - 06 Writing Function
  - 0080 Hexa-Decimal Recording (Start address of the recordings that have been read)
  - 0002 Hexa-Decimal Recording (Value to be recorded in the address)
  - CRC (16 bits)

For the above example, the equipment will send the following response:

- **010600800002 (CRC)**
  - ☐ 01 Peripheral 1
  - ☐ 06 Writing Function
  - ☐ 0080 Hexa-Decimal Recording (Start address of the recordings that have been read)
  - ☐ 0002 Hexa-Decimal Recording (Value to be recorded in the address)
  - ☐ CRC (16 bits)

APPENDIX C.- MODBUS© RECORDINGS

ADDRESS (Decimal)	ADDRESS (Hexadecimal)	RECORDINGS
0	0	Bits 15…0 = Input status 16…1
1	1	Bits 15…0 = Input status 32…17
2	2	Bits 15…0 = Input status 48…33
3	3	Bits 1…0 = Input status 50…49
0128 – 0129	80-81	Recording 32 bits input 1
0130 – 0131	82-83	Recording 32 bits input 2
0132 – 0133	84-85	Recording 32 bits input 3
0134 – 0135	86-87	Recording 32 bits input 4
0136 – 0137	88-89	Recording 32 bits input 5
0138 – 0139	8A-8B	Recording 32 bits input 6
0140 – 0141	8C-8D	Recording 32 bits input 7
0142 – 0143	8E-8F	Recording 32 bits input 8
0144 – 0145	90-91	Recording 32 bits input 9
0146 – 0147	92-93	Recording 32 bits input 10
0148 – 0149	94-95	Recording 32 bits input 11
0150 – 0151	96-97	Recording 32 bits input 12
0152 – 0153	98-99	Recording 32 bits input 13
0154 – 0155	9A-9B	Recording 32 bits input 14
0156 – 0157	9C-9D	Recording 32 bits input 15
0158 – 0159	9E-9F	Recording 32 bits input 16
0160 – 0161	A0-A1	Recording 32 bits input 17
0162 – 0163	A2-A3	Recording 32 bits input 18
0164 – 0165	A4-A5	Recording 32 bits input 19
0166 – 0167	A6-A7	Recording 32 bits input 20
0168 – 0169	A8-A9	Recording 32 bits input 21
0170 – 0171	AA-AB	Recording 32 bits input 22
0172 – 0173	AC-AD	Recording 32 bits input 23
0174 – 0175	AE-AF	Recording 32 bits input 24
0176 – 0177	B0-B1	Recording 32 bits input 25
0178 – 0179	B2-B3	Recording 32 bits input 26
0180 – 0181	B4-B5	Recording 32 bits input 27
0182 – 0183	B6-B7	Recording 32 bits input 28
0184 – 0185	B8-B9	Recording 32 bits input 29
0186 – 0187	BA-BB	Recording 32 bits input 30
0188 – 0189	BC-BD	Recording 32 bits input 31
0190 – 0191	BE-BF	Recording 32 bits input 32
0192 – 0193	C0-C1	Recording 32 bits input 33
0194 – 0195	C2-C3	Recording 32 bits input 34
0196 – 0197	C4-C5	Recording 32 bits input 35

0198 – 0199	C6-C7	Recording 32 bits input 36
0200 – 0201	C8-C9	Recording 32 bits input 37
0202 – 0203	CA-CB	Recording 32 bits input 38
0204 – 0205	CC-CD	Recording 32 bits input 39
0206 – 0207	CE-CF	Recording 32 bits input 40
0208 – 0209	D0-D1	Recording 32 bits input 41
0210 – 0211	D2-D3	Recording 32 bits input 42
0212 – 0213	D4-D5	Recording 32 bits input 43
0214 – 0215	D6-D7	Recording 32 bits input 44
0216 – 0217	D8-D9	Recording 32 bits input 45
0218 – 0219	DA-DB	Recording 32 bits input 46
0220 – 0221	DC-DD	Recording 32 bits input 47
0222 – 0223	DE-DF	Recording 32 bits input 48
0224 – 0225	E0-E1	Recording 32 bits input 49
0226 – 0227	E2-E3	Recording 32 bits input 50