LM25-M

1.- DESCRIPTION

LM25-M is a concentrator with 25 digital inputs, designed to centralize the status of up to 25 logical signals, or the number of impulses received at each of the inputs. In addition, the unit has the capacity to time the active or inactive status of an input.

This document is the user and operation manual of the LM25-M device. If misplaced, the manual may be downloaded from CIRCUTOR's web site:

www.circutor.com

Disconnect the device from all power supply sources before undertaking any form of maintenance, modification of connections, repairs, etc. If you suspect any operational faults in the unit or in its protection system, remove the device from its power supply and leave it out of service. The design of the unit makes it easy to replace in the event of a fault.

If the unit is not operated according to the manufacturer's specifications, the unit's guaranteed degree of protection may be compromised.

The vast majority of energy, water and gas meters have an impulse output proportional to the unit consumed by the installation. **LM25-M** is a centralizer unit that features twenty-five digital inputs activated by potential-free contact whose main function is to read the impulses coming from those meters.

In addition, the unit has the capacity to time the activation/deactivation of each of its inputs, depending on how the unit's configuration is programmed. Thus, it is a timer concentrator, depending on the status of each of its inputs (0/1).

2.- INSTALLATION

The unit is installed in DIN rail 46277 (EN 50022). All connections remain inside the electrical panel.

Take into account that when the unit is connected, the terminals may be hazardous to the touch, and opening the covers or removing elements may provide access to parts that are dangerous to the touch. Do not use the unit until it is fully installed.

The unit must be connected to a power circuit protected with type gl fuses, in compliance with IEC 269, or type M, with values ranging from 0.5 to 1A. It must be fitted with a circuit breaker switch or equivalent device in order to be able to disconnect the unit from the mains power supply. The power supply cable must have a cross-section of at least 1 mm^2.

2.1.- Terminals

B S A	RS-485 communication connection
N L	Power supply terminals
1 C 2 C ... 25 C	Input terminals

3.- START-UP

One or several **LM25-M** centralizers can be connected to a computer or PLC. This system makes it possible to centralise the data in a single log point, in addition to the normal operation of each unit (PowerStudio® platform). The **LM25-M** has an RS-485 serial communication output. If more than one device is connected to a serial communication bus, each one must be assigned a distinct peripheral number or address (from 01 to 254), with a maximum of 32 units per communication bus, so that the central computer sends the queries from the various requested logs to these addresses.

4.- CONFIGURATION PARAMETERS

The **LM25-M** has a RS-485 communication port for reading and writing to the 25 internal meters through a management application; to do so, it uses the Modbus/RTU communications protocol.

The unit has functions for reading and resetting the various internal meters and functions for reading the timers of each of the digital inputs. The unit has write variables for changing the communication parameters (peripheral, speed, etc.).

4.1.- Slave address configuration

The unit comes with peripheral number 95 by default (5F in hexadecimal). The Modbus address modification write command can be used to assign any other address (a maximum of FE in hexadecimal, equivalent to peripheral 254 in decimal).

4.2.- Communications configuration

The unit's communication configuration is by default 19200, 8, N, 1. It is possible to assign this speed using Modbus RTU write commands.

MODBUS (Hex)	Peripheral Configuration / Speed Writing		
0200	Modbus Address From 0001 to 00FF (Hex)	*0001* *00FF*	01 Decimal to 254 Decimal
0201	Bauds RS485 bus speed	*0000* *0001* *0002* *0003* *0004*	4,800 bauds 9,600 bauds 19,200 bauds 38,400 bauds 57,600 bauds
0202	Parity	*0000* *0001* *0002*	No parity Odd Even
0203	Stop bits	*0001* *0002*	1 Stop bit 2 Stop bits
2710-2711	Serial number	-	Switch to decimal

For example:
Request to modify the Modbus address and speed. Tx: 5F 10 0200 0004 08 ***0001 0001 0000 0001*** CRC
(peripheral 01, 9600, N, 1).

4.3.- Default configuration

If you do not know or remember the slave number or the other communication parameters, you can restore the unit's default values using the following procedure:

- Disconnect the unit's power supply.
- Press and hold the front-panel button while reconnecting the device's auxiliary power supply.
- Hold the button down for five seconds with the power supply connected. Once the default values have been programmed, the Rx and Tx LEDs will flash, indicating that the operation was successful.
- Then release the button.

4.4.- Read and write functions

The Modbus read function for reading internal logs is 03 and 04 Hex and for writing it is 06 and 10 Hex.

MODBUS (Hex)	Description
03 / 04	Reading of input logs
06 / 10	Writing of one log or several logs

4.5.- Logic status of the inputs

When requesting Modbus instructions, the device returns the information on the logic status of each of the digital inputs.

MODBUS (Hex)	Digital Input Status Reading	
0000	Hexadecimal to Binary	Bits 15 to 0 Input status 16 to 1
0001	Hexadecimal to Binary	Bits 8 to 0 Input status 25 to 17

For example:
Request to read the logic status of digital inputs Tx: 5F 04 ***0000 0001*** CRC *(request for the status of inputs 1 to 16).*

4.6.- Impulse width configuration (ms)

LM25-M enables configuration of the minimum impulse width (minimum and default time is 10 ms), to increase the impulses in a unit. The minimum time between two successive impulses at the same input must be 1 ms. This represents a maximum sampling frequency at each of the inputs of 90 Hz.

The millisecond value is the same for all the digital inputs.

MODBUS (Hex)	Impulse width configuration (ms)	
00F0	Minimum time: 10 Maximum time: 500	Default: 10 ms

For example:
Request to write the minimum time of the impulse at 50 ms. Tx: 5F 10 00F0 0001 02 ***0032*** CRC

4.7.- Impulse value of the inputs

Using the Modbus address reading function indicated in the table above, you can get the total value of the impulses recorded at each of the digital inputs.

MODBUS (Hex)	Reading of impulse values - Inputs 1 to 25	
0080-0081	Meter Value 1	0000 0000 ... FFFF FFFF (Hex)
0082-0083	Meter Value 2	0000 0000 ... FFFF FFFF (Hex)
0084-0085	Meter Value 3	0000 0000 ... FFFF FFFF (Hex)
....	Meter Value	0000 0000 ... FFFF FFFF (Hex)
00AC-00AD	Meter Value 23	0000 0000 ... FFFF FFFF (Hex)
00AE-00AF	Meter Value 24	0000 0000 ... FFFF FFFF (Hex)
00B0-00B1	Meter Value 25	0000 0000 ... FFFF FFFF (Hex)

For example:
Request to read the impulses received by meter 1. Tx: 5F 04 ***0080 0002*** CRC

4.8.- Timebase of the timers

Considering each meter's time, keep in mind that the timebase is the same for all inputs, with a maximum value of 4,294,967,296 units, and once this value is exceeded the timer will reset to zero.

Keep in mind the scale being used for each timer, which can vary between: seconds, tenths of seconds, hundredths of seconds and milliseconds. This scale is the same for all the digital inputs.

MODBUS (Hex)	Timebase of the digital inputs		
00F5	Timebase Selection	*0000* *0001* *0002* *0003*	1 s (Default) 0.1 s 0.01 s 0.001 s

For example:
Request to write the timebase of the 25 meters. Tx: 5F 10 00F5 0001 02 ***0001*** CRC *(Timebase 0.1 sec.).*

4.9.- Configuration of timer status

LM25-M allows the total time to be measured, or the time of the most recent ON / OFF operation detected by the digital input.

This configuration can be applied individually to each of the twenty-five digital inputs, according to the needs of the installation.

MODBUS (Hex)	Configuration of the time log mode	
00F6	0 = Total time 1 = Most recent impulse value	Bits 15 to 0 Input status 16 to 1
00F7	0 = Total time 1 = Most recent impulse value	Bits 8 to 0 Input status 25 to 17

For example:
Write request for the configuration of the time log mode for each of the digital inputs. Tx: 5F 10 00F6 0002 04 ***01F0 7C1F*** CRC
Input status of inputs 25 to 1 (considering 25):
0000000111110000011111000011111 = 01F0 7C1F (Hex)

The activation of the timers can be configured using an open or closed input, and every one of the unit's inputs is configurable.

MODBUS (Hex)	Timer status for ON and OFF positions	
00F1	ON = Bit at 0 OFF = Bit at 1	Bits 15 to 0 Input status 16 to 1
00F2	ON = Bit at 0 OFF = Bit at 1	Bits 8 to 0 Input status 25 to 17

For example:
Write request for the configuration of the timer status for each of the digital inputs. Tx: 5F 10 00F6 0002 04 ***01F0 7C1F*** CRC
Input status of inputs 32 to 1 (considering 25):
0000000111110000011111000011111 = 01F0 7C1F (Hex)

4.10.- Time value of the inputs

The reading of the logged time value (depending on the timebase) at each of the digital inputs is obtained from the reading of the following Modbus logs:

MODBUS (Hex)	Reading of time values - Inputs 1 to 25	
00B2-00B3	Time Value I1	0000 0000 ... FFFF FFFF (Hex)
00B4-00B5	Time Value I2	0000 0000 ... FFFF FFFF (Hex)
00B6-00B7	Time Value I3	0000 0000 ... FFFF FFFF (Hex)
....	Time Value I...	0000 0000 ... FFFF FFFF (Hex)
00E0-00E1	Time Value I24	0000 0000 ... FFFF FFFF (Hex)
00E2-00E3	Time Value I25	0000 0000 ... FFFF FFFF (Hex)

For example:
Request to read the time logged at input 1. Tx: 5F 04 ***00B2 0002*** CRC

5.- TECHNICAL FEATURES

Power circuit:	
- Single-phase (A1 – A2) :	90…264 V_{ac} / 120…300 V_{dc}
- Maximum consumption:	5 VA … 6 VA / 3.5 W … 3.5 W
- Ground connection:	⏚
- Frequency:	47…63 Hz
- Working temperature:	-10 … +60 ºC
- Humidity (non-condensing):	5 … 95%
Mechanical features:	
- Case material:	UL94 - V0 self-extinguishing plastic
- Unit's protection degree:	IP 20
- Dimensions (mm):	158.2 x 57.75 x 90 mm (8 modules)
- Weight:	350 g
- Maximum operating height:	2,000 m
Serial interface:	
- Type:	Three-wire RS-485 (A/S/B)
- Transmission speed (configurable):	4,800, 9,600,19,200, 34,800, 57,600 bauds
- Data bits:	8
- Parity:	No parity, odd, even
- Stop bit	1 or 2

LED symbols:	
- Power (green)	Powered unit and CPU activity
- Flashing TX (yellow)	RS-485 frame reception activity
- Flashing RX (yellow)	RS-485 frame emission activity

Safety:

Installation category Category III / EN61010 Double-insulated electric shock protection class II. The unit must be connected to a power circuit protected with type gl fuses, in compliance with IEC 269, or type M, with values ranging from 0.5 to 1 A. It must be fitted with a circuit breaker switch or equivalent device in order to be able to disconnect the unit from the mains power supply. The power supply cable must have a cross-section of at least 1 mm^2.

If the unit is not operated according to the manufacturer's specifications, the unit's guaranteed degree of protection may be compromised.

Standard:

EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-11, IEC61000, UL94, UNE-EN55011, RoSH

6.- CONNECTIONS

Figure 1. Details of the power supply and RS-485 communication connections

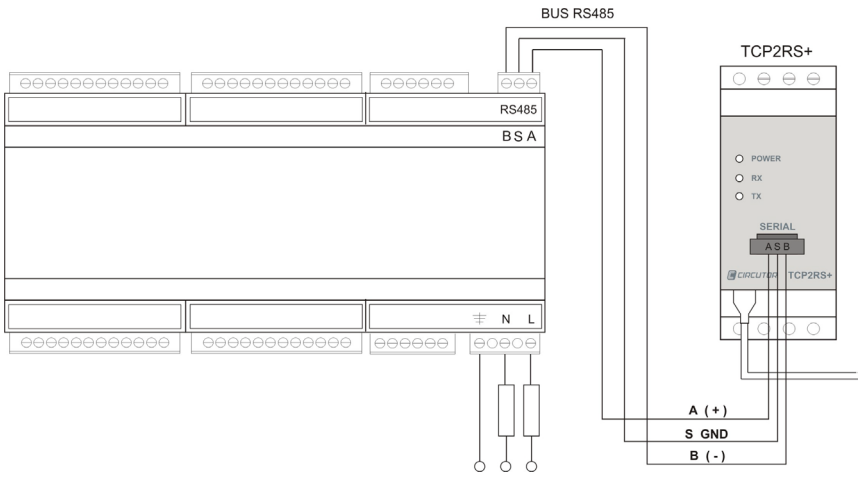
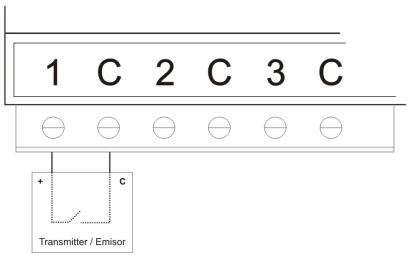


Figure 2. Detail of the activation of the digital input



7.- TECHNICAL SERVICE

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

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