



METER CENTRALISER

LM8-DLP

(Code M31523)

INSTRUCTION MANUAL

(M98202001-20-05A)

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1 BASIC INSTRUCTIONS.

1.1 Delivery spot check.

This manual is issued to help all the LM8-DLP users to install and use it in order to get the best from it. After receiving the unit please check the following points:

- a. Does this device correspond to your order specifications?
- b. Check if any damage was done during the shipment process.
- c. Verify that it includes *One instruction

1.2 Connection procedures.



The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions.

2 LM8-DLP DESCRIPTION.

Electronic energy meters, either single or three phase models, are usually provided with a pulse output proportional to the energy measured. The LM8-DLP is a centralization unit of energy meters that have 24 inputs (optocoupled type) for reading pulses provided by those energy meters. Values of those pulses are saved on memory..

The device allows to measure the input closing time, accumulating also the total time during each input is closed.

Any input can be programmed independently to work in any mode, allowing a mixture of both. Once stored, the information can be read through the built in LCD screen, or sent through a serial communication line to a central unit or PC, using the MODBUS protocol.

It has also, a load profile register, where every 15 minutes is stored the number of impulses received for each input.

The device has a communication serial port type RS-485, for either reading or writing actions over the 24 meters of the LM8-DLP through a PC or a PLC. Several LM8-DLP might be linked to a same RS-485 network. An identification number (from 1 to 255¹) can be given by the user to each device. Commands for reading and reset to zero actions over the diverse energy meters are also available.

¹ Except 0,199, 205 and 255

3 INSTALLATION AND START-UP

The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions.

The instrument must not be powered and used until its definitive assembly on the cabinet's door.



Whether the instrument is not used as manufacturer's specifications, the protection of the instrument can be damaged.

When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1 Installation.

Before applying AC power to the, check following points:

- 1) Supply voltage.
 - Power supply VAC (Single-Phase) 230 V c.a.
 - Frequency: 50...60Hz
 - Voltage Tolerance: + 10 % / -20 %
 - Supply terminals: 20 - 21 .
 - Instrument burden: <4 VA
- 2) Operation conditions
 - Operating temperature: 0 a 55°C
- 3) Safety:
 - Designed to meet protection class II as per EN 61010.

3.2 Mounting.

Instrument is to be mounted on DIN rail mounting device with low dimensions.
All connections keep inside the cabinet.



Note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed

The instrument must be connected to a power supply circuit protected with gl type (IEC 269) or M type fuses rated between 0.5 and 2 A. This circuit should be provided with an automatic switch or any equivalent element to disconnect the instrument from the power supply network. The supply and measuring voltage circuits will be both connected through a wire with a minimum cross-section of 1 mm²

4 FUNCTIONAL DESCRIPTION.

4.1 Pulse count mode.

The unit has been specifically designed to receive the pulses from meters complying with the DIN Standard 43846, referred as SO pulses. In this mode, each input circuit receives the contact closing from a meter, and accumulates it in a register that can be read through the serial line.

As specified in the standard, the pulses must be at least 30 ms long, both for high and low level. The maximum frequency for this type of pulse is then 16,66 Hz. If the pulse duration is less than 30 ms, the pulse is not accepted.

The On and Off time do not have any restriction, allowing to receive very slow pulses with different duty cycles.

4.2 Closing time mode.

In this mode, each input measures the time during which the external contact is closed, in seconds. Each register stores the total amount of time in which a signal has been active, for instance to know how much time a machine has been on.

4.3 Load curve recording.

According to the mode selected for each input, a record is created every fifteen minutes, with the pulses received or the closing time counted during this period. In order to increase the numbers of registers stored in the memory. The device can store up to 90 days of data.

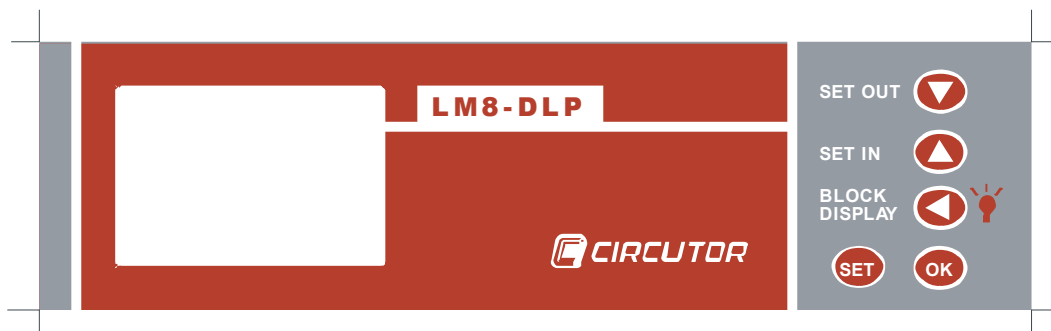
The maximum number of pulses received during fifteen minutes is 250, and the maximum frequency can not be higher than $\frac{1}{4}$ Hz, or one pulse every 4 seconds.

For the closing time, the maximum possible measured value is 900 seconds. For instance, a read value of 4, means actually 20 seconds. The carries produced in the count are registered into the following period.

5 KEYBOARD.

Through the keyboard several parameters can be shown on the display. When the device is powered up, a display test is done, and all segments are on. Four seconds later, a message appears, showing CIRCUTOR in the upper line, and " LM-8M" in the lower line, indicating the model and the version included.

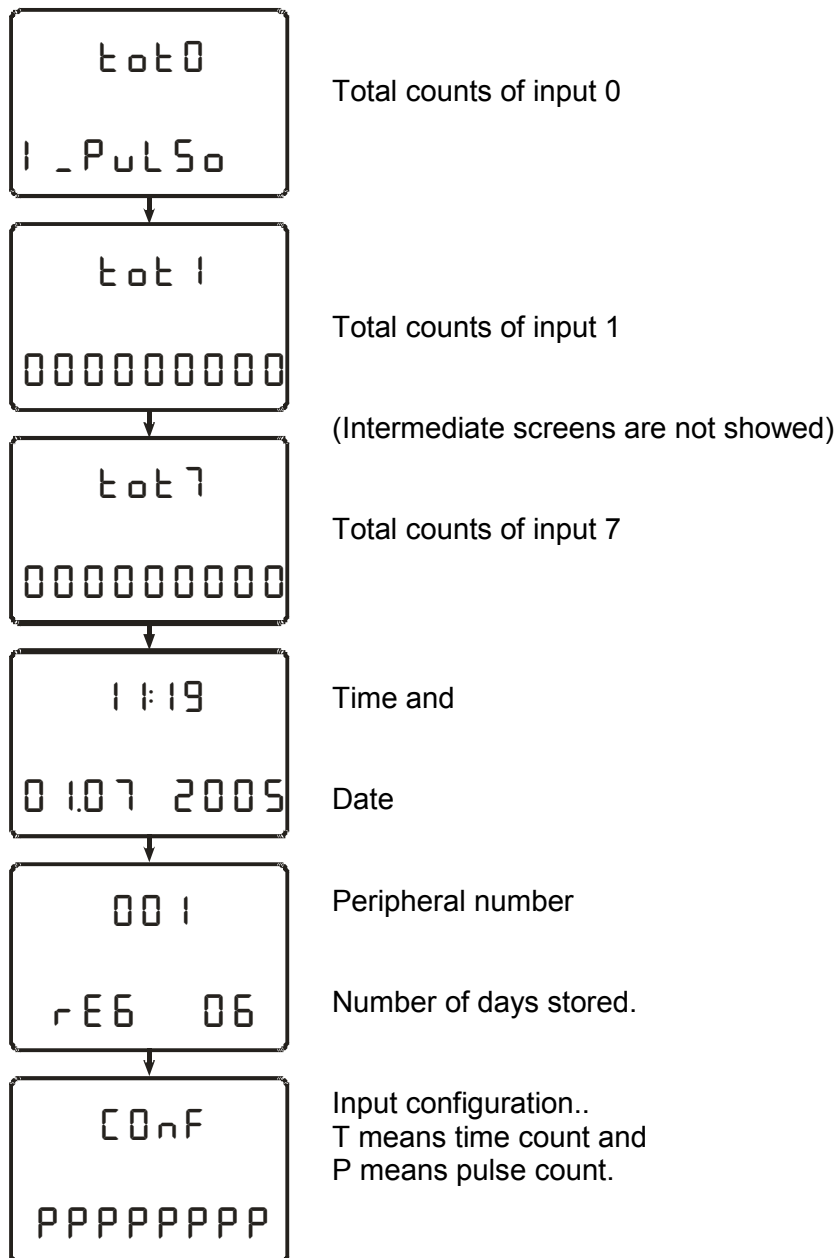
5.1 Front of the box description.



- To visualize the different data, use the arrows up and down.
- To enter into the SETUP press simultaneously SET and SET IN (up arrow)
- To move through the different digits from a value to edit, press the left arrow.
- To validate a modification/edition, press OK
- To leave the SETUP press SET and SET OUT simultaneously (down arrow).
- If it is wanted to block the screen, press SET and BLOCK DISPLAY (left arrow). To unblock, press SET and SET OUT simultaneously.

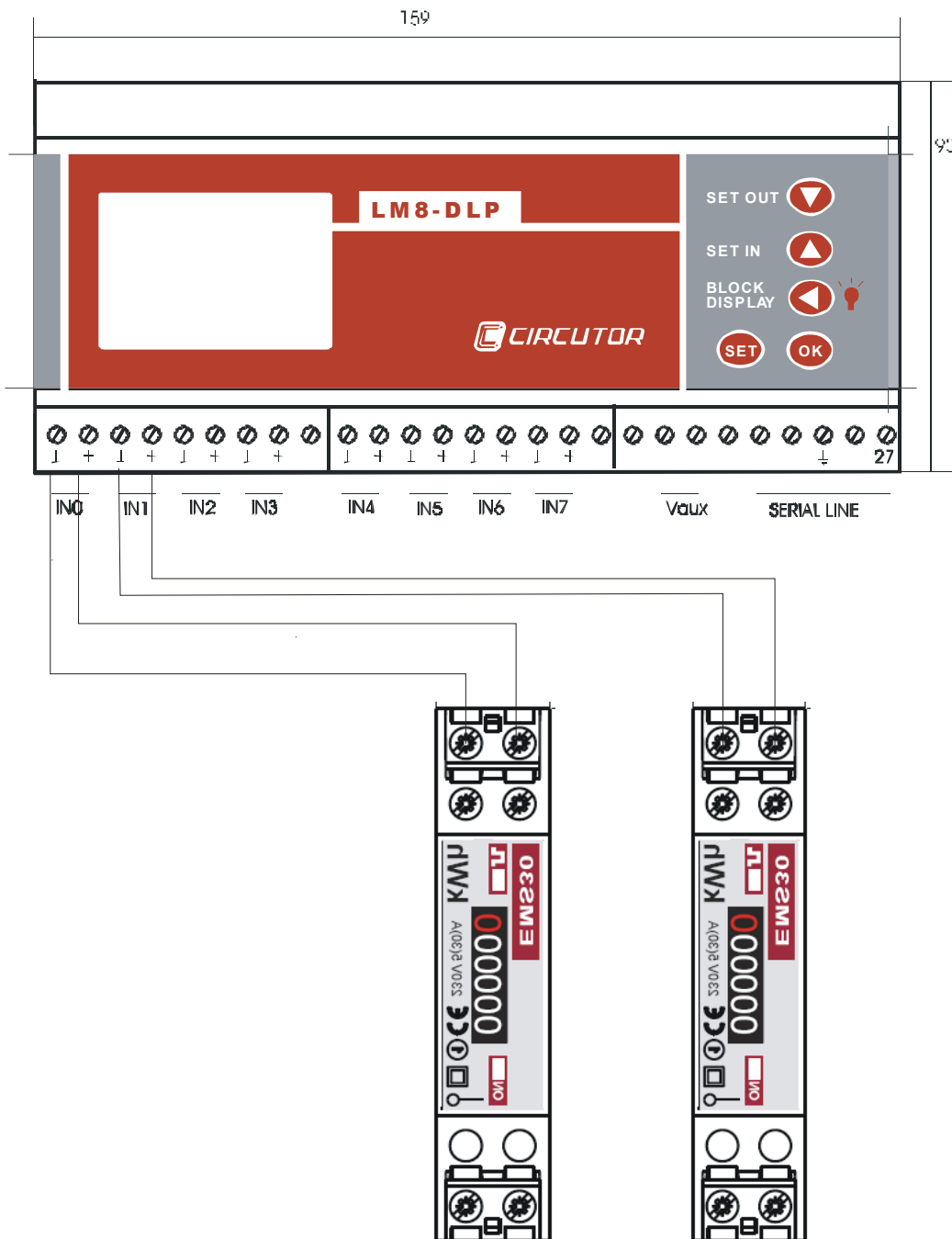
5.2 Reading mode.

After the initial test, the device enters in reading mode. The information is presented in sequential pages in the following order. Pressing “UP” or “DOWN”, changes accordingly the page.



10	Input and common of the first meter.
INO	
V. Aux 50Hz 230V ac	Input supply
20 21	
25	Communications RS-485 terminals
26 L+	
27 L-	

5.5 ELECTRICAL DIAGRAM (example with the EMS-30Cmeter)



5.6 LM8-DLP-m connection to pc

Supply the instrument with 230 V a.c. (+ 15 % / --15 %) through the 20 and 21 connection terminals.

Connect RS-485 output of the LM (terminals 25, 26 and 27) to any of the serial port of the PC. In case of a RS-232 port, use a RS-232 / RS-485 converter (code M54020).

6 COMMUNICATIONS.

In order to provide more flexibility, two addressing zones have been implemented, one starting at 1000H, and other at 3000H. Every variable can be accessed in any of the zones, in homologous positions

6.1 Counting mode.

6.1.1 Configuration parameters

ADDR. ZONE 1	ADDR. ZONE 2	VARIABLE	FORMAT	DESCRIPTION	MOD	MODBUS COMMANDS	USER
105DH	305DH	HOUR	WORD	TIME	R/W	3,4,6,16	SI
1063H	3063H	CONF_INP	WORD	INPUT CONFIG.	R/W	3,4,6,16,	SI
1064H	3064H	PROG_VEL	WORD	COMM.SPEED.	R/W	3,4,6,16	SI
10A2H	30A2H	CODE_ACC	WORD	INT. ACCESS CODE	W	16	NO
12DAH	32DAH	SER_NUMB	STRING(10)	SERIAL NUMBER	R	3,4,16	NO
12E4H	32E4H	ID	BYTE	IDENTITY	R/W	3,4,6,16	SI
12E5H	32E5H	TIPO	STRING(6)	SW VERSION	R	3,4	NO
10F0H	30F0H	PASS	LONG	PASSWORD	R/W	3,4,16	SI
10F4H	30F4H	TIPO_PROT	WORD	MODBUS/JBUS	R/W	3,4,6,16	

- HOUR is a 16 bit Word, coded in BCD as HH:MM
- CONF_INP: defines the working mode for each input. 1 means pulse count mode. 0 means time count mode.
- PROG_VEL: defines the communication speed according to: When the speed is modified, the change will be effective from the moment the device sends an ACK response

0	9600 Bps
1	300 Bps
2	600 Bps
3	1200 Bps
4	2400 Bps
5	4800 Bps
6	19200 Bps

- CODE_ACC: It is a manufacturing code, not to be used by the user..
- SER_NUM: It is the serial number. The user can not modify it
- ID: It's the peripheral number of the device, when connected in the communication bus. It can be changed, but the values 0, 0FFH, 199D, and 205D, must be reserved for another uses.
- TIPO: Defines the SW version.
- PASS: Password of the keyboard.
- TIPO_PROT 0= JBUS, 1= MODBUS.

6.1.2 Registers.

ADDR. ZONE 1	ADDR.. ZONE 2	VARIABLE	FORMAT	DESCRIPTION	MOD	MODBUS COMMANDS	USER
1011H	3011H	TOT_0	LONG	Internal counter n° 0	R/W	3,4,16	YES
1015H	3015H	TOT_1	LONG	Internal counter n° 1	R/W	3,4,16	YES
1019H	3019H	TOT_2	LONG	Internal counter n° 2	R/W	3,4,16	YES
101DH	301DH	TOT_3	LONG	Internal counter n° 3	R/W	3,4,16	YES
1021H	3021H	TOT_4	LONG	Internal counter n° 4	R/W	3,4,16	YES
1025H	3025H	TOT_5	LONG	Internal counter n° 5	R/W	3,4,16	YES
1029H	3029H	TOT_6	LONG	Internal counter n° 6	R/W	3,4,16	YES
102DH	302DH	TOT_7	LONG	Internal counter n° 7	R/W	3,4,16	YES

ADDR. ZONE 1	ADDR.. ZONE 2	VARIABLE	FORMAT	DESCRIPTION	MOD	MODBUS COMMANDS	USER
1065H	3065H	IMP_COUNT0	LONG	PULSE COUNT 0	R/W	3,4,16	YES
1069H	3069H	IMP_COUNT1	LONG	PULSE COUNT 1	R/W	3,4,16	YES
106DH	306DH	IMP_COUNT2	LONG	PULSE COUNT 2	R/W	3,4,16	YES
1071H	3071H	IMP_COUNT3	LONG	PULSE COUNT 3	R/W	3,4,16	YES
1075H	3075H	IMP_COUNT4	LONG	PULSE COUNT 4	R/W	3,4,16	YES
1079H	3079H	IMP_COUNT5	LONG	PULSE COUNT 5	R/W	3,4,16	YES
107DH	307DH	IMP_COUNT6	LONG	PULSE COUNT 6	R/W	3,4,16	YES
1081H	3081H	IMP_COUNT7	LONG	PULSE COUNT 7	R/W	3,4,16	YES

ADDR. ZONE 1	ADDR.. ZONE 2	VARIABLE	FORMAT	DESCRIPTION	MOD	MODBUS COMMANDS	USER
1085H	3085H	SEC_COUNT0	LONG	SECONDS COUNT 0	R/W	3,4,16	YES
1089H	3089H	SEC_COUNT1	LONG	SECONDS COUNT 1	R/W	3,4,16	YES
108DH	308DH	SEC_COUNT2	LONG	SECONDS COUNT 2	R/W	3,4,16	YES
1091H	3091H	SEC_COUNT3	LONG	SECONDS COUNT 3	R/W	3,4,16	YES
1095H	3095H	SEC_COUNT4	LONG	SECONDS COUNT 4	R/W	3,4,16	YES
1099H	3099H	SEC_COUNT5	LONG	SECONDS COUNT 5	R/W	3,4,16	YES
109DH	309DH	SEC_COUNT6	LONG	SECONDS COUNT 6	R/W	3,4,16	YES
10 ^a 1H	30A1H	SEC_COUNT7	LONG	SECONDS COUNT 7	R/W	3,4,16	YES

There are three different registers accessible by the user.

- IMP_COUNT registers store the value reached in the pulse count mode.
- SEC_COUNT registers store the values reached in the closing time mode.
- TOTALIZING registers store the value from one of them.

Depending on the mode selected for each input. That is, if the input 3 is working in mode pulse count, TOT_3 stores the value IMP_COUNT3. However, if the input is working in closing time mode, it will store the SEC_COUNT3. In this way, only an eight variable block must be read to get the values independently of the working mode. The registers store the value in any mode, and if an input changes from one to another, the TOT_x changes accordingly.

6.2 Load curve registers.

6.2.1 Configuration parameters.

ADDR. ZONE 1	ADDR.. ZONE 2	VARIABLE	FORMAT	DESCRIPTION	MOD	MODBUS COMMANDS	USER
1600H	3600H	TIME	STRING(6)	TIME STAMP	R/W	3,4,16	YES

1604H	3604H	NUM_REC	WORD	NÚMBER OF DAYS STORED	R	3,4	YES
1605H	3605H	HORA_REG	WORD	NEXT RECORD HOUR	R	3,4	YES
1930H	3930H	RESET_SW	WORD	RESET COMMAND	W	16	YES
1938H	3938H	ERASE_REG	WORD	ERASE RECORDS	W	16	YES
1939H	393AH	INIC_REG	WORD	STARTS REC.MODE	W	16	YES
193CH	393CH	BOR_PAR	WORD	ERASE RECORD	W	16	YES

- TIME: hh.mm.ss.00 dd.mm.year 8 bytes. Hour and date are BCD coded. Year, in Hex..
- NUM_REC: Shows the total of days stored.
- HORA_REG: Time at which the next record will be taken.
- RESET_SW: Resets the device.
- BORRAR_REG: Sets NUM_REC to zero.
- INIC_REG: Starts the recording process.
- BOR_PAR: Partial erase of registers. Erases one record.

6.2.2 Daily records

Each daily record, for any of the eight inputs, consists of 104 bytes coded as follows:

- HEADER: day/month, year 4 bytes
starting value 4 bytes
- DATOS: First quarter count 1 byte
“
“
“
96th quarter count 1 byte.

To get the data pertaining to an input, a multiple read command must be issued asking for 104 bytes, addressed to a virtual location as indicated in the following table

Input number	Day 11	Day 2	Day 90
0 zone 1	4000H	4001H		4059H
0 zone 2	2000H	2001H		2059H
1 zone 1	4100H	4101H		4159H
1 zone 2	2100H	2101H		2159H
2 zone 1	4200H	4201H		4259H
2 zone 2	2200H	2201H		2259H
3 zone 1	4300H	4301H		4359H
3 zone 2	2300H	2301H		2359H
4 zone 1	4400H	4401H		4459H
4 zone 2	2400H	2401H		2459H
5 zone 1	4500H	4501H		4559H
5 zone 2	2500H	2501H		2559H
6 zone 1	4600H	4601H		4659H
6 zone 2	2600H	2601H		2659H

7 zone 1	4700H	4701H		4759H
7 zone 2	2700H	2701H		2759H

For instance, the command

ID 04 4120H 00 34H CRCL CRCH

Will get an answer

ID 04 68H HEADER (8 BYTES) DATA (96 BYTES) CRCL CRCH
Corresponding the data to input 1, day 33th

6.2.3 Data polling.

Each frame consists of :

- Identity number Un byte
- Command code 04H or 03H
- Data address Two bytes: H, L
- Number of words to be read Two bytes: H, L
- CRC Two bytes: L, H

6.2.4 Writing command.

Preset Single Register

- Identity number One byte
- Command code 10H
- Data address Two bytes: H, L
- Number of words to be written Two bytes
- Number of bytes to be written One byte
- CRC Two bytes: H, L

Preset Multiple Registers

- Identity number One byte
- Command code 10H
- Data address Two bytes: H, L
- Number of words to be written Two bytes
- Number of bytes to be written One byte
- Variable value Four bytes
- Variable value Four bytes.
- CRC 2 bytes: L, H

6.2.5 Answer frame.

Each frame consists of::

- Identity One byte
- Command code (the same as received) 04H
- Number of bytes sent One byte
- Variable value Four bytes
- Variable value Four bytes.
- CRC 2 bytes: L, H

6.2.6 Acknowledge frame.

It consists of:

- Identity	One byte
- Command code (the same as received)	10H
- Data address (the same as received)	Two bytes: H, L
- Number of words written (the same as received)	Two bytes: H, L
- CRC	2 bytes: L, H

7 TECHNICAL FEATURES

Power supply circuit:

Power supply:	Single phase 110, 230,400V a.c. (according model)
Voltage tolerance:	+10/-20 %
Frequency:	50...60 Hz
Consumption:	<4 VA
Operating temperature:	0 to 55°

Digital inputs: 8 contact inputs –selfsupplied at 24V.

Assembly features:

Type of casing	Self-extinguishing plastic modules
Mounting:	Symmetrical DIN 46277 profile (EN 50022) coupling
Casing front:	Lexan front
Terminals:	IP20
Sizes:	152x91x58 mm
Weight:	500 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