MICROCOM

Simply More

NEMOS LP+

Autonomous GSM Datalogger

User manual

Revision 26.00

"Perfection is achieved, not when there is nothing more to add,
But when there is nothing left to take away."
-Antoine de Saint Exupery

Warning

1.- This system has been developed to be installed by professionals, not by end users. In case of doubt regarding any technical aspect, please consult our experts.

2.- Our innovation effort in both software and hardware is ongoing. However, despite paying great attention to documenting our products adequately, discrepancies between the product and some of its specifications may be found by error. Therefore, if you have any doubts or observations, please contact us at the following email address: microcom@microcom.es.

3.- Communications based on the GSM network are extraordinarily reliable. However, we advise against using our equipment in critical systems if some type of redundancy related to the communications network has not been provided, as it may exceptionally go out of service.

4.- "Life Support": This unit is not designed for use in systems on which human life depends. That is, in devices whose malfunction puts human life at risk.

5.- Our responsibility in relation to the equipment will be limited to its repair or replacement under the terms established in the warranty.

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Introduction

The NEMOS LP+ is a datalogger or data acquisition device with GSM communication and battery power. In its standard configuration, it has 8 digital inputs suitable for flow meters, 4 configurable analog inputs for 0-10 VDC or 4-20 mA loop, 4 voltage outputs of up to 24 VDC, and 1 1-wire communication bus compatible with Microcom probes. Optionally, it can be equipped with a MODBUS RTU interface over RS-485.

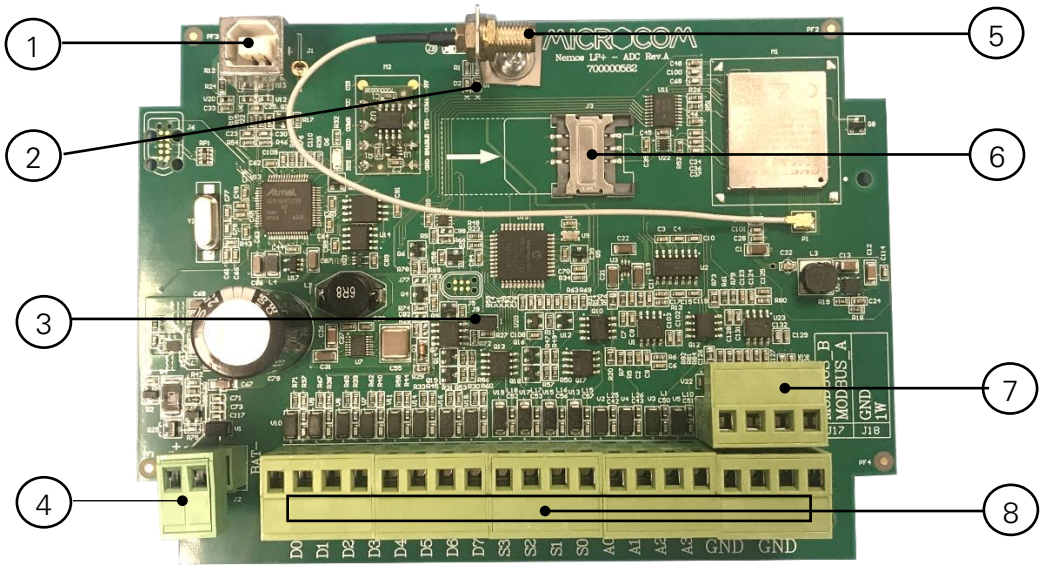
It is designed to work in places where mains power is not available. In its standard configuration, it is powered by a set of size D alkaline batteries that provide an estimated battery life of between 2 and 5 years depending on the configuration. Optionally, these can be replaced with a lithium battery pack. The device is housed in a case with IP67 environmental protection.

It incorporates the latest narrowband communication technologies, NB-IoT and CAT.M1, while retaining the 2G standard. Thus, the device communicates with the most abundant networks currently (2G) and is prepared for the future development of NB-IoT/CAT.M1. For local communication and diagnostics, a USB port is available.

This manual provides basic information for installing the equipment. The acquisition of this system gives you the right to free use of the ZEUSweb monitoring portal. Register your device and enjoy the convenience of monitoring your station from the internet and with applications for Android and iOS mobile devices.

https://www.microcom360.com/en/zeus-web-platform/

1. Presentación del producto

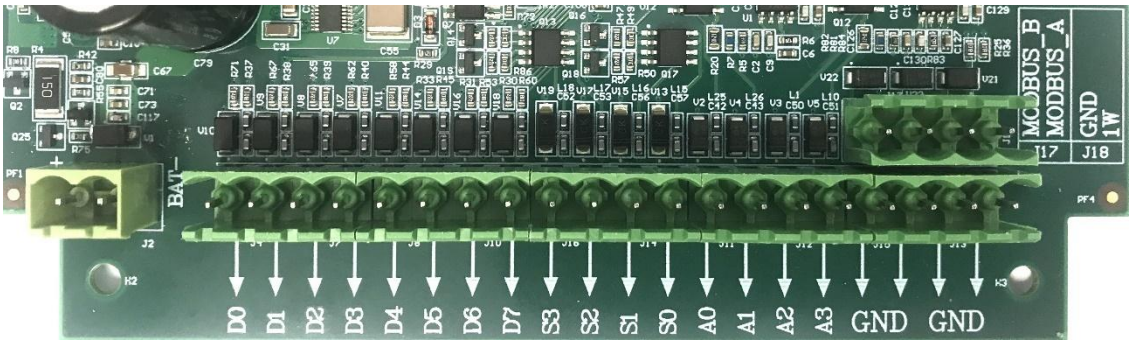


#	*Description*
1	USB TYPE B PORT Computer connection
2	STATUS LED This LED shows the device status, indicating the connectivity level and possible detected errors. Refer to the "STATUS LED Interpretation" section for more information.
3	JUMPER J9. Jumper for sleep mode inhibition. If J9 is closed (covering both pins) the Nemos will not enter sleep mode.
4	PLUGGABLE TERMINAL FOR BATTERY. Refer to the "Terminal Designation" section for more information.
5	ANTENNA CONNECTOR. SMA type.
6	SIM HOLDER. Socket for the SIM card. Size 2FF
7	PLUGGABLE TERMINAL FOR COMMUNICATIONS. Refer to the "Terminal Designation" section for more information.
8	PLUGGABLE TERMINALS FOR INPUTS AND OUTPUTS.. Refer to the "Terminal Designation" section for more information.

1.1. STATUS LED Interpretation

LED	*Colour*	*Behaviour*	*Description*
GSM	ROJO	Off	Device OFF or in sleep mode.
		1 blink	Device ON.
GSM	VERDE	Off	GSM modem not registered or device off
		1 blink	Insufficient GSM signal strength
		2 blinks	Sufficient GSM signal strength
		3 blinks	Good GSM signal strength
		4 blinks	Excellent GSM signal strength
		5 blinks	Excellent GSM signal strength

1.2. Terminal designation



Terminal	*Interface*	*Description*
BAT +	Positive power supply	Voltage range from 5 to 15 VDC
BAT -	Negative power supply	Voltage range from 5 to 15 VDC
D0	Digital input 0	Activation by contact with GND.
D1	Digital input 1	Activation by contact with GND.
D2	Digital input 2	Activation by contact with GND.
D3	Digital input 3	Activation by contact with GND.
D4	Digital input 4	Activation by contact with GND.
D5	Digital input 5	Activation by contact with GND.
D6	Digital input 6	Activation by contact with GND.
D7	Digital input 7	Activation by contact with GND.
S3	Voltage output 3	Configurable from 5 to 24 VDC (1 VDC steps)
S2	Voltage output 2	Configurable from 5 to 24 VDC (1 VDC steps)
S1	Voltage output 1	Configurable from 5 to 24 VDC (1 VDC steps)
S0	Voltage output 0	Configurable from 5 to 24 VDC (1 VDC steps)
A0	Analog input 0	Configurable: 0...10 VDC or 4...20 mA loop
A1	Analog input 1	Configurable: 0...10 VDC or 4...20 mA loop
A2	Analog input 2	Configurable: 0...10 VDC or 4...20 mA loop
A3	Analog input 3	Configurable: 0...10 VDC or 4...20 mA loop
GND	Voltage reference	For analog and digital inputs.
GND	Voltage reference	For analog and digital inputs.
GND	Voltage reference	For analog and digital inputs.
GND	Voltage reference	For analog and digital inputs.
MODBUS_B	RS485 (-)	B(-) signal for MODBUS RTU communication
MODBUS_A	RS485 (+)	A(+) signal for MODBUS RTU communication
GND	1-wire GND	Voltage reference for 1-wire communication
1W	1-wire positive	Data cable for 1-wire communication

2. Operation

2.1. Power-up and Energy Control

The Nemos LP+ is a battery-powered system designed to provide battery life measured in years, and it is essential to maintain strict control of available energy. For this reason, by default it operates in an ultra-low consumption mode that we call "sleep mode". In sleep mode, the GSM modem and main CPU are off, and therefore it will not be possible to communicate with the device.

The functions that remain active in sleep mode are:

- Scanning of digital inputs
- Reading of flow meters.

The device is designed to exit the sleep state under the following circumstances:

- Digital input alarm activation. The device will exit the sleep state, activate GSM communications and notify the alarm as required by the configuration.
- Timer expiration. Actions configured in timers are executed regardless of whether the device is in sleep mode.
- USB connection to computer. The device also turns on when connecting USB.
- Insertion of the J9 jumper for sleep mode inhibition.

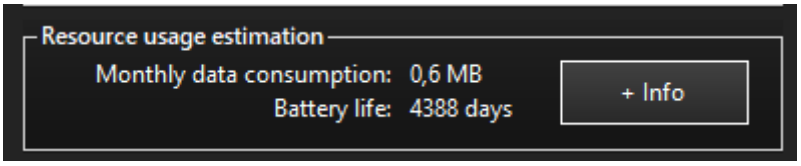
2.2. Battery life

The following table shows examples of configurations and typical battery life:

Signals	*Recording Frequency*	*Transmission Frequency*	*Battery*	*Battery Life**
1 flow meter	*5 minutes*	*24 hours*	*Lithium*	*10 years*
1 flow meter	*5 minutes*	*24 hours*	*Alkaline*	*5 years*

** Test Conditions: Temperature 20ºC, RSSI: -93dBm and download to Zeus server via GPRS.*

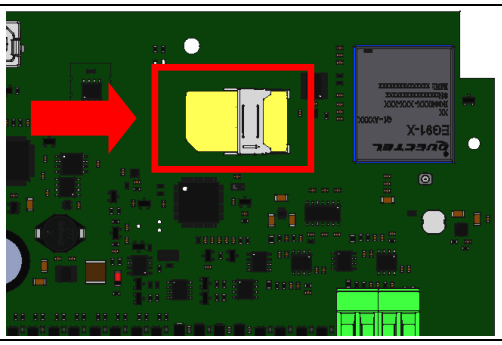
Any configuration that deviates from what is specified will have a direct impact on battery life, particularly more frequent data transmission. To know the battery life estimate for your particular case, use the MicroConf universal configuration software or consult Microcom support



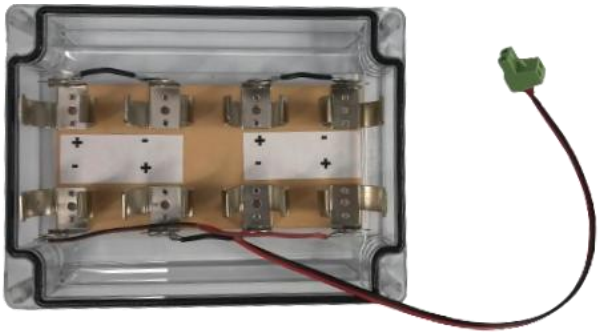
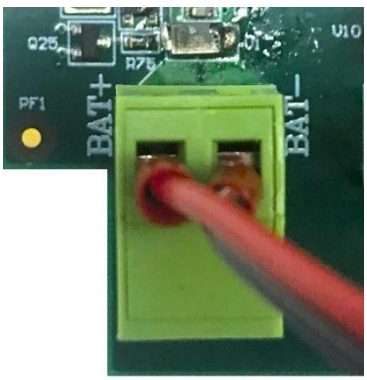
3. Installation

This section indicates how to install and handle the equipment safely. Please read the following sections completely before handling the equipment.

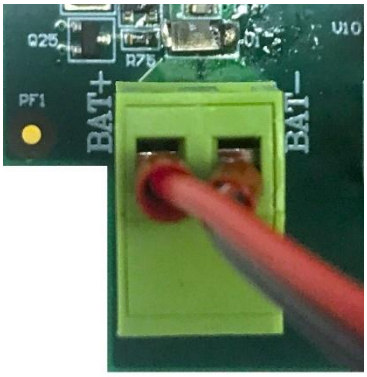
3.1. SIM Card Installation

	SIM Card Installation
1	Remove the 4 screws that join the cover with the body to remove the front cover.
2	Insert the SIM card as shown in the figure: ▪ Metallic part of the SIM facing the electronic board. ▪ 45º cut to the right (front view) Note: The SIM card must have PIN code request disabled 
3	Place the cover and screw on the front cover

3.2. Installation of 4 Type D Alkaline Batteries

	Installation of 4 Type D Alkaline Batteries
1	Open the closures that join the cover with the body to remove the front cover
2	Place the alkaline batteries respecting the indicated polarity 
3	Connect/Disconnect batteries from circuit. Procedure: ▪ Connection: Place the connector in the appropriate position and push towards the electronic board. ▪ Disconnection: Pull the terminal to unplug from the electronic board. ▪ The power terminal also allows removal of wiring by loosening the terminal screws with a small screwdriver. 
4	Place the cover and close the closures that join the cover with the equipment body.

3.3. Lithium Battery Pack Installation

	Lithium Battery Pack Installation
1	Open the closures that join the cover with the body to remove the front cover.
2	Attach the battery to the Nemos PL+ cover using the velcro that is attached to the battery.
3	Connect/Disconnect batteries from circuit. Procedure: ▪ Connection: Place the connector in the appropriate position and push towards the electronic board. ▪ Disconnection: Pull the terminal to unplug from the electronic board. ▪ The power terminal also allows removal of wiring by loosening the terminal screws with a small screwdriver. 
4	Place the cover and close the closures that join the cover with the equipment body.

4. Configuration and Start-up

This equipment is packed with the battery disconnected and the cover closed. The first step to start using the device is to connect the battery as specified in section "4. Assembly and Installation" and turn it on following the steps indicated in section "3. Operation"

This equipment is user programmable. Programming is performed using the MICROCONF universal configuration software. This software, the user manual and video tutorials with programming examples are available for download at the following web link:

microcom360.com/start/

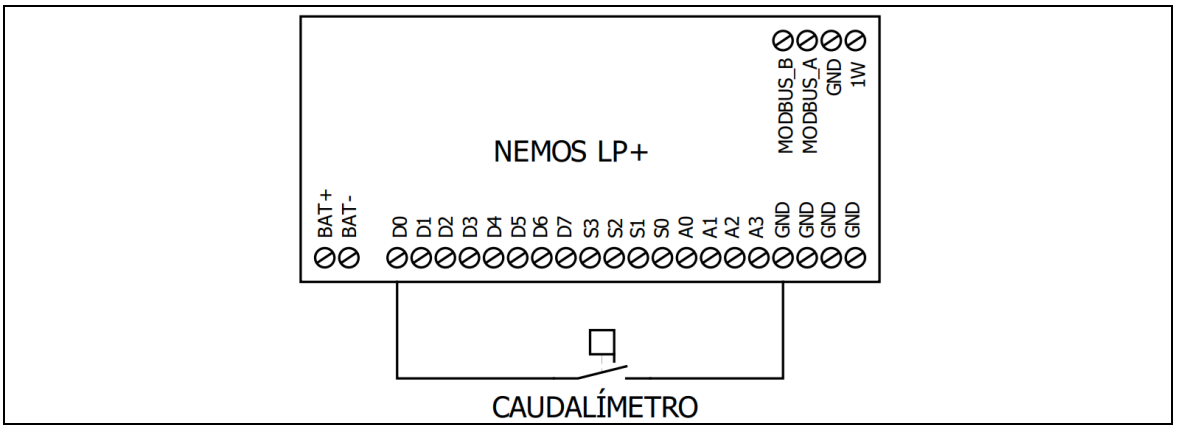
5. Wiring Examples

5.1. Digital Input Wiring

The Nemos LP+ has 8 digital inputs and can be used as alarm signals, totalizing pulse counters or flow meters.

NOTES FOR DIGITAL INPUTS:
- All digital signals are activated by contact with GND.
- Unused signals must be left unconnected.
- Depending on whether the configured sampling rate is 64 or 256 Hz, the minimum required input pulse width will be 16 or 4 milliseconds respectively.

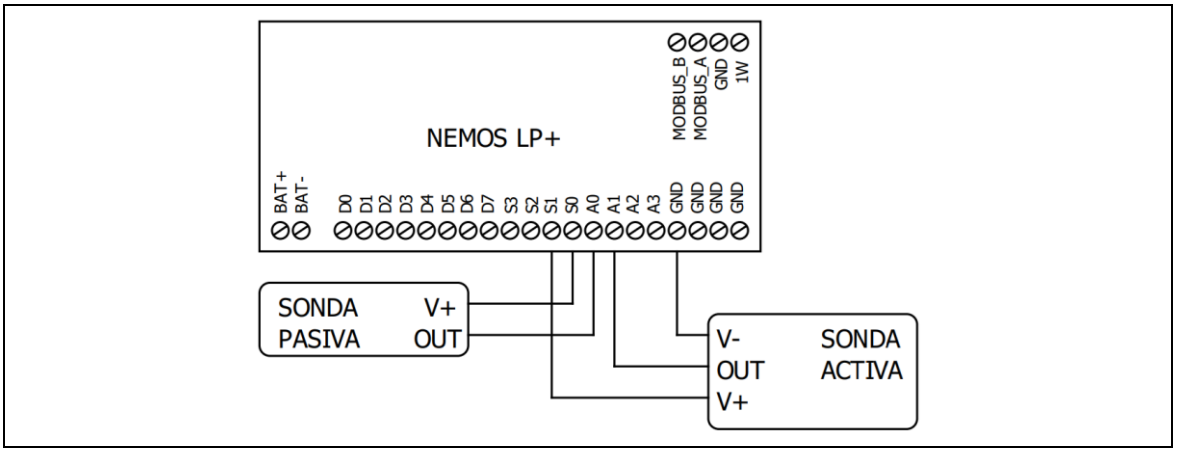
Example connection of a digital flow meter with potential-free contact output (reed contact or optocoupler) connected to digital input 0 (D0) of the Nemos LP+.



5.2. Analog Input Wiring

The Nemos LP+ has 4 configurable analog inputs: 0-10 VDC or 4/20 mA loop. There are also 4 voltage outputs that provide 5 to 24 VDC in 1 volt steps to power the probes.

Example of connecting two analog probes to the Nemos LP+. The passive two-wire probe is powered by voltage output 0 (S0) and connected to analog input 0 (A0). The active probe is powered by voltage output 1 (S1) and GND and connected to analog input 1 (A1).

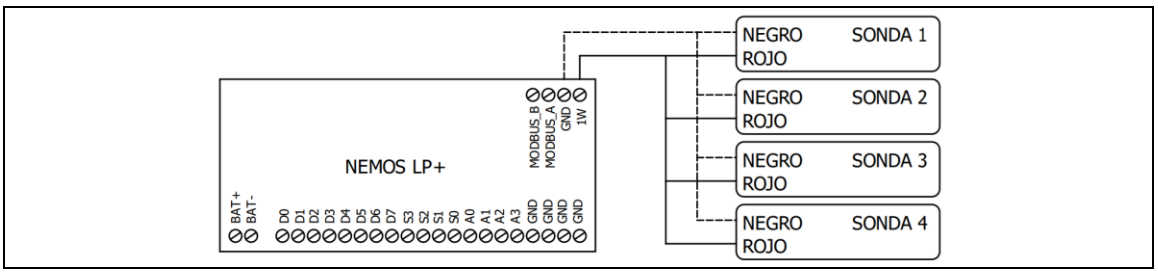


5.3. Microcom Probes Wiring (1-wire bus)

The Nemos LP+ has a connection port for Microcom probes. For this purpose, at Microcom we manufacture the STDV01 (temperature) and STDV02 (combined temperature and humidity) probes.

Communication between the Nemos LP+ and the probes is digital type forming a "multi-drop" bus in which each probe has a unique identifier assigned. All system probes are connected in parallel to terminals 1W and GND. The probe cable length can be extended up to 100 meters as long as shielded cable is used, connecting the shield to GND, and includes the total sum of each probe's cable.

Example wiring of 4 Microcom STDV01 probes.

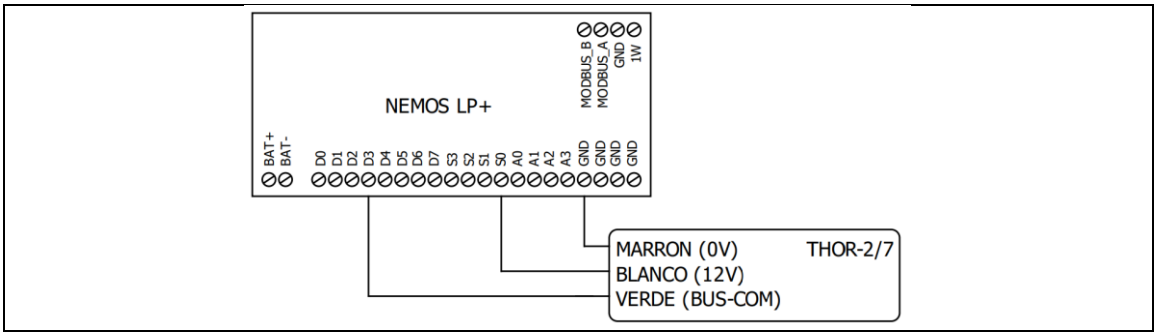


5.4. THOR-2 and THOR-7 Modules Wiring

The Nemos LP+ is compatible with 2-wire latch valve control modules. There are 2 models available, THOR-2 and THOR-7, with 2 and 7 outputs respectively.

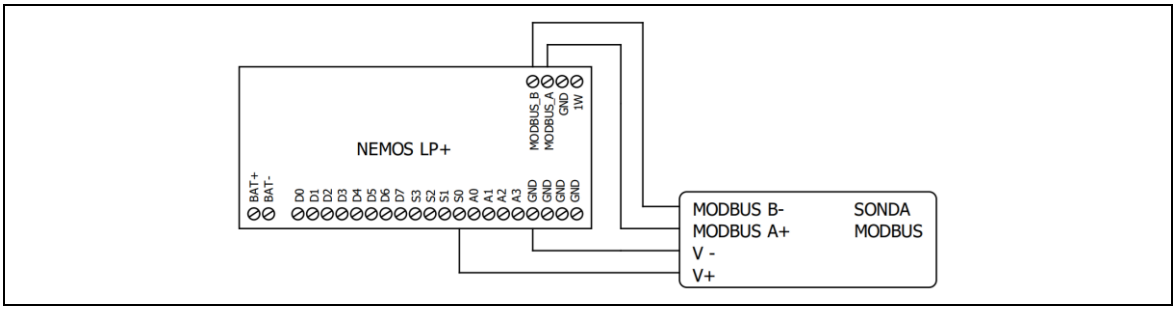
NOTES FOR MICROCONF CONFIGURATION:

- Select the module to be connected in the ADVANCED screen (Menu -- General -- Advanced).
- Check "Enable digital communication on digital input 3" in the DIGITAL INPUTS screen (Menu -- Inputs and outputs -- Digital I.)



5.5. MODBUS RTU / RS485 Instrumentation Wiring

The Nemos LP+ has an RS-485 port compatible with the MODBUS RTU protocol. The equipment can be used as a MASTER and allows reading up to 32 MODBUS variables.



6. Technical Specifications

<table>
<tr><td colspan="2">GENERAL</td></tr>
<tr><td>External power supply</td><td>Range: 5 to 15 VDC</td></tr>
<tr><td>Battery capacity</td><td>Option A: 4 Alkaline batteries
Option B: Pack of 4 lithium battery cells.</td></tr>
<tr><td>Grado IP</td><td>IP67</td></tr>
<tr><td>Radio Modem</td><td>
<table>
<tr><th>Version</th><th>Model</th><th>FCC ID</th><th>Bandas (MHz)</th></tr>
<tr><td>2G/
NB-IoT</td><td>Quectel
BG95-M3</td><td>XMR201910BG9
5M3</td><td>GSM / (E)GPRS:
850/900/ 1800/1900
MHz
Cat.M1 / Cat.NB2:
Bands: 1, 2, 3, 4, 5, 8,
12, 13, 18, 19, 20, 25,
26, 27, 28, 66, 71, 85</td></tr>
</table>
</td></tr>
<tr><td>Data logger</td><td>> 150.000 data points</td></tr>
<tr><td>Operating temperature</td><td>-20 ºC to +75 ºC</td></tr>
<tr><td>Configuration & diagnostics</td><td>Type B USB connector</td></tr>
<tr><td>Dimensions (cubic)</td><td>Without cable-glands: 115 x 125 x 150 mm (width, depth, height)</td></tr>
<tr><td>External material</td><td>Top cover: Polycarbonate
Body: ABS</td></tr>
<tr><td>Antenna connector</td><td>SMA male</td></tr>
<tr><td>Included antenna</td><td>Magnetic base 0 DBI and 1.8 meters wire</td></tr>
<tr><td colspan="2">DIGITAL INPUTS</td></tr>
<tr><td>Number</td><td>8 (All can be used for flow meter reading)</td></tr>
<tr><td>Sampling frequency</td><td>64 Hz / 256 Hz</td></tr>
<tr><td colspan="2">ANALOG INPUTS</td></tr>
<tr><td>Number</td><td>4</td></tr>
<tr><td>Type</td><td>0-10 VDC or 4/20 mA</td></tr>
<tr><td>Accuracy</td><td>0.1%</td></tr>
<tr><td>Resolution</td><td>16 bits</td></tr>
<tr><td>Impedance</td><td>Voltage mode: 2 MΩ. Current mode: 125 Ω</td></tr>
<tr><td colspan="2">VOLTAGE OUTPUTS</td></tr>
<tr><td>Number</td><td>4</td></tr>
<tr><td>Rango</td><td>From 5 to 24 Vdc. Steps of 1 Vdc.</td></tr>
<tr><td>Maximum current</td><td>40 mA</td></tr>
<tr><td colspan="2">1-WIRE PROBE BUS</td></tr>
<tr><td>Protocol</td><td>1-WIRE</td></tr>
<tr><td>Number</td><td>4</td></tr>
<tr><td colspan="2">FIELD BUS</td></tr>
<tr><td>Interface</td><td>RS-485</td></tr>
<tr><td>Protocol</td><td>MODBUS RTU</td></tr>
<tr><td>Channels</td><td>32</td></tr>
</table>

7. Warranty

1- MICROCOM guarantees this product to be free from defects in materials and manufacturing for five (5) years. However, MICROCOM's sole obligation under this warranty shall be to repair or replace at no charge any part of the equipment that MICROCOM deems defective in materials or workmanship upon examination, and only under the conditions listed below:

2-

a) That the defects have been made known to MICROCOM, in writing and within five (5) years after the date of purchase of the equipment.

b) That the equipment has not been maintained, repaired, or altered by any person who has not been previously approved or authorized by MICROCOM.

c) That the equipment has been used in a suitable and normal manner, and that it has not been altered or used incorrectly, nor has it suffered any accident or been damaged by an act of God or other similar catastrophic incident.

d) The buyer, whether the DISTRIBUTOR or a client of the DISTRIBUTOR, will pack and send or deliver the equipment to the MICROCOM factory in Irún, Spain, within a maximum period of 30 days after MICROCOM has received written notification of the defect. Transportation to MICROCOM, within Spanish national territory, will be at the expense of MICROCOM.

e) MICROCOM's liability is limited to the repair or replacement of any part of the equipment at no charge, if MICROCOM's examination reveals that such part has been defective due to failure in material or manufacturing.

1.1.- The DISTRIBUTOR or the DISTRIBUTOR's clients may send the equipment directly to MICROCOM if they are unable to repair the equipment themselves, even if the DISTRIBUTOR has been approved to carry out such repairs and has agreed with the client to carry them out as covered by this limited warranty.

1.2.- In the event that products must be returned to MICROCOM for a repair covered by the warranty, the DISTRIBUTOR should contact MICROCOM prior to shipment to receive a Return Materials Authorization "RMA" number.).

Disposal of electrical and electronic waste (applicable in the European Union and other countries with selective collection). The symbol present on the product or packaging indicates that the product will not be treated as household waste. Instead, it must be delivered to an authorized collection center for recycling of electrical and electronic waste. By ensuring that the product will be disposed of properly, you avoid a potential negative impact on the environment and human health, which could be caused by improper disposal management of the product. Recycling materials will contribute to the conservation of natural resources. For more detailed information, we invite you to contact your city's specific office, the waste disposal service or the supplier from whom you purchased the product.