ISONRG™

ML 311

HEAT METER

MI-004 APPROVED
in accordance with the Directive 2004/22/EC

Warranty conditions are available on this website:
www.isomag.eu only in English version

ISOIL INDUSTRIA
The solutions that count

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SYSTEM DESCRIPTION

ML 311 is an energy meter designed for heating, cooling or combined heating/cooling carried by a thermal fluid; typically the thermal fluid is water, though a special features allow to calculate the energy even for water and glycol ethylene or polypropylene at several concentration. The calculator contains all the necessary circuits for calculating energy value according to the standard EN1434; the thermal energy calculation is based on the following calculation :

$$Q = \int_{t0}^{t1} q_m \Delta h dt$$

Where :

- Q : amount of heat (energy) transferred or absorbed
- q_m : mass flow rate of the vector fluid /kg s^{-1}
- Δh : Δ of specific enthalpy between in-let and out-let pipe line /J kg^{-1}
- t : time /s

FLOW MEASUREMENT

The calculator can calculate the flow rate throughout two channel :

- Analogic : it acquire the 4-20mA signal from a flow meter

or

- Factorized pulses: it calculate the flow rate throughout factorized pulses coming from the flow meter

TEMPERATURE MEASUREMENT

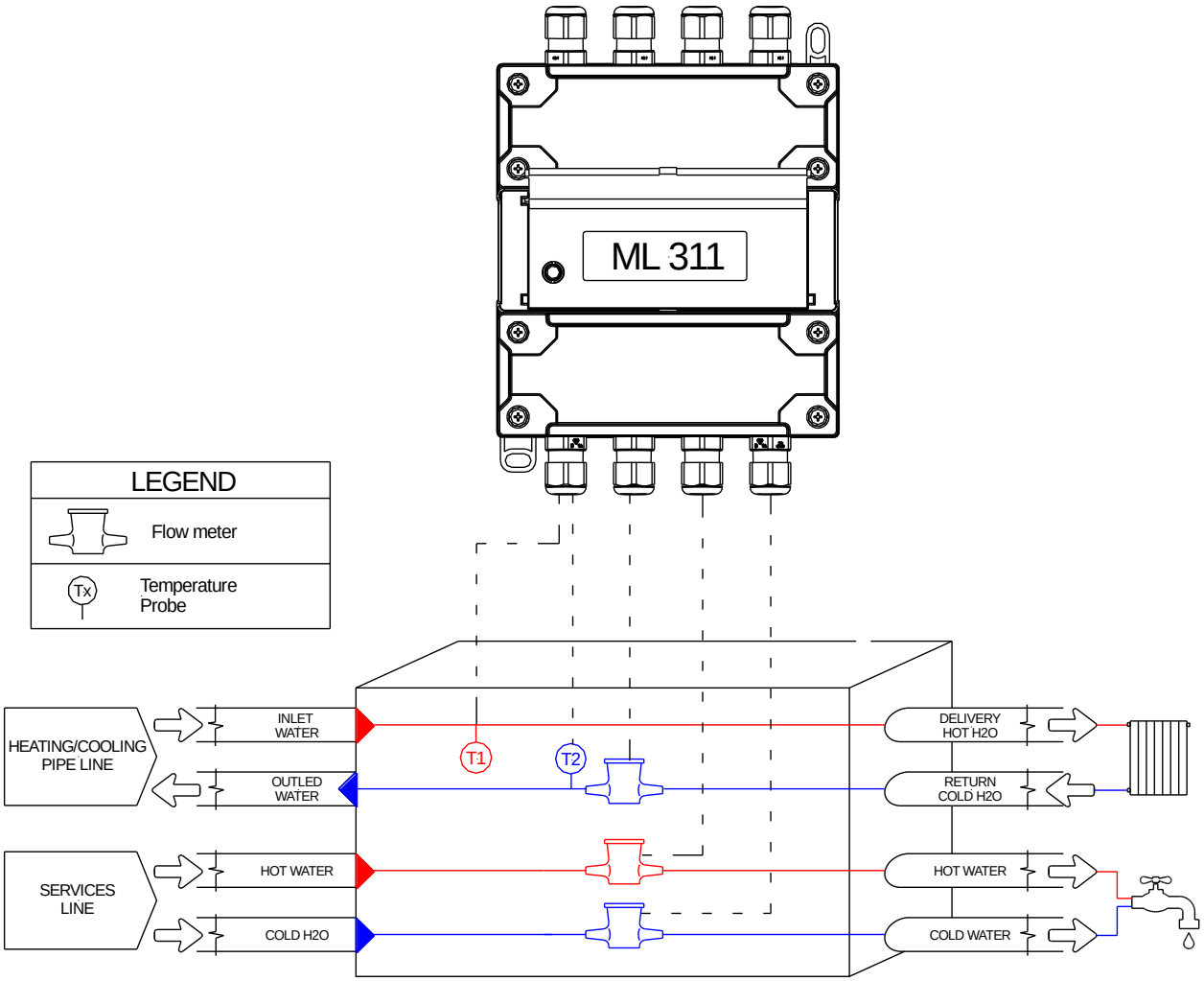
The instrument measures the temperature by RTD (PT type), in a 4-wires configuration; the PT values, can be selected via software; the allowed model are:

- PT100
- PT500
- PT1000

TIME

By a highly accurate internal reference system and an appropriate electronic switch network, the temperatures are measured by highly accurate ADC (Analog to Digital Converter).

The diagram below is a schematic of the principle: in addition to the thermal energy meter function, the ML 311 allows to totalize the hot and cold water volume used for service lines; in some cases this solution can be helpful for a quick reference of the measures and the possibility to transfer them to other systems using several fieldbus which the instrument has built-in.



TECHNICAL DATA

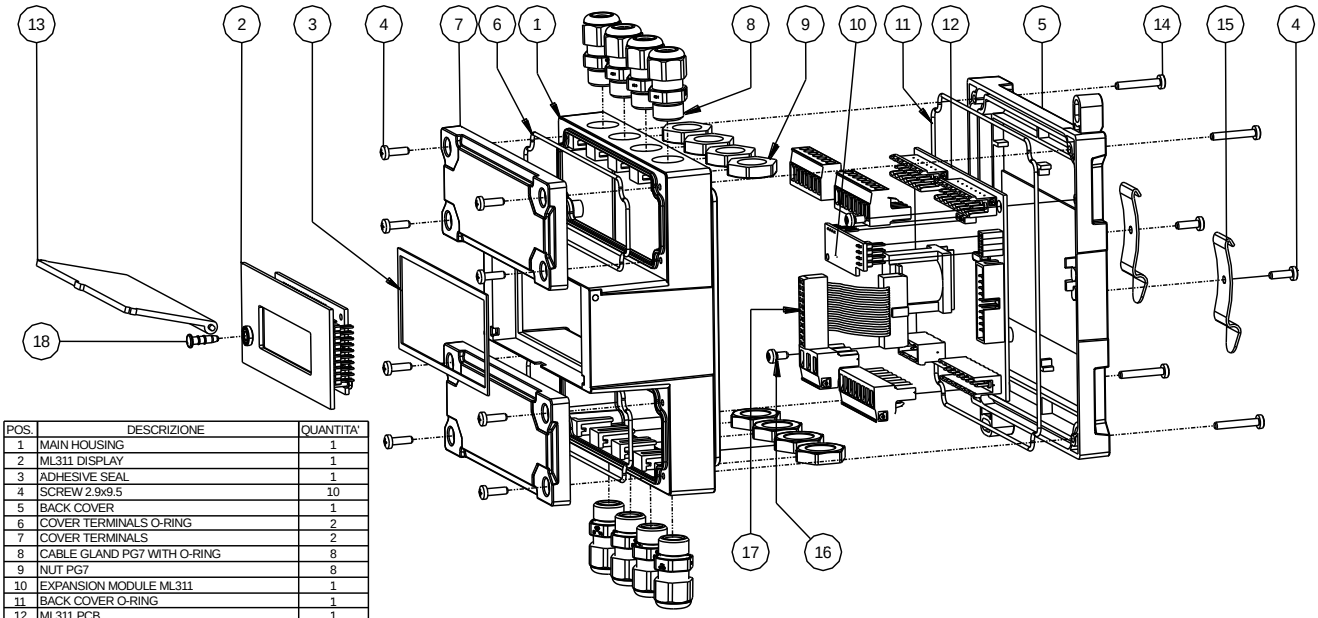
OVERALL FEATURES	
Maximum Thermal Power	❑ **P_s = 99999 GW**
Hot/Cold Switching	❑ **Automatic through assignment of the +/- sign (possibility of congruence control from remote input)**
Measure Units Available	❑ **kW/MJ**
Installation	❑ **Any orientation - DIN rail**
Altitude	❑ **From -200m to 4000m (from -656 to 13120 feet)**
Environmental Temperature	❑ **+5... +55°C (+41...+131°F)**
Temperature Range(Measure)	❑ **-15... +200 (+5...+392°F)** ❑ **-15... +150 (+5...+302°F) for MID instrument**
Protection Rate	❑ **IP65**

STANDARD FEATURES	
Housing Material	❑ **PC/ABS self-extinguishing**
Power Supply/Power Consumption	❑ **15-45V⎓ (6W); 15-45V~ – 45-66Hz (12 VA)**
Pulses Outputs	❑ **N° 2 output 1250Hz, 100mA, 40Vdc**
Available Protocols	❑ **ETP**
Digital Input	❑ **N° 1 multifunction (reset totalizer, cooling /heating)**
Analog Input For Flow Meter	❑ **N°1 4..20mA range for measure fluid flow rate**
Pulses Inputs	❑ **N° 3 inputs (frequency max. 1kHz, min. 0.003 Hz):** ▪ **Vector Fluid volume** ▪ **Cold water volume** ▪ **Hot water volume**
Inputs For Sensor Temperature	❑ **N° 2 (one for the delivery and one for the return)**
Digital Outputs	❑ **N° 2 programmable for alarms or pulses for energy/volume**
Programming Plug In	❑ **Protected plug in for the connection to PC**
Galvanic Isolation	❑ **All the inputs/outputs are galvanically isolated from power supply up to 500 V**
Diagnostic Function	❑ **Yes**
CE Certification	❑ **Yes**

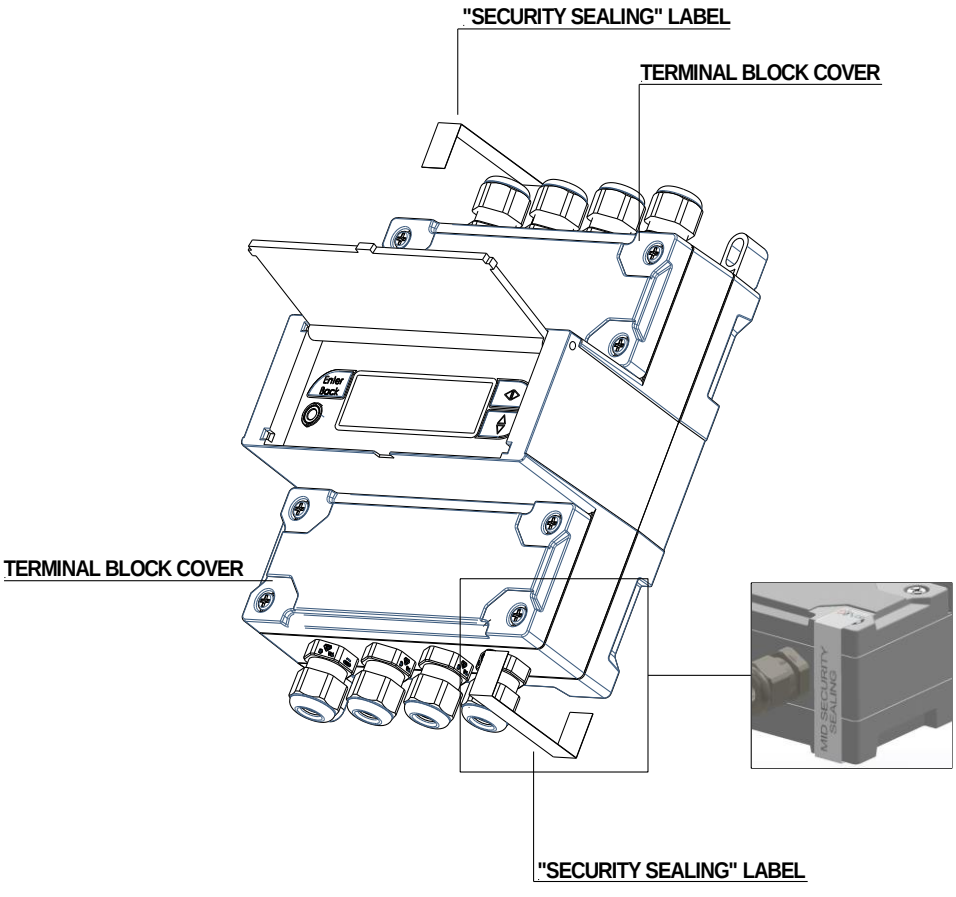
OPTIONAL FEATURES *(CHECK FOR MORE DETAILS 'HOW TO ORDER' ON LAST PAGE)*	
LCD Display	❑ **Graphic display 122 x 32 pixels back light; characters height 6,8 mm** ❑ **3 membrane keys**
Current Output	❑ **N° 1 0/4...20mA selectable alternatively for flow, energy, temperature T1, T2 or delta T**
Temperature Sensor	❑ **Thermal probes PT 100/PT500/PT1000 (2/3/4 wires)**
Communication Port	❑ **RS 485/MBus**
Available Protocols	❑ **Modbus over RS485/N2/BACnet over RS485/Mbus**
Data Storage	❑ **F-RAM: permanent data storage in power failure case**
MID Certification	❑ **MI-004**

MEASUREMENT	
Temperature Measuring Range	❑ ϑ_{min} **-15 °C (+5°F),** ϑ_{max} **200°C (392°F)**
Delta Temperature ($\Delta\vartheta$)	❑ $\Delta\vartheta_{min}$ **2 °C (35.6°F),** $\Delta\vartheta_{max}$ **150 °C (392°F)** ❑ $\Delta\vartheta_{min}$ **0,1 °C (32.18°F)** $\Delta\vartheta_{max}$ **200 °C (392°F) – for instruments without MID certificate**
Measurement Accuracy	❑ **System: ± 0.20 % (0.18 +** $\Delta\vartheta_{min}/\Delta\vartheta$**)**

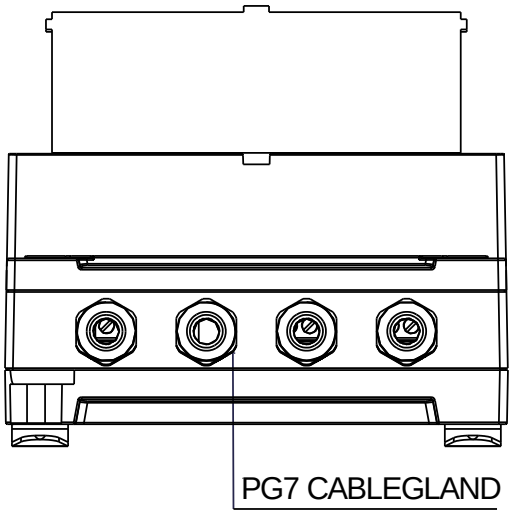
EXPLODED LAYOUT

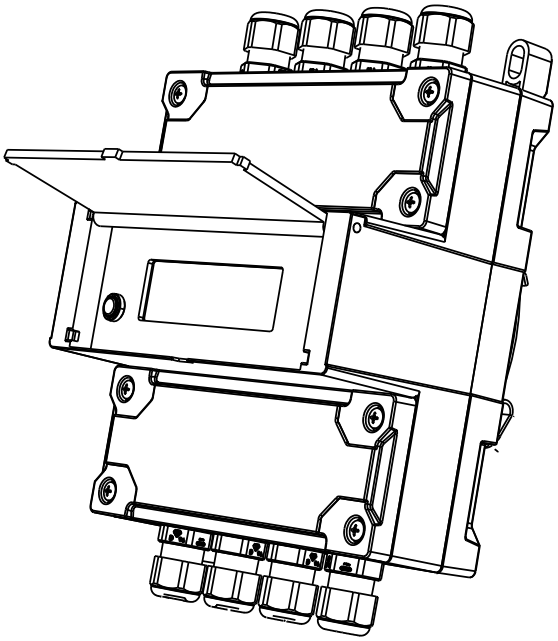


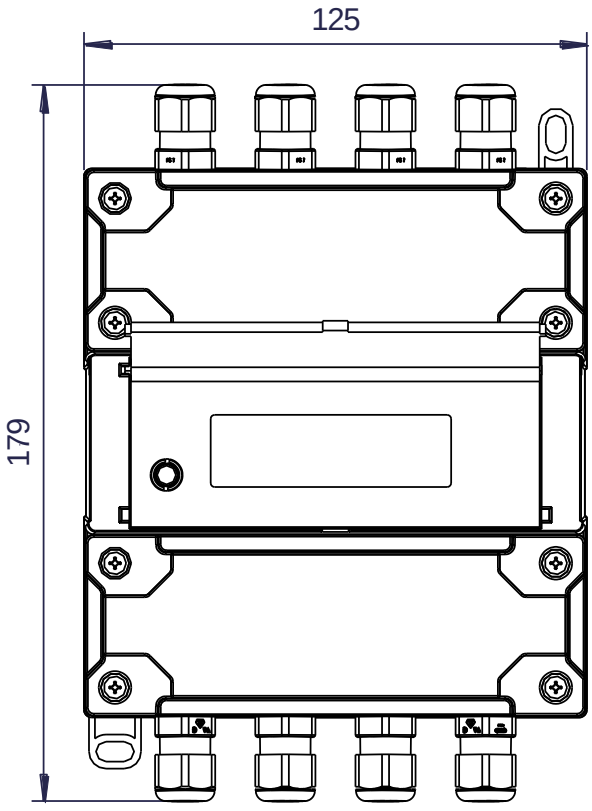
POS.	DESCRIZIONE	QUANTITA'
1	MAIN HOUSING	1
2	ML311 DISPLAY	1
3	ADHESIVE SEAL	1
4	SCREW 2.9x9.5	10
5	BACK COVER	1
6	COVER TERMINALS O-RING	2
7	COVER TERMINALS	2
8	CABLE GLAND PG7 WITH O-RING	8
9	NUT PG7	8
10	EXPANSION MODULE ML311	1
11	BACK COVER O-RING	1
12	ML311 PCB	1
13	PROTECTION GLASS	1
14	SCREW 2.9x19	4
15	DIN RAIL BRACKETS	2
16	SCREW 2.9x6	2
17	20 POLES FLAT CABLE	1
18	DUST PROTECTION CAP JACK 3.5	1

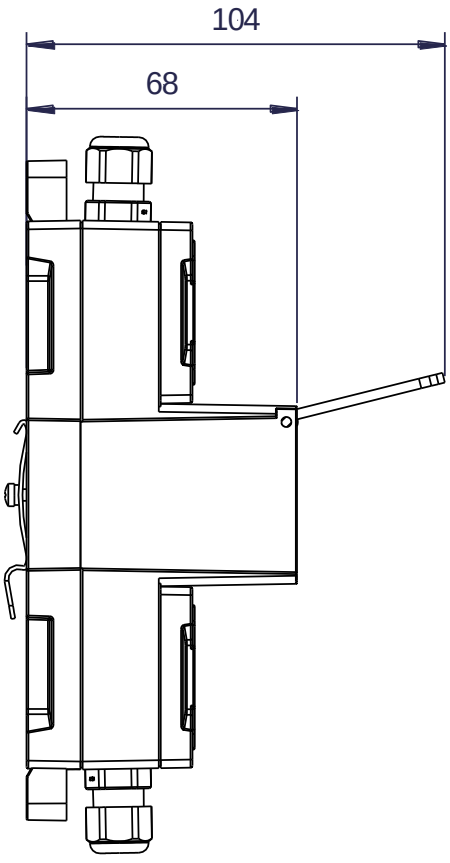


OVERALL DIMENSIONS

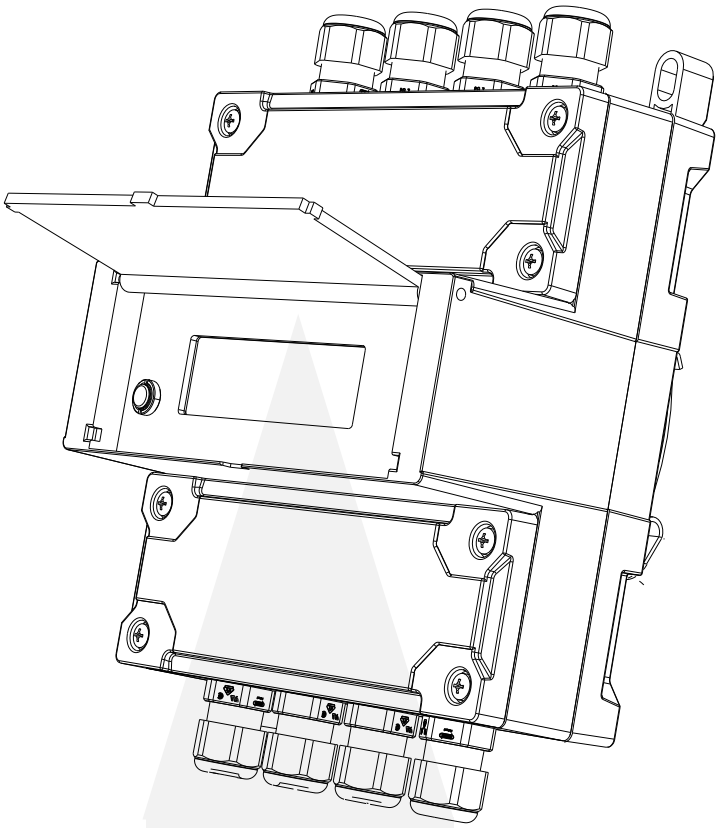






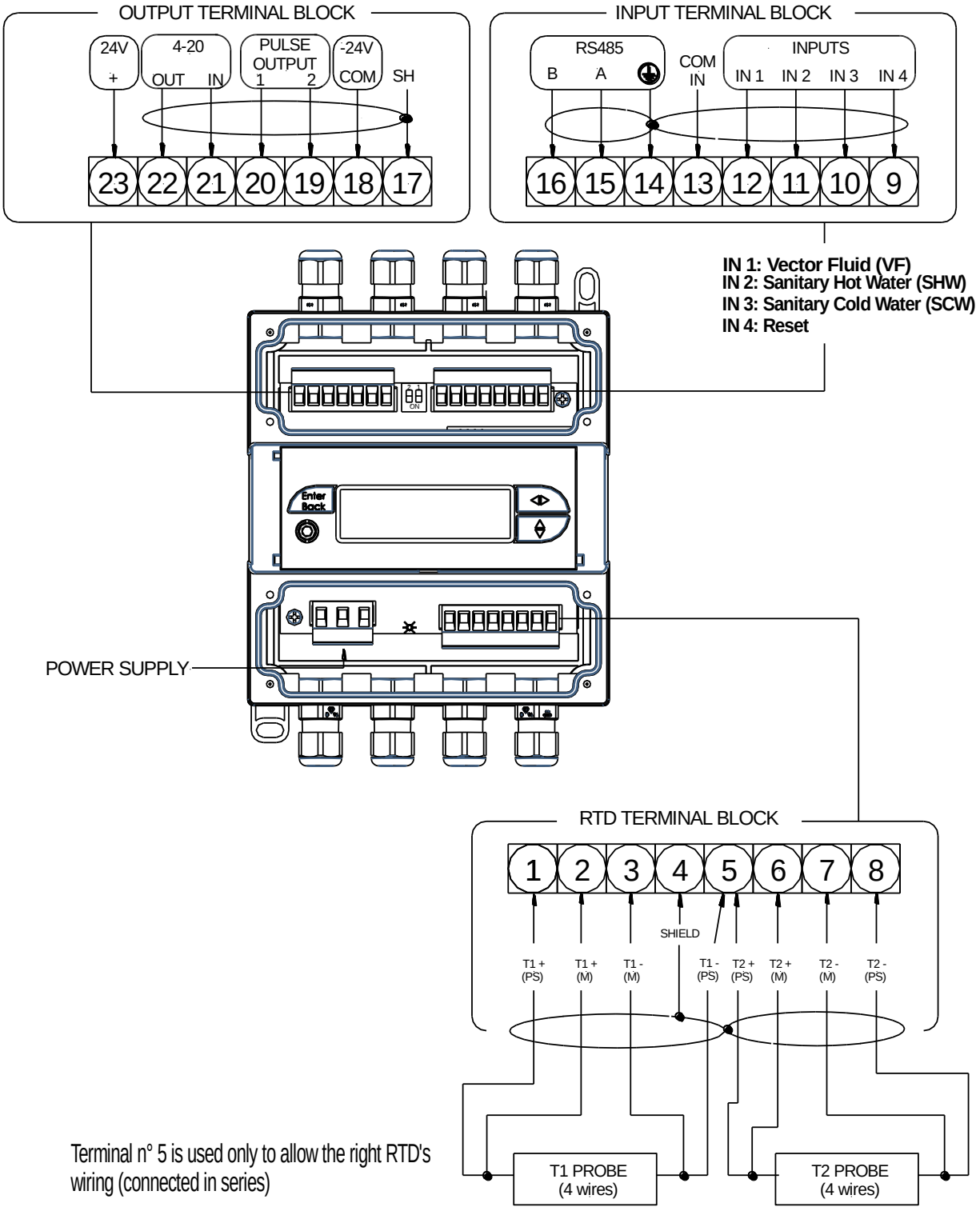


VISUALIZATION PAGES



Different visualization possibilities by simply pressing of a key

ELECTRICAL CONNECTIONS

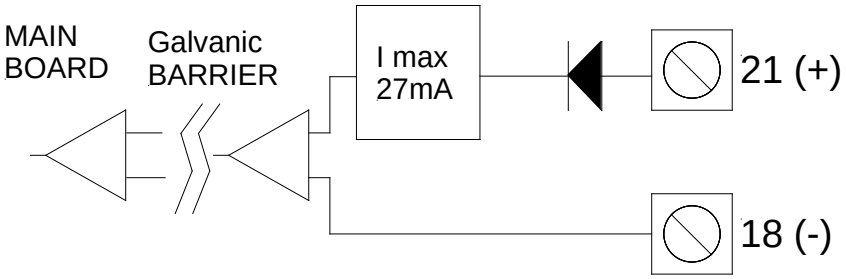


Terminal n° 5 is used only to allow the right RTD's wiring (connected in series)

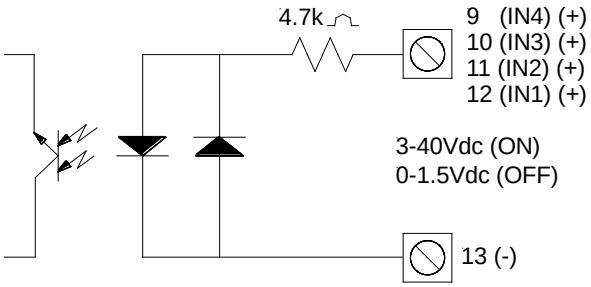
To connect 2 wire probe:
T1: connect the probe to terminal block 2 and 3, bridge on 1-2 and 3-5
T2: connect the probe to terminal block 6 and 7, bridge on 5-6 and 7-8

INPUTS/OUTPUTS

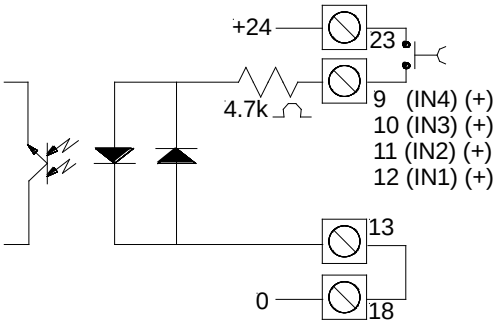
4-20mA INPUT



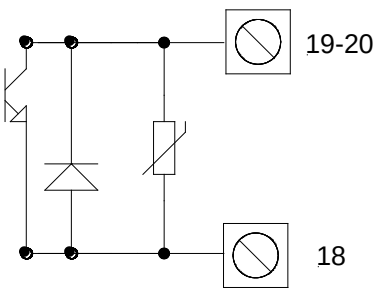
DIGITAL INPUT EXTERNALLY POWERED



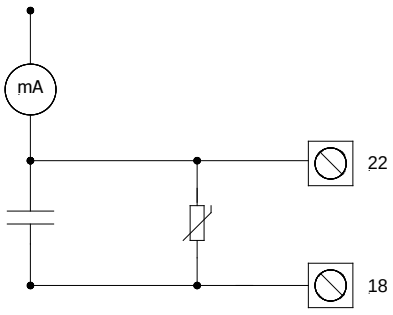
DIGITAL INPUT INTERNALLY POWERED



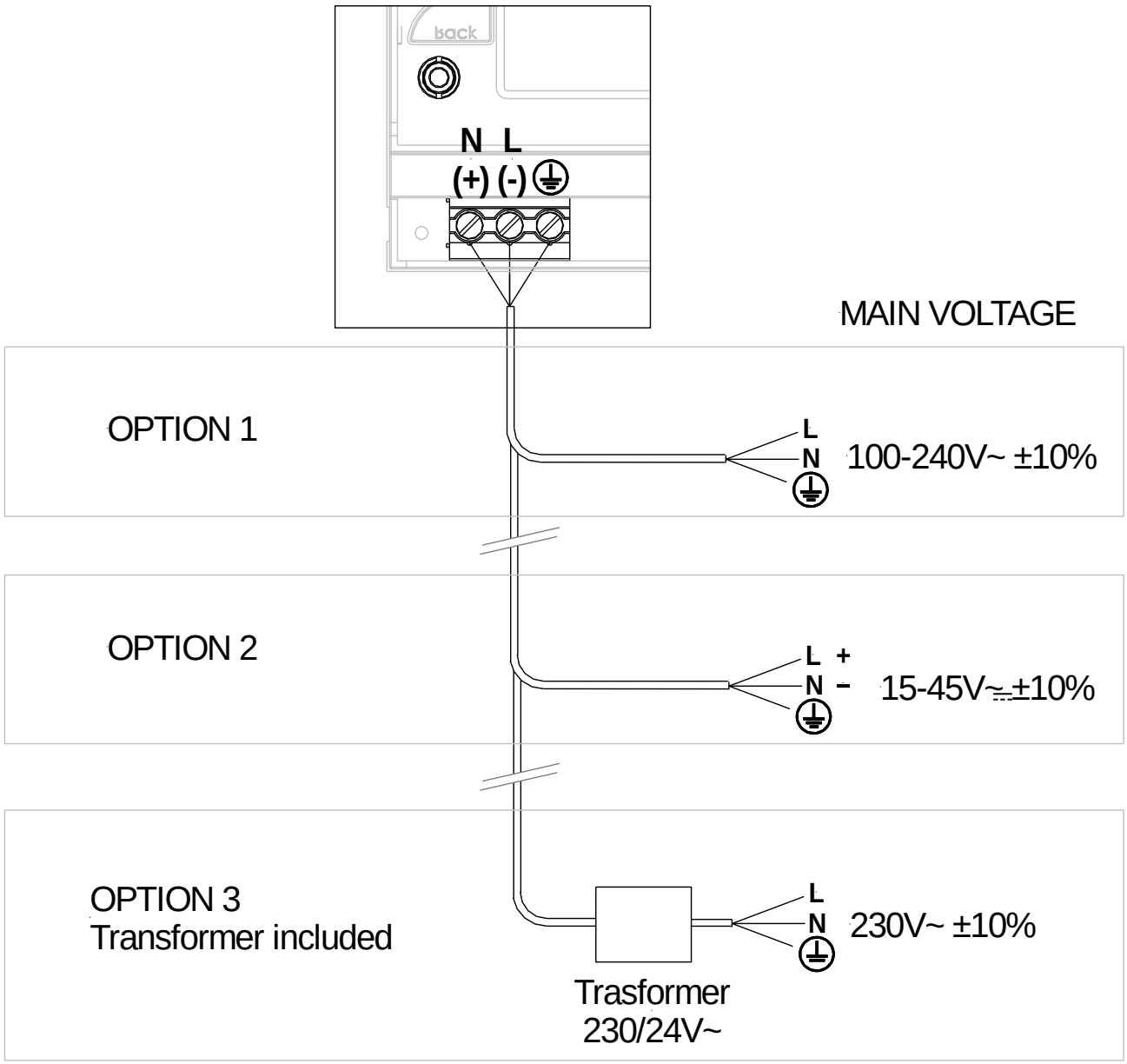
ON/OFF 1250Hz OUTPUT



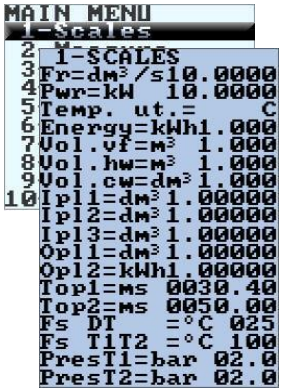
4-20mA OUTPUT



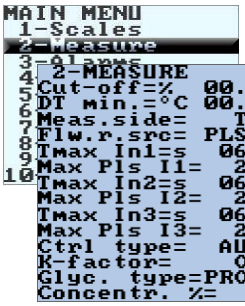
POWER SUPPLY



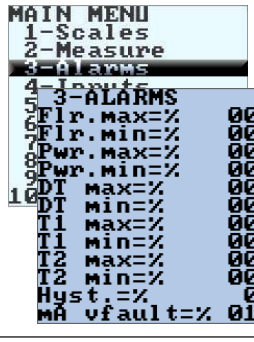
FUNCTIONS



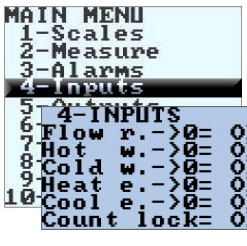
1.1* Flow rate full scale value
1.2* Thermal power full scale value
1.3 Temperature measure unit
1.4* Energy totalizers measure unit value
1.5* Vector fluid volume totalizers measure unit value
1.6* Hot water volume totalizers measure unit value
1.7* Cold water volume totalizers measure unit value
1.8* Input 1 pulse value (VF)
1.9* Input 2 pulse value (SHW)
1.10* Input 3 pulse value (SCW)
1.11*Output 1 pulse value (Vector Fluid)
1.12*Output 2 pulse value (Energy)
1.13*Output 1 pulse time (Vector Fluid)
1.14*Output 2 pulse time (Energy)
1.15 Temperature delta T full scale
1.16 Temperature T1 and T2 full scale
1.17*Pressure value measured at T1 point
1.18*Pressure value measured at T2 point



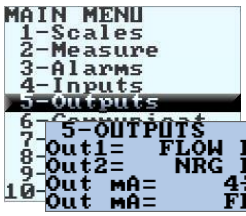
2.1* Measure filter cut-off threshold
2.2* Minimum Delta T
2.3* Flow rate calculation side
2.4* Flow rate source measure
2.5* maximum waiting time between two pulse on input 1 (VF)
2.6* Maximum pulse number on input 1 (VF)
2.7* maximum waiting time between two pulse on input 2 (SHW)
2.8* Maximum pulse number on input 2 (SHW)
2.9* maximum waiting time between two pulse on input 3 (SCW)
2.10*Maximum pulse number on input 3 (SCW)
2.11*Control type
2.12*Enable substance additive
2.13*Glycole type
2.14*Substance concentration



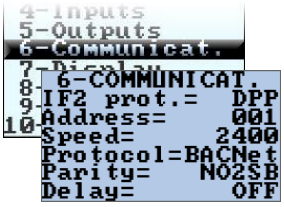
3.1 Positive rate maximum flow alarm. Express in full scale %. Value =0: alarm disabled
3.2 Positive rate minimum flow alarm. Express in full scale %. Value =0: alarm disabled
3.3 Maximum thermal power alarm. Express in full scale %. Value =0: alarm disabled
3.4 Minimum thermal power alarm. Express in full scale %. Value =0: alarm disabled
3.5 Maximum delta temperature alarm. Value =0: alarm disabled
3.6 Minimum delta temperature alarm. Value =0: alarm disabled
3.7 Maximum temperature on temperature point T1 Value =0: alarm disabled
3.8 Minimum temperature on temperature point T1. Value =0: alarm disabled
3.9 Maximum temperature on temperature point T2. Value =0: alarm disabled
3.10 Minimum temperature on temperature point T2. Value =0: alarm disabled
3.11 Hysteresis thresholds alarm
3.12*Output current alarm condition value



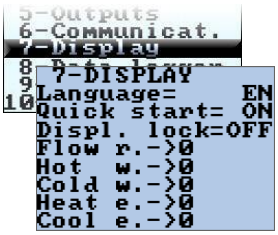
4.1* Flow rate partial volume totalizer enable reset
4.2* Hot water partial volume totalizer enable reset
4.3* Cold water partial volume totalizer enable reset
4.4* Heat energy partial totalizer enable reset
4.5* Cool energy partial totalizer enable reset
4.6* Input totalizers counting lock enable



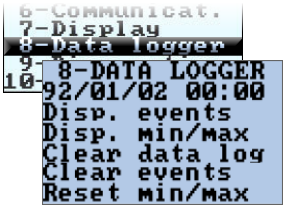
5.1* Output 1 function
5.2* Output 2 function
5.3* Current output scale
5.4* Current output function



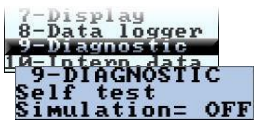
6.1 IF2 protocol type
6.2 Device address (range 0 - 255)
6.3 RS485 speed
6.4 RS485 protocol type
6.5 RS485 parity
6.6 Answer delay



7.1 Choice of the language: EN=English, IT=Italian, FR=French, SP=Spanish, DE=German
7.2 Quick start menu enable
7.3 Display lock enable
7.4 Flow rate volume totalizer partial reset
7.5 Hot water volume totalizer partial reset
7.6 Cold water volume totalizer partial reset
7.7 Heat energy partial totalizer reset
7.8 Cool energy partial totalizer reset



8.1* Date and time set
8.2* Stored events read
8.3 Minimum and maximum visualization of: flow rate, thermal power, DT, T1, T2
8.5 Reset all events stored: hourly, daily, monthly the datalogger
8.5 Reset all events stored
8.4 Reset all minimum and maximum values



9.1* Converter autotest
9.2* Measure simulation enable

HOW TO ORDER

CODE EXAMPLE		*Certification*
0	0	WITHOUT MID-004
	M	CE M CERTIFICATION: MID-004
Display		
A	A	Blind version (without display)
	B	4 LINES X 15 CHARACTER DISPLAY
Housing material / Protection rate		
	0	PPO Housing sealable
	1	PPO Housing sealable - ET version
2	2	PC/ABS housing sealable
	3	PC/ABS housing sealable - ET version
FLOW RATE SOURCE (THERMAL FLUID)		
A	A	Pulses
	B	4/20 mA
Power supply		
1	1	Power supply :100 ... 240 V AC 45/66 Hz
	2	Power supply : 15-45 VAC/DC
	3	Power supply : 15-45 VAC/DC + TRANSFORMER 230/24 VAC
Analogue output		
A	A	without analog out
	B	Analogue output 0/4...20/22 mA
Serial Interface		
0	0	None
	2	RS485 Serial Interface
	3	Modbus protocol over RS 485 interface
	4	N2 protocol over RS 485 interface
	5	Mbus protocol
	6	BACnet protocol over RS 485 interface
Additional module		
A	A	None
	B	PT 100
	C	PT 500
	D	PT 1000
Special Features		
0	0	NONE

ML311-0A2A1A0A0 (Example of order code)

Due to the constant technical development and improvements of its products, the manufacturer reserves the right to make changes and / or modify the information contained in this document without notice. Information contained herein is not binding.

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