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SYSTEM DESCRIPTION

ML 311 is an heat meter provided to a consumer through a thermal fluid (typically water). The energy value is calculated according to the standard EN1434.

The quantities to be measured are the flow rate of thermal fluid and two circuit temperatures, measured respectively on inlet and outlet of the fluid itself.

FLOW MEASUREMENT

It can be done through the acquisition of two different measures:

- Analog: the thermal energy meter can acquire the 4-20mA signal from a flow meter
- Factorized pulses (frequency): flow measure by the factorized pulses counting, arriving to the thermal energy meter by a dedicated digital input.

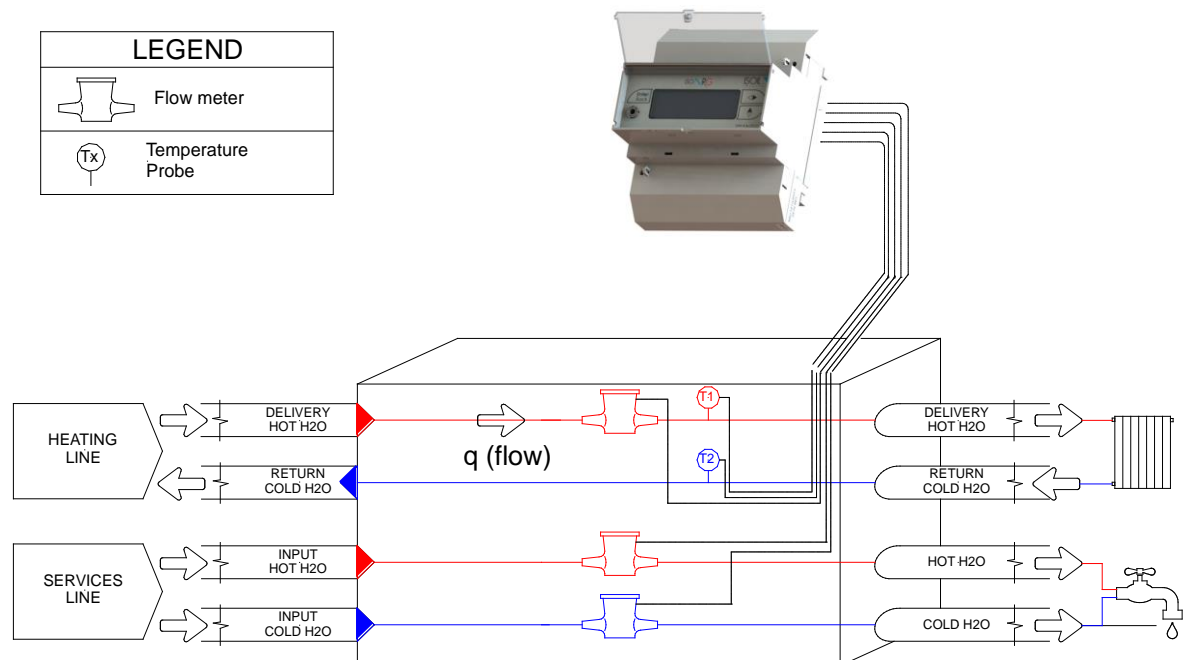
TEMPERATURE MEASUREMENT

The instrument measures the temperature by RTD (PT type), in a configuration of 4-wires connections; the PT values connected, selectable by software, are:

- PT100
- PT500
- PT1000

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

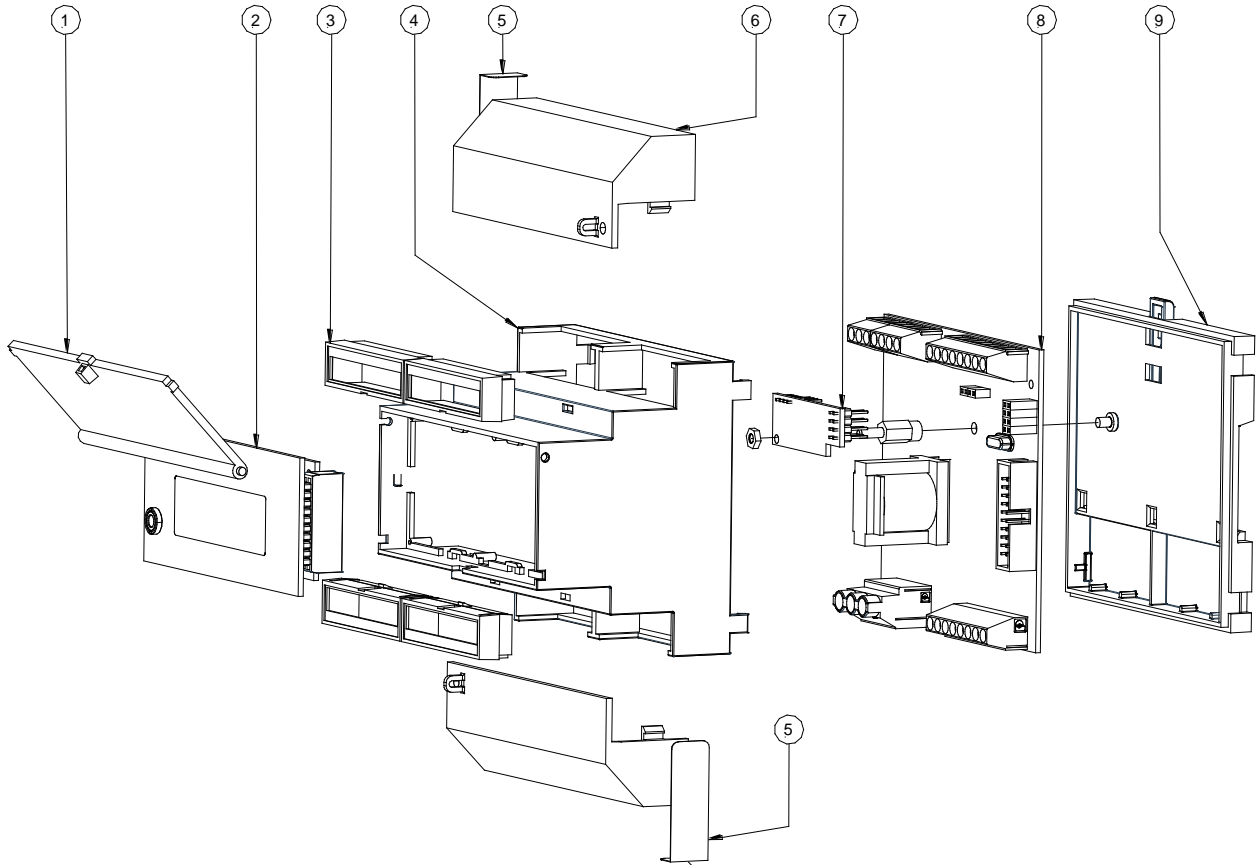
<i>OVERALL FEATURES</i>	
Maximum thermal power	<input type="checkbox"/> $P_s = 99999 \text{ GW}$
Hot/cold switching	<input type="checkbox"/> Automatic through assignment of the +/- sign (possibility of congruence control from remote input)
Measure units available	<input type="checkbox"/> kW/MJ
Installation	<input type="checkbox"/> Any orientation - DIN rail
Altitude	<input type="checkbox"/> From -200m to 4000m (from -656 to 13120 feet)
Environmental temperature	<input type="checkbox"/> +5... +55°C (+41...+131°F)
Temperature Range(Measure)	<input type="checkbox"/> -15... +200 (+5...+392°F) <input type="checkbox"/> -15... +150 (+5...+302°F) for MID instrument
Protection Rate	<input type="checkbox"/> IP65

<i>STANDARD FEATURES</i>	
Housing material	<input type="checkbox"/> PPO self-extinguishing
Power supply/power consumption	<input type="checkbox"/> 15-45V $\overline{\text{---}}$ (6W); 15-45V \sim – 45-66Hz (8 VA)
Pulses/frequency (out)	<input type="checkbox"/> N° 2 output 1250Hz, 100mA, 40Vdc
Available protocols	<input type="checkbox"/> ETP
Digital input	<input type="checkbox"/> N° 1 multifunction (reset totalizer, cooling /heating)
Analog input for flow meter	<input type="checkbox"/> N°1 4..20mA range for measure fluid flow rate
Frequency inputs for flow meter (q max function of the value for pulse)	<input type="checkbox"/> N° 3 inputs (frequency max. 1kHz, min. 0.003 Hz): <ul style="list-style-type: none"> ▪ Fluid volume ▪ Cold water volume ▪ Hot water volume
Inputs for sensor temperature	<input type="checkbox"/> N° 2 (one for the delivery and one for the return)
Digital outputs	<input type="checkbox"/> N° 2 programmable for alarms or pulses for energy/volume
Programming Plug In	<input type="checkbox"/> Protected plug in for the connection to PC
Galvanic Isolation	<input type="checkbox"/> All the inputs/outputs are galvanically isolated from power supply up to 500 V
Diagnostic Function	<input type="checkbox"/> Yes
CE Certification	<input type="checkbox"/> Yes

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

MEASUREMENT	
Temperature measuring range	<input type="checkbox"/> $\vartheta_{min} -15\text{ °C} (+5\text{ °F})$, $\vartheta_{max} 150\text{ °C} (302\text{ °F})$
Delta temperature ($\Delta\vartheta$)	<input type="checkbox"/> $\Delta\vartheta_{min} 2\text{ °C} (35.6\text{ °F})$, $\Delta\vartheta_{max} 150\text{ °C} (302\text{ °F})$ <input type="checkbox"/> $\Delta\vartheta_{min} 0,1\text{ °C} (32.18\text{ °F})$ – for instruments without MID certificate
Measurement accuracy	<input type="checkbox"/> System: $\pm 0.20\%$ ($0.18 + \Delta\vartheta_{min}/\Delta\vartheta$)

EXPLODED LAYOUT



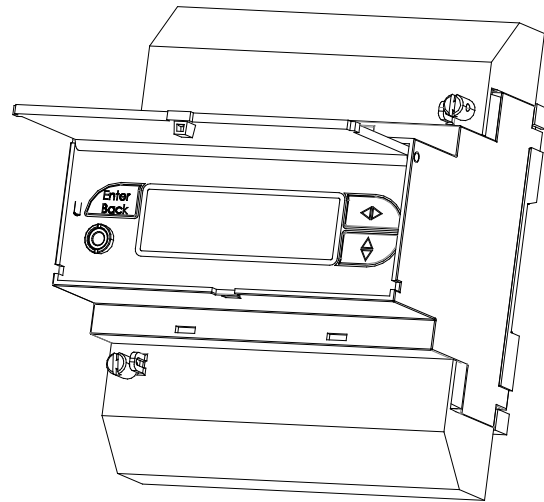
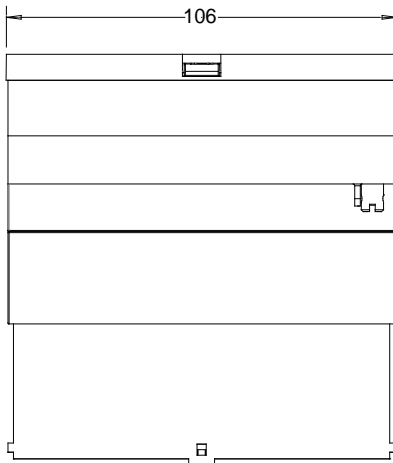
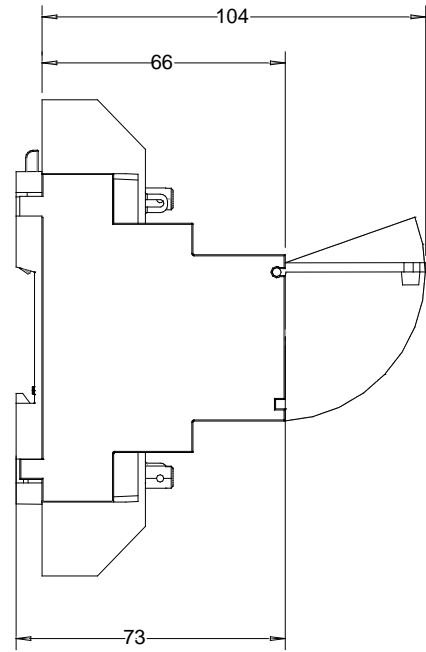
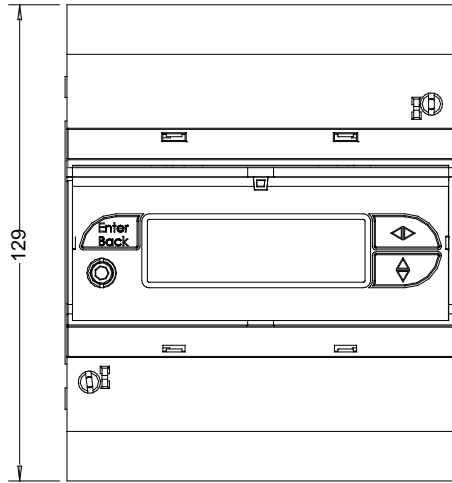
ITEM N.	DESCRIPTION	QUANTITY
1	COVER-DISPLAY GLASS	1
2	KEYBOARD/DISPLAY	1
3	TERMINALS COVER	4
4	HOUSING	1
5	MID SECURITY SEALING LABEL	2
6	TERMINAL BLOCKS COVER	2
7	EXPANSION MODULE	1
8	PCB BOARD	1
9	REAR CLOSURE	1



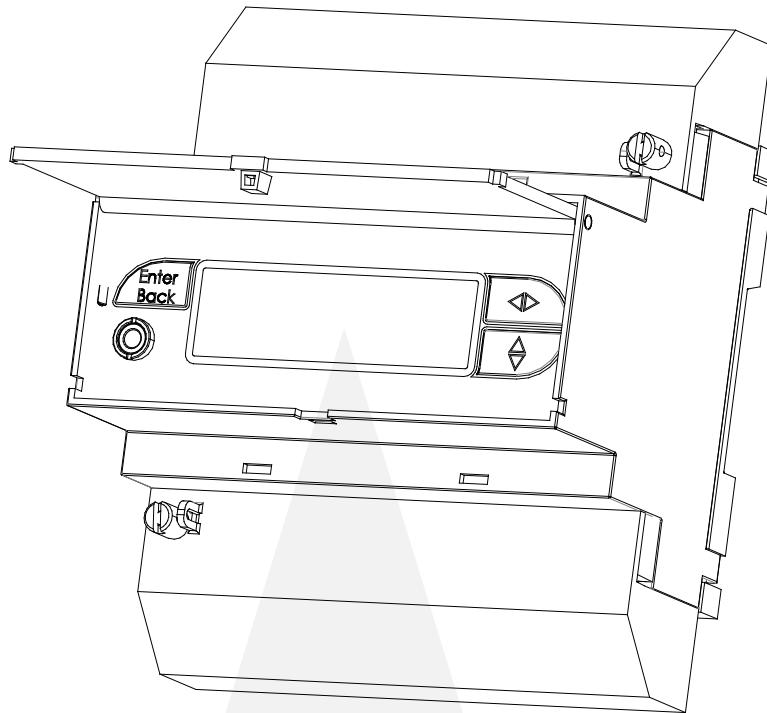
MID SECURITY
SEALING



OVERALL DIMENSIONS



VISUALIZATION PAGES



```
TEMPERATURES
T1 °C 0.18
T2 °C 21.89
T3 °C 21.91
```



```
VECTOR FLUID
M³ .000
M³ .000
```



```
HOT WATER
M³ .000
M³ .000
```



```
COLD WATER
M³ .000
M³ .000
```



```
POWER & FLOW
kW 0.0000
m³/s 0.0000
```



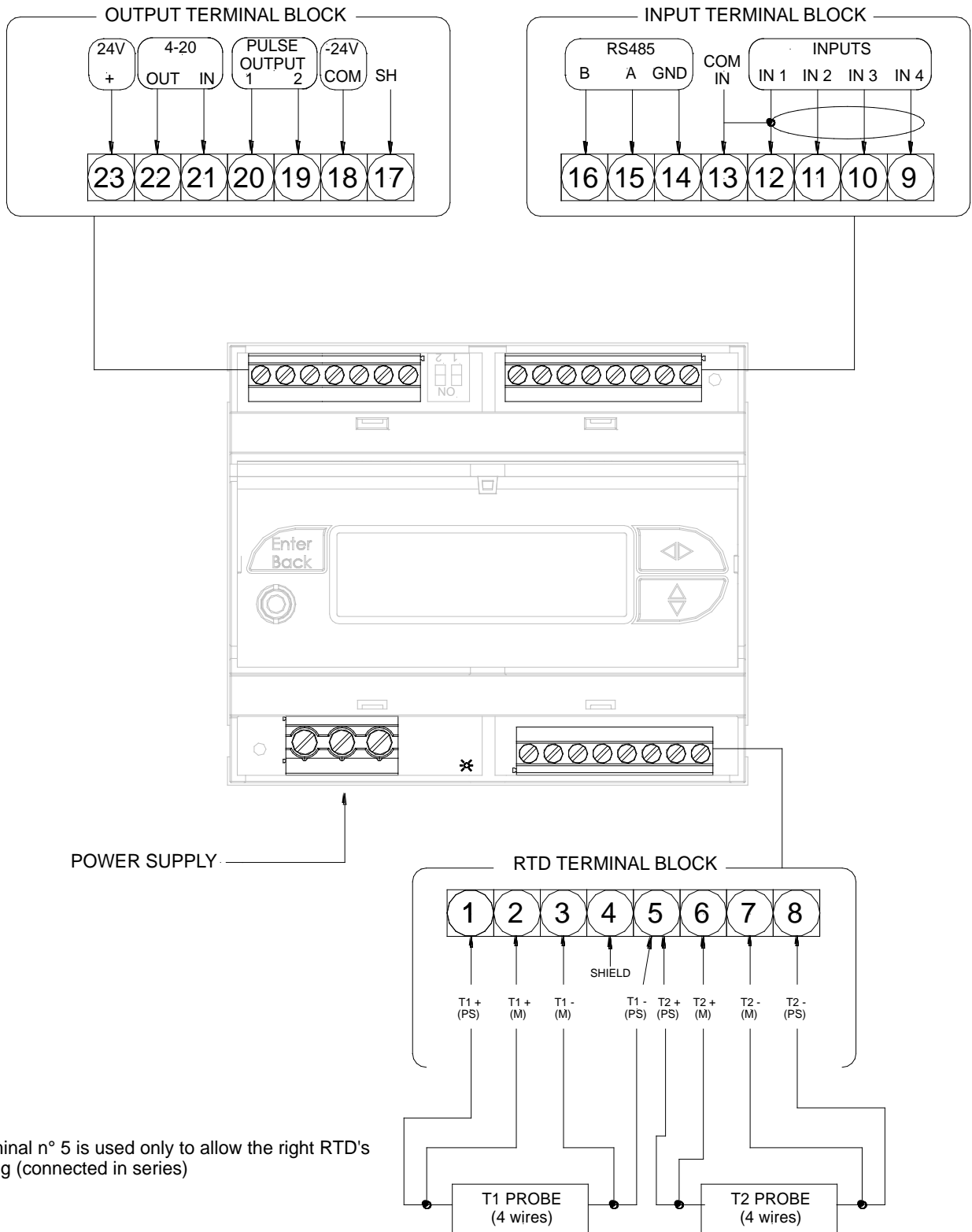
```
HEATING ENERGY
kWh .000
kWh .000
```



```
COOLING ENERGY
kWh .000
kWh .000
```

Different visualization possibilities simply by simply pressing a key

ELECTRICAL CONNECTIONS

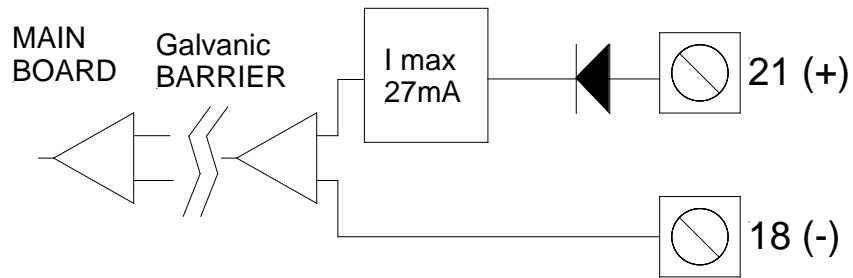


Terminal n° 5 is used only to allow the right RTD's wiring (connected in series)

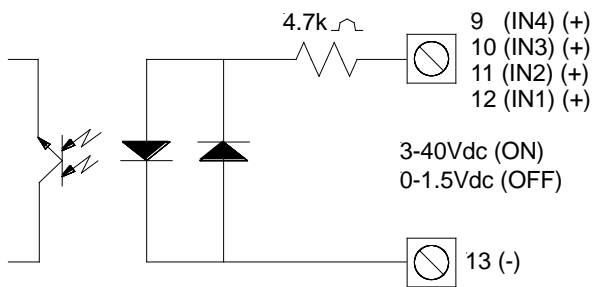
To connect 2 wire probe:
 T1: connect the probe to terminal block 2 and 3, bridge on 1-2 and 3-5
 T2: connect the probe to terminal block 6 and 7, bridge on 5-6 and 7-8

INPUTS/OUTPUTS

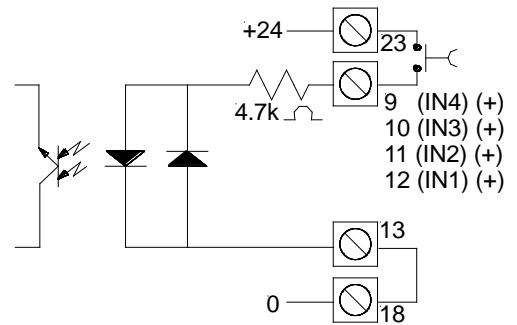
4-20mA INPUT



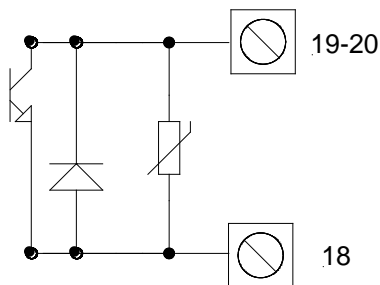
DIGITAL INPUT WITH EXTERNAL POWER SUPPLY



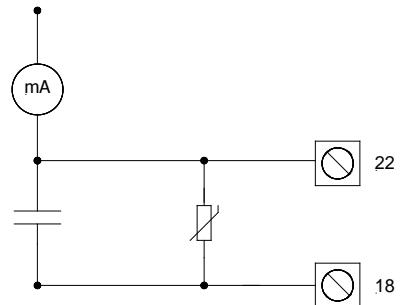
DIGITAL INPUT WITH INTERNAL POWER SUPPLY



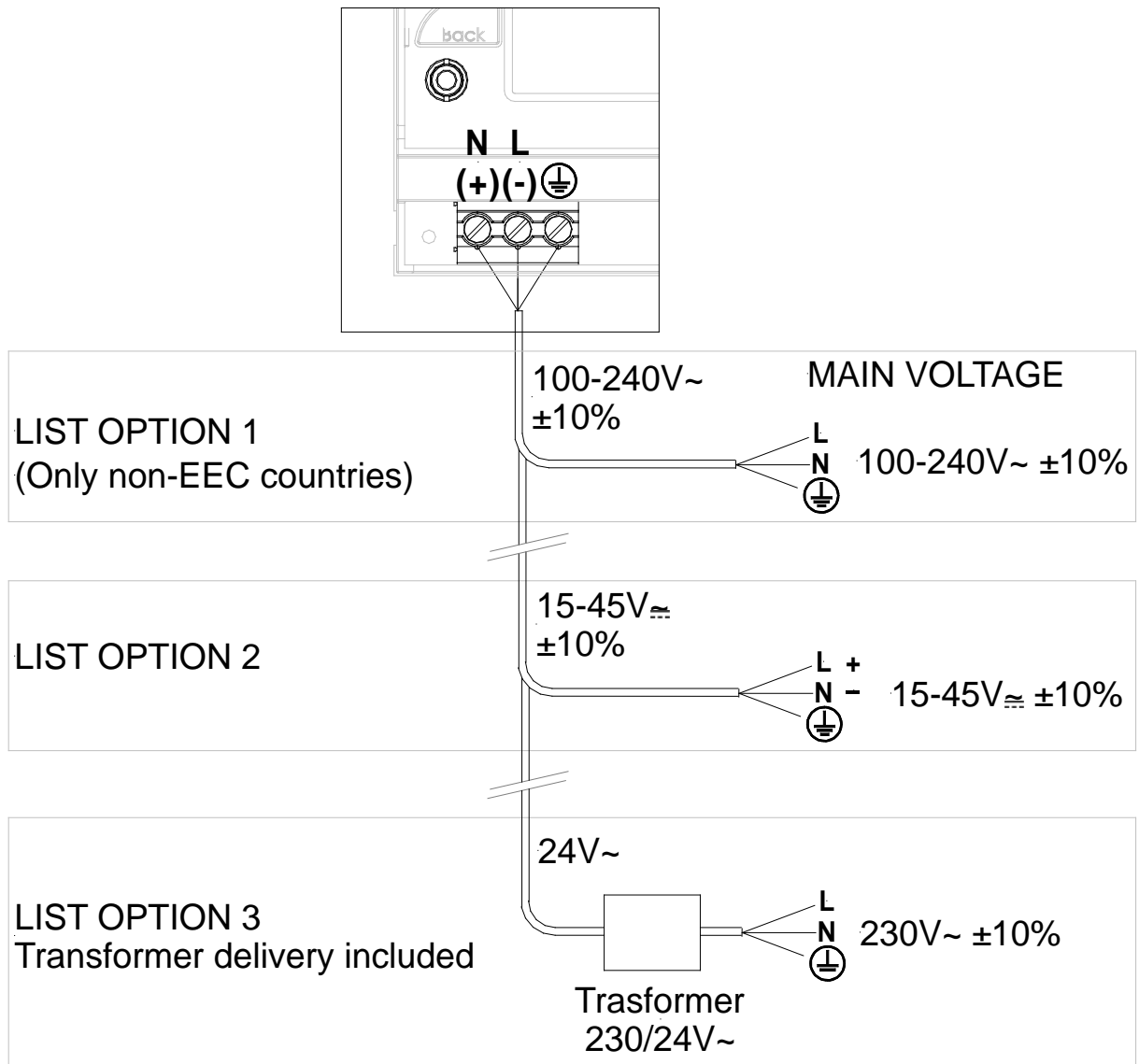
ON/OFF 1250Hz OUTPUT



4-20mA OUTPUT



POWER SUPPLY



FUNCTIONS

```

MAIN MENU
1-Scales
1-SCALES
Fr=dm³/s10.0000
Pwr=kW 10.0000
Volume= m³1.000
Energy=kWh1.000
Ipl1= m³0.00100
Ipl2= m³0.00100
Ipl3= m³0.00100
Opl1= m³0.00100
Opl2=kWh1.00000
Iop1=ms 0050.00
Iop2=ms 0050.00
Fs.DT = °C 025
Fs.T1T2 = °C 100
PresT1=bar 02.0
PresT2=bar 02.0
  
```

- 1.1* Flow rate full scale scale value
- 1.2* Thermal power full scale value
- 1.3* Volume totalizers measure unit value
- 1.4* Energy totalizers measure unit value
- 1.5* Input 1 pulse value
- 1.6* Input 2 pulse value
- 1.7* Input 3 pulse value
- 1.8* Output 1 pulse value
- 1.9* Output 2 pulse value
- 1.10*Output 1 pulse time
- 1.11*Output 2 pulse time
- 1.12 Temperature delta T full scale
- 1.13 Temperature T1 and T2 full scale
- 1.14*Pressure value measured at T1 point
- 1.15*Pressure value measured at T2 point

```

MAIN MENU
1-Scales
2-Measure
2-MEASURE
Cut-off=X 25.0
DT min.= °C 00.0
Meas. side= I2
Flw.r. src= PLS1
Imax In1=s 060
Imax In2=s 060
Imax In3=s 060
Ctrl type= AUT
  
```

- 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 period on input 1
- 2.6* Maximum period on input 2
- 2.7* Maximum period on input 3
- 2.8* Control type

```

MAIN MENU
1-Scales
2-Measure
3-ALARMS
3-ALARMS
Flr. max=X 000
Flr. min=X 000
Pwr. max=X 000
Pwr. min=X 000
DT max=X 000
DT min=X 000
T1 max=X 000
T1 min=X 000
T2 max=X 000
T2 min=X 000
Hyst.=X 00
mA vfaul=X 010
  
```

- 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

```

MAIN MENU
1-Scales
2-Measure
3-ALARMS
4-INPUTS
4-INPUTS
Flow r.->0= OFF
Hot w.->0= OFF
Cold w.->0= OFF
Heat e.->0= OFF
Cool e.->0= OFF
Count lock= OFF
  
```

- 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

```

MAIN MENU
1-Scales
2-Measure
3- Alarms
4-Inputs
5-Outputs
5-OUTPUTS
Out1= FLOW PLS
Out2= POWER PLS
Out mA= 0:22
Out mA= FLOW

```

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

```

5-Inputs
5-Outputs
6-Communicat.
6-COMMUNICAT.
IF2 prot.= DPP
Address= 255
Speed= 9600
Protocol=N2open
Parity= NO,1SB
Delay= OFF

```

- 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

```

6-Outputs
6-Communicat.
7-Display
7-DISPLAY
Language= EN
Quick start=OFF
Disp. lock= OFF
Flow r.->0
Hot w.->0
Cold w.->0
Heat e.->0
Cool e.->0

```

- 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

```

6-Communicat.
7-Display
8-Data logger
8-DATA LOGGER
10/11/13 13:12
Disp.min/max
Display events
Reset min/max
Clear events

```

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

```

7-Display
8-Data logger
9-Diagnostic
9-DIAGNOSTIC
Self test
Simulation= OFF

```

- 9.1* Converter autotest
- 9.2* Measure simulation enable

```

8-Data logger
9-Diagnostic
10-Intern. data
10-INTERN. DATA
keycode= 0000
Load fact.data
DT null
DT null res

```

- 10.1 L2 access code
- 10.2 Load factory data
- 10.3* Delta T null command
- 10.4 Delta T null reset, annul the previous function

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 CHARAPHTER DISPLAY
Housing material / Protection rate		
0	0	PPO Housing sealable
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 (Only for countries out of CEE) (NO MI-004)
	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 (NO MI-004)
	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



ML311-0A0A1A0A0 (Example of order code)

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