THE MOST ACCURATE BATTERY POWERED SYSTEM

# ISOMAG™

## The friendly magmeter

# FLOWIZ™

(ML 255)

**Electromagnetic converter powered by batteries and universal power supply. Optional built in modules for GPRS transmission and pressure measurement.**

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

ISOIL INDUSTRIA
*The solutions that count*

# INDEX

# TECHNICAL DATA

| *OVERALL FEATURES* | |
|---|---|
| **Suitable For** | ❑ **ISOMAG sensors** |
| **Minimum conductivity** | ❑ **5 µS/cm** |
| **Version** | ❑ **Compact**<br>❑ **Separate** |
| **Power consumption** | ❑ **0.08W With Batteries; Average 0.2W/Max 3 W With Universal Power** |
| **Altitude** | ❑ **-200 m up to 2000 m** |
| **Ambient Temperature** | ❑ **-20... +60°C / -4... +140 °F** |
| **Humidity Range** | ❑ **0÷100% (IP 67)** |
| **Accuracy** | ❑ **See Table** |

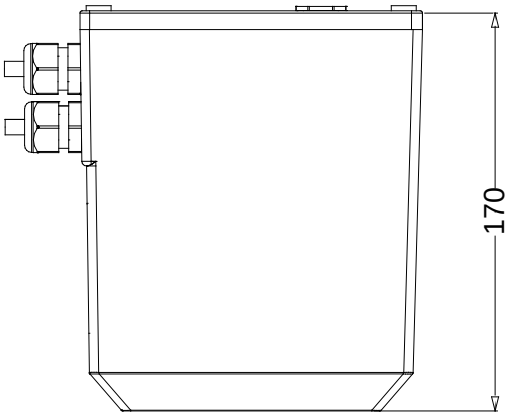
| *STANDARD FEATURES* | |
|---|---|
| **Housing materials** | ❑ **Painted Aluminium die casting** |
| **Protection Rate** | ❑ **IP 67** |
| **Power Supply** | ❑ **Mixed System Batteries and main Power Supply; n° 1 Size D Not Rechargeable Lithium Battery +Universal Power Supply :12-60V⎓ / 100÷240V~** |
| **Data Logger** | ❑ **MicroSD Memory Card 2 GBytes** |
| **Data storage** | ❑ **F-Ram** |
| **Protocols** | ❑ **ETP** |
| **Galvanic Isolation** | ❑ **All the inputs/outputs are galvanically isolated from power supply up to 500 V** |
| **Programming Plug In** | ❑ **Protected plug in for the connection to PC (IF2X interface)** |
| **Bi-Directional** | ❑ **Yes** |
| **Dual Range** | ❑ **Yes** |
| **Diagnostic Funct.** | ❑ **Yes** |
| **Empty Pipe Detect.** | ❑ **Yes** |
| **CE Certification** | ❑ **Yes** |

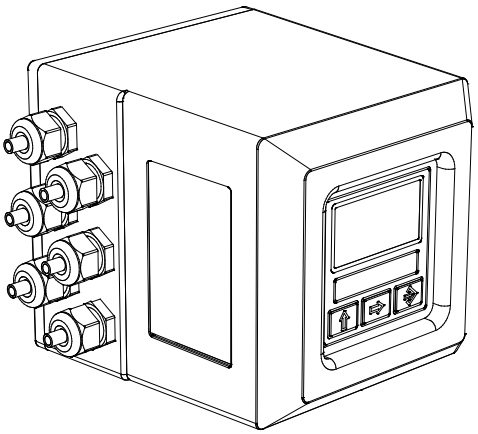
| *OPTIONAL FEATURES (CHECK FOR MORE DETAILS 'HOW TO ORDER' ON LAST PAGE)* | |
|---|---|
| **Housing materials** | ❑ **AISI304** |
| **Protection Rate** | ❑ **IP 68** |
| **Sensor-Converter Connection Cable** | ❑ **CABLE C015 - C016 (for separate version)** |
| **Wires connections** | ❑ **IP 68 Connectors** |
| **LCD Display** | ❑ **Graphic display WSTM 128x64 pixels, 3 membrane keys** |
| **Power Supply** | ❑ **Up to 6 1 Size D Not Rechargeable Lithium Battery** |
| **Pulses/Alarm Outputs** | ❑ **N°2 , 50 Hz, 100mA, 40 Vdc** |
| **Digital Input** | ❑ **N°1 On/Off Input** |
| **Additional Modules** | ❑ **GSM /GPRS (SMS/CSD System)** |
| **Communication port** | ❑ **RS232 ( DPP/HTP protocols)** |
| **Additional measure** | ❑ **UP to 2 Pressure Sensors**<br>❑ **ONE Temperature Sensor**<br>**Note: for temperature measure Two Wires PT500 must be used ; check for possible combinations of the above.** |

| *ACCURACY* | |
|---|---|
| **Measurements tolerance** | ❑ **Flow rate (volume) = ±0,1% v.l.** |
| **Accuracy (whole system converter+sensor)** | ❑ **See table** |

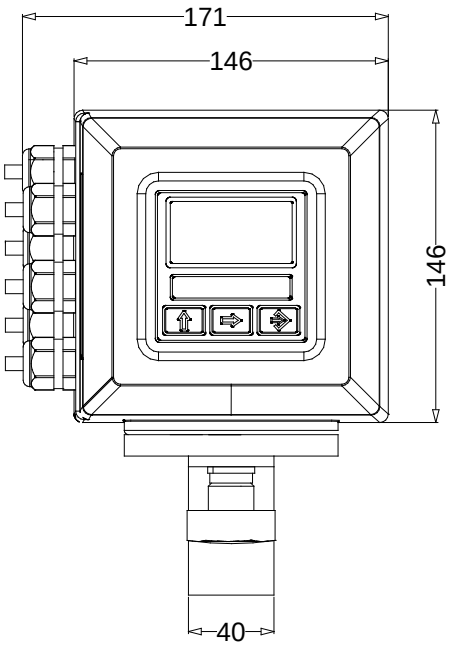
# OVERALL DIMENSIONS

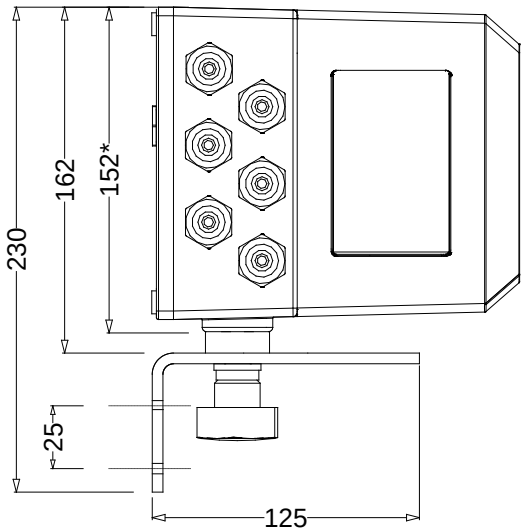
## COMPACT VERSION



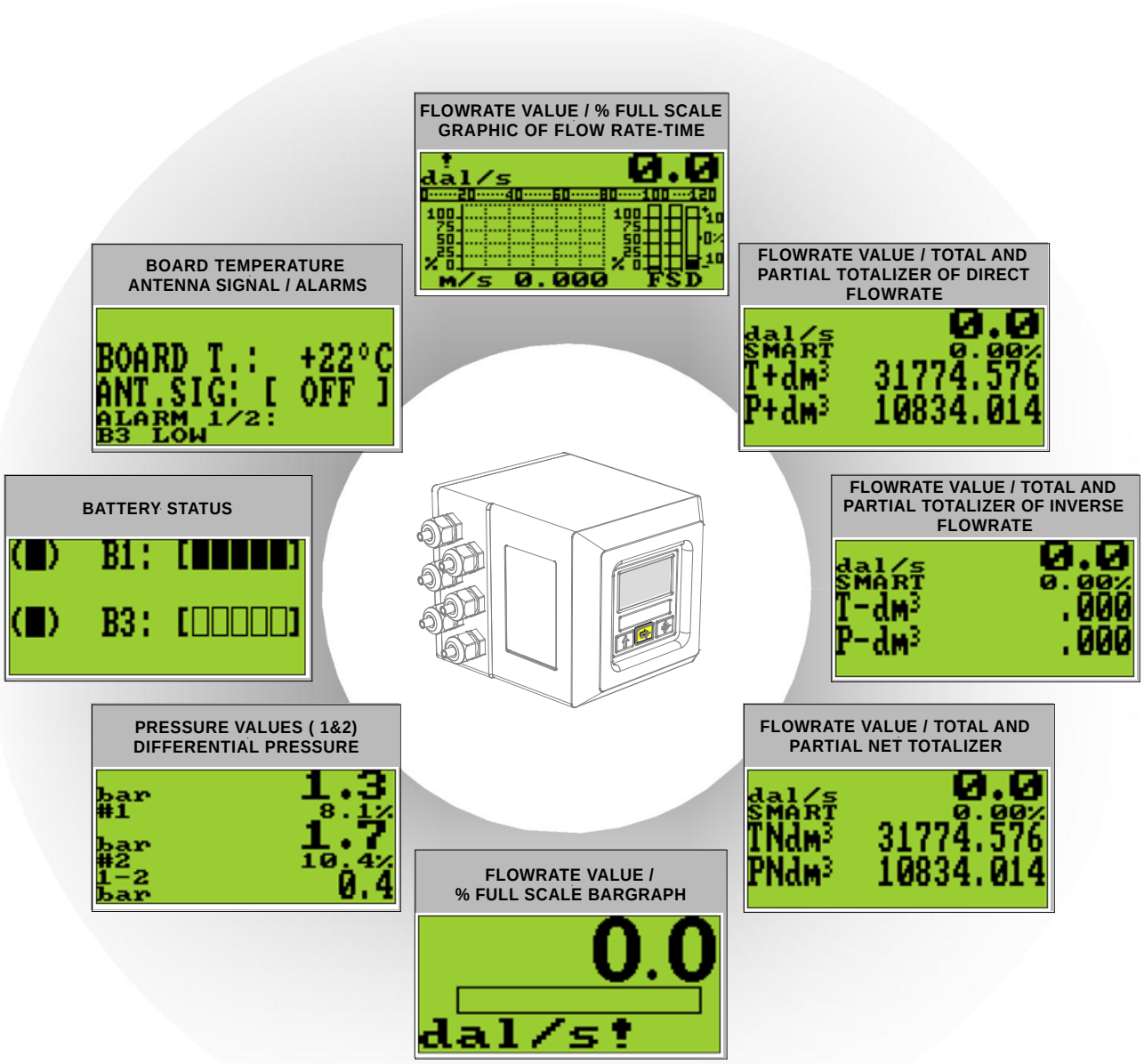
## SEPARATE VERSION



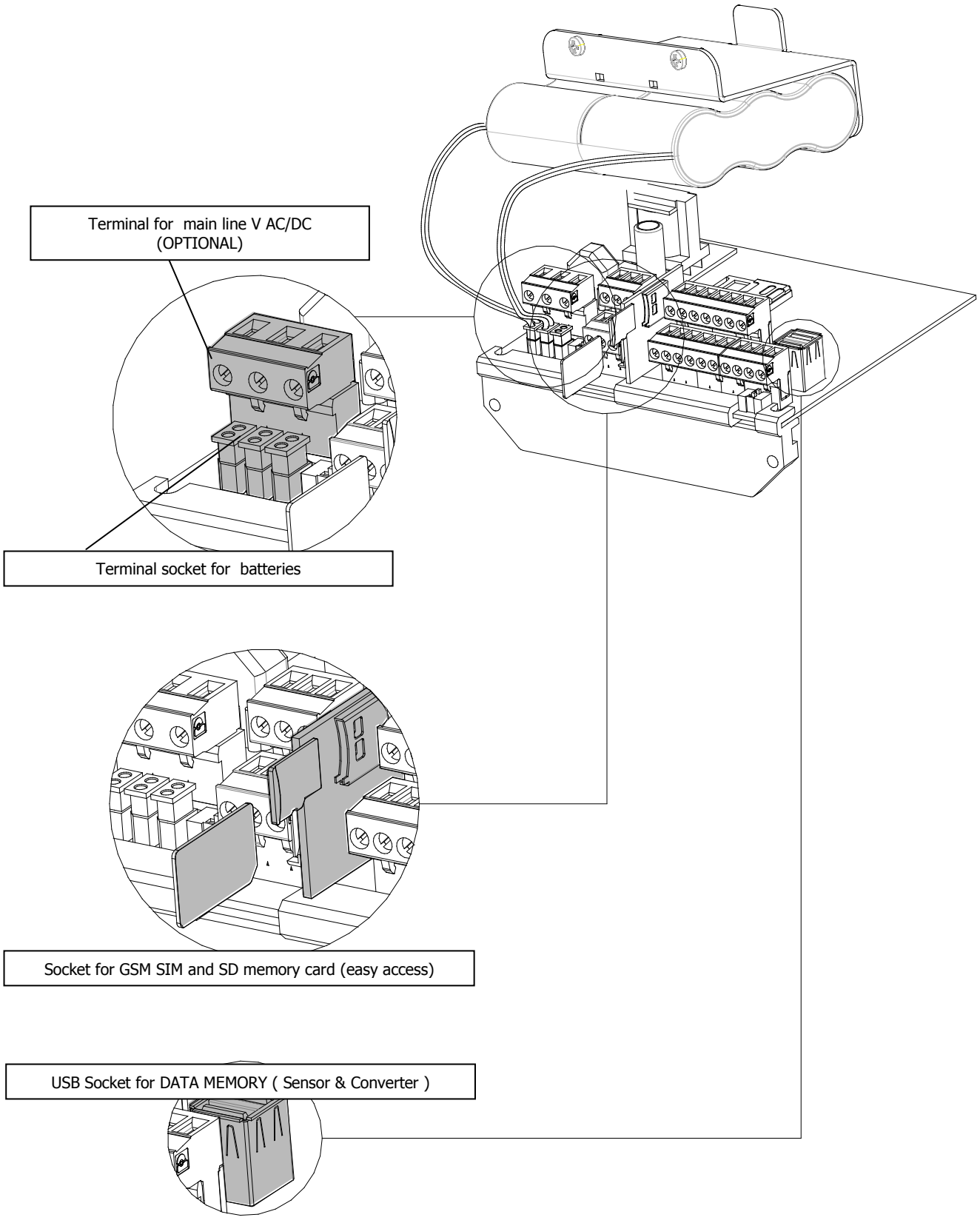



# VISUALIZATION PAGES

**Different visualization possibilities by simply pressing a key**

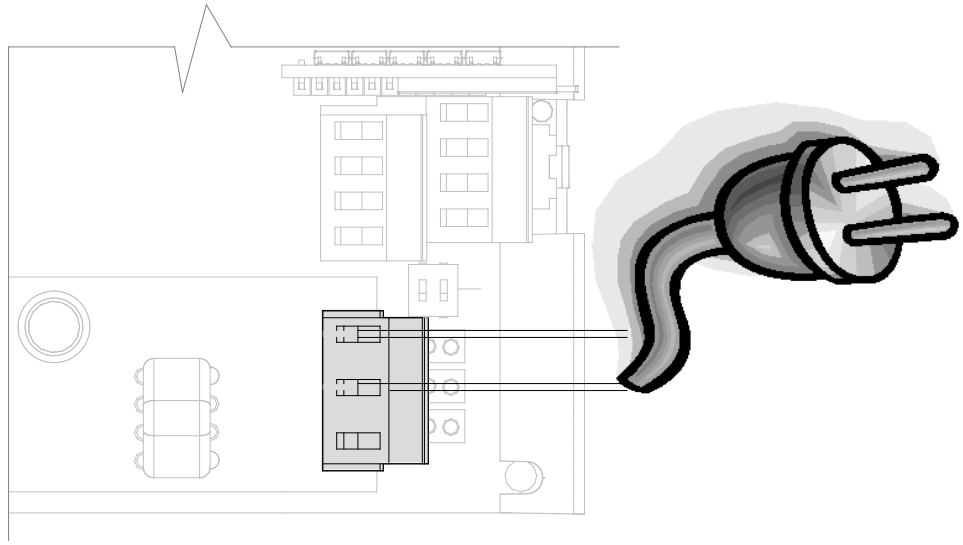


# PCB LAYOUT


Terminal for main line V AC/DC
(OPTIONAL)
Terminal socket for batteries
Socket for GSM SIM and SD memory card (easy access)
USB Socket for DATA MEMORY ( Sensor & Converter )

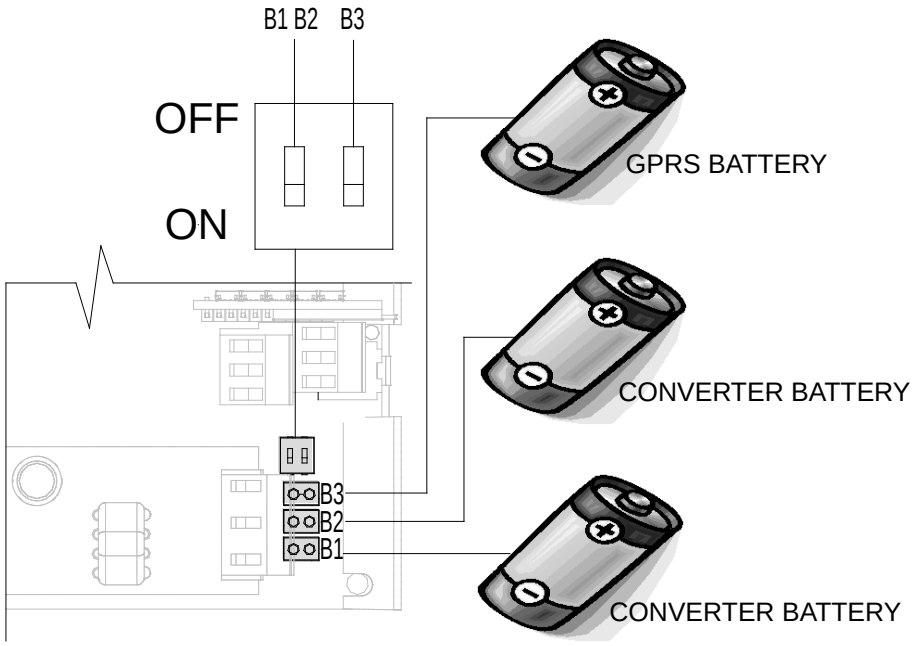
# POWER SUPPLY

## BY MAIN VOLTAGE



Auto detection of the power source: when main power supply is ON, batteries are excluded and the system always works at the maximum sampling rate (continuous sampling)

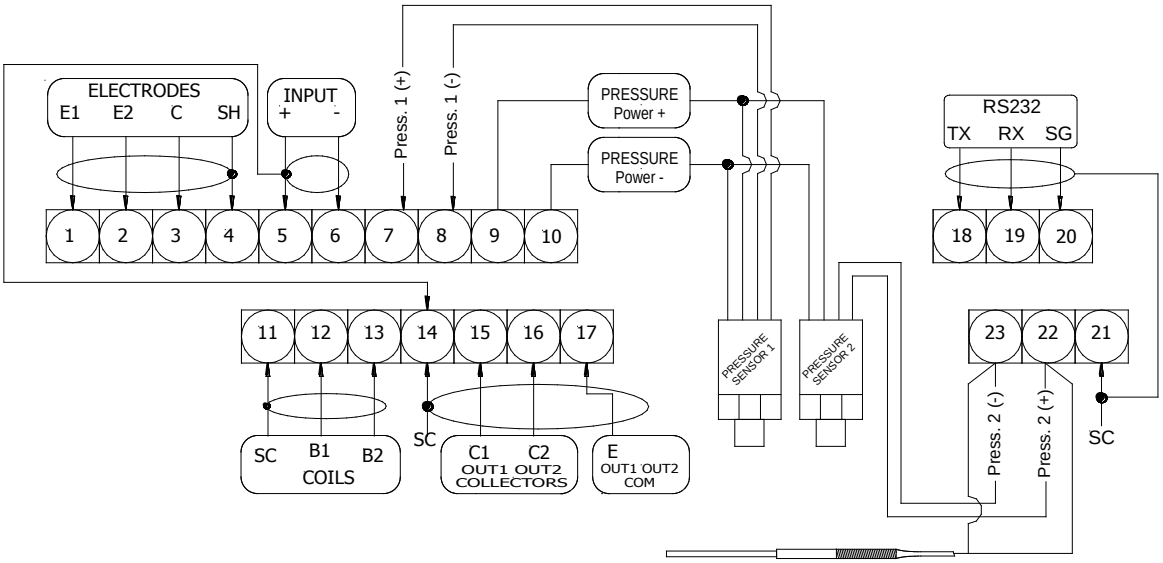
## BY BATTERIES




Note : Lithium batteries are subject to special transportation regulations according to "Regulation of Dangeroug Goods, UN3090 and UN 3091". Special documentation is required to observe there regulations.

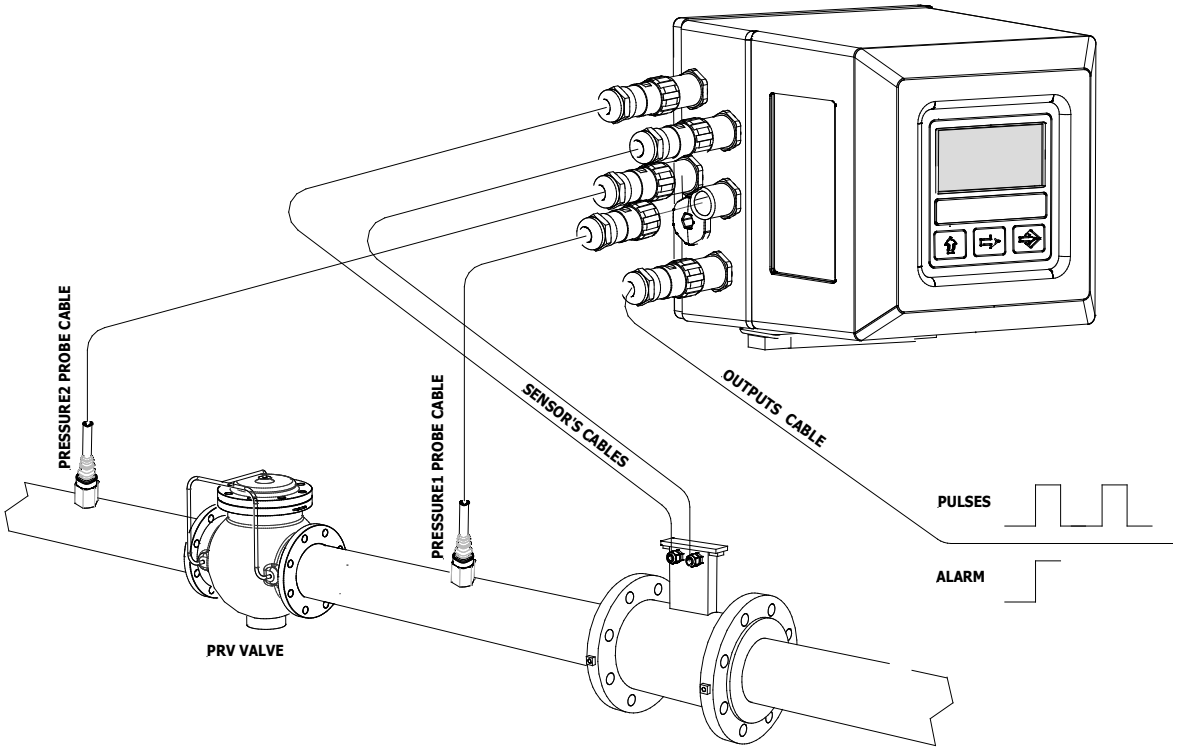
# ELECTRICAL CONNECTIONS

## TERMINAL BLOCK: COMPACT/SEPARATE VERSION



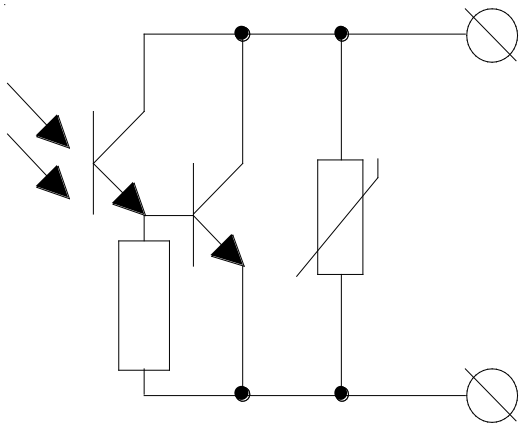

Temperature probe ( INSTEAD OF PRESSURE 2)

## IP 68 VERSION : CONNECTION WITH IP 68 CONNECTORS



# DIGITAL INPUT / OUTPUT

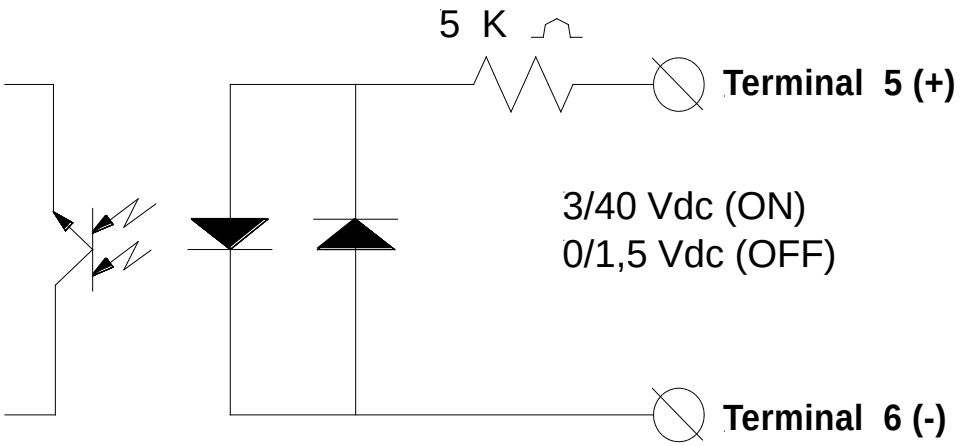
## ON/OFF OUTPUT



**Terminal 15 / 16**
(Out1) (Out2)

**Terminal 17**
COM
OUT 1-2

## ON/OFF INPUT

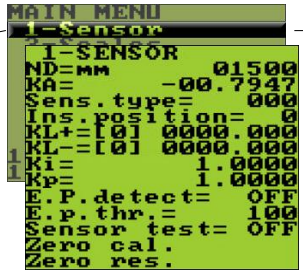



**Terminal 5 (+)**

3/40 Vdc (ON)
0/1,5 Vdc (OFF)

**Terminal 6 (-)**

# FUNCTION'S LIST



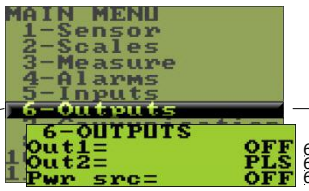

1.1 Insert ND of sensor (0-3000)
1.2 Calibration data of sensor visualized on sensor's label
1.3 Sensors model: Enter the first two characters of the serial number of the sensor
1.4 Position for insertion sensors: 0=1/8DN, 1=1/2DN, 2=7/8DN
1.5 Factory parameter
1.6 Automatic setting according to ID ( insertion meter only )
1.7 Automatic setting according to ID ( insertion meter only )
1.8 Enables the empty pipe detection function
1.9 Value of empty pipe sensibility detection
1.10 Perfom a SENSOR TEST ( sensor MUST be connected)
1.11*Enables the automatic zero calibration system
1.12 Reset the preceding value


2.1* Full scale value measure set for flowrate
2.2* Pulse value on channel 1
2.3* Duration of the pulse generated on channel 1
2.4* Pulse value on channel 2
2.5* Duration of the pulse generated on channel 2
2.6 Full scale value set for pressure measure
2.7 Unit of measure of temperature
2.8* Unit of measure and number of decimal totalizes


3.1 Low flow zero threshold: 0-25% of full scale value
3.2* Consumption profiles


4.1 Maximum value alarm set for direct flow rate
4.2 Minimum value alarm set for direct flow rate
4.3 Maximum value alarm set for reverse flow rate
4.4 Minimum value alarm set for reverse flow rate
4.5 Maximum value alarm set for pressure 1
4.6 Minimum value alarm set for pressure 1
4.7 Maximum value alarm set for pressure 2
4.6 Minimum value alarm set for pressure 2
4.7 Maximum value alarm set for differential pressure
4.8 Minimum value alarm set for differential pressure
4.9 Hysteresis threshold set for the minimum and maximum flow rate alarms


5.1* Total direct (positive) flow totalise reset enable
5.2* Partial direct (positive) flow totalise reset enable
5.3* Total reverse (negative) flow totalise reset enable
5.4* Partial reverse (negative) flow totalise reset enable
5.6 Totalise counting lock command
5.7* Autozero calibration external command
5.8 Alarm from external signal (i.e. flooding/intrusion/..)
5.8* Auto- switch on command



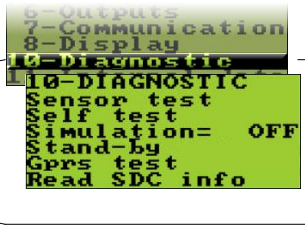

6.1* Output 1
6.5* Output 2
6.6 Power supply of pressure probes


7.1 Choice of the communication protocol for the IF2 device
7.2 Minimum antenna signal strength to send e-mail*
7.3 Choice of how to send data logger*
7.4 Choice of when send data logger*
7.5 Interval of data logger sending if 7.4 is set on "PERIODIC"
7.6 Interval of sending DATA LOGGER*
7.7 Send Process data*
7.8 Send Alarm*
7.8 Check INCOMING SMS*
7.9 Roaming enable*
7.10 Send Data Logger , instant command*
7.11 Send EVENTS , instant command*
7.12 Send config through e-mail immediately*
7.13 Enables clock synchronization with a specified server via the HTTP protocol*
7.14 Check INCOMING E-MAIL*

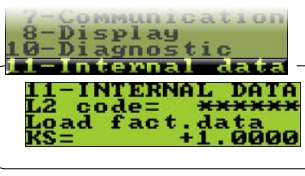
* (Communication function group only) = see wireless specific manual supplied for more details


8.1 Choice of the language: EN= English, IT=Italian, FR= French, SP= Spanish
8.2 Time for switch off display (shown with function 3.7 enabled)
8.3 Visualization of "Quick start menu"
8.4 lock of DISPLAY in ONE SPECIFIC visualization page
8.5* Total direct (positive) flow totalizer reset from keyboard
8.6* Partial direct (positive) flow totalizer reset from keyboard
8.7* Total reverse (negative) flow totalizer reset enable from keyboard
8.8* Partial reverse (negative) flow totalizer reset enable from keyboard


9.1* Date and time set
9.2 Set of Time Zone ( Against GMT -12 to +12 hours)
9.3* Automatic data logger enable
9.4 Data formatted like ML250
9.5* choice of single (off) or double (on) interface
9.6* Interval time 1 for the data logging function
9.7* Interval time 2 for the data logging function
9.8 Interval 2 start loggin time
9.9 Interval 2 stop loggin time
9.10 Enables the sending of direct total totalizer
9.11 Enables the sending of direct partial totalizer
9.12 Enables the sending of reverse total totalizer
9.13 Enables the sending of reverse partial totalizer
9.14 Enables the sending of net total totalizer
9.15 Enables the sending of net partial totalizer
9.16 Enables the sending of flow rate
9.17 Enables the sending of pressure 1
9.18 Enables the sending of pressure 2
9.19 Enables the sending of differential pressure
9.18 Enables the sending of temperature
9.20*Loggin of statistical data
9.21 Enables the sending of measure units ( technical units )
9.22 Enables the sending of measure units ( % )
9.23 Symbol used as separator on CSV files




10.1 Perfrom a sensor test (SENSOR MUST BE CONNECTED)
10.2* Converter auto-test
10.3* Flow rate simulation enabling
10.4* Stand-by function
10.5* Test of GPRS connections
10.6* SD card status/info



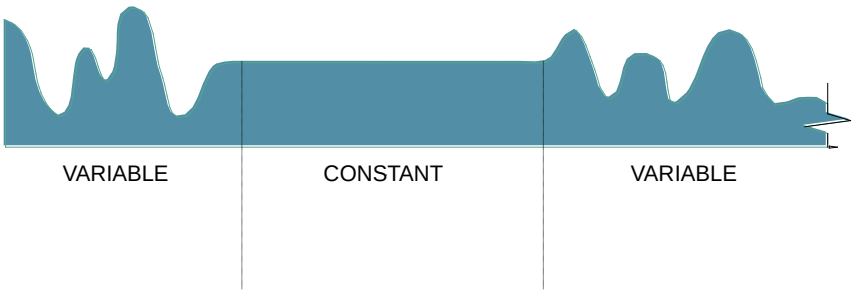

11.1 Level 2 access code enter
11.2 Load factory data pre-set
11.3 Ks Coefficient

Note : all references to page number are linked to the operating manual .

# MEASURE / SAMPLE FREQUENCY

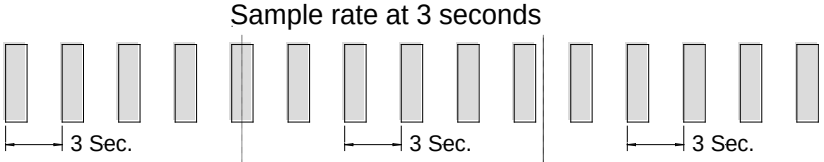
ML 255 can be programmed to measure in four different modes:

## REAL FLOW PROFILE

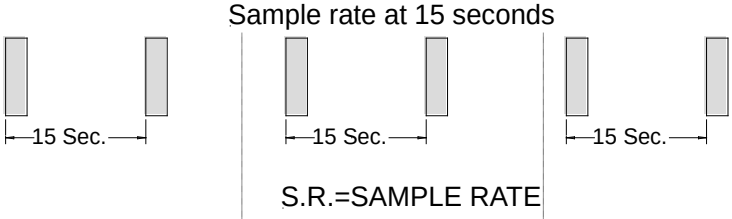



## CONTINUOS SAMPLING

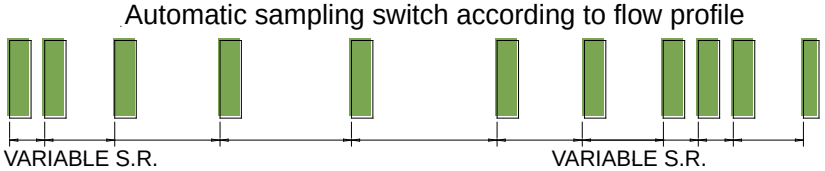

## AVERAGE SAMPLING




## MAX LIFE SAMPLING



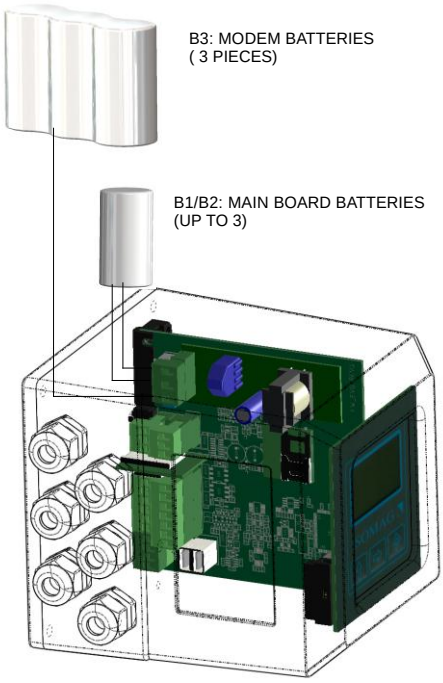

## THE NEW SMART SAMPLING FUNCTION

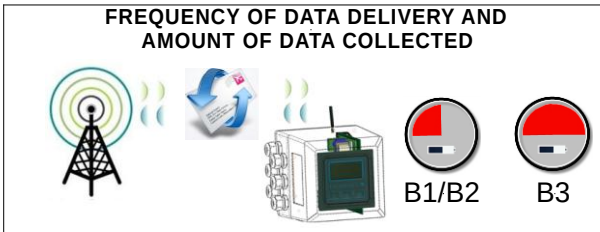


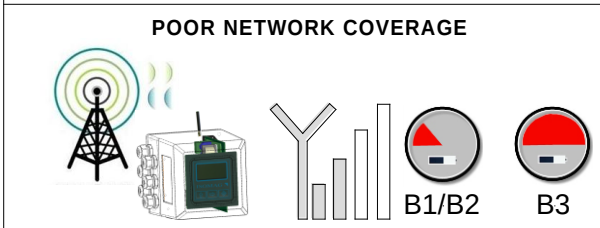

An internal algorithm allows the unit to automatically detect flow rate variations in the process. This capability determines the automatic setting of the sampling frequency. No variations means lower sampling frequency, with less power consumption; high variations means higher frequency to better follows the changes in the process.

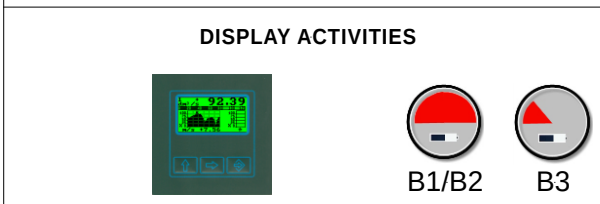
# BATTERIES CONSUMPTION

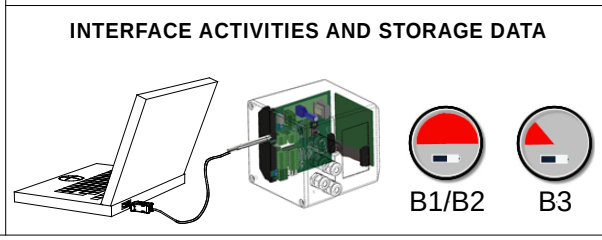
Battery consumption depends on the setting of the following elements: main board, sampling profiles, sensor diameter, modem network conditions, frequency of data sending, amount of collected data, interfaces activity (display, modem,etc.).

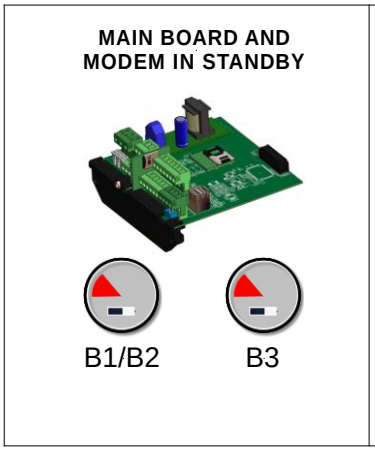



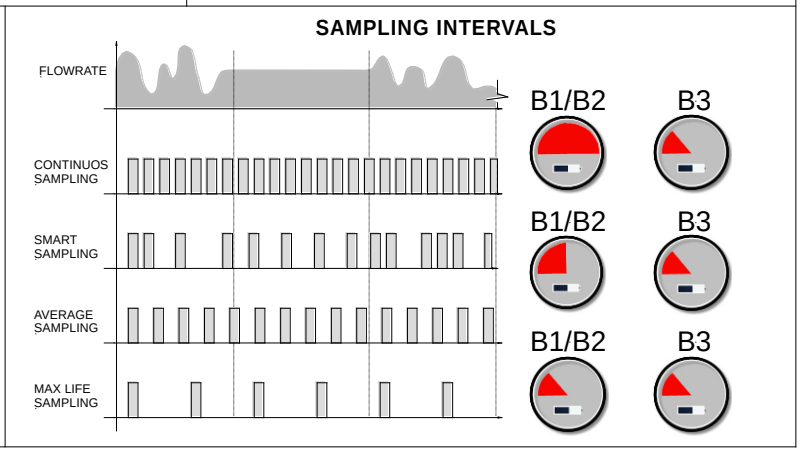



# BATTERIES LIFE

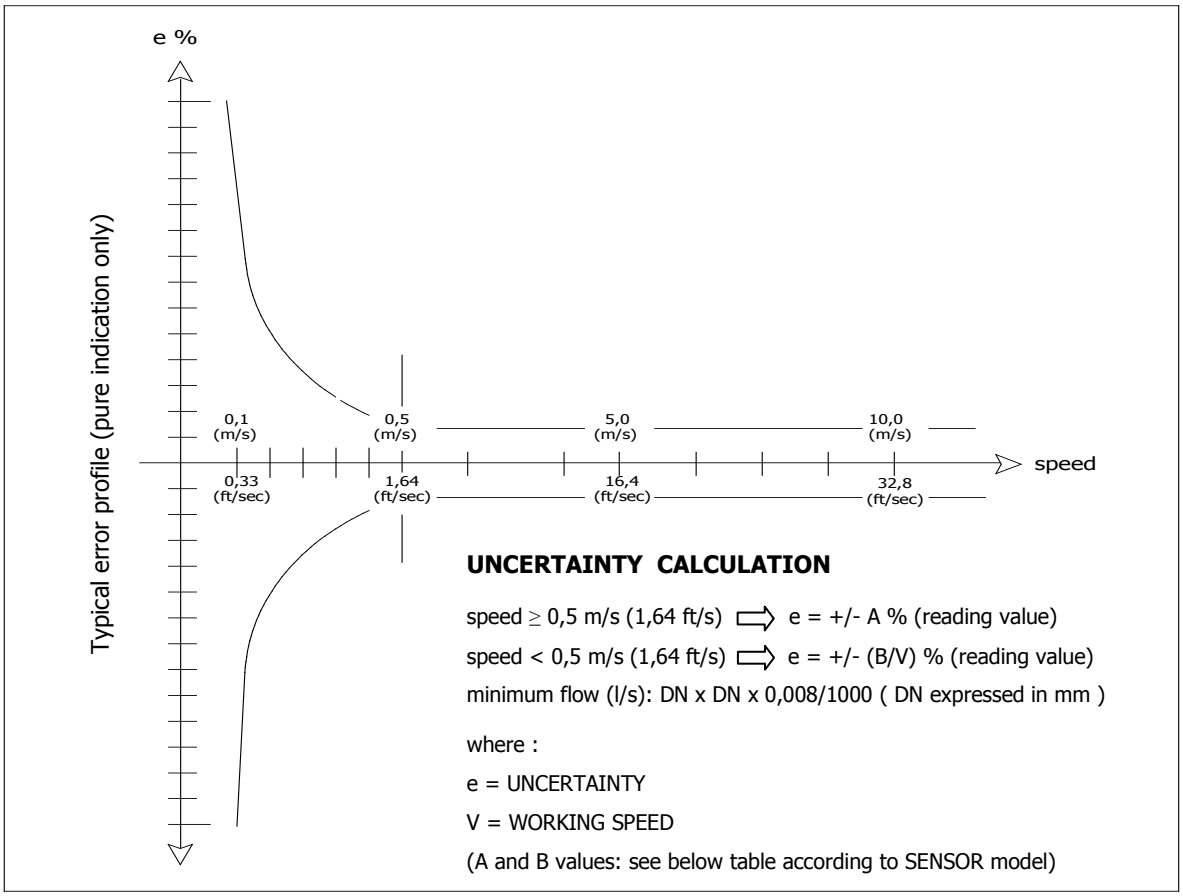
## Power tool software


Power tool is a software which allows to evaluate the converter battery life.
The estimation is done with an easy guided procedure

WARNING:
Battery life calculation exclude the life of the GPRS Battery pack; considers only the influence of modem activity on main battery (board and/or display wake up).

**NOTE: the Customer is solely responsible for ensuring that there is sufficient GPRS/GSM mobile network coverage for each device, and that neither the reseller nor ISOIL shall have any liability in the event of a reduction or cessation of such coverage.**

# ACCURACY TABLE




**UNCERTAINTY CALCULATION**

speed ≥ 0,5 m/s (1,64 ft/s) ⇨ e = +/- A % (reading value)

speed < 0,5 m/s (1,64 ft/s) ⇨ e = +/- (B/V) % (reading value)

minimum flow (l/s): DN x DN x 0,008/1000 ( DN expressed in mm )

where :

e = UNCERTAINTY

V = WORKING SPEED

(A and B values: see below table according to SENSOR model)

## FULL BORE SENSORS

| MS501/MS1000/MS2500 | | | MS5000 | | |
|---|---|---|---|---|---|
| A | B(m/s) | B(ft/s) | A | B(m/s) | B(ft/s) |
| 0,4 | 0,20* | 0,66 | 2,0 | 1,0 | 3,28 |

## INSERTION SENSORS

## See MS 3770 / MS 3800 DATA SHEET

Reference conditions below and as per internal testing procedures:

- ❑ Constant flow rate during the test
- ❑ Pressure: >30 Kpa
- ❑ Flow condition : fully developed flow profile
- ❑ Zero stability +/- 0,005 %

* Special accuracy on request

# HOW TO ORDER

| CODE EXAMPLE | | |
|---|---|---|
| | ***DISPLAY*** | |
| B | **A** | Blind execution (without display and programming keys) |
| | **B** | Graphic LCD WSTN 128 x 64, 8 line each of 16 characters and 3 programming keys |
| | ***HOUSING MATERIAL / PROTECTION RATE*** | |
| 0 | **0** | Painted aluminum die casting , protection rate IP 67 **- MODULE AVAILABLE : 3-4-5-7-8-a-b** |
| | **1** | AISI304 Stainless Steel housing, protection rate IP67 **( DISPLAY NOT ROTABLE ) MODULE AVAILABLE : 3-4-5-7-8-a-b** |
| | **5** | AISI304 Stainless Steel housing, protection rate **IP68 1,5 meters under water ( ONLY FOR COMPACT VERSION ,DISPLAY NOT ROTABLE ) - MODULE AVAILABLE : 7-9-a-b-c-d** |
| | **6** | Painted aluminium die casting **IP 68 1,5 meters under water ( ONLY FOR COMPACT VERSION ,DISPLAY NOT ROTABLE ) - MODULE AVAILABLE : 7-9-a-b-c-d** |
| | **7** | Painted aluminium die casting **IP 68 1,5 meters under water ( ONLY FOR SEPARATE VERSION ,DISPLAY NOT ROTABLE ) - MODULE AVAILABLE :7-9-a-b-c-d, COMPLETE WITH 2 CONNECTORS IP 68 FOR CABLE C015/C016** |
| | ***VERSION*** | |
| A | **A** | Compact version with sensor MS |
| | **B** | Separate version for wall mounting, complete with mounting accessories in **Aluminium** (painted RAL6028) , **max lenght of C015/C016 = 20 m** |
| | **D** | Separate version for wall mounting, complete with mounting accessories in **AISI304 , max lenght of C015/C016 = 20 m** |
| | ***POWER SUPPLY*** | |
| 1 | **0** | n° 1 LITHIUM BATTERY **- WITHOUT UNIVERSAL POWER SUPPLY** |
| | **1** | n° 1 LITHIUM BATTERY**- WITH UNIVERSAL POWER SUPPLY** |
| | **2** | n° 4 LITHIUM BATTERY ( 1 + 1 OF 3 ELEMENTS PACK **NECESSARY FOR GPRS ) - WITH UNIVERSAL POWER SUPPLY** |
| | **4** | n° 6 LITHIUM BATTERY ( N° 2 X 3 ELEMENTS PACK ) **- WITHOUT UNIVERSAL POWER SUPPLY** |
| | **5** | N° 3 LITHIUM BATTERY ( N° 1 OF 3 ELEMENTS PACK ) - **WITHOUT UNIVERSAL POWER SUPPLY** |
| | **6** | n° 4 LITHIUM BATTERY ( 1 + 1 OF 3 ELEMENTS PACK **NECESSARY FOR GPRS ) - WITHOUT UNIVERSAL POWER SUPPLY** |
| | **7** | WITHOUT BATTERY **WITH** UNIVERSAL POWER SUPPLY |
| | **8** | WITHOUT BATTERY **WITHOUT** UNIVERSAL POWER SUPPLY |
| | **9** | n° 6 LITHIUM BATTERY ( N° 2 X 3 ELEMENTS PACK ) **- WITH UNIVERSAL POWER SUPPLY** |
| | **a** | n° 2 LITHIUM BATTERY **( 1+1 ) - WITHOUT UNIVERSAL POWER SUPPLY** |
| | **b** | n° 5 LITHIUM BATTERY **(1+1 +1 OF 3 ELEMENTS PACK ) - WITHOUT UNIVERSAL POWER SUPPLY** |
| | ***INPUT*** | |
| A | **A** | without input |
| | **C** | Input for n° 1 pressure probe ( pressure sensor to be ordered separately ) |
| | **D** | Input for n° 1 pressure sensor complete with **IP 68 connector** ( pressure sensor to be ordered separately ) |
| | **E** | Input for n° 2 pressure probe ( pressure sensor to be ordered separately ) |
| | **F** | Input for n° 2 pressure sensor complete with **IP 68 connector** ( pressure sensor to be ordered separately ) |
| | **G** | Input for PT 500 THERMAL PROBE ( two wire, to be ordered separately) |
| | **H** | Option C + G |
| | ***ADDITIONAL MODULES*** | |
| 1 | **1** | NONE |
| | **3** | N° 2 on/off out ( max 50 Hz - max 100 mA ) **+ N° 1 Digital Input** |
| | **4** | Port RS232 |
| | **5** | GPRS module ( COMPLETE OF : ETP ; FLOWIZ SERVICE ) **WITH ANTENNA ON THE HOUSING** |
| | **7** | GPRS module ( COMPLETE OF : ETP ; FLOWIZ SERVICE ) **WITH 3 METERS CABLE LENGT OF MAGNETIC ANTENNA ( NECESSARY WITH IP 68 VERSION )** |
| | **8** | Options 3 + 4 **( DIGITAL IN/OUT + RS 232)** |
| | **9** | Options 3 + 4 **complete with IP 68 connector( DIGITAL IN/OUT + RS 232 )** |
| | **a** | GPRS module ( COMPLETE OF : ETP ; FLOWIZ SERVICE ) **WITH ANTENNA ON THE HOUSING + 2 on/off OUT + N° 1 Digital Input ( COMPLETE WITH IP 68 CONNECTORS)** |
| | **b** | GPRS module( COMPLETE OF : ETP ; FLOWIZ SERVICE)**WITH 3 METERS CABLE LENGT OF MAGNETIC ANTENNA( NECESSARY WITH IP 68 VERSION ) + 2 on/off OUT+ N° 1 Digital Input( COMPLETE WITH IP 68 CONNECTORS)** |
| | **c** | Options 3 **complete with IP 68 connector** |
| | **e** | GPRS module ( COMPLETE OF : ETP ; FLOWIZ SERVICE ) **WITH ANTENNA ON THE HOUSING + 2 on/off OUT + N° 1 Digital Input** |
| | **f** | GPRS module( COMPLETE OF : ETP ; FLOWIZ SERVICE)**WITH 3 METERS CABLE LENGTH OF MAGNETIC ANTENNA( NECESSARY WITH IP 68 VERSION ) + 2 on/off OUT+ N° 1 Digital Input** |
| | **g** | n° 2 DIGITAL OUT + RS 232 complete of **2 x 4 poles MIL-C-26482** connectors ( Male + female, one for D/O + one for RS232)) |
| | **Z** | RS 232 **without** chip ON BOARD |
| | ***SPECIAL FEATURES*** | |
| A | **A** | NONE |
| | **B** | WITH ANTICONDENSE CAP |
| | **C** | Connector for IP68 out connection (One piece , 10 contacts) |
| | **D** | Connector for IP68 out connection (Two pieces , 10 contacts) |
| | ***DAT MEMORY*** | |
| 0 | **0** | NONE |
| | **1** | Sensor data memory |
| | **2** | Converter data memory |
| | **3** | Converter & Sensor data memory |

ML255-B0A1A1A0 (Complete code example for order)

**The manufacturer reserves the right to make design improvements without notice.**

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