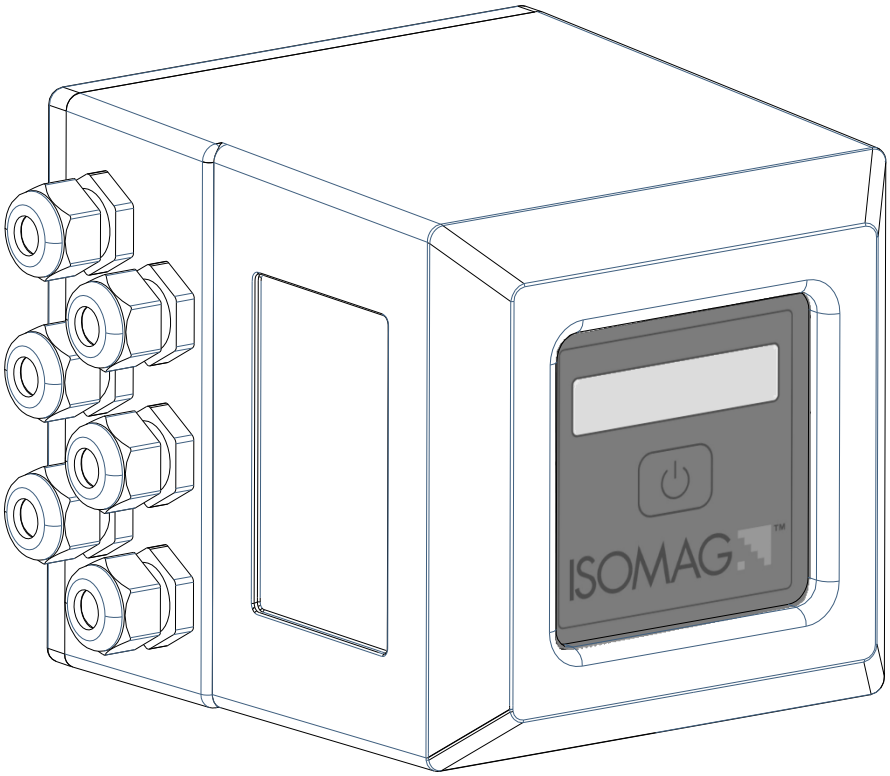
THE MOST ACCURATE BATTERY POWERED SYSTEM

ISOMAG™

The friendly magmeter

ML 145

(FLOWIZ™ FAMILY)



Electromagnetic converter powered by batteries, solar panel or DC power with 4/20 mA output.

Official Isoil dealer for The Netherlands:

UFM Ultrasonic Flow Management

ISOIL INDUSTRIA
The solutions that count

INDEX

TECHNICAL DATA

OVERALL FEATURES	
Suitable For	❑ **ISOMAG sensors UP TO DN 800**
Minimum Conductivity	❑ **20 µS/cm**
Version	❑ **Compact** ❑ **Separate**
Power Consumption	❑ **0.08W With Batteries; Average 0.2W/Max 3W With solar panel or DC power**
Altitude	❑ **-200 m up to 4000 m**
Ambient Temperature	❑ **-20... +60°C / -4... +140 °F**
Humidity Range	❑ **0÷100% (IP 67)**
Accuracy	❑ **See Table**

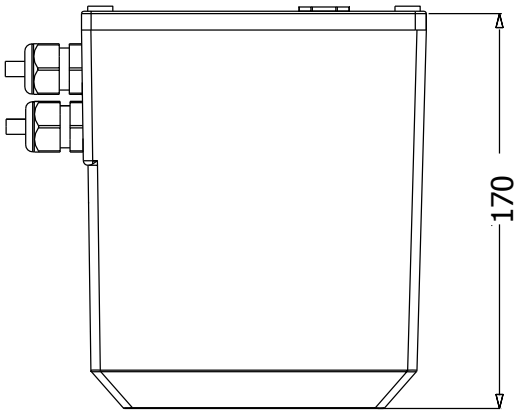
STANDARD FEATURES	
Housing Materials	❑ **Painted Aluminium die casting**
Protection Rate	❑ **IP 67**
Power Supply	❑ **Mixed System Batteries and main Power Supply; n° 1 Size D Not Rechargeable Lithium Battery**
Data Logger	❑ **MicroSD Memory Card 2 GBytes**
Data Storage	❑ **F-Ram**
Protocols	❑ **ETP**
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 Functions	❑ **Yes**
Empty Pipe Detect.	❑ **Yes**
CE Certification	❑ **Yes**

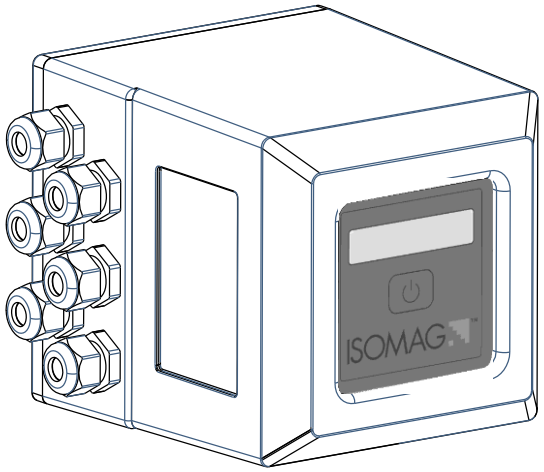
OPTIONAL FEATURES (CHECK FOR MORE DETAILS 'HOW TO ORDER' ON LAST PAGE)	
Housing Materials	❑ **AISI304**
Protection Rate	❑ **IP 68**
Sensor-Converter Connection Cable	❑ **CABLE C015 - C016 (for separate version)**
Wires connections	❑ **IP 68 Connectors**
LCD Display	❑ **Alphanumerical display: 2 lines x 16 characters NO back light**
Power Supply	❑ **Up to 6 Size D Not Rechargeable Lithium Battery+Main Power :10-30V⎓**
Pulses/Alarm Outputs	❑ **N°2 , 50 Hz, 100mA, 40 Vdc**
Digital Input	❑ **N°1 On/Off Input**
Analog Output (NOT galvanically separated from Main Power)	❑ **0/4..20 mA (available ONLY with Main Power Supply)**

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

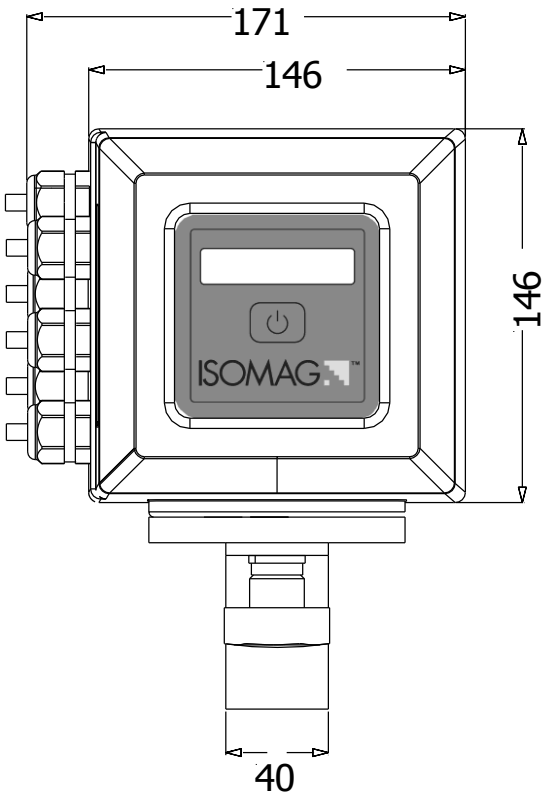
OVERALL DIMENSIONS

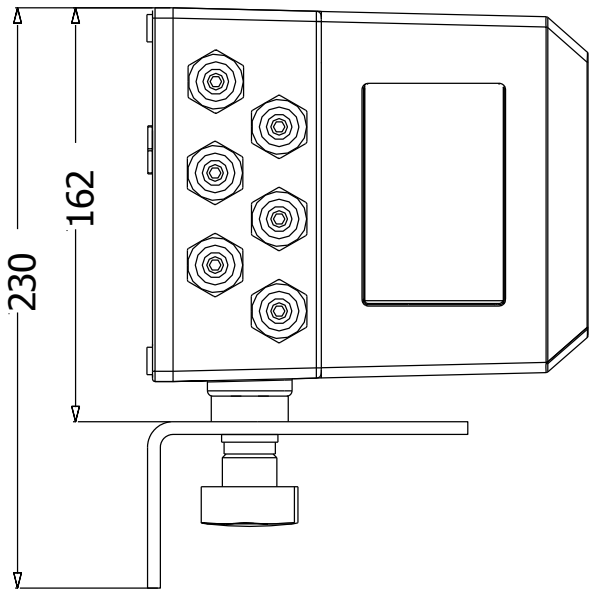
COMPACT VERSION





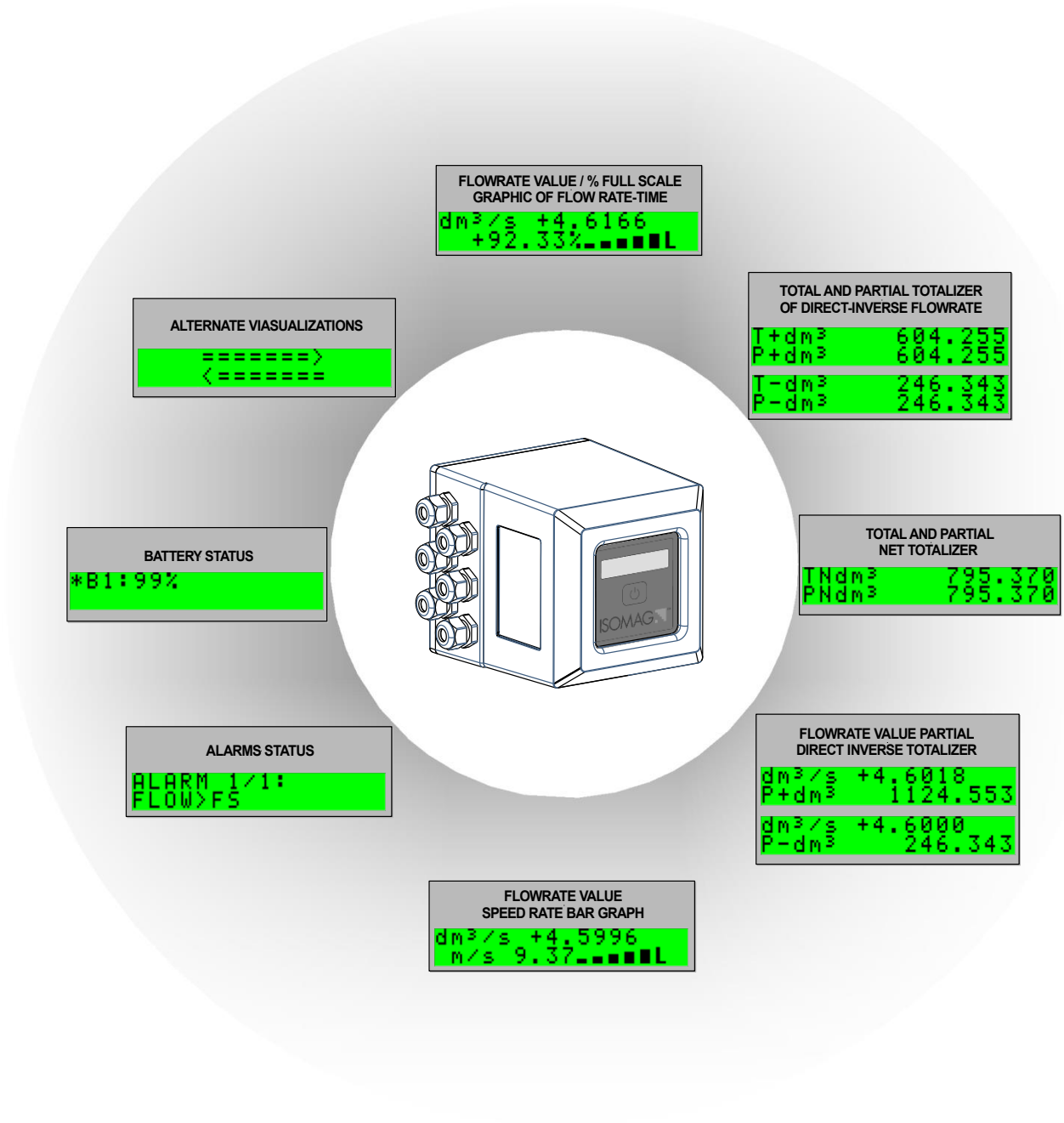
SEPARATE VERSION



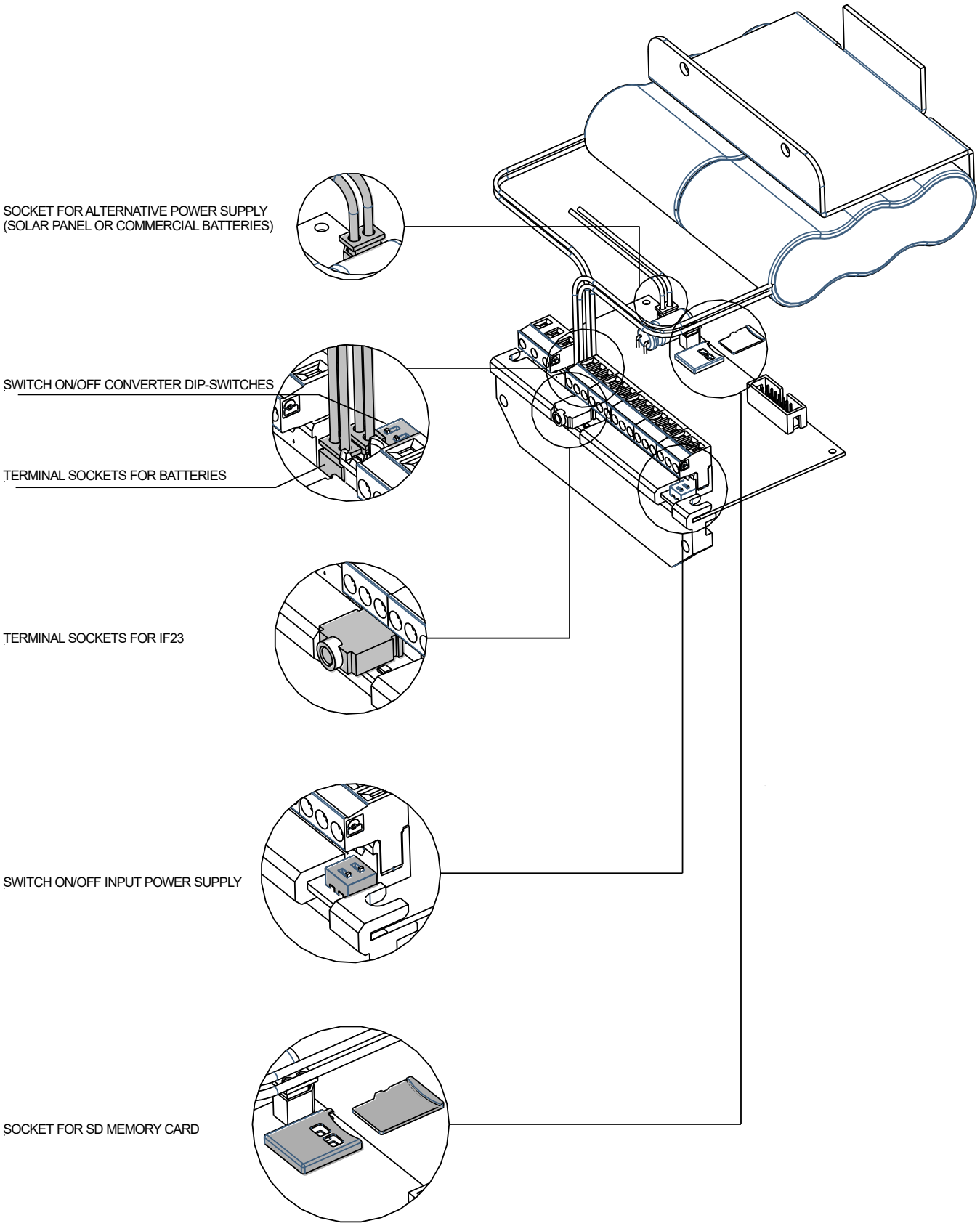


VISUALIZATION PAGES

Different visualization possibilities

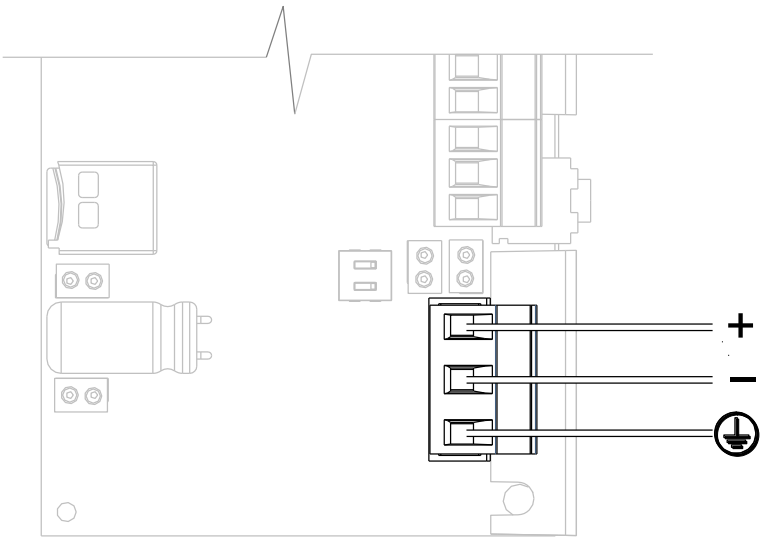


PCB LAYOUT


SOCKET FOR ALTERNATIVE POWER SUPPLY
(SOLAR PANEL OR COMMERCIAL BATTERIES)
SWITCH ON/OFF CONVERTER DIP-SWITCHES
TERMINAL SOCKETS FOR BATTERIES
TERMINAL SOCKETS FOR IF23
SWITCH ON/OFF INPUT POWER SUPPLY
SOCKET FOR SD MEMORY CARD

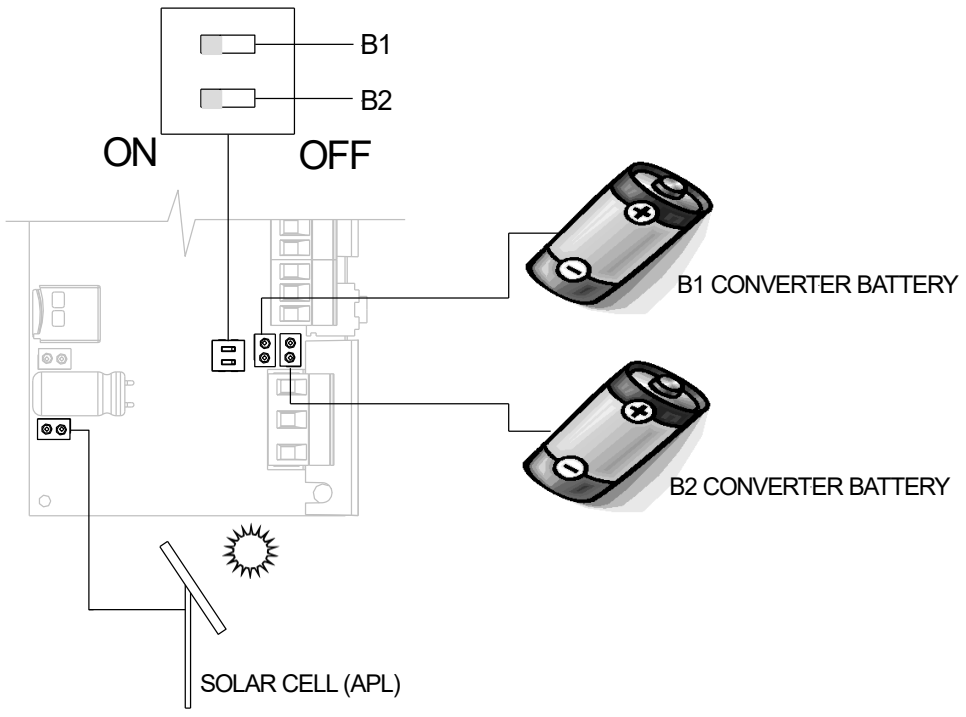
POWER SUPPLY

BY MAIN VOLTAGE



Auto detection of the power source: when main power supply is ON, batteries are excluded and the system operate in continuous sampling mode

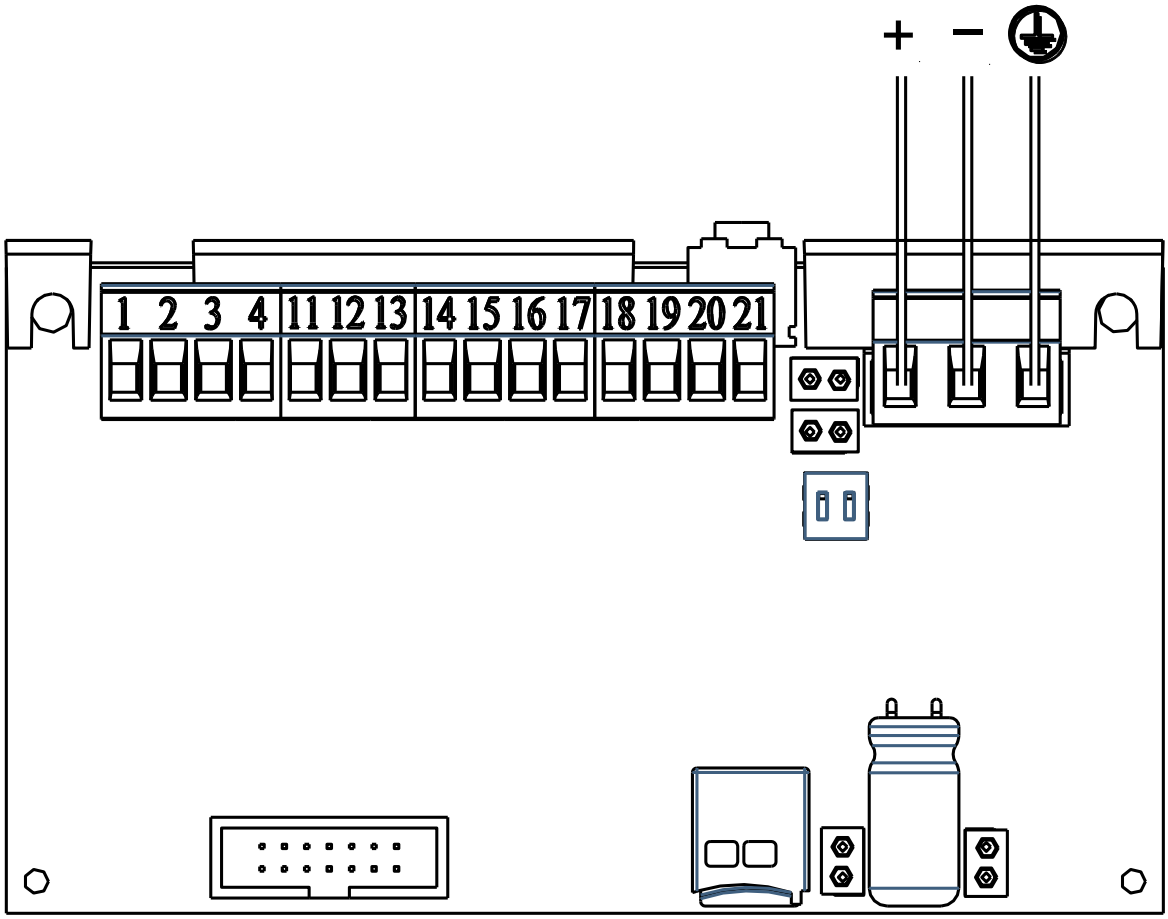
BY BATTERIES

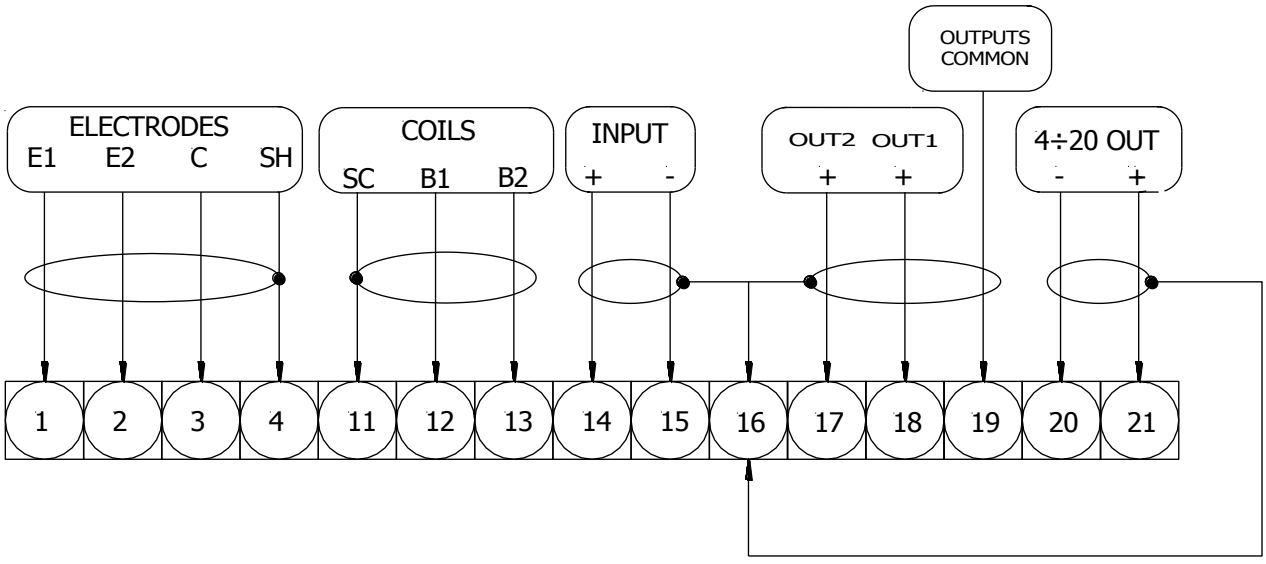


Note : Lithium batteries are subject to special transportation regulations according to "Regulation of Dangeroug Goods, UN3090 and UN 3091". Special documentation is required to observe there regulations.

ELECTRICAL CONNECTIONS

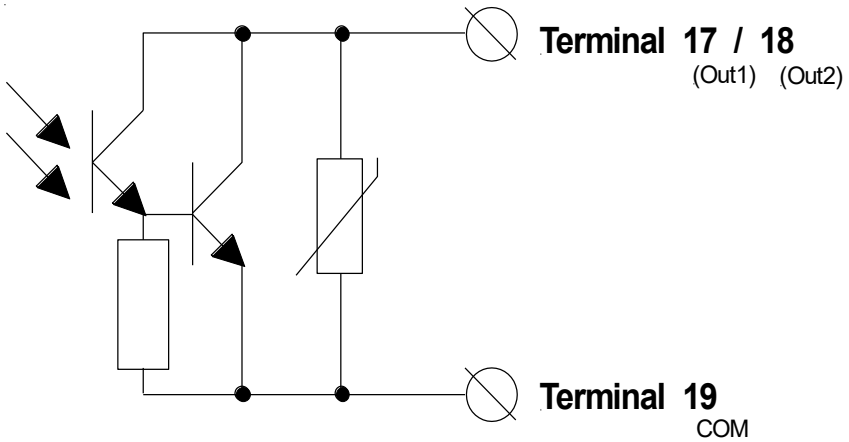
TERMINAL BLOCK: COMPACT/SEPARATE VERSION



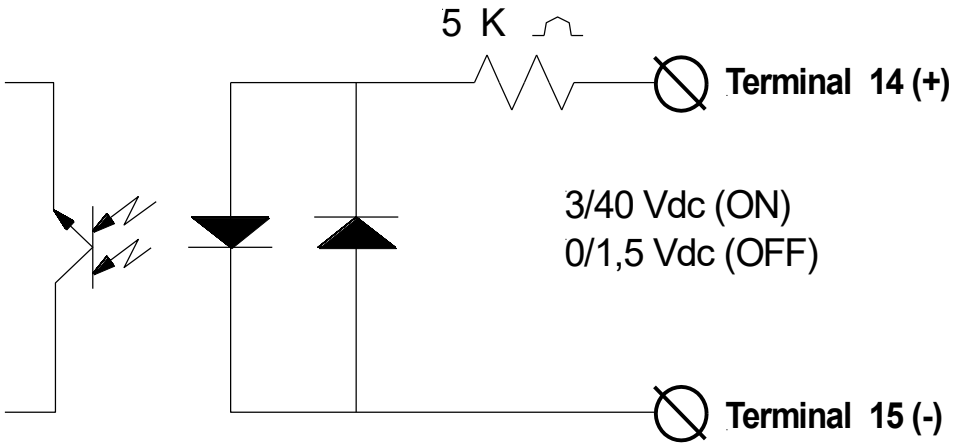


DIGITAL INPUT / OUTPUT

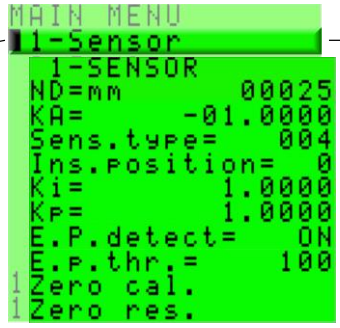
ON/OFF OUTPUT



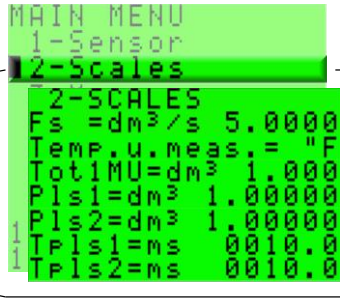
ON/OFF INPUT



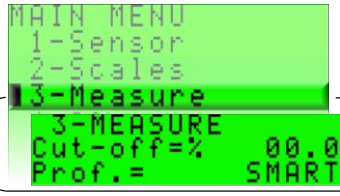
FUNCTION'S LIST



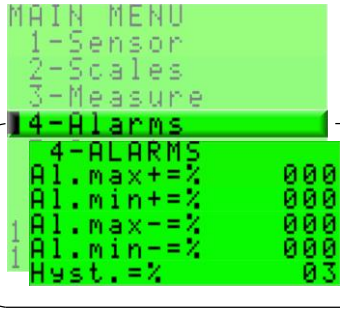
1.1 Insert ND of sensor (0-3000)
1.2 Calibration data of sensor visualized on sensor's label
1.3 Sensors model: Enter the first two characters of the serial number of the sensor
1.4 Position for insertion sensors: 0=1/8DN, 1=1/2DN, 2=7/8DN
1.5 Automatic setting according to ID (insertion meter only)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



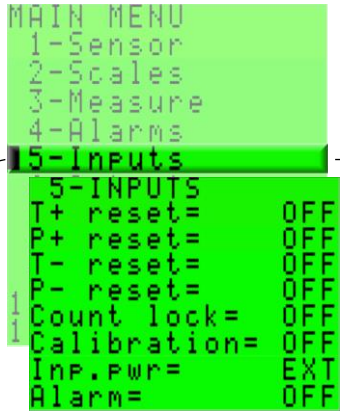
2.1* Full scale value measure set for flowrate
2.2 Unit of measure of temperature
2.3* Unit of measure and number of decimal totalizes
2.4* Pulse value on channel 1
2.5* Pulse value on channel 2
2.6* Duration of the pulse generated on channel 1
2.7* Duration of the pulse generated on channel 2



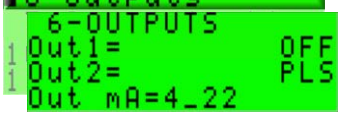
3.1 Low flow zero threshold: 0-25% of full scale value
3.2* Consumption profiles



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 Hysteresis threshold set for the minimum and maximum flow rate alarms

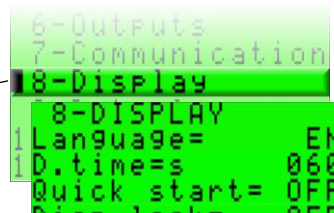


5.1* Total direct (positive) flow totalise reset enable
5.2* Partial direct (positive) flow totalise reset enable
5.3* Total reverse (negative) flow totalise reset enable
5.4* Partial reverse (negative) flow totalise reset enable
5.5 Totalise counting lock command
5.6* Autozero calibration external command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

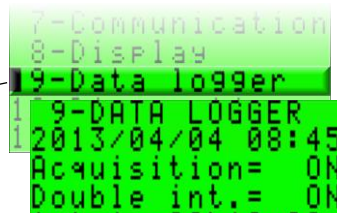


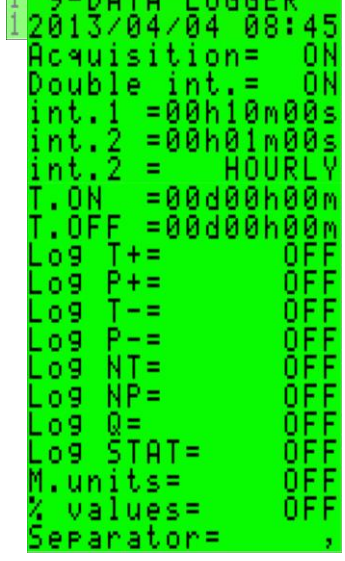
6.1* Output 1
6.2* Output 2
6.3 4÷20 Output

7.1 Choice of the communication protocol for the IF2 device

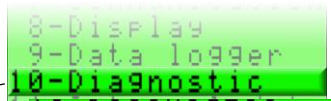


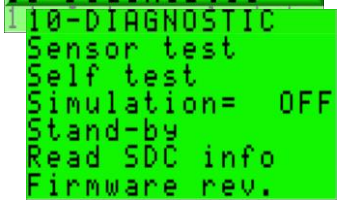
8.1 Choice of the language: EN= English, IT=Italian, FR= French, SP= Spanish
8.2 Time for switch off display (shown with function 3.7 enabled)
8.3 Visualization of "Quick start menu"
8.4 Lock of DISPLAY in ONE SPECIFIC visualization page
8.5* Total direct (positive) flow totalizer reset from keyboard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



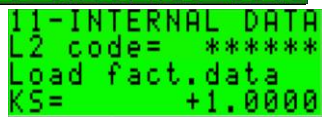


9.1* Date and time set
9.2* Automatic data logger enable
9.3* Choice of single (off) or double (on) interface
9.4* Interval time 1 for the data logging function
9.5* Interval time 2 for the data logging function
9.6 Interval period 2 for the data logging function
9.7 Interval 2 start loggin time
9.8 Interval 2 stop loggin time
9.9 Enables the sending of direct total totalizer
9.10 Enables the sending of direct partial totalizer
9.11 Enables the sending of reverse total totalizer
9.12 Enables the sending of reverse partial totalizer
9.13 Enables the sending of net total totalizer
9.14 Enables the sending of net partial totalizer
9.15 Enables the sending of flow rate
9.16*Logging of statistical data
9.17 Enables the sending of measure units (technical units)
9.18 Enables the sending of measure units (%)
9.19 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* SD card status/info
10.6* Show firmware revision of converter



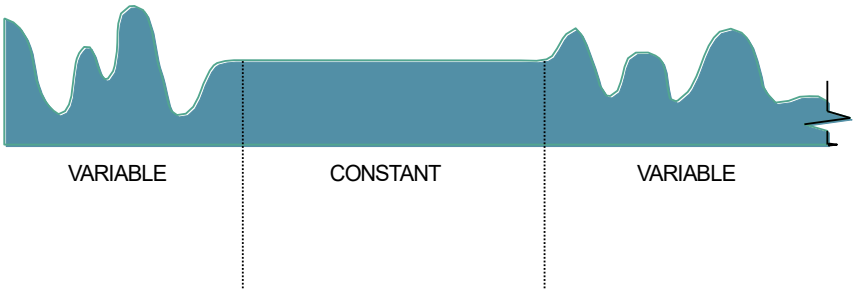
11.1 Level 2 access code enter
11.2 Load factory data pre-set
11.3 Ks Coefficient

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

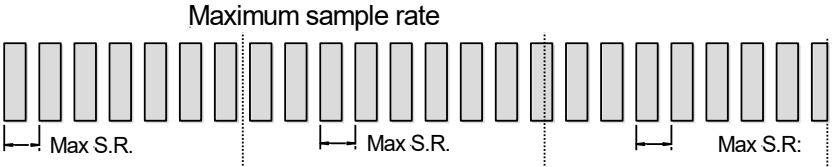
MEASURE / SAMPLE FREQUENCY

ML 145 can be programmed to measure in four different modes:

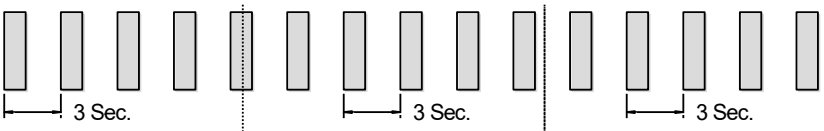
REAL FLOW PROFILE



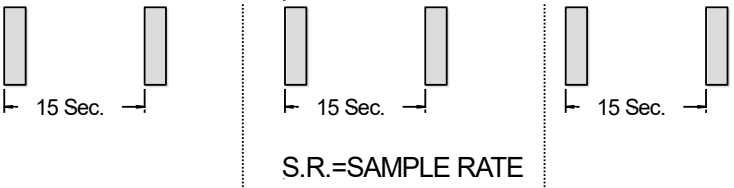
CONTINUOS SAMPLING



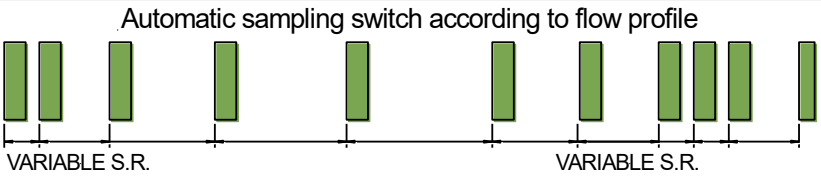
AVERAGE SAMPLING



MAX LIFE SAMPLING



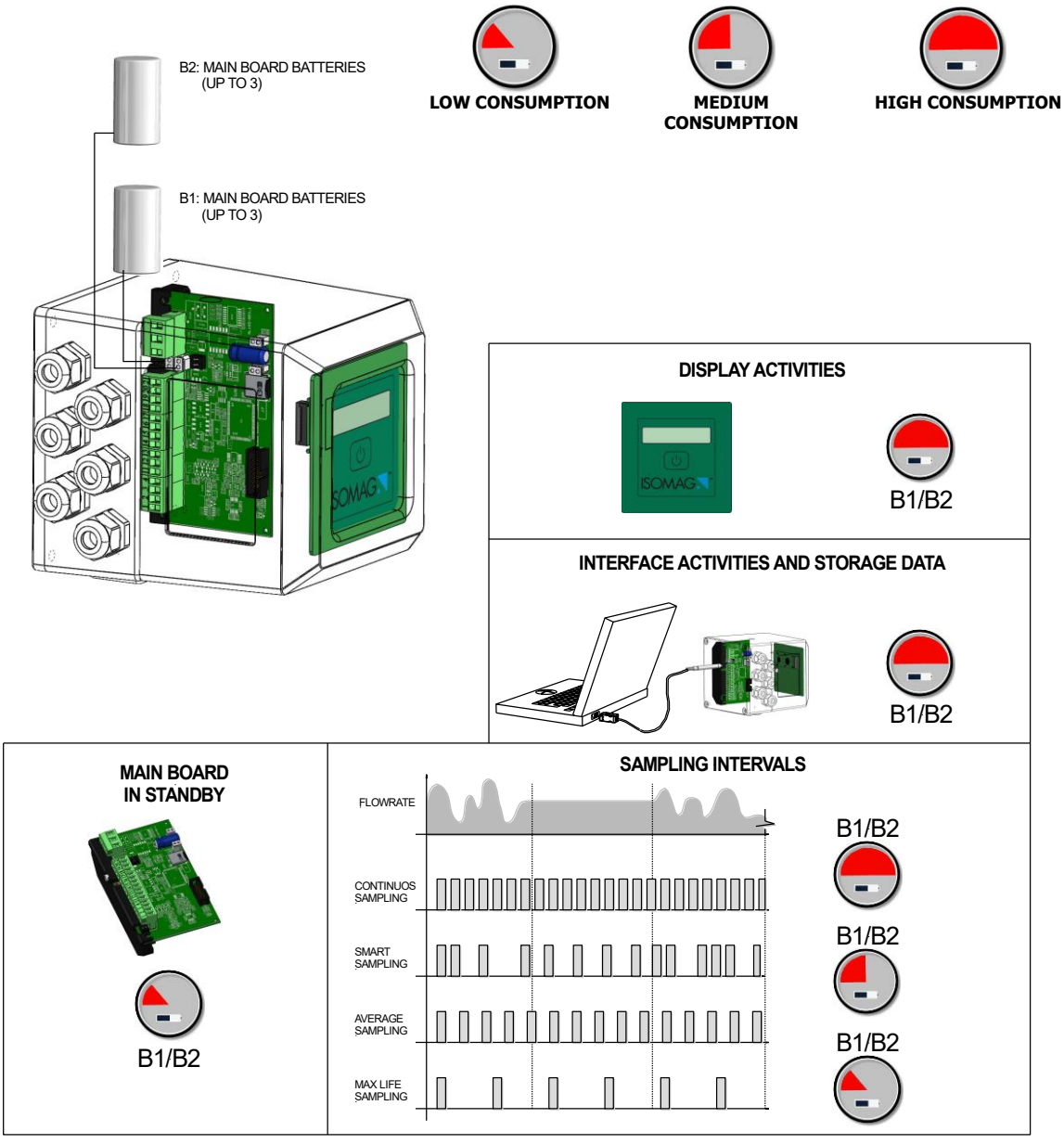
THE NEW SMART SAMPLING FUNCTION



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 follow the changes in the process.

BATTERIES CONSUMPTION

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

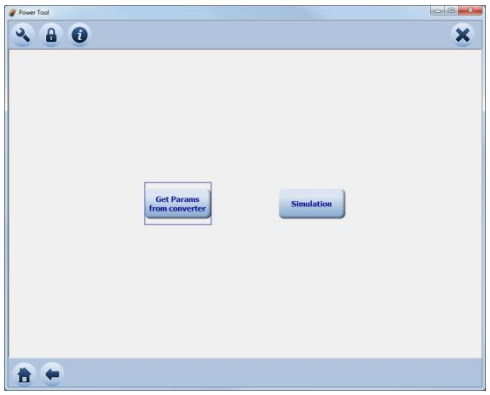


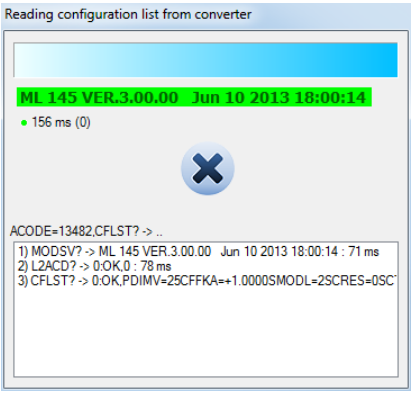
POWER TOOL SOFTWARE

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

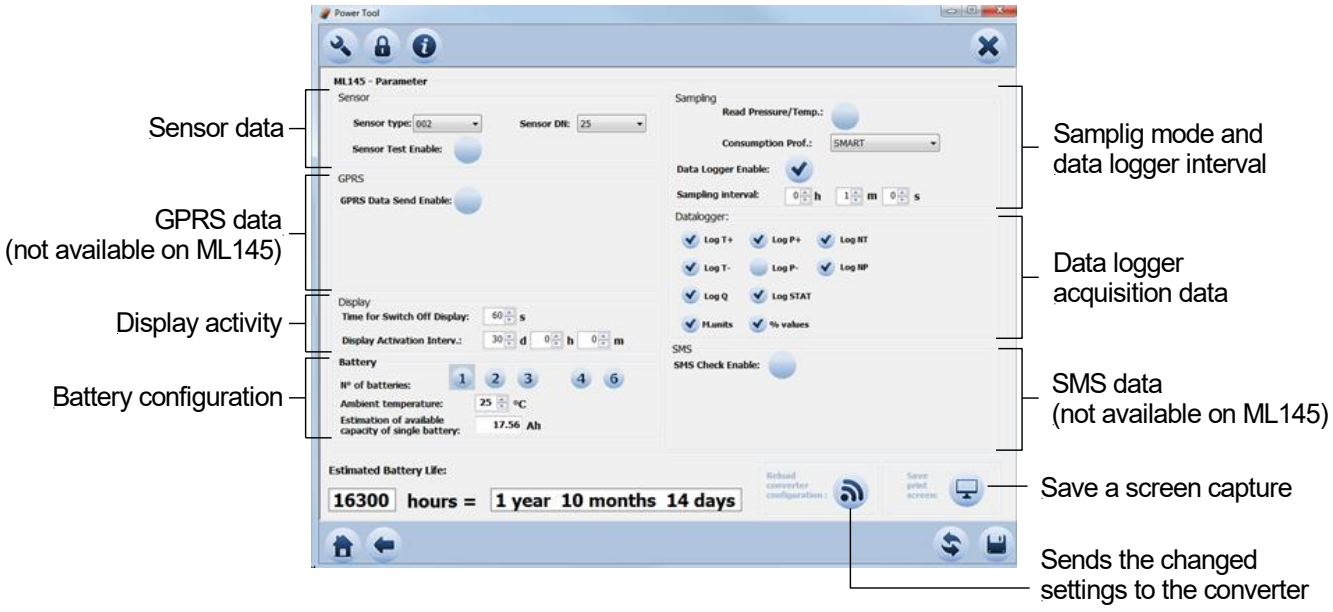
Connect the converter to the PC throughout the IF23 cable, then :

- launch the Power tool software
- select the relevant converter
- select "Get params from converter" or "Simulation" if the converter is not available
- waiting for the reading of converter's parameters (not in simulation mode)



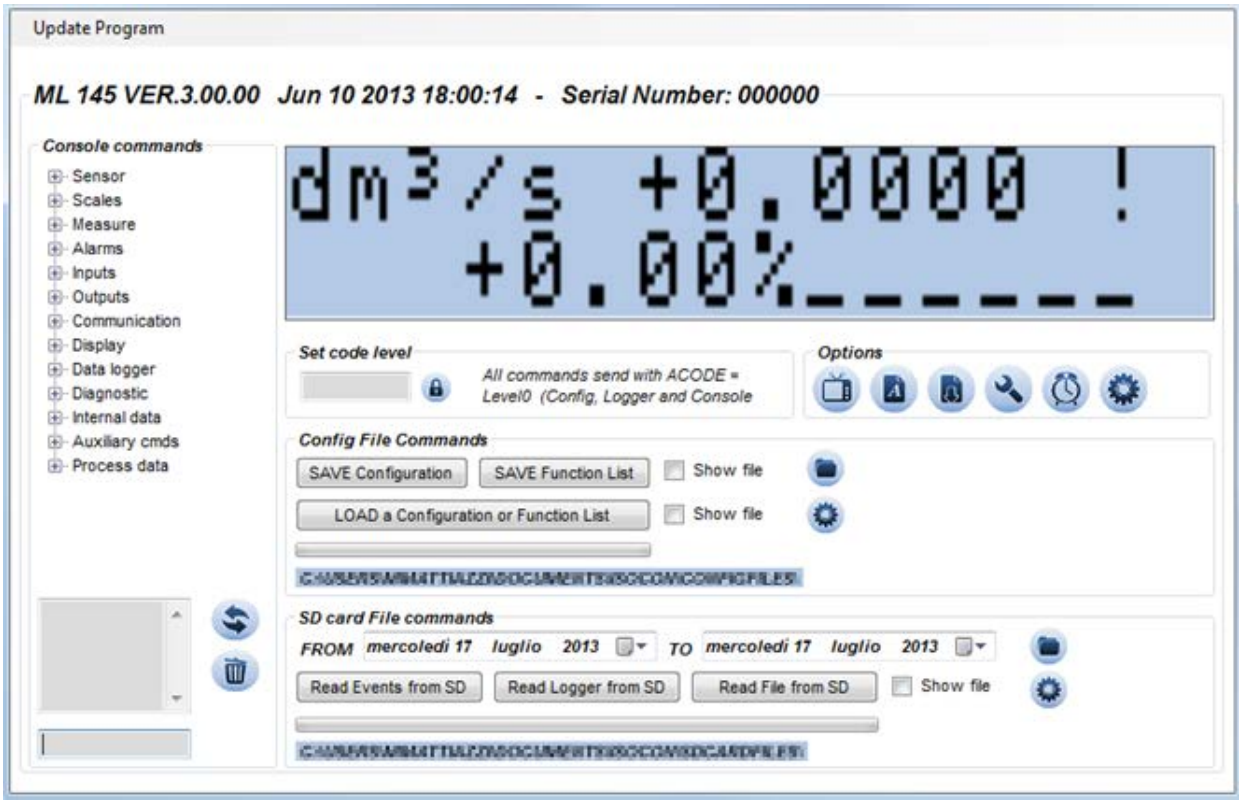


It is now possible to calculate the expected life battery; it is automatically updates after any parameters change. Once the procedure will be completed, the new configuration can be send to the converter by the relevant key.



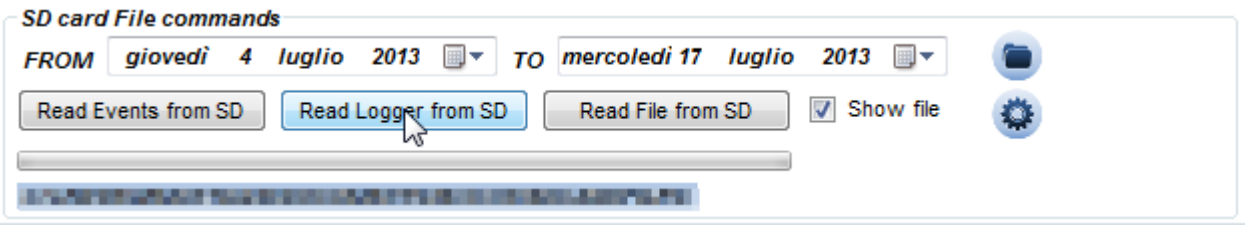
USER INTERFACE

Besides the keyboard, the converter can be programmed by ISOCON INTERFACE: a real time interface between converter and PC.

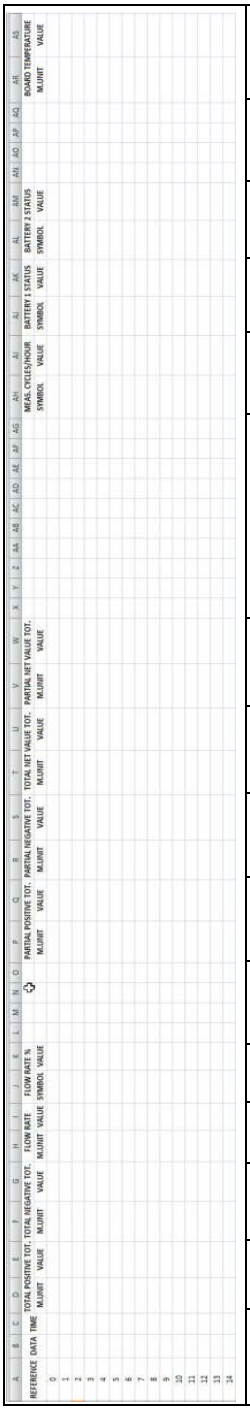


DATA LOGGER

Data is stored on micro SD card; the recorded data or the events, can be easily downloaded by the ISOCON INTERFACE, pressing the relevant key as shown below

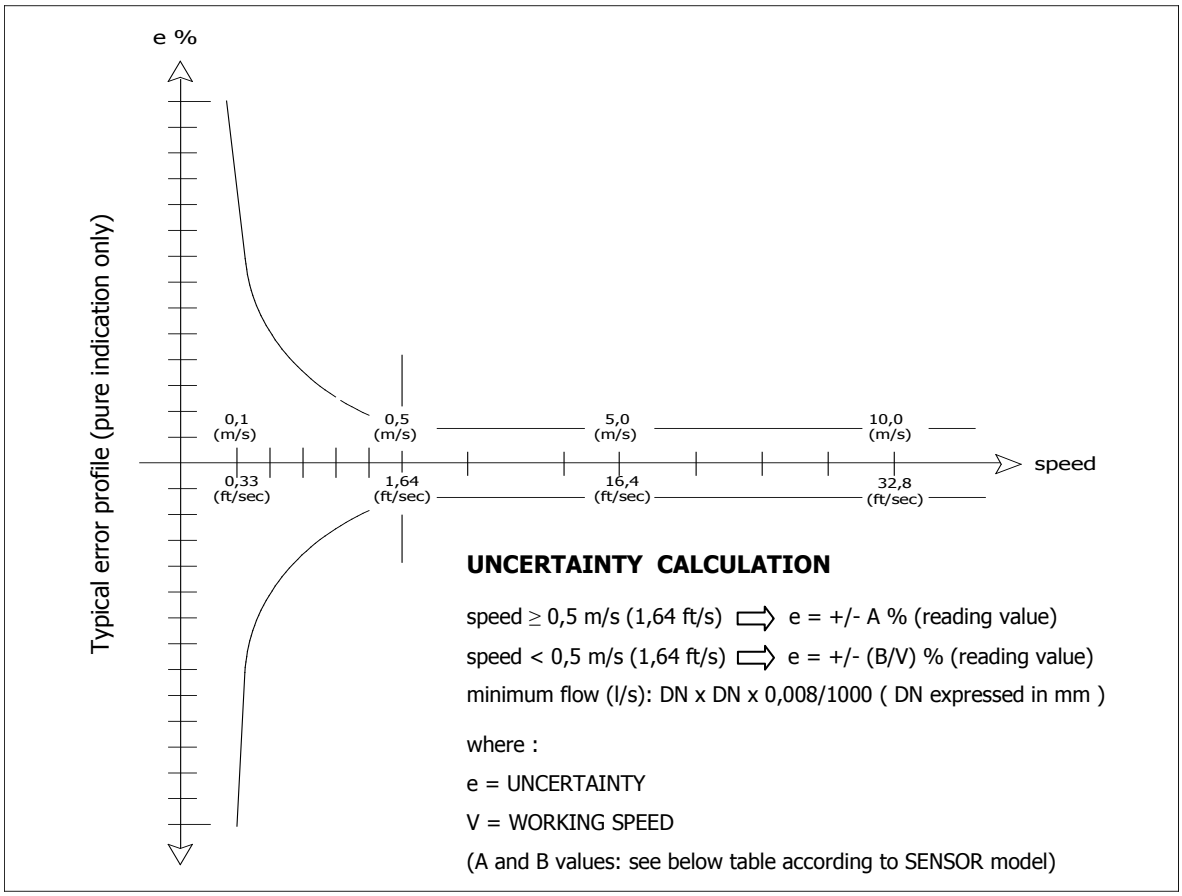


Note: to record correctly the data, the date and time shall be properly set.



Board temperature, measure unit and value.
Blank to future expansion
Battery 2 status, symbol and value
Battery 1 status, symbol and value
Measure cycles/hour, symbol and value
Blank to future expansion
Partial net value totalizer, measure unit and value
Total net value totalizer, measure unit and value
Partial negative totalizer, measure unit and value
Partial positive totalizer, measure unit and value
Blank to future expansion
Flow rate %, symbol and value
Flow rate, measure unit and value
Total negative totalizer, measure unit and value
Total positive totalizer, measure unit and value
Reference data: n° record, date and time

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)
0,5*	0,25*	0,82	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 version (without display)
	B	Alphanumerical display: 2 lines x 16 characters NO back light
		HOUSING MATERIAL / PROTECTION RATE
0	**0**	Painted aluminium die casting , protection rate IP 67
	1	AISI304 Stainless Steel housing, protection rate IP67 (NO ROTATABLE DISPLAY)
	5	AISI304 Stainless Steel housing, protection rate IP68 1,5 meters under water (COMPACT VERSION ONLY, NO ROTATABLE DISPLAY)
	6	Painted aluminium die casting IP 68 1,5 meters under water (COMPACT VERSION ONLY, NO ROTATABLE DISPLAY)
	7	Painted aluminium die casting IP 68 1,5 meters under water (SEPARATE VERSION ONLY, NO ROTATABLE DISPLAY) COMPLETE WITH 2 CONNECTORS IP 68 FOR CABLE C015/C016
	8	AISI 304 - IP 68 1,5 meters under water (SEPARATE VERSION ONLY, NO ROTATABLE DISPLAY) 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 Aluminium mounting accessories, max length of C015/C016 = 20 m
	D	Separate version for wall mounting, complete with AISI304 mounting accessories, max length of C015/C016 = 20 m
		POWER SUPPLY
1	**0**	n° 1 LITHIUM BATTERY - WITHOUT MAIN POWER DC
	1	n° 1 LITHIUM BATTERY - WITH MAIN POWER DC
	2	n° 4 LITHIUM BATTERIES (1 + 1 PACK OF 3) - WITH MAIN POWER DC
	4	n° 6 LITHIUM BATTERIES (2 X 3 PACKS) - WITHOUT MAIN POWER DC
	5	n° 3 LITHIUM BATTERIES (1 PACK OF 3) - WITHOUT MAIN POWER DC
	6	n° 4 LITHIUM BATTERIES (1 + 1 PACK OF 3) - WITHOUT MAIN POWER DC
	7	WITHOUT BATTERIES WITH MAIN POWER DC
	8	WITHOUT BATTERIES WITHOUT MAIN POWER DC (Batteries to be purchased locally)
	9	n° 6 LITHIUM BATTERIES (2 X 3 PACKS) - WITH MAIN POWER DC
	a	n° 2 LITHIUM BATTERIES (1+1) - WITHOUT MAIN POWER DC
		OUTPUT
A	**A**	NONE
	B	N° 2 on/off out (max 50 Hz - max 100 mA) + n° 1 digital input
	C	N° 1 out 4/20 mA (Available ONLY with MAIN POWER DC option)
	D	Options B + C
	E	N° 2 on/off outs (max 50 Hz - max 100 mA) + n° 1 digital input with IP68 connector
	F	Options C + E with N° 1 IP 68 connectors
		SPECIAL FEATURES
1	**0**	NONE
	1	WITH ANTICONDENSE CAP
	2	Connector for IP68 out connection (One piece , 10 contacts)
	3	N° 1 IP 68 CONNECTOR FOR IF22 INTERFACE
	4	Options 2 + 3

ML145-B0A1A1 (Complete code example for order)

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