

THE MOST ACCURATE BATTERY POWERED SYSTEM

# ISOMAG ™

*The friendly magmeter*

## FLOWIZ™

(ML 250)



Electromagnetic Converter with battery and universal power supply. Optional in built modules for pressure measure and GPRS transmission .

Warranty conditions are available on this website:  
[www.isomag.eu](http://www.isomag.eu) only in English version

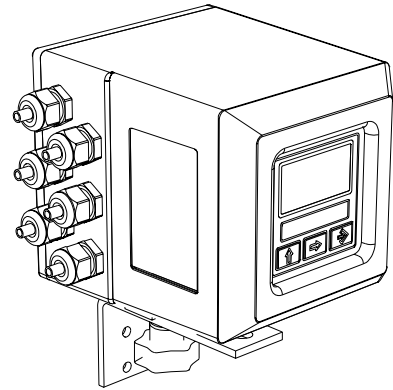
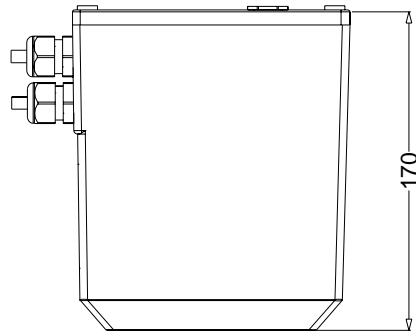
**ISOIL**   
INDUSTRIA  
The solutions that count

## TECHNICAL DATA

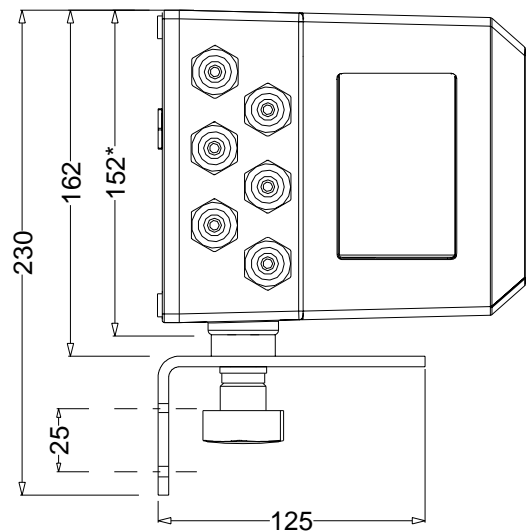
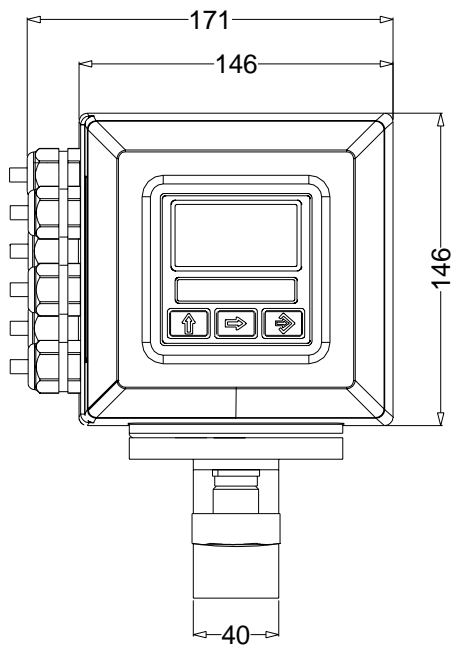
Suitable for	<input type="checkbox"/> All the ISOMAG sensors
Minimum Conductivity	<input type="checkbox"/> 5 $\mu$ S/cm
Version/Housing materials	<input type="checkbox"/> Wall/Compact: Painted Aluminium die casting (OPT. AISI304)
Dimensions	<input type="checkbox"/> See Drawing
Protection rating	<input type="checkbox"/> IP 67 <input type="checkbox"/> IP 68 ( OPTIONAL )
Connection sensor cable	<input type="checkbox"/> C015 / C016 cable (maximum length 20 meters )
Cable gland	<input type="checkbox"/> standard PG 11/Connectors (Opt.)
Ambient temperature	<input type="checkbox"/> -20...+60°C
LCD Display	<input type="checkbox"/> Alphanumerical display: 2 lines x 16 characters NO back light
Keyboard	<input type="checkbox"/> 3 membrane keys
Pressure measure	<input type="checkbox"/> Input for Pressure sensor (0÷2000 , 0÷4000 Kpa)
Additional Modules	<input type="checkbox"/> n°2/4 On/Off out + n°1 On/Off input, RS232 Serial Communication, GSM /GPRS (SMS/CSD system)
Data Logger	<input type="checkbox"/> Two Sets ( 1 Mbit ). <input type="checkbox"/> 8192 records collected at intervals of 1,2,3,5,15,30,60 minutes <input type="checkbox"/> 256 records collected at the Measure Sample Rate <input type="checkbox"/> Note: both sets of records contain Date/Time reference, Flow Rate, Positive and Negative volumes and auxiliary Input data (Pressure) expressed in Technical Units <input type="checkbox"/> Recording of the last 64 alarm Events
Bi-directional	<input type="checkbox"/> Yes
Full Scale value	<input type="checkbox"/> 0,4...10 m/s
Diagnostic functions	<input type="checkbox"/> Yes
Empty Pipe Detection	<input type="checkbox"/> Yes
Galvanic Isolation	<input type="checkbox"/> All Inputs/Outputs are galvanically insulated from Power Supply
Data storage	<input type="checkbox"/> EEprom, battery backup RAM
Programming plug in	<input type="checkbox"/> Protected plug in for connection to PC ( IF2x)
CE certification	<input type="checkbox"/> Yes
Accuracy	<input type="checkbox"/> See table below
Power Supply (see details pag.5)	<input type="checkbox"/> Standard: n°1 size D not rechargeable Lithium Battery, Life Time 2 Years using 15s Sampling Rate, 1 month with Continuous Sampling Rate; Universal Power Supply 10÷400 Vac/dc; functioning also as mixed system network Power Supply + Battery as backup. Optional: up to n° 6 Lithium batteries ( up to 10 years )
Power consumption	<input type="checkbox"/> 0.08W with battery, 0.2W with Universal Power Supply

## OVERALL DIMENSIONS

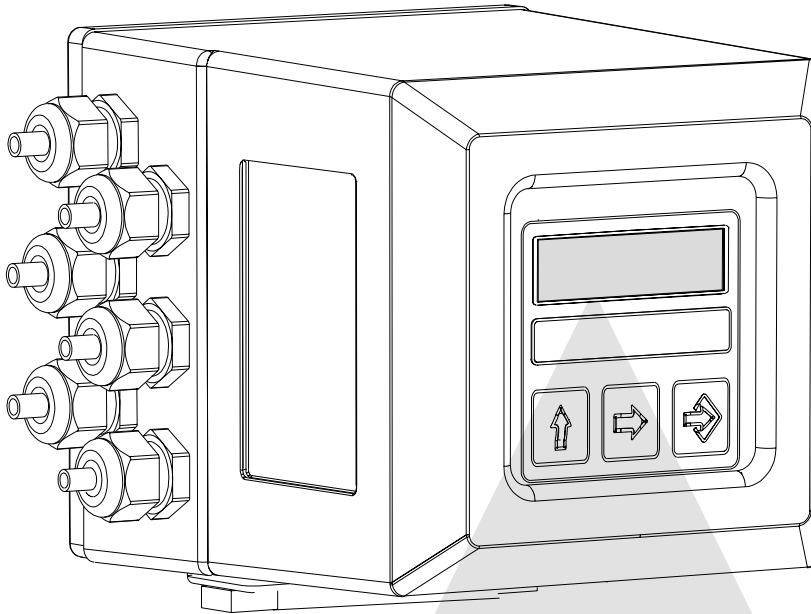
### COMPACT VERSION



### SEPARATE VERSION



## VISUALIZATION PAGES

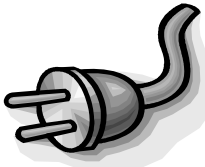


→	$\text{dm}^3/\text{s}$ +0.000 *1 +0.0%-----	Flow rate value
→	$\text{T}+\text{dm}^3$ 323.380 $\text{P}+\text{dm}^3$ 1.077	Totalized values
→	bar +99.8 *1 +99.8%■■■■■	Pressure
→	$\text{dm}^3/\text{s}$ +0.232 *1 $\text{P}+\text{dm}^3$ 15.864	Direct flow rate and positive totalizer
→	$\text{dm}^3/\text{s}$ +0.252 *1 $\text{m}/\text{s}$ 0.51-----	Flow rate and flow velocity
→	=====> <=====	Scrolling visualization of data
↑	1992/01/01 16:05 MEASURE>FS	Alarm ON visualization
↓	*B1:99% B2: 0% *B3:99% Y■■■■■	Battery status / Antenna signal strength

Different visualisation possibilities with the simple press of a key

## POWER SUPPLY

### MAIN POWER



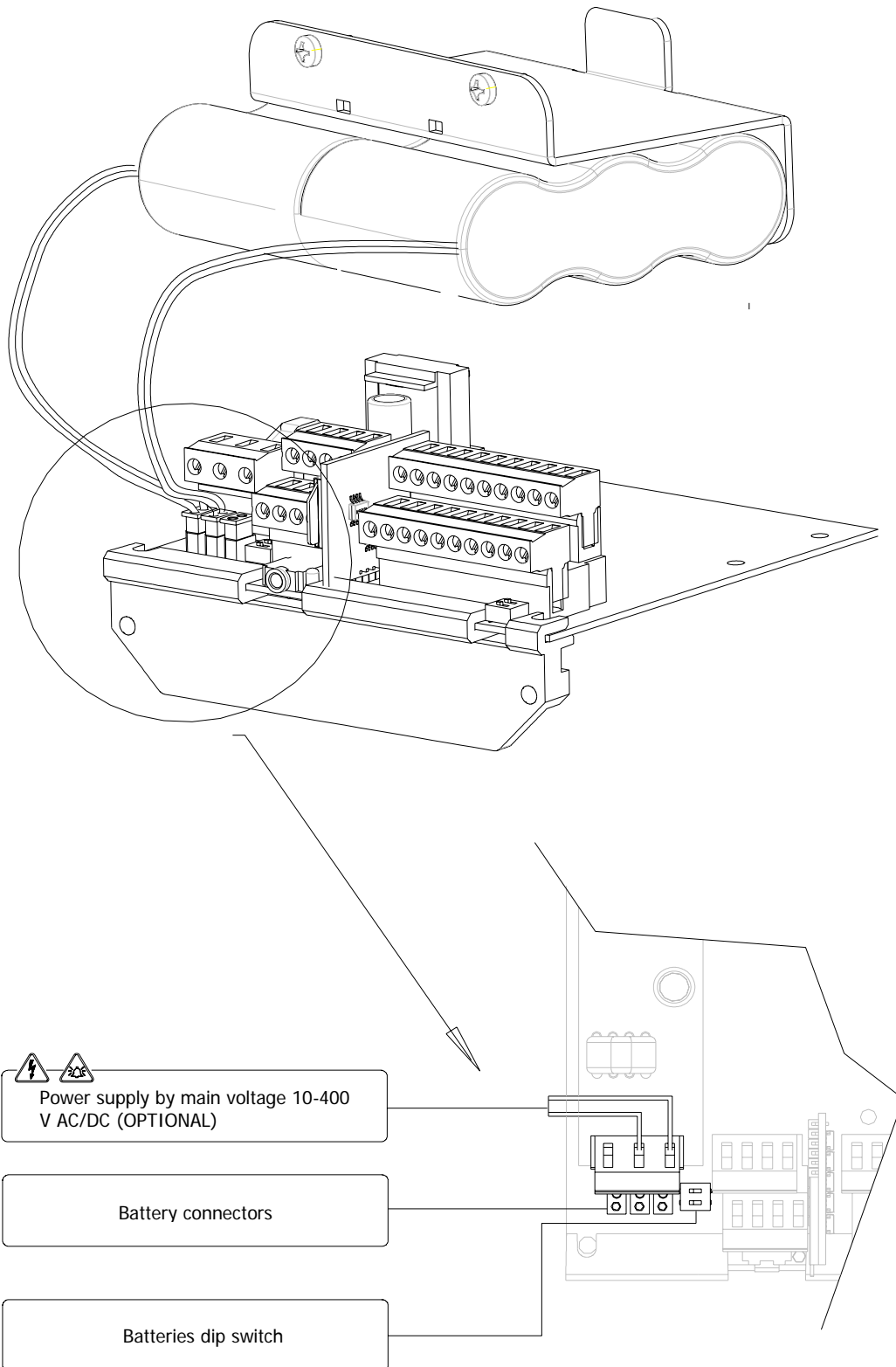
With mains power supply the batteries are automatically excluded and the converter always works at the maximum sampling rate (continuous sampling).

### BATTERIES



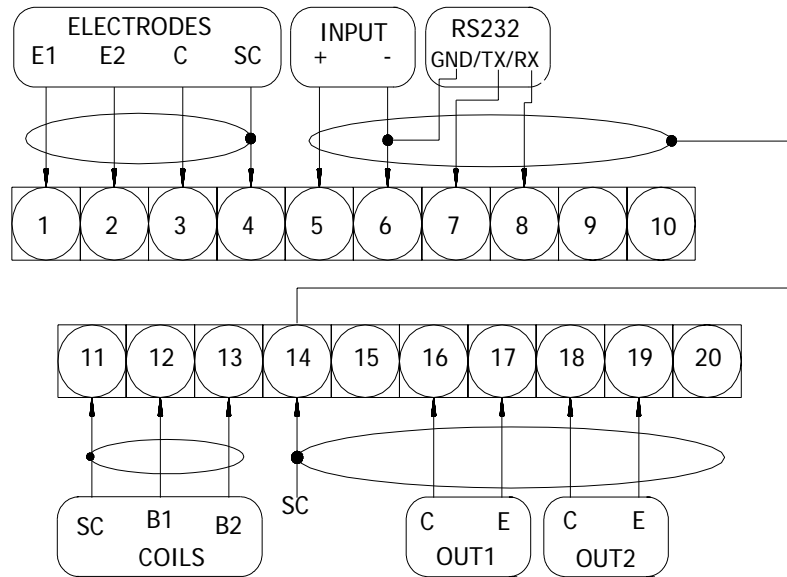
To avoid drawing the batteries in a very short period of time activate the 'Energy Saving' function and set the 'Measure Interval' to a set value.

# POWER SUPPLY LAYOUT

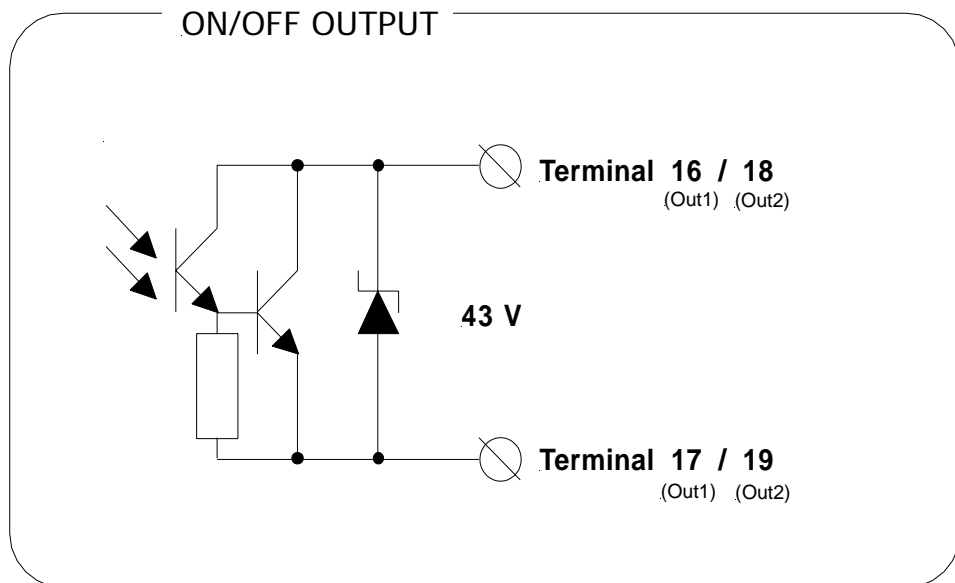


## ELECTRICAL CONNECTIONS

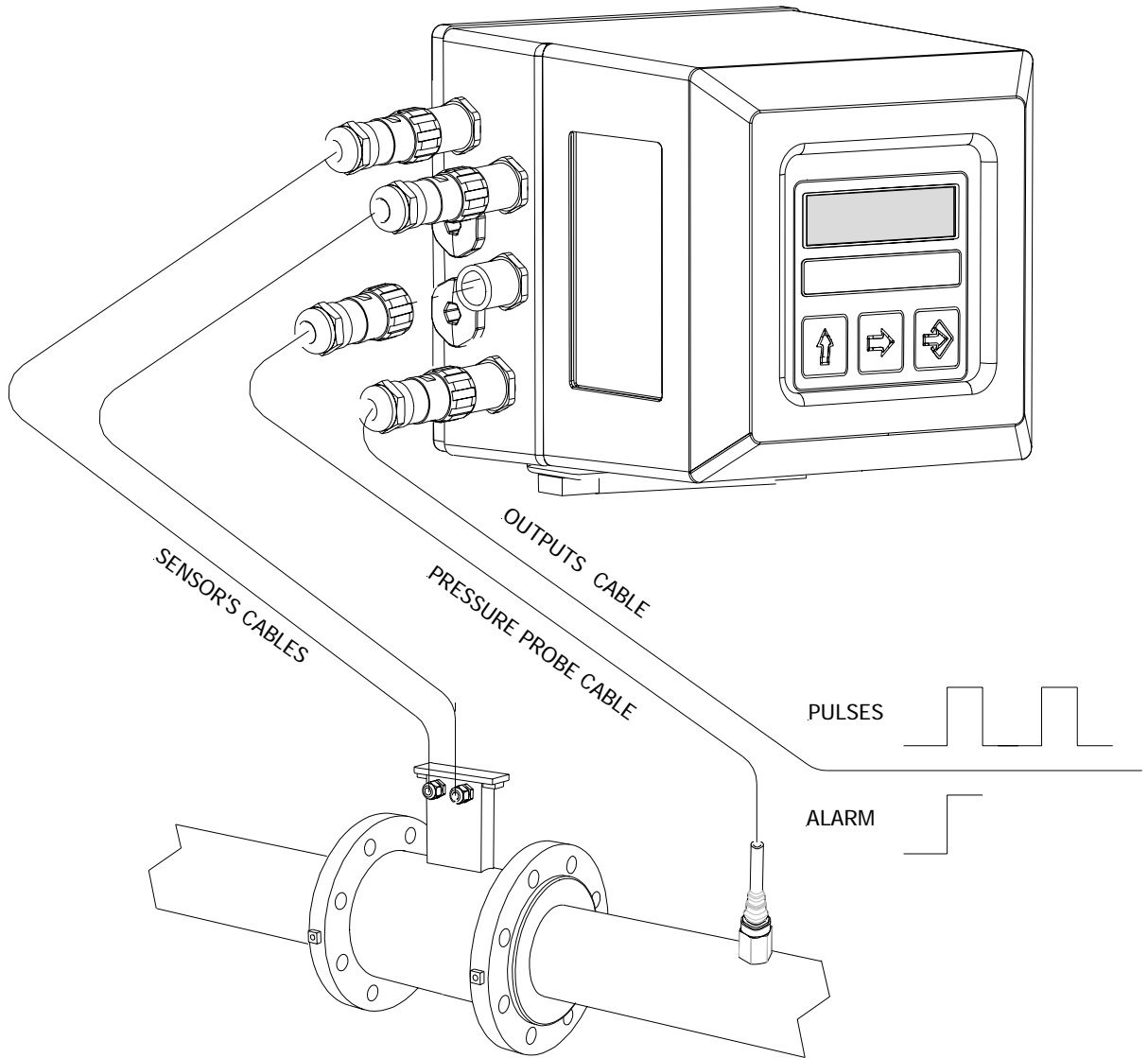
### TERMINAL BLOCK: COMPACT/SEPARATE VERSION



### STANDARD ON/OFF OUTPUT



# IP 68 EXECUTION : CONNECTION WITH IP 68 CONNECTORS



## FUNCTIONS

MAIN MENU  
1-Sensor

```

1-SENSOR
ND=mm      00025
KA=        +00.9900
Sens.type= 000
Ins.Position= 0
KL=+[0] +00.0000
KL=-[0] +00.0000
Ki=        1.0000
Kp=        1.0000
E.P.detect= OFF
E.P.thr.=  100
Autozero cal.
Autozero res.

```

- 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\*Enables the automatic zero calibration system
- 1.11 Reset the preceding value

MAIN MENU  
2-Scales

```

2-SCALES
Fs1=dm³/s 05.000
Tot.MU=dm³ 1.000
Pls1=dm³ 01.0000
Pls2=dm³ 01.0000
Tpls1=ms 0010.0
Tpls2=ms 0010.0
P.Fs=bar +016.00

```

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

MAIN MENU  
3-Measure

```

3-MEASURE
Tconst=s 0001.0
Cut-off=1 01.0
Autocal.= OFF
E.saving= OFF
N.measures= 01
Interval=s 00005
Max.saving= OFF

```

- 3.1\* Time constant
- 3.2 Low flow zero threshold: 0-25% of full scale value
- 3.3 Enable every hour an internal cycle of calibration. The measure it's stopped for 8-15 sec.
- 3.4\* Energy saving function enabling
- 3.5 Number of samples in energy saving ON
- 3.6 Interval time of the measure when energy saving function is enabled (page 12)
- 3.7 Factory parameter

MAIN MENU  
4-alarms

```

4-ALARMS
Max thr+=% 000
Max thr-=% 000
Min thr+=% 000
Min thr-=% 000
P.max th=% 000
P.min th=% 000
Hyst.=% 03

```

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

Note: Only relevant or accessible functions are shown in the group lists on above. Others will be visible on the converter when powered up but are not modifiable or influence normal working of the converter.

MAIN MENU  
5-Inputs

```

5-INPUTS
T+ reset= OFF
P+ reset= OFF
T- reset= OFF
P- reset= OFF
Count lock= OFF
Calibration= OFF
Wake-up= OFF

```

- 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 (see page 18)
- 5.7\* Autozero calibration external command
- 5.8\* Auto- switch on command

MAIN MENU  
6-Outputs

```

6-OUTPUTS
Out1= IMP1
Out2= OFF
Out3= OFF
Out4= OFF

```

- 6.1\* Total direct (positive) flow totalise reset enable
- 6.2\* Partial direct (positive) flow totalise reset enable
- 6.3\* Total reverse (negative) flow totalise reset enable
- 6.4\* Partial reverse (negative) flow totalise reset enable

### MAIN MENU 7-Communication

```

7-COMMUNICATION
IF2 Prot.= DPP
IF2 supply= OFF
RS232 Prot.= DPP
SCADA Prot.= OFF
Address= 000
RS232 bps= 19200
Send data= OFF
Interval= 1h
Send time =00:30
Send delay=m 000
Min.ant.s.= % 25
Send SDL= OFF
Send DDL= OFF
Send EUT= OFF
SMS= OFF
Int.r.SMS=h 1
S.event SMS= OFF
S.p.data SMS= OFF
S.logger SMS= OFF
Clock sync.= OFF
Roaming= OFF
Send data
Send config.
S.p.data SMS
S.logger SMS
  
```

- 7.1 Choice of the communication protocol for the IF2 device
- 7.2 Factory purpose function
- 7.3 Choice of the communication protocol for the RS232 port
- 7.4 Enable SCADA protocol\*
- 7.5 Address value of converter (range 0 - 255)
- 7.6 Speed of the RS232 output (possible choices: 2400, 9600, 19200, 38400 bps)
- 7.7 Enables the sending of emails\*
- 7.8 Interval of e-mail sending\*
- 7.9 Time of sending data\*
- 7.10 Delay of data sending (USEFUL FOR SCADA SYSTEM)\*
- 7.11 Minimum radio signal to allow the communications
- 7.12 Enables the sending of STATIC DATA LOGGER by e-mail\*
- 7.13 Enables the sending of DINAMIC DATA LOGGER by e-mail\*
- 7.14 Enables the sending of EVENTS by e-mail\*
- 7.15 Enable the SMS operations\*
- 7.16 Interval of SMS checking\*
- 7.17 Enable the SMS over event\*
- 7.18 SMS Process Data Send Enable\*
- 7.19 Enables the sending of STATIC DATA LOGGER by SMS\*
- 7.20 Enables clock synchronization with a specified server via the HTTP protocol\*
- 7.21 Roaming enable\*
- 7.22 Send data through e-mail immediately (according to settings of above functions)
- 7.23 Send config through e-mail immediately\*
- 7.24 Send process data through sms immediately(according of above functions)\*
- 7.25 Send data logger through sms immediately(according of above functions) \*

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

### MAIN MENU 8-Display

```

8-DISPLAY
Language= EN
T+ reset
P+ reset
T- reset
P- reset
D.time=s 060
Quick start= OFF
Net total.= OFF
Currency= OFF
Curr.decim.= 2
EUR/dm³+ 01.0000
EUR/dm³- 01.0000
  
```

- 8.1 Choice of the language: EN= English, IT=Italian, FR= French, SP= Spanish
- 8.2\* Total direct (positive) flow totalizer reset from keyboard
- 8.3\* Partial direct (positive) flow totalizer reset from keyboard
- 8.4\* Total reverse (negative) flow totalizer reset enable from keyboard
- 8.5\* Partial reverse (negative) flow totalizer reset enable from keyboard
- 8.6 Time for switch off display (shown with function 3.7 enabled)
- 8.7 Visualization of "Quick start menu"
- 8.8 Enable the page of net totalizer (difference between direct and reverse. see page 16)
- 8.9 Visualizes the values of the partial totalizer in the unit of selected currency
- 8.10 Choice of the numbers of decimals for the visualization currency value: From 0 to 3
- 8.11\* Value of conversion/currency for direct totalizer
- 8.12\* Value of conversion/currency for reverse totalizer

### MAIN MENU 9-Data logger

```

9-DATA LOGGER
Acquisition= ON
1992/01/06 23:14
T.zone=h +00.0
Interval=m 1
Log T+= OFF
Log T-= OFF
Log FLOW= OFF
Log AUX= OFF
M.units= ON
Separator= ,
Disp.dyn.data
Display data
Display events
Disp.min/max
Clear dyn.data
Clear data
Clear events
Reset min/max
  
```

- 9.1\* Automatic data logger enable
- 9.2\* Date and time set
- 9.3 Set of Time Zone ( Against GMT -12 to +12 hours)
- 9.4\* Interval time for the data logging function: 1, 2, 3, 5, 15, 30, 60 minutes
- 9.5 Enables the sending of direct totalizer
- 9.6 Enables the sending of reverse totalizer
- 9.7 Enables the flow rate sending
- 9.8 Enables the sending of an auxiliary input ( PRESSURE )
- 9.9 Enables the sending of measure units ( technical units )
- 9.10 Choice of the separator character for CSV format ("," or ";")
- 9.11\* Display dynamic data
- 9.12 Displaying of the data stored in the data logger
- 9.13 Displaying of the last 64 alarms stored in the data logger
- 9.14 Visualization function of minimum and maximum peak of flow rate
- 9.15 Logged dynamic data clearing function
- 9.16 Logged data clearing function
- 9.17 Reset all alarm events
- 9.18 Reset all minimum and maximum peak of flow rate stored

```
MAIN MENU
10-Dia9nostic
```

```
10-DIAGNOSTIC
Calibration
Self test
Simulation= OFF
Stand-by
```

- .10.1\* Enable the calibration of the converter
- .10.2\* Converter auto-test
- .10.3\* Flow rate simulation enabling
- .10.4\* Stand-by function

```
MAIN MENU
11-Internal data
```

```
11-INTERNAL DATA
L2 keycode=00000
Lock level= 3
N.batt.= 1
Load fact.Pres.
Load user Pres.
Save user Pres.
Hours= 000015
KS= +1.0000
```

- .11.1 Level 2 access code enter
- .11.2 Block level function can be set from 0 to 3
- .11.3 Number of batteries installed
- .11.4 Load factory data pre-set
- .11.5 Load user data saved
- .11.6 Save user data
- .11.7 Visualisation of the total operation hours of the converter (function not editable)
- .11.8 Ks Coefficient

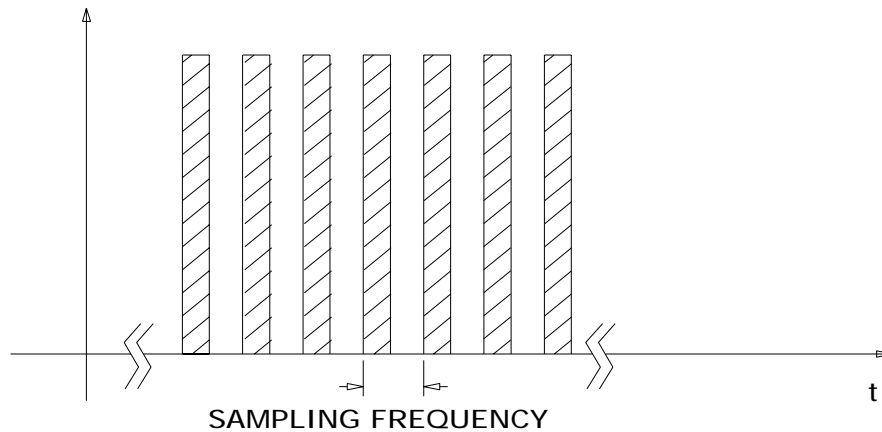
Note : all page number references are to the operating manual .

## MEASURE / SAMPLING FREQUENCY

The ML 250 converter can measure in two different modes:

### CONTINUOUS SAMPLING

In this mode the converter measures according to the classic mag meter scheme; the system consumption, for any sensor diameter, is 0,1 W; the battery life is 1 month with 1 battery ; 1 month \* N (N = number of additional battery). The system accuracy is defined according to this operation mode.

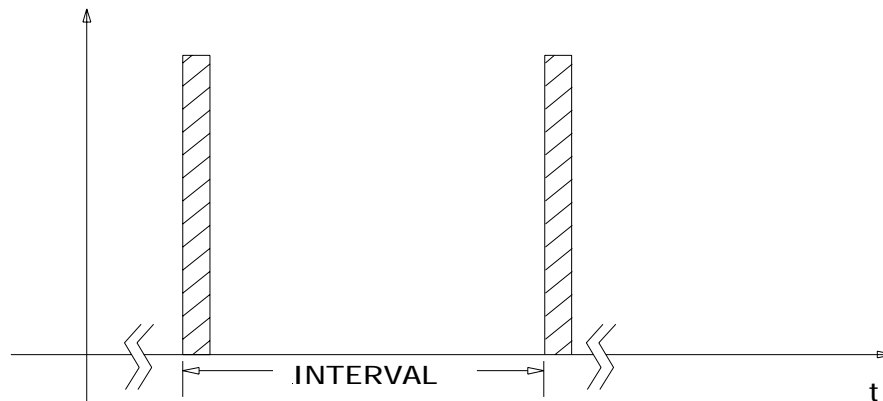


### SAMPLING AT PROGRAMMED INTERVAL

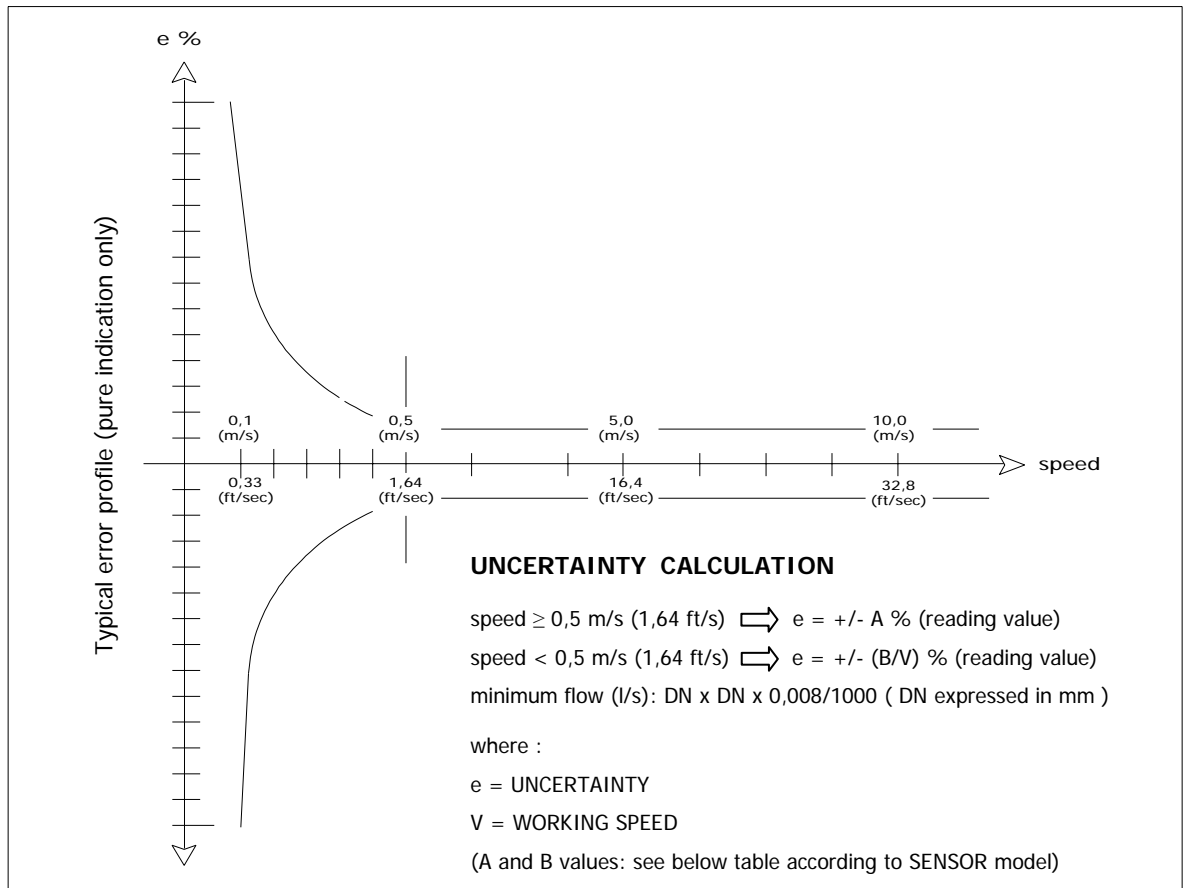
The mode to sample at intervals allows for large battery power savings; the consumption is the following:

Sampling time (s)	Battery life - n° 1 battery (years)	Battery life - " N " batteries (years)
1	0,7	0,7 * N
2	1.3	1.3 * N
5	2.1	2.1 * N
10	2.7	2.7 * N
15	3.0	3.0 * N

Regardless of the number of batteries, the maximum operating time is limited to 10 years



## ACCURACY TABLE



### 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

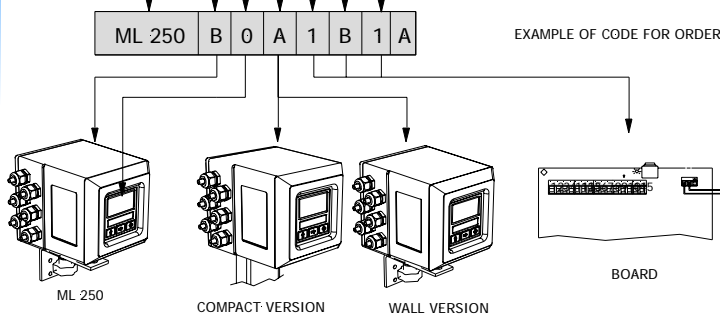
MS3770			MS3800		
A	B(m/s)	B(ft/s)	A	B(m/s)	B(ft/s)
2,0	1,0	3,28	2,0	1,0	3,28

Reference conditions :

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

# HOW TO ORDER

ML 250	<b>Display</b>
A	Blind version without display and keyboard
B	Alphanumeric LCD display 2 line, each of 16 characters and 3 programming keys
<b>Housing material - Protection rate</b>	
0	Painted aluminum die casting , protection rate IP 67 - MODULE AVAILABLE : 0-3-4-5-7-8-a-b
1	AISI304 housing, protection rate IP67 ( DISPLAY NOT ROTABLE ) MODULE AVAILABLE : 0-3-4-5-7-8-a-b
5	AISI304 housing, IP68 1,5 meters under water ( ONLY COMPACT DISPLAY NOT ROTABLE ) - MODULE AVAILABLE : 7-9
6	Painted aluminum die casting IP 68 1,5 meters under water(ONLY COMPACT DISPLAY NOT ROTABLE) - MODULE AVAILABLE : 7-9-c-d
7	Painted aluminum die casting IP 68 1,5 meters under water ( ONLY FOR SEPARATE VERSION ,DISPLAY NOT ROTABLE ) MODULE AVAILABLE : 7-9-c-d , COMPLETE WITH 2 CONNECTORS IP 68 FOR CABLE C012/C013
<b>Version</b>	
A	Compact version with sensor MS.... (liquid maximum temperature 100 °C)
B	Separate version for wall monting, complete with mounting accessories in Carbon Steel (painted RAL6028) ; CABLE C015/C016
D	Separate version for wall monting, complete with mounting accessories in Stainless Steel (AISI 304) ; CABLE C015/C016
<b>Power supply</b>	
0	N° 1 Lithium Battery - Without Universal
1	N° 1 LITHIUM BATTERY+ UNIVERSAL POWER SUPPLY
2	N° 4 LITHIUM BATTERY(1+1 OF 3 ELEMENTS PACK NECESSARY WITH GPRS ) + UNIVERSAL
4	N° 6 LITHIUM BATTERY ( N° 2 X 3 ELEMENTS PACK ) - WITHOUT UNIVERSAL
5	N° 3 LITHIUM BATTERY ( N° 1 OF 3 ELEMENTS PACK ) - WITHOUT UNIVERSAL
6	n° 4 LITHIUM BATTERY( 1+1 OF 3 ELEMENTS PACK NECESSARY WITH GPRS )-WITHOUT UNIVERSAL
7	WITHOUT BATTERY WITH UNIVERSAL POWER SUPPLY
8	WITHOUT BATTERY WITHOUT UNIVERSAL POWER SUPPLY
<b>Input</b>	
A	Without remote input
C	Input for pressure probe ( to be specified the pressure span - add the gauge price )
D	Pressure input with IP 68 male connector( to be specified the pressure span - add the gauge price )
Z	Other
<b>Additional module</b>	
0	n° 4 ON/OFF out ( max 50 Hz - max 100 mA )
1	Without additional module
3	n. 2 ON/OFF out
4	RS 232 communication port
5	GPRS MODULE (Ant. on converter)+ETP+Flowiz Serv.
7	GPRS MODULE (Ant. 3 meters cable)+ETP+Flowiz Serv.
8	N° 2 DIGITAL OUT + RS 232
9	N° 2 DIGITAL OUT + RS 232 WITH IP 68 connector
a	GPRS MODULE (Ant. on converter)+ETP+Flowiz Serv. + 2 ON/OFF OUT
b	GPRS MODULE (Ant. 3 meters cable)+ETP+Flowiz Serv. + 2 ON/OFF OUT
c	n° 2 ON/OFF out ( max 50 Hz - max 100 mA ) complete with IP 68 connector
d	n° 4 ON/OFF out ( max 50 Hz - max 100 mA ) complete with IP 68 connector
<b>Special Features</b>	
A	NONE
B	WITH ANTICONDENSE CAP
C	Female Connector IP68 for the modules : 9,c,d (One piece , 10 contacts)



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