

# ISOMAG ™

*The friendly magmeter*

**FAST SAMPLING CONVERTER**

## ML4-F1



**HIGH SAMPLING RATE CONVERTER  
(UP TO 400 SAMPLES/SECOND)**

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

**ISOIL**   
INDUSTRIA  
*The solutions that count*

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## TECHNICAL DATA

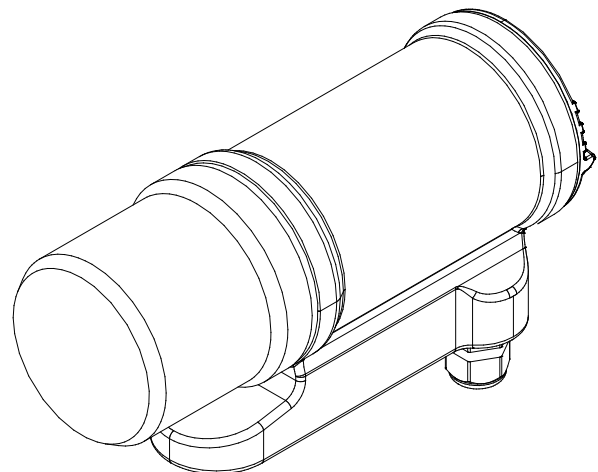
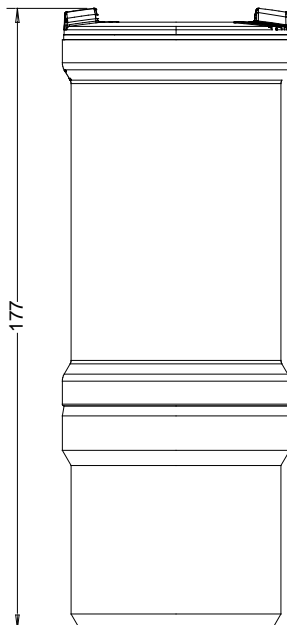
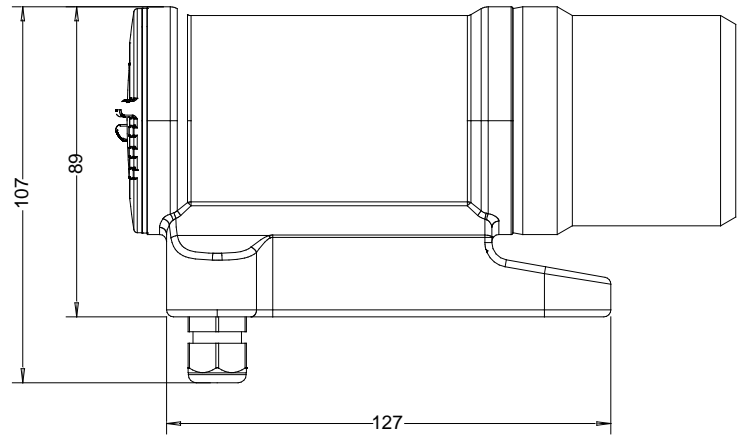
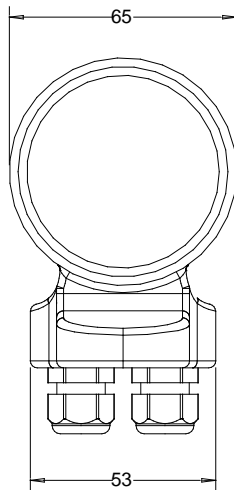
<i>OVERALL FEATURES</i>	
<b>Suitable For</b>	<input type="checkbox"/> <b>All the ISOMAG sensors</b>
<b>Minimum conductivity</b>	<input type="checkbox"/> <b>5 <math>\mu</math>S/cm</b>
<b>Altitude</b>	<input type="checkbox"/> <b>-200 m up to 2000 m</b>
<b>Ambient Temperature</b>	<input type="checkbox"/> <b>-20... +60°C / -4... +140 °F ( max 40°C 104°F with liquid &gt; 60 °C 140°F)</b>
<b>Liquid temperature</b>	<input type="checkbox"/> <b>Max 100°C 212°F ( 130°C 266°F for 30 min ; no time limits if converter off )</b>
<b>Humidity Range</b>	<input type="checkbox"/> <b>0÷100% (IP 67)</b>

<i>STANDARD FEATURES</i>	
<b>Housing materials</b>	<input type="checkbox"/> <b>Stainless steel AISI 304</b>
<b>Protection Rate</b>	<input type="checkbox"/> <b>IP 67</b>
<b>Power Supply</b>	<input type="checkbox"/> <b>18-30 V <math>\overline{\text{---}}</math></b>
<b>Cable Gland</b>	<input type="checkbox"/> <b>N° 2 CABLE GLAND PG 9</b>
<b>Full scale value</b>	<input type="checkbox"/> <b>0,4...10m/s</b>
<b>Protocols</b>	<input type="checkbox"/> <b>ETP</b>
<b>Galvanic Isolation</b>	<input type="checkbox"/> <b>All the inputs/outputs are galvanically isolated from power supply</b>
<b>Programming Plug In</b>	<input type="checkbox"/> <b>Protected plug in for connection to PC</b>
<b>Data Storage</b>	<input type="checkbox"/> <b>Eeprom stored measuring values on power failure</b>
<b>Bi-Directional</b>	<input type="checkbox"/> <b>Yes</b>
<b>Diagnostic Funct.</b>	<input type="checkbox"/> <b>Yes</b>
<b>Empty Pipe Detect.</b>	<input type="checkbox"/> <b>Yes</b>
<b>Batch Function</b>	<input type="checkbox"/> <b>Yes, also with auto-preset</b>
<b>CE Certification</b>	<input type="checkbox"/> <b>Yes</b>

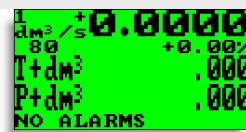
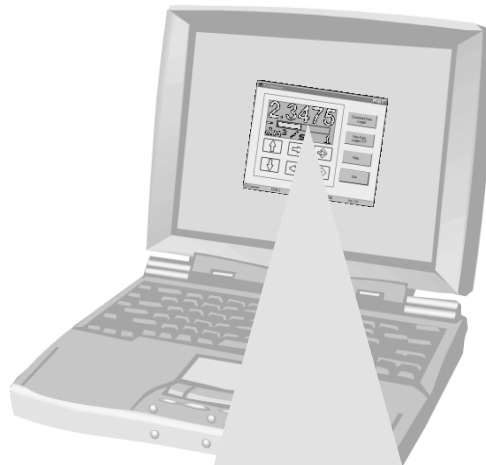
<b>OPTIONAL FEATURES</b> (CHECK HOW TO ORDER, AT LAST PAGE, FOR MORE DETAILS)	
<b>Power Supply</b>	<input type="checkbox"/> 20-30 V $\overline{\text{---}}$ with 4/20 mA
<b>Pulses/ Alarm Outputs</b>	<input type="checkbox"/> N°2 , 1250 Hz, 100mA, 40 V $\overline{\text{---}}$
<b>Digital Input/Outputs</b>	<input type="checkbox"/> N° 5 O.C. freely Programmable function ( as input or output, see pag. 5 for details )
<b>Current Output</b>	<input type="checkbox"/> (OPTIONAL) 4...20mA – RL 500 $\Omega$ passive (p.s. 20-30 VDC)
<b>Communication interface</b>	<input type="checkbox"/> RS485/PROFIBUS DP
<b>Protocols</b>	<input type="checkbox"/> ETP/Profibus DP

<b>ACCURACY</b>	
<b>Measurement Tolerance</b>	<input type="checkbox"/> Flow rate (volume) = $\pm 0,05\%$ r.v. <input type="checkbox"/> Out 4/20 mA = $\pm 0,5\%$ r.v. <input type="checkbox"/> Frequency Out = $\pm 0,08\%$ r.v.
<b>Repeatability</b>	<input type="checkbox"/> Better than 0,01%
<b>Accuracy (whole system converter+sensor)</b>	<input type="checkbox"/> See table below

## OVERALL DIMENSIONS



## VISUALIZATION PAGES



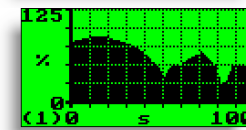
Flowrate and totalizers visualization



Flowrate, speed values and graph



Flowrate value and Full scale %



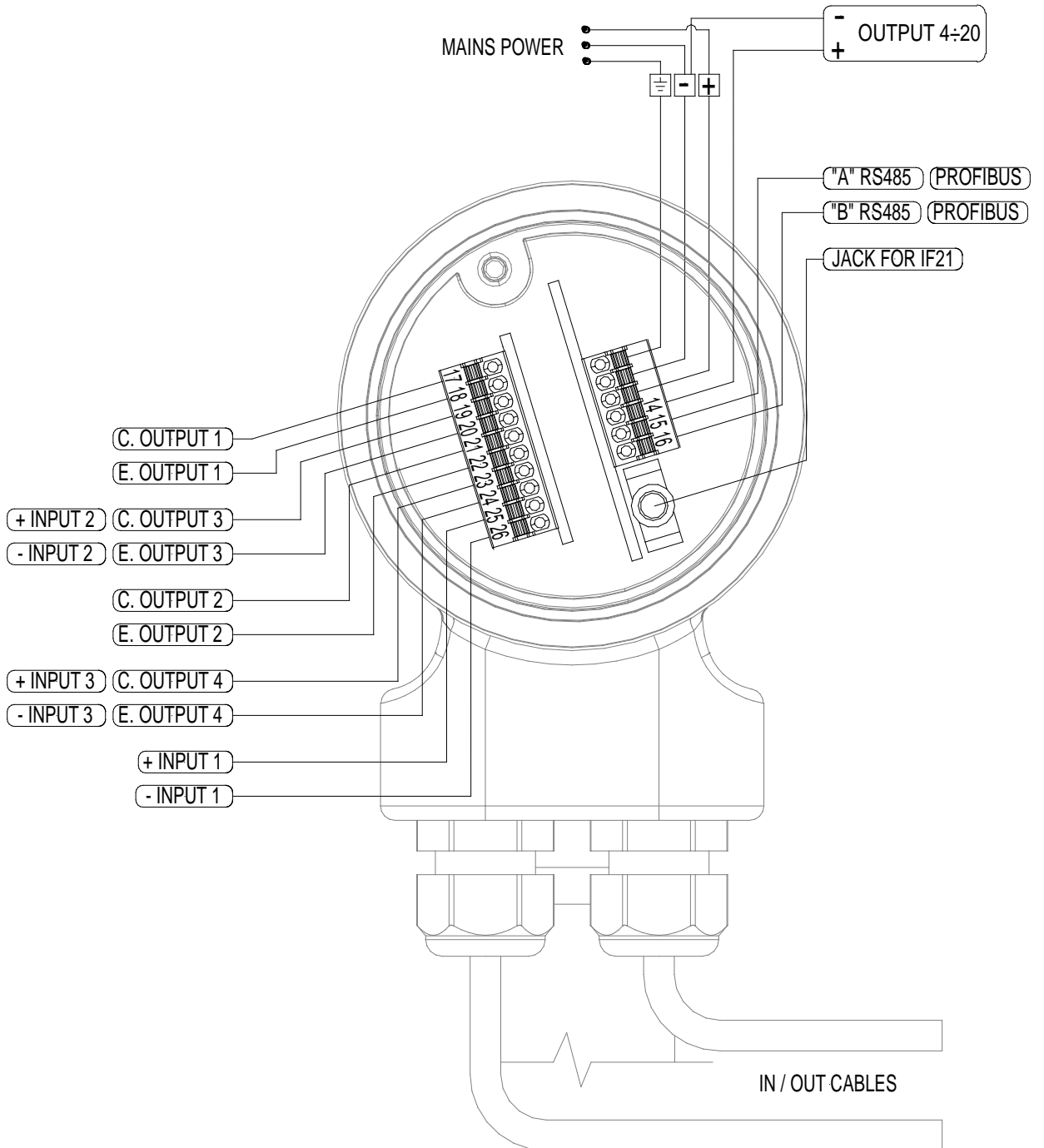
Flowrate graph



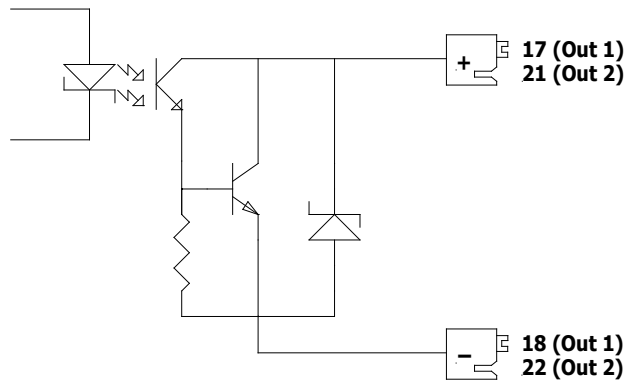
Flowrate value with currency function enabled

**Different visualisation possibilities with the simple press of a key**

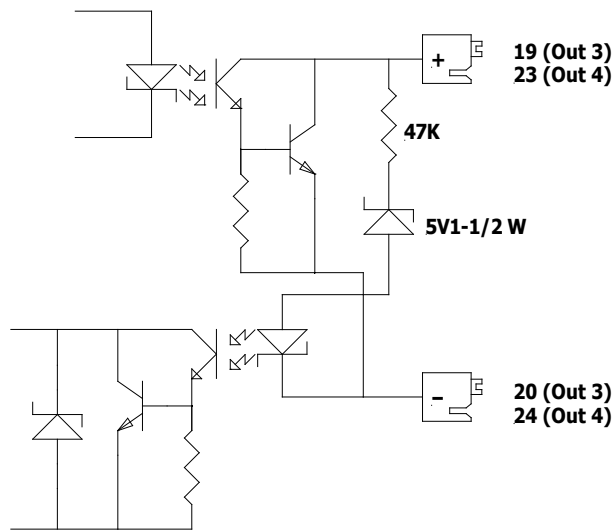
# ELECTRICAL CONNECTIONS



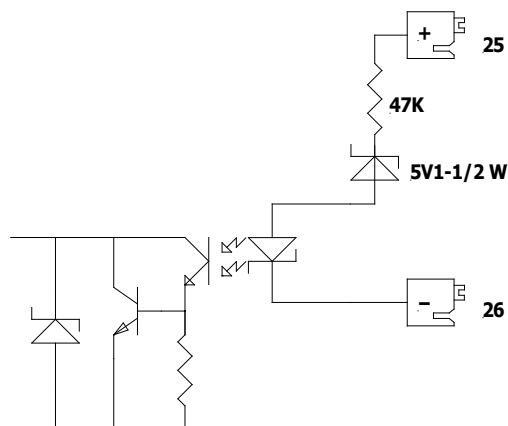
**OUTPUT 1/2**



**PROGRAMMABLE INPUT/OUTPUT**



**INPUT**





# FUNCTIONS

```

MAIN MENU
1-Sensor
2-Scales
1-SENSOR
ND=mm 00025
KA=mm +01.0000
S.model= 014
Ki= 1.0000
Kp= 1.0000
E.p.detect= OFF
E.cleaning= OFF
E.p.thr.= 200
Autozero cal.
                    
```

- 1.1 Insert the Nominal Diameter of the sensor (0-3000mm)
- 1.2 Calibration data of sensor visualized on sensor label
- 1.3 Sensor model: enter the first two characters of the sensor serial number
- 1.4 Factory parameters
- 1.5 Enables the empty pipe detection feature
- 1.6\* Electrodes cleaning
- 1.7\* Value of empty pipe sensibility detection
- 1.8\* Enables the automatic zero calibration system

```

MAIN MENU
1-Sensor
2-Scales
2-SCALES
Fs1=dm³/s 5.0000
Fs2=dm³/s 8.1920
MlTot.=dm³ 1.000
Imp1=dm³ 1.00000
Imp2=dm³ 1.00000
Ipul1=ms 0050.00
Ipul2=ms 0050.00
Sg=kg/dm³ 01.0000
                    
```

- 2.1\* Full scale value set for range N.1
- 2.2\* Full scale value set for range N.2
- 2.3\* Unit of measure and number of decimal totalizes
- 2.4\* Pulse value on output 1
- 2.5\* Pulse value on output 2
- 2.6\* Duration of the pulse generated on output 1
- 2.7\* Duration of the pulse generated on output 2
- 2.8 Specific gravity set in kg/dm³ (enable only if FS1 or FS2 are weigh/time)

```

MAIN MENU
1-Sensor
2-Scales
3-Measure
3-MEASURE
Damping= OFF
Cut-off=% 10.0
Start thr=% 00.0
Autocal.= OFF
Autorange= OFF
                    
```

- 3.2\* Measure filter
- 3.1 Low flow zero threshold: 0-25% of full scale value
- 3.4 Only for service purposes
- 3.5 Enable every hour an internal cycle of calibration. The measure is stopped for 8-15 sec.
- 3.6\* Automatic change of scale

```

MAIN MENU
1-Sensor
2-Scales
3-Measure
4-alarms
4-ALARMS
Max thr+=% 000
Max thr-=% 000
Min thr+=% 000
Min thr-=% 000
Hyst.=% 03
M.A.v.fault=% 000
Timeout=s 00.0
                    
```

- 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 Hysteresis threshold set for the minimum and maximum flow rate alarms
- 4.6\* Current output value in case of failure
- 4.7\* Batch safety timer

```

MAIN MENU
1-Sensor
2-Scales
3-Measure
4-alarms
5-inputs
5-INPUTS
T1 reset= OFF
T2 reset= ON
Puls.reset= OFF
Count lock= OFF
Meas.lock= ON
Calibration= OFF
Range change= OFF
Batch= ON
Inp.2= OFF
Inp.3= OFF
                    
```

- 5.1\* Total direct (positive) flow totalizer reset enable
- 5.2\* Partial direct (positive) flow totalizer reset enable
- 5.3 Reset totalizer of pulse from digital input (see page 13)
- 5.4 Totalizer counting lock command (see page 13)
- 5.5\* Block measures command
- 5.6\* Autozero calibration external command
- 5.7 Range change external command (see pos. 3.5)
- 5.8 Batch start/stop external command (see batch functions)
- 5.9\* Functions assigned to input 2 (automatically disabled if OUT3 is enabled)
- 5.10\* Functions assigned to input 3 (automatically disabled if OUT4 is enabled)

Functions assigned on input 1

```

1-Measure
2-alarms
3-Inputs
4-Outputs
5-Outputs
6-OUTPUTS
Out1= #1 IMP+
Out2= SIGN
Out3= OFF
Out4= #2 IMP+
Out1 mA=4:22

```

- 6.1\* Output 1 functions
- 6.2\* Output 2 functions
- 6.3\* Output 2 functions
- 6.4\* Output 4 functions
- 6.5\* Choice of the function and the range of current output n.1

```

6-Outputs
7-COMMUNICATION
IF2 pr.= DPP
Address= 000
Speed= 38400
A.delay=ms @

```

- 7.1 Choice of the communication protocol for the IF2 device
- 7.2 Address value of the converter
- 7.3 Speed of the RS485 output (possible choices: 4800, 9600, 19200, 38400 bps)
- 7.4 Instrument answer delay

```

6-Outputs
7-Communication
8-DISPLAY
Language= EN
Totaliz.= T+/T-
D.rate=Hz 10
Quick start= OFF
T1 reset
T2 reset

```

- 8.1 Choice of the language: EN= English, IT=italian, FR= French, SP= Spanish
- 8.2 Display totalizer mode
- 8.3 Updating frequency on the display: 1-2-5-10 Hz
- 8.4 Quick start menu visualization
- 8.5\* Volume totalizer 1 reset
- 8.6\* Volume totalizer 2 reset

### Menu 9 visualized only IF batch is active

```

9-BATCH
N.samples= 000
Hyst.=% 010
U.com.dm= 00.000
U.pre.dm= 00.000
Auto batch= OFF
BM auto sel= OFF
Cons.mode= OFF
8-Display
9-BATCH
10-Diagnostic
11-Internal data

```

- 9.1\* Number of batch cycles to be done to define the value of compensation.
- 9.2\* % limit of compensation threshold
- 9.3\* Compensation value
- 9.4\* Prebatch value
- 9.5\* Auto-batch
- 9.6\* Automatic selection of batch formula
- 9.7\* Static consent of batch

```

MAIN MENU
10-DIAGNOSTIC
Calibration
Self test
Simulation= OFF
STAND-BY
Firmware rev.
7-Communication
8-Display
9-Batch
10-Diagnostic
11-Internal data

```

- 10.1\* Enable the calibration of the converter
- 10.2\* Converter autotest
- 10.3\* Flow rate simulation enabling
- 10.4 Stand-by of converter to reduce the consumption during service operation
- 10.5 Firmware revision/version

```

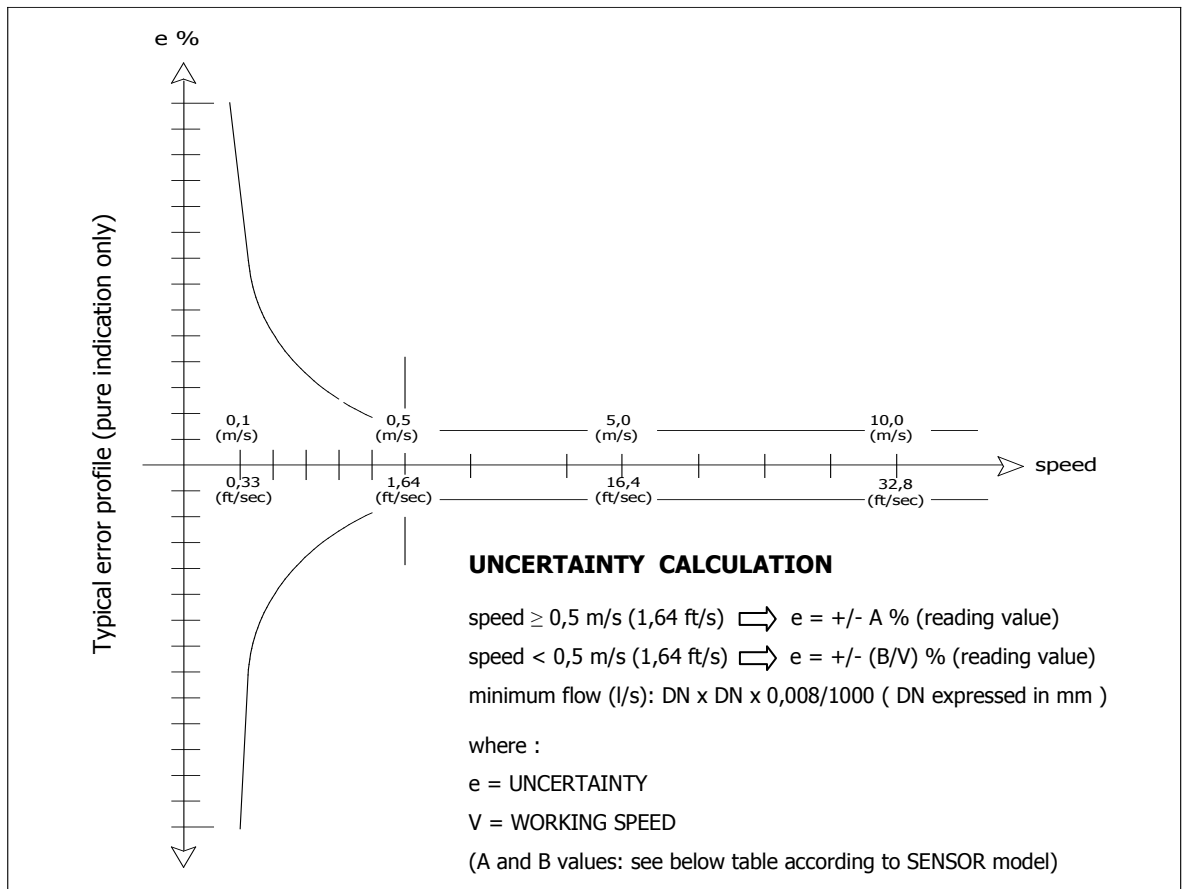
MAIN MENU
1-Sensor
11-INTERNAL DATA
L2 keycode=*****
Load fact.pres.
Load user pres.
Save user pres.
Ign.cal.err= OFF
KS= +1.0000
10-Diagnostic
11-Internal data

```

- 11.1 Level 2 access code enter
- 11.2 Load factory data pre-set
- 11.3 Load user data saved
- 11.4 Save user data
- 11.5 Ignore the calibration error during the switch on test
- 11.6 Ks coefficient (only for service purposes)

Note : all page number references are to the operating manual

## ACCURACY TABLE



### FULL BORE SENSORS

MS501/MS1000/MS2410/MS2500			MS 600			MS5000		
A	B(m/s)	B(ft/s)	A	B(m/s)	B(ft/s)	A	B(m/s)	B(ft/s)
0,2	0,1	0,33	0,4	0,2	0,66	2	1	3,28

### INSERTION SENSORS

**See MS 3770 / MS 3800 DATA SHEET**

Reference conditions :

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

## HOW TO ORDER

<b>Display</b>	
A	<b>A</b> Blind execution (without display and programming keys)
<b>Housing material / Protection rate</b>	
1	<b>1</b> AISI304 Stainless Steel housing, protection rate IP67
<b>Version</b>	
A	<b>A</b> Compact version with sensor MS... Max LIQUID T=100°C - 212°F (130°C - 266°F for 30 min ; no time limits if converter off )
<b>Analogue output</b>	
0	<b>0</b> Without Analogue output
	<b>1</b> Analogue output 4...20/22 mA ( passive )
<b>Additional module</b>	
A	<b>A</b> Without additional module
	<b>B</b> <b>ME35</b> : Profibus DP
	<b>C</b> <b>ME36</b> : RS485 serial interface module
	<b>D</b> <b>ME35</b> : Profibus DP , <b>complete with 2 connectors : 1 for Profibus connection and 1 for Power Supply + IN/OUT conn</b>
	<b>E</b> <b>M12 Male connector for Power Supply and output</b>
	<b>F</b> <b>ME36</b> : RS 485 , <b>complete with 2 connectors: n° 1 for RS 485 connection and 1 for Power Supply + IN/OUT conn</b>
	<b>G</b> <b>ME35</b> : Profibus DP , <b>complete with 3 connectors : n° 2 for Profibus connection (Male+Female) and n° 1 for Power Supply + IN/OUT conn</b>



ML4-F1-A1A0A (Complete code example for order)

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