MicroComp

EMKO Group

MICROMAG F31

micomp.cz

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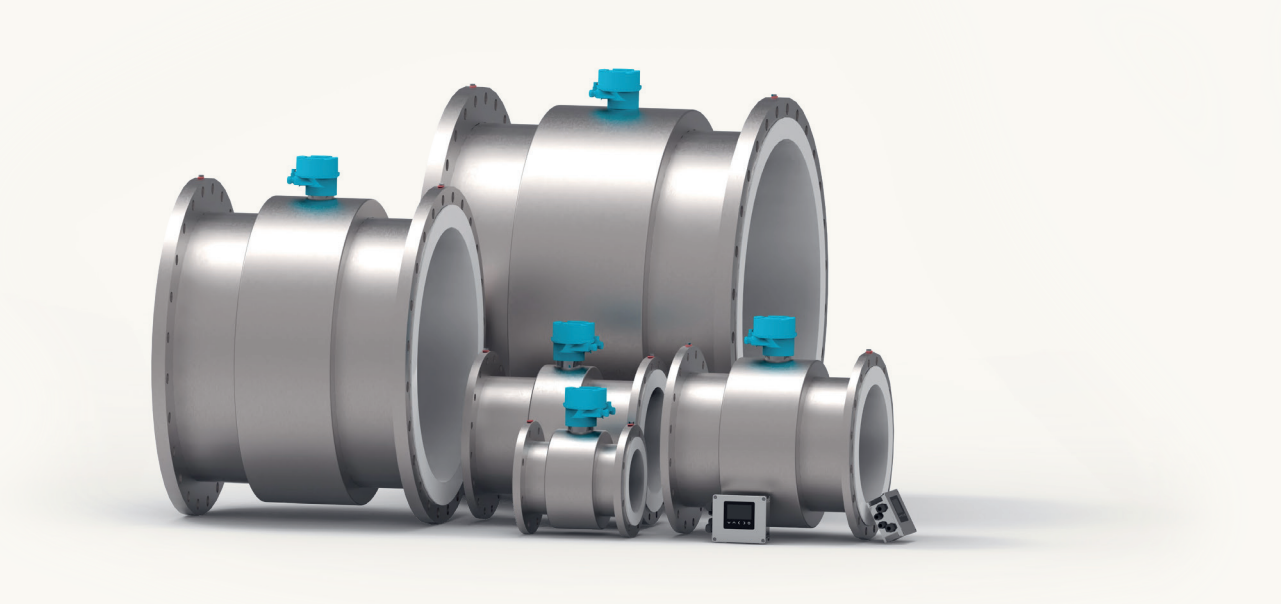
A Introduction to MICROMAG F31



The F31 MAGMETER has been designed for use in water resources management technologies to measure clean/waste-water flow as well as the flow of other conductive fluids. This instrument features high accuracy and stability for bidirectional flow measurement within the range of 0.1 to 10 m/s. The standard instrument includes a large graphic display, a keyboard and 3 isolated programmable outputs for remote data transfer. Two outputs may be used as pulse/status outputs and one as a current output. The standard model also features an internal data logger and an RS232 data output. Available is also a GSM module for remote data reading using SMS.

Key Features:

- Sensor spool in sizes from DN6 to DN1400 (NPS 1/2" to 56")
- Accurate measurement (up to 0.2% of reading) over wide range of flow velocity (0.1 ~ 10 m/s)
- Corrosion resistive internal liner in different materials (suitable for corrosive services)
- Empty Pipe Detection (EPD – 4th electrode)
- CIP (Cleaning in Place) mode available
- LCD Display by default
- Different power supply options (230 VAC or 14~34 VDC)
- Active & Passive Analogue, Pulse & Programmable Binary and frequency outputs
- Optional Digital communications (HART, Modbus RTU, M-Bus)
- Available in both Compact & Remote transmitter versions
- Internal Data logger

B Principle of operation & measurement

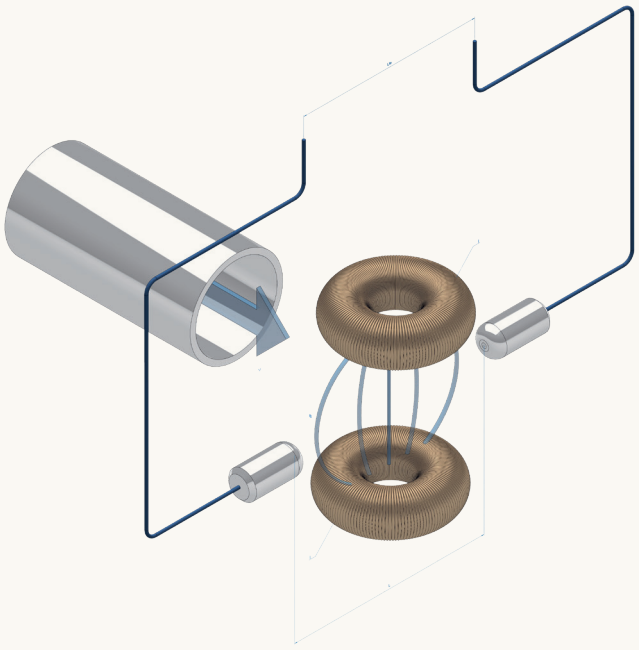
Based on Faraday`s law of magnetic induction, if a conductor moves through a magnetic field, a voltage is being generated (induced). This principle can be incorporated to measure a passing liquid medium (which act as a conductor) though a known magnetic field in a closed conduit by have 2 isolated measurement electrodes.

The induced voltage will have a proportional relationship to the Velocity of the medium through the said conduit. Since we already know the cross-section area of the closed conduit that liquid is passing, we can have “Volumetric Flowrate”.

Basically, an Electromagnetic flow meter is a magnetic field generator & voltage meter at the same time.

Ue: Induced voltage
B: Magnetic induction (magnetic field)
L: Electrode spacing
I: Current
v: Flow velocity

- Induced voltage $Ue = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$



For above mentioned reasons, the liquid medium should be a “Conductive” type and gases cannot be measured by this type of flowmeters. The conductivity of the liquid should be at least 5 µS/cm.

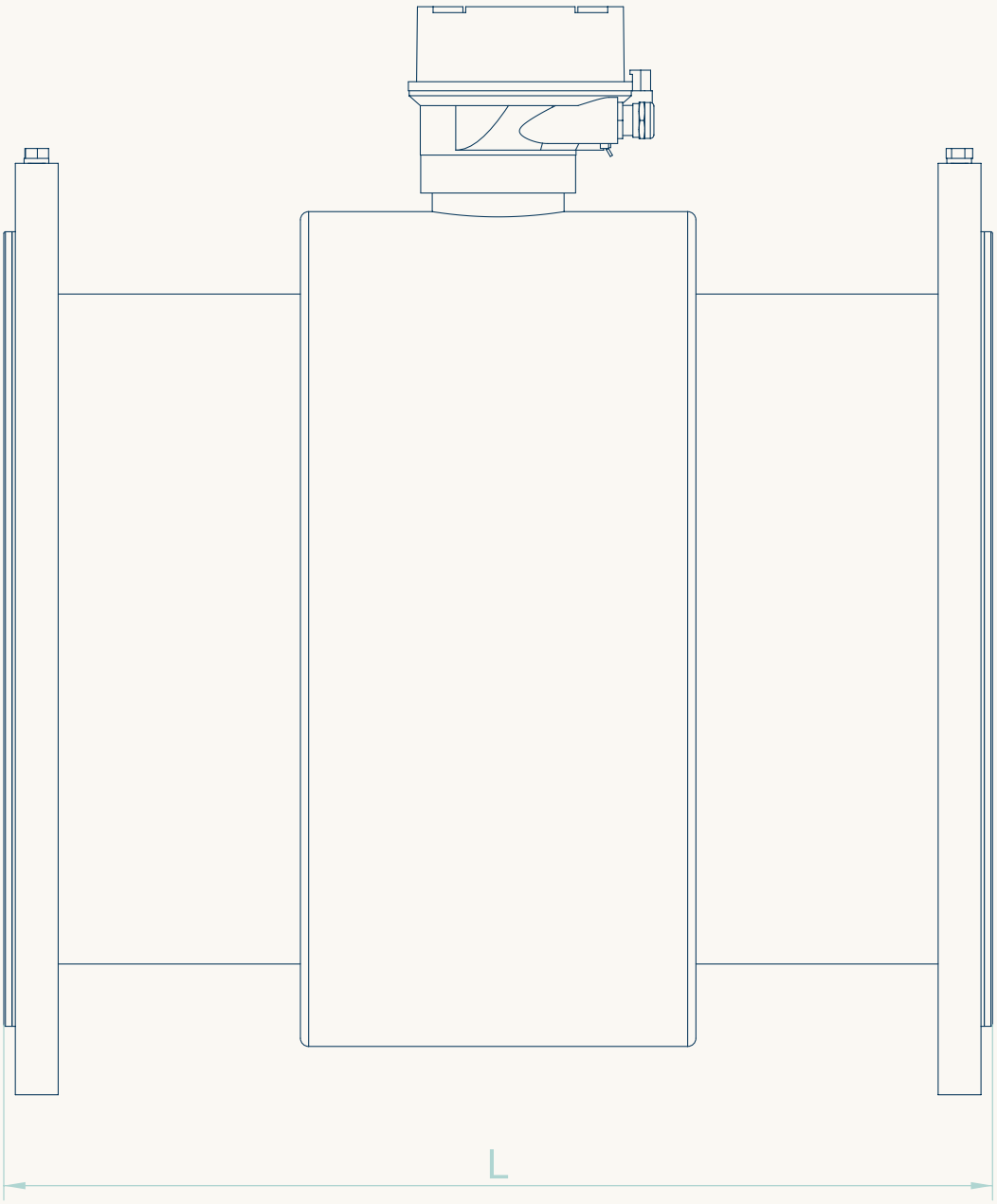
C General specifications

Sensor Spool Size:	DN6 to DN1400 (NPS 1/2"to 56")
Operating pressure:	PN10 to PN63 (ASME/ANSI 150# to 600# depends on size)
Process connection:	Flanges as per EN 1092 or ASME B16.5, threaded, wafer, clamp
Measuring tube material:	Main Spool: non-ferrous Austenite steel (EN 1.4301/304) Flanges: Carbon steel (EN 1.0460 / A105 N) (other materials are available in case of need)
Measuring tube liner:	Hard rubber: for DN50 and above (−5 ~ +80 °C) PTFE: for DN25 to 300 (−5 ~ +135 °C) (PTFE for other sizes are available) ETFE: for DN250 and above (−5 ~ +135 °C) PFA: For DN6, 8 & 10 only (up to +180 °C) PP: (up to +90 °C)
Sensing electrodes/Material:	2x Measuring, 1x Grounding, 1x Empty Pipe Detection (EPD) 1.4404 / SS 316 L stainless steel, Titanium, Tantalum, Hastelloy C276
Flow velocity range:	0.1 to 10 m/s
Flow Direction:	Bi-directional
Measurement error:	0.5% of measured value (0.5 to 10 m/s flow rate)
	0.8% of measured value (0.1 to 0.5 m/s flow rate)
	0.2% of optional value (special calibration)
Repeatability:	0.1 % of measured value
Ambient temperature:	−20 to 60°C
Operating temperature:	−40 to 175°C (depending on lining material)
Power supply:	Externally powered (4-wire configuration), 230 VAC (optional 12–34 VDC)
Power input:	max. 10 VA (10 Watts)
Outputs:	Binary 1: programmable multifunctional (pulse/status), isolated (relay, 125 V/1A or 30V/2A loading)
	Binary 2: programmable multifunctional (pulse/status), isolated (NPN transistor, max. 30 V/50 mA loading)
	Analogue 1: Active current (0 to 20 mA / 4 to 20 mA up to ≤500Ω loop load), galvanically isolated
	Analogue 2: Passive current (0 to 20 mA / 4 to 20 mA up to ≤500Ω loop load), galvanically isolated
	Frequency output scalable from 1 to 10 KHz (for calibraion purposes)
Communication:	RS232 Modbus RTU, HART, M-Bus, SMS via internal GSM module
Data logger:	Logging up to 100 samples
Cable conduits:	2 x ISO M20 × 1.5 + 2 x ISO M16 × 1.5 (other options available)
Display graphic:	Matrix LCD (128 × 64 pixels), 68 × 42mm visible area, with backlight
	Intensity adjustable by a potentiometer, 20 mm characters,
	Displaying simultaneously instantaneous and total flow rates in both directions.
	5-bottom interation keypad
Min Req. liquid Conductivity:	5 µS/cm
Transmitter Housing	Painted Di-cast Alu. Alloy + SS Cover plate
Pressure loss:	Negligible (almost no pressure loss)
Ingress protection:	IP68 (Sensor), IP65/66 (Transmitter)

D Size/weight chart with possible flowrates

PN10 Variant

DN	L (mm)	Weight (kg)	Flow rate (lit/Sec)		Flow rate (m3/hr)	
			Qmin	Qmax	Qmin	Qmax
15	200	8	0,018	1,8	0,065	6,48
20	200	8	0,032	3,2	0,115	11,52
25	200	9	0,05	5	0,18	18
32	200	9	0,08	8	0,288	28,8
40	200	11	0,125	12,5	0,45	45
50	200	13	0,2	20	0,72	72
65	200	17	0,32	32	1,152	115,2
80	200	18	0,5	50	1,8	180
100	250	20	0,8	80	2,88	288
125	250	24	1,2	120	4,32	432
150	300	36	1,8	180	6,48	648
200	350	50	3,2	320	11,52	1152
250	450	70	5	500	18	1800
300	500	85	7	700	25,2	2520
350	500	98	9,6	960	34,56	3456
400	500	105	12,5	1250	45	4500
500	500	140	20	2000	72	7200
600	600	200	28	2800	100,8	10080
700	700	230	38,5	3850	138,6	13860
800	800	325	50	5000	180	18000
900	900	420	63,5	6350	228,6	22860
1000	1000	510	78,5	7850	282,6	28260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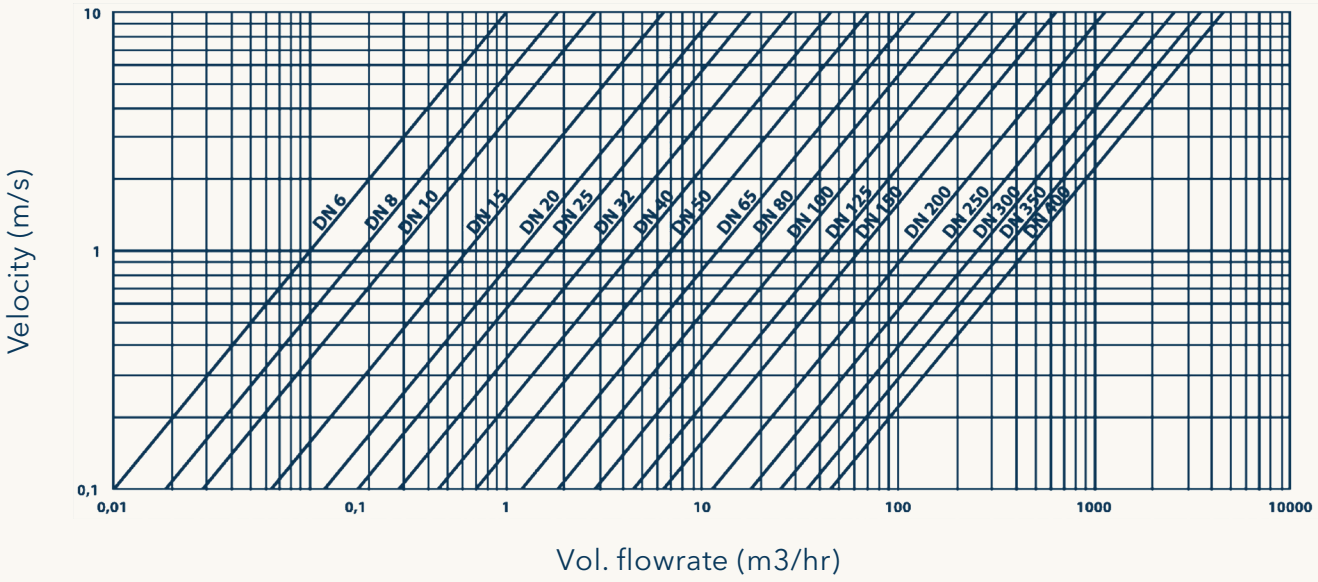

Velocity (m/s)
10
1
0,1
0,01
0,1
1
10
100
1000
10000
DN 6
DN 8
DN 10
DN 15
DN 20
DN 25
DN 32
DN 40
DN 50
DN 65
DN 80
DN 100
DN 125
DN 150
DN 200
DN 250
DN 300
DN 350
DN 400
Vol. flowrate (m3/hr)

E Order code specification xxxx

Micromag F31-	XXXX	XXXX	XX	XX	XX	XX	XX	XXX	XXX	XXX
Meter Sensor Size										
DN 6 - 1/4 inch	0006									
DN 10 - 3/8 inch	0010									
DN 15 - 1/2 inch	0015									
DN 20 - 3/4 inch	0020									
DN 25 - 1 inch	0025									
DN 32 - 1 1/4 inch	0032									
DN 40 - 1 1/2 inch	0040									
DN 50 - 2 inch	0050									
DN 65 - 2 1/2 inch	0065									
DN 80 - 3 inch	0080									
DN 100 - 4 inch	0100									
DN 125 - 5 inch	0125									
DN 150 - 6 inch	0150									
DN 200 - 8 inch	0200									
DN 250 - 10 inch	0250									
DN 300 - 12 inch	0300									
DN 350 - 14 inch	0350									
DN 400 - 16 inch	0400									
DN 450 - 18 inch	0450									
DN 500 - 20 inch	0500									
DN 600 - 24 inch	0600									
DN 700 - 28 inch	0700									
DN 800 - 32 inch	0800									
DN 900 - 36 inch	0900									
DN 1000 - 40 inch	1000									
DN 1200 - 48 inch	1200									
DN 1400 - 56 inch	1400									
Special	zzzz									
Meter Sensor Connection										
EN 1092-1, PN 10		PN10								
EN 1092-1, PN 16		PN16								
EN 1092-1, PN 25		PN25								
EN 1092-1, PN 40		PN40								
EN 1092-1, PN 63		PN63								
ASME B16.5, Class 150		#150								
ASME B16.5, Class 300		#300								
ASME B16.5, Class 600		#600								
Special		zzzz								
Liner Material										
Hard Rubber			L1							
PTFE (Teflon)			L2							
ETFE			L3							
PFA			L4							
PP			L5							
Electrodes Material										
1.4404 / SS 316 L				E1						
Titanium				E2						
Tantalum				E3						
Hastelloy C-22				E4						

Grounding Rings	
None	G0
1.4304 / SS 304	G1
1.4404 / SS 316	G2
Hastelloy C-22	G3
Titanium	G4

Transmitter Type	
Compact (Meter-mount)	MM
Remote (Wall-mount)	RM

Transmitter Powe Supply	
230 VAC	V1
15~36 VDC	V2

Remote Mount Cable	
None	RC0
5 meters	RC5
10 meters	RC10
20 meters	RC20
30 meters	RC30
40 meters	RC40
50 meters	RC50

Remote Mount Cable	
None	DO0
M-BUS	DO1
HART	DO2
MODBUS	DO3

Options	
MTC type 3.1 as per EN10204	OP1
Hydro-Pressure test on sensor	OP2
Calibration 3-Point	OP3
Calibration 5-Point	OP4
Calibration 5-Point (traceable as EN 17025)	OP5
Tag plate in 1.4301	OP6
Metal cable glands for Transmitter housing	OP7
In-Place Electrode Cleaning	OP8

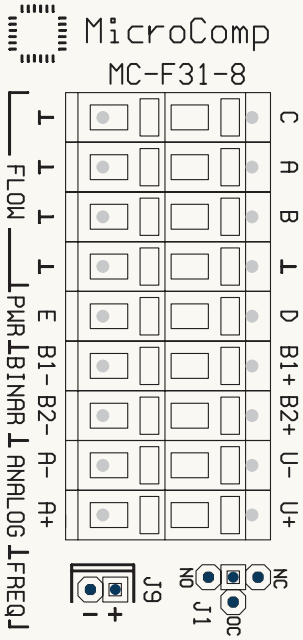
Order code example:

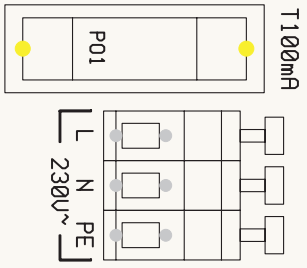
MICROMAG F31-100-PN25-L1-E1-G0-MM-V1-RC0-DO2-OP1+OP4+OP6

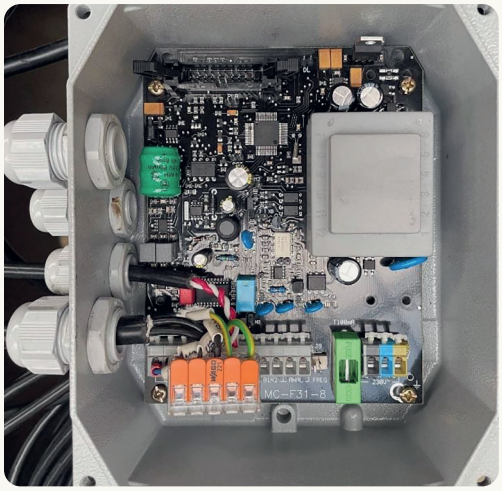
Specification	Code	Description
Meter Sensor Size	100	DN 100 - 4 inch
Meter Sensor Connection	PN25	EN 1092-1, PN 25
Liner Material	L1	Hard Rubber
Electrodes Material	E1	1.4404 / SS 316 L
Grounding Rings	G0	None
Transmitter Type	MM	Meter-mount (Compact)
Transmitter Powe Supply	V1	230 V AC
Remote Mount Cable	RC0	None
Digital Communication	DO2	HART
Options	OP1	MTC type 3.1 as per EN10204
	OP4	Calibration 5-Point
	OP6	Tag plate in 1.4301

F Terminal assignment of transmitter housing

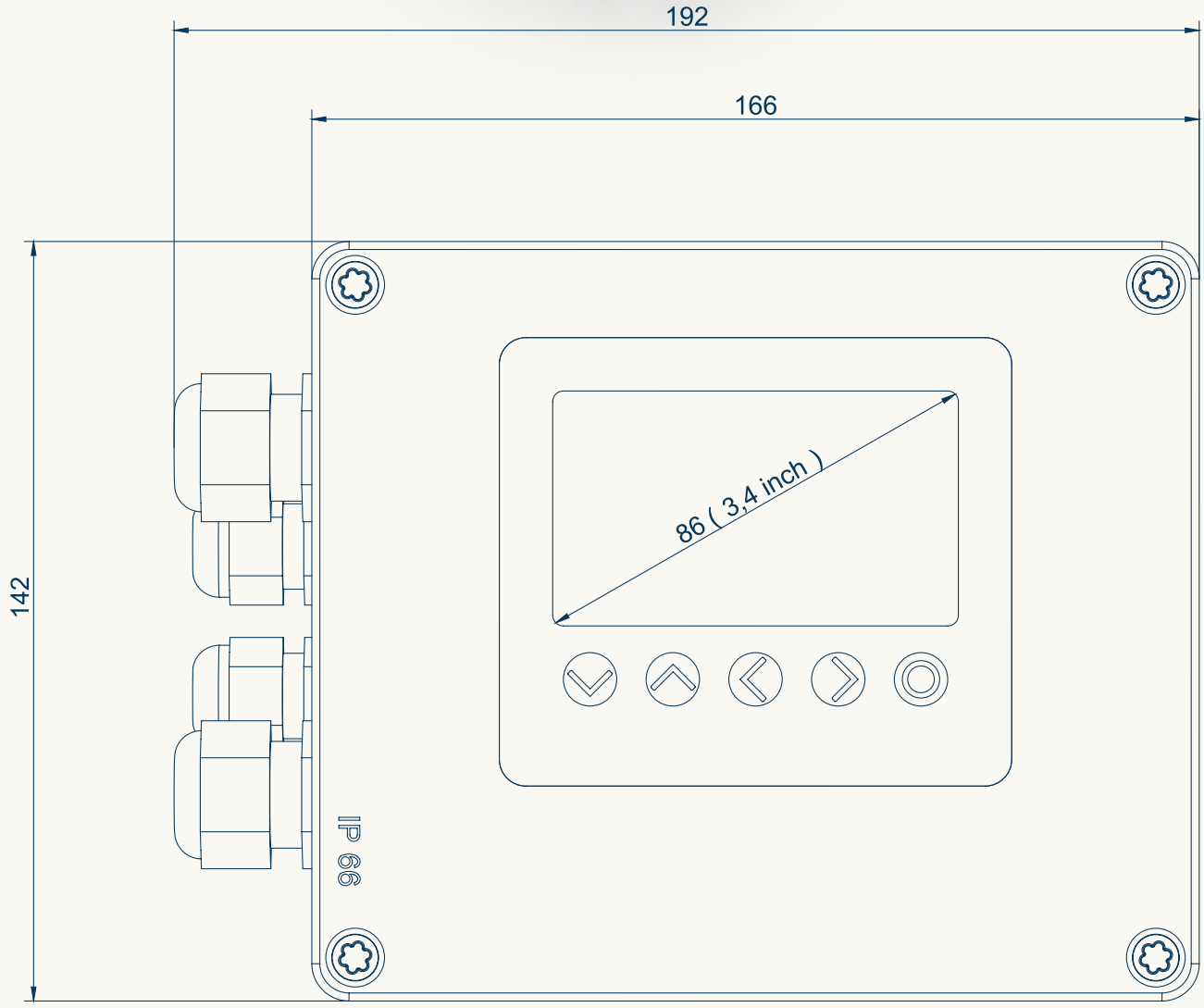
Terminal Name	Description
FLOW C	Empty Pipe Detection (EPD) electrode
FLOW A	Measuring electrode
FLOW B	Measuring electrode
FLOW ⊥	Sensor ground terminals
PWR D	Coil Exitation + terminal
PWR E	Coil Exitation - terminal
BIN 1	Programmable multifunctional (Puls/ status) output
BIN 2	Programmable multifunctional (Puls/ status) output
ANALOG (U)	Analogue output (Active)
ANALOG (A)	Analogue output (Passive)
FREQ (J9)	Frequency output (for calibration only)
230V L	230 V/50 Hz phase conductor
230V PE	Protective Earth conductor
230V N	230 V /50 Hz neutral conductor
PO1	100 mA protective fuse (with 230 V/50 Hz power supply)
	1 A protective fuse (with AC/DC power supply)



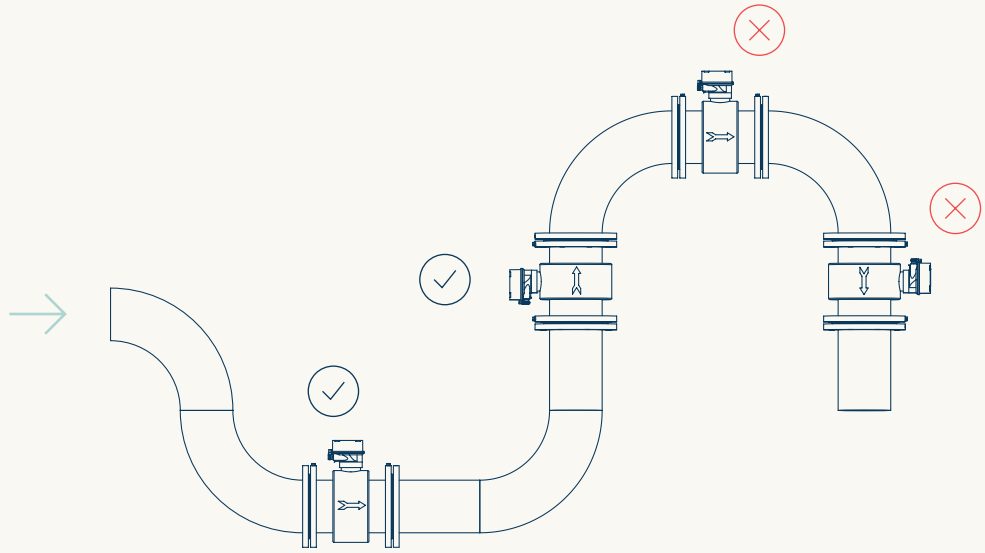


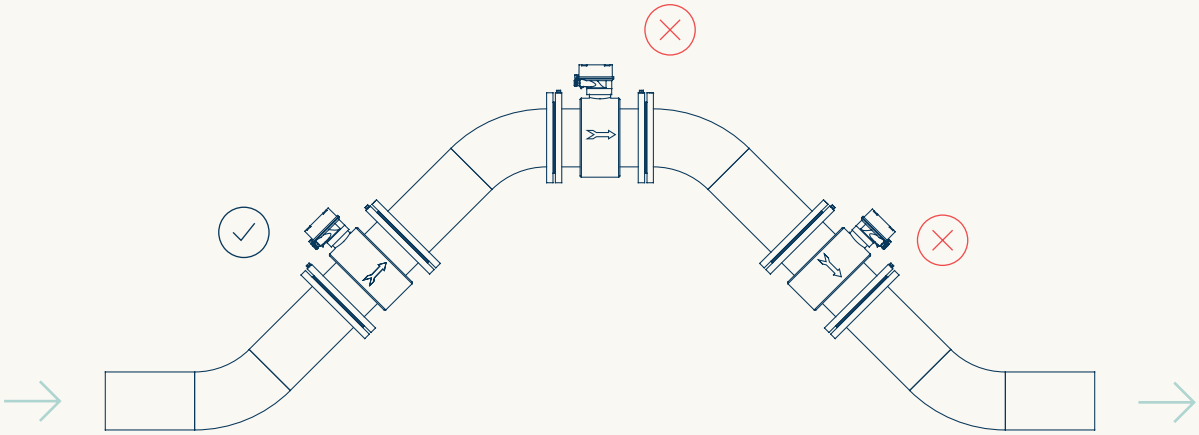


G Transmitter housing schematics



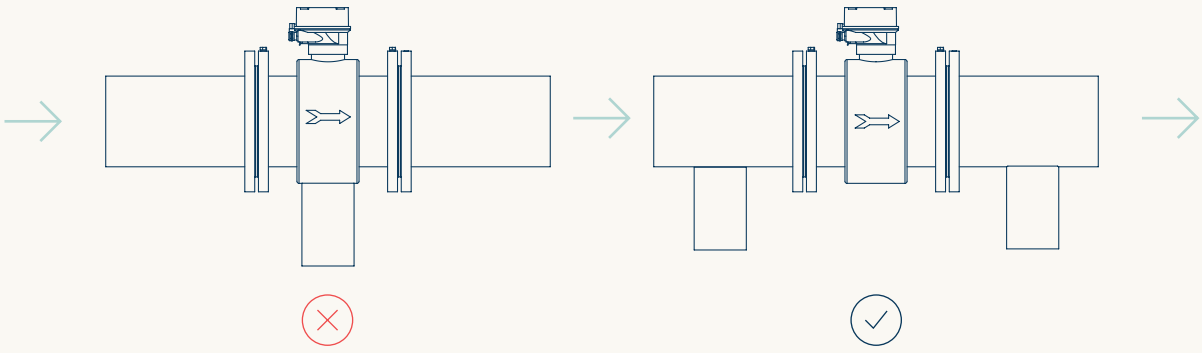
H Installation recommendation

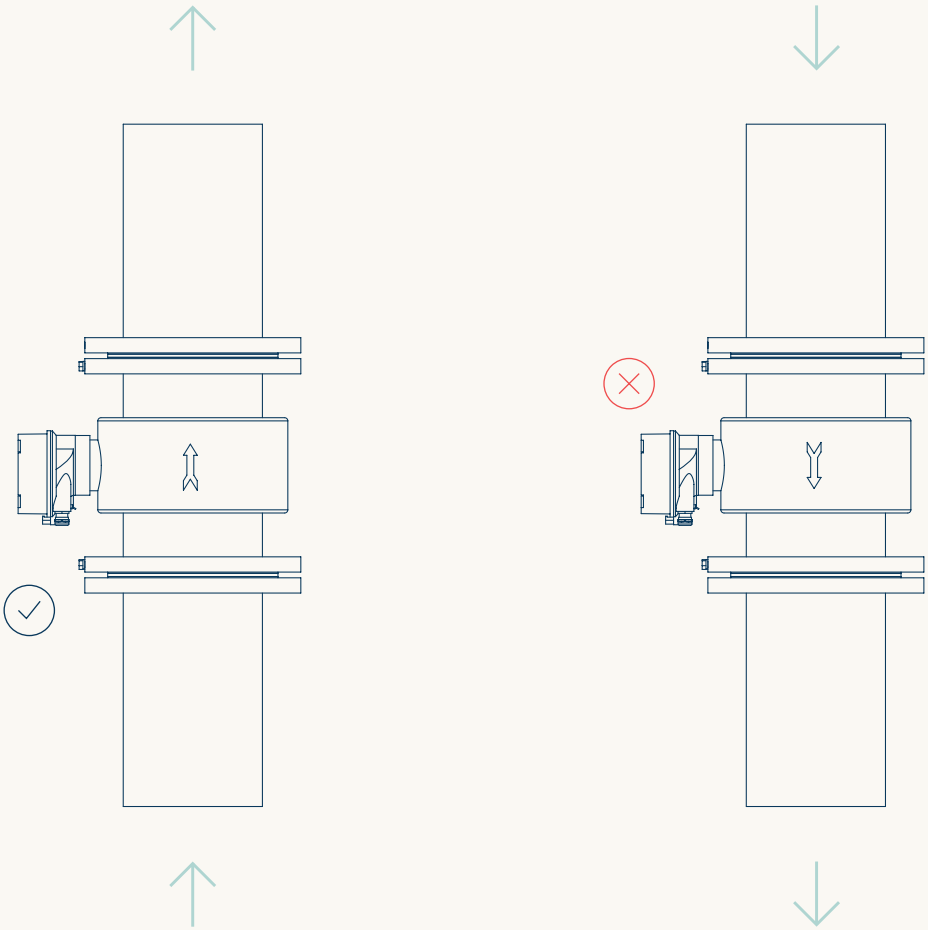




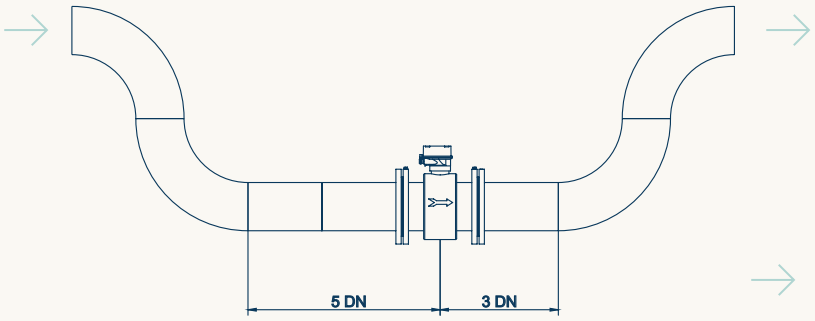
DO NOT USE the sensor as a support for the pipe

The pipe must be the support for the flowmeter

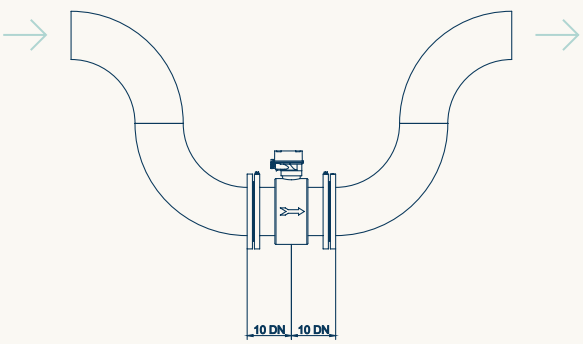




Ideal instllation



Installation in limited spaces



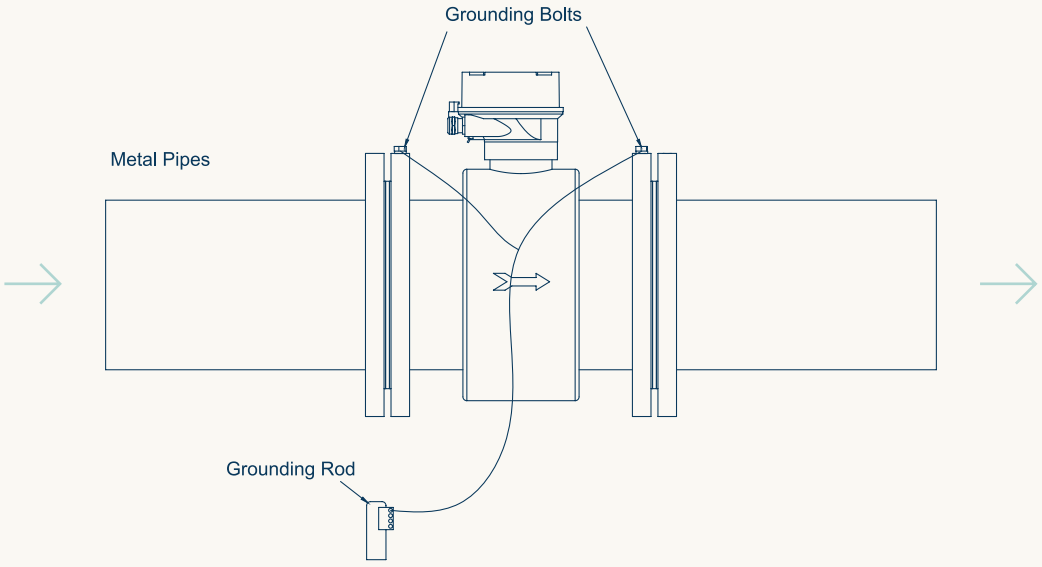
Grounding of the flowmeter

The purpose of grounding is to protect the system from external electromagnetic interference. Failure to correctly grounding the device will measurement inaccuracy to the system.

Grounding can be done in 2 styles:

- Pipe grounding
- With grounding rings

Pipes made of non-metal material (e.g. plastic, ...) or with internal coating which the liquid is not electrically connected to the pipes, grounding rings are required.



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