

MagFlux[®]
Electromagnetic Flow Meter



GB 3.05 MagFlux 0605

We reserve the right to continuously improve our products and make any change in the stated specifications and dimensions without prior notice.

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General



MagFlux® Electromagnetic Flow Meters deliver very stable and highly accurate flow measurements in conductive liquids.

MagFlux® Flow Meters have no moving parts to foul, create no hydraulic influence on the flow, use a well proven technology, and communicate using a standard protocol.

MagFlux® Flow Sensors are available in sizes ranging from DN 3 to DN 1200, with standard construction lengths and connections.

MagFlux® Flow Meters are installed either with the electronics mounted on the flow sensor, on a wall, or mounted in a panel.

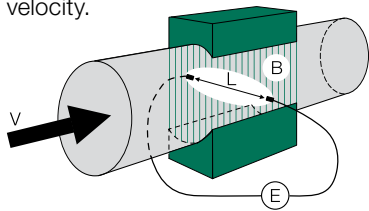
Applications

MagFlux® Flow Meters are used for measuring and totalizing flow of conductive liquids in a pressurized closed pipe system.

MagFlux® Flow Meters measure flow in both directions of potable water, wastewater and process fluids.

Function

The MagFlux® operation is based on Faraday's law of induction. A conductive fluid passes through a magnetic field in the sensor. The induced electromagnetic field (IMF) induced between the two electrodes in the flow sensor tube is directly proportional to the fluid velocity.



When the internal diameter of the Flow Sensor is known, the actual volume is calculated by the Converter.

The electromagnetic field induced between the electrodes equates to:

$E = L \times B \times V$, where;

E: Induced electromagnetic voltage

L: Flow sensor diameter

B: The strength of the magnetic field

V: The velocity of the liquid

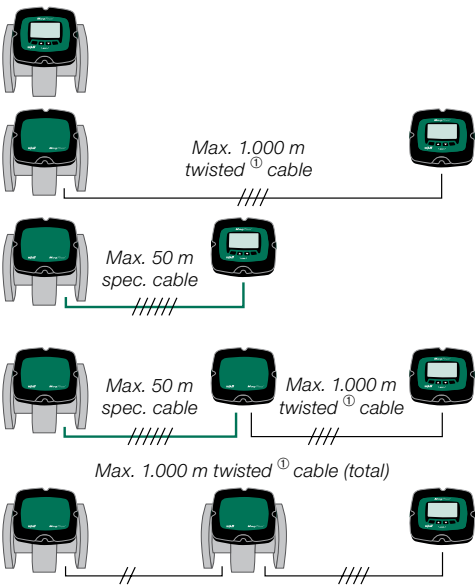
The voltage E is measured and converted to a volumetric flow.

Flexible Installation

MJK's modular design is versatile. The Display Unit can be mounted up to 1000 m from the Flow Converter with ordinary wires. It also provides an option for mounting the Converter where it is most convenient to

make the electrical connections. One Display Unit can control up to 4 Converters and Flow Sensors for greater economy, space savings and an improved overview of the multiple measurement values.

- The MagFlux® Converter and Display Unit mounted directly on the Flow Sensor.
- The MagFlux® Converter mounted directly on the flow sensor with remote mounted Display Unit.
- The MagFlux® Converter and Display Unit remote mounted. E.g. when the sensor is being buried or submerged.
- The MagFlux® Converter is mounted remote from the Flow Sensor, and the Display Unit is mounted separately from the Converter. E.g. when the Sensor is being buried.
- The MagFlux® Converters are mounted directly on the Flow Sensors, while the remote mounted Display Unit communicates with 2 MagFlux® Converters and Flow Sensors.



① In noisy environments, twisted shielded cable is recommended.



Simple to Operate

The *MagFlux*® Display Unit has many unique and intelligent functions. It has a simple cell-phone-like menu structure and displays text in several selectable languages, and in metric or English units.

Easy-to-use Menu Structure

The *MagFlux*®'s PC connection allows downloading configurations and logged data to a PC, and for uploading new software updates and instrument customization. All with intuitive steps using a common USB port.

Registering the Flow Sensor

The *MagFlux*® System registers the Flow Sensor to the Converter using a unique coded six-digit serial number. This sets the calibration data, nominal diameter and sensor configuration – making the *MagFlux*® System ready to measure immediately. This avoids difficult and sensitive field calibration and delicate electronics in the sensor and allows unlimited interchanging of *MagFlux*® Converters and Flow Sensors.

Counters for Flow in Both Directions

The *MagFlux*® Converter has re-settable and non re-settable counters for flow in both directions. *MagFlux*® has two batch counters with smart batch counting.

Forward and Backwards Flow Measurement and Totalizing

The *MagFlux*® System measure flow in both directions and can totalize the net flow for both. A simple menu selection determines the normal flow direction. So there is no way to install *MagFlux*® Flow Sensors backward.

Data Logger

The *MagFlux*®'s built-in 256 kB data logger logs 20.000 entries with time and date. The data is displayed graphically, or can be exported to a PC via the USB port on the Display Unit.

Flexible In- and Outputs

The *MagFlux*® Converter has a 4-20 mA output, two digital outputs and one digital input. The digital input can stop and zero counter settings, or manual control the batch counters. Each alarm can be displayed as a pop up alarm until they are reset.

Automatic Electrode Cleaning

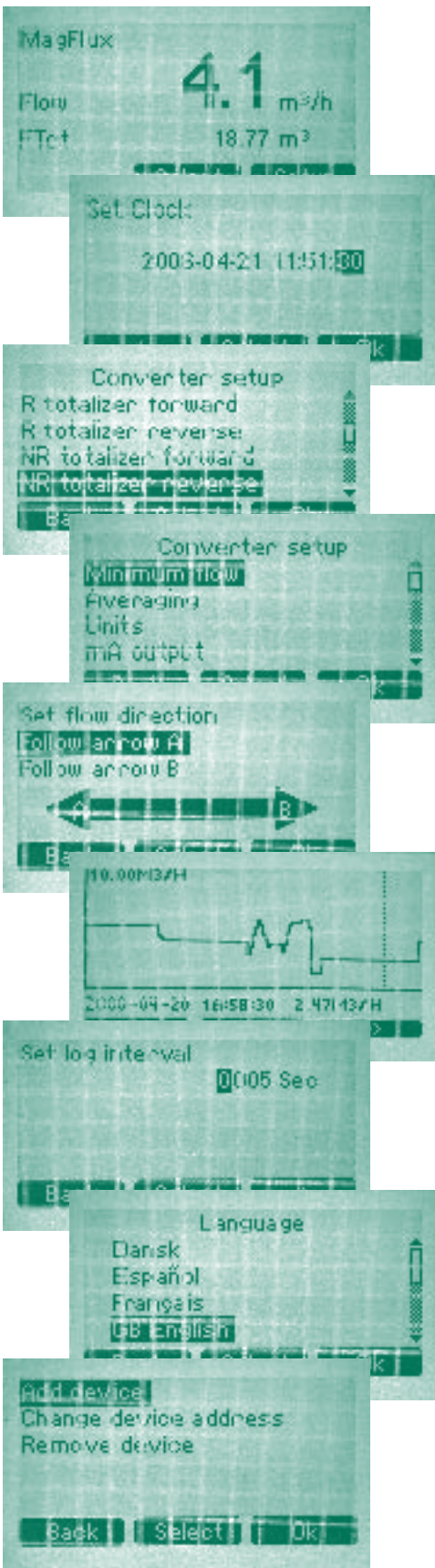
The *MagFlux*®'s built-in electronic electrode cleaning system is always active.

User definable text

The *MagFlux*® display can be configured by the user for up to five lines of text. The graphic display is automatically adjusted to show the largest characters possible.

Modbus Communication

The Display Unit uses Modbus communication to connect to the *MagFlux*® Converter or a PLC.





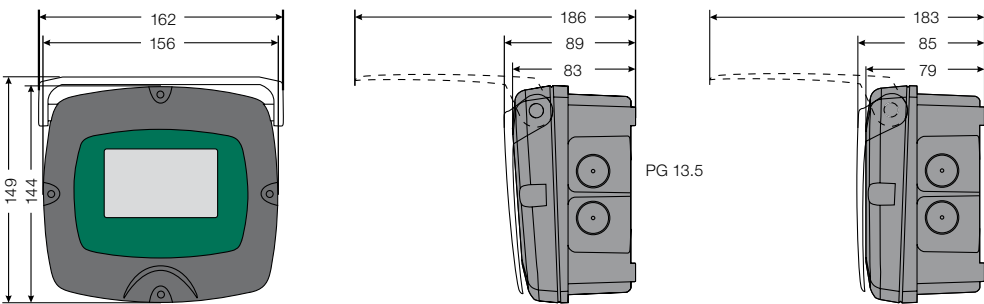
Specifications,
Converter and
Display Unit

Display unit:	
Enclosure rating:	Dust- and waterproof IP 67 = NEMA 6 (when mounted on Converter)
Housing material:	Polycarbonate, glass reinforced
Protection lid:	Transparent Polycarbonate
Display:	White backlit LCD-display (64 x 128 pixels) with softkeys
Indication:	Indication of flow, flow direction, volume, totalizers, configuration and graph
Clock:	Real time clock with built-in battery backup
Communication:	MODBUS RTU-mode 9600 baud 2-wire RS 485, master-mode
Interface:	RS 485
Memory:	256 Kb Flash memory, 20.000 entries with: Date, time, value
Interface:	USB 1,1 type mini B Female

Converter:	
Accuracy:	+/- 0,1% of reading
Measuring range:	Max. range = 0 - 0,2 m/s Max. range = 0 - 10 m/s
Min. liquid conductivity:	≥ 5 µS
Analog output:	1 active 4 - 20 mA, galvanically isolated (max. load 800 Ω)
Digital outputs:	1 voltage-free electromechanical relay (max. 50 VDC / 1 A) 1 optically isolated MOSFET relay (max. 50 VAC / VDC / 120 mA) Programmable for: Totalizer counter, batch counter, high/low flow, system error, empty pipe, flow direction.
Digital inputs:	1, max. 30 V DC, < 5 VDC = 0 ; > 10 VDC = 1, pulse length min. 100 ms
Communication:	MODBUS RTU-mode 9600 baud 2-wire RS 485, slave-mode
Interface:	RS 485 for connection to Display Unit or PLC
Power supply:	230 / 115 VAC, 50 / 60 Hz ± 10 % Power consumption max. 10 W
Cabinet material:	Polycarbonate, glass reinforced IP 67 = NEMA 6X
Enclosure rating:	IP 67.
Temperature range:	- 20 ... 60 °C
Weight:	1,0 kg
CE approvals:	EN 61000-6-4:2001, EN 61000-6-2:2001

Connection box:	
Enclosure rating:	NEMA 6X (using gel potting kit part no. 579035, the flowmeter can withstand unlimited immersion of 10 m water.
Cabinet material:	Polycarbonate, glass reinforced

Mechanical Dimensions,
Converter and
Display Unit





IP 68 Protection

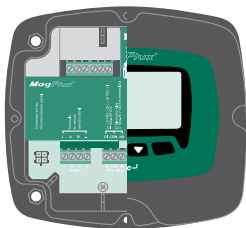


If the *MagFlux*® Sensor has to be buried or are permanently under water, the Converter and Display Unit must be remote mounted and the electrical connection to the sensor must be potted using the gel potting kit part no. 579035.

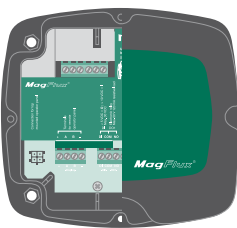
Order Numbers, *MagFlux*® Converters and Displays

MagFlux® converter	
207910	MagFlux® Converter (blind) for sensor mounting 230/115 V AC
207911	MagFlux® Converter (blind) for sensor mounting 24 V AC
207920	MagFlux® Converter with Display Unit for Flow Sensor mounting 230/115 V AC
207921	MagFlux® Converter with Display Unit for Flow Sensor mounting 24 V AC
207925	MagFlux® Converter with Display Unit for wall mounting 230/115 V AC
207926	MagFlux® Converter with Display Unit for wall mounting 24 V AC

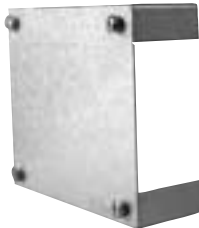
Accessories	
207930	MagFlux® Wall Mounting Kit
207935	MagFlux® Panel Mounting Bracket
207940	MagFlux® Display Unit
579035	MagFlux® Gel Potting Kit
691080	MagFlux® Sensor Cable
691092	MagFlux® USB Cable



207920, MagFlux® Converter with Display Unit for Sensor Mounting



207930, MagFlux® Wall Mounting Kit

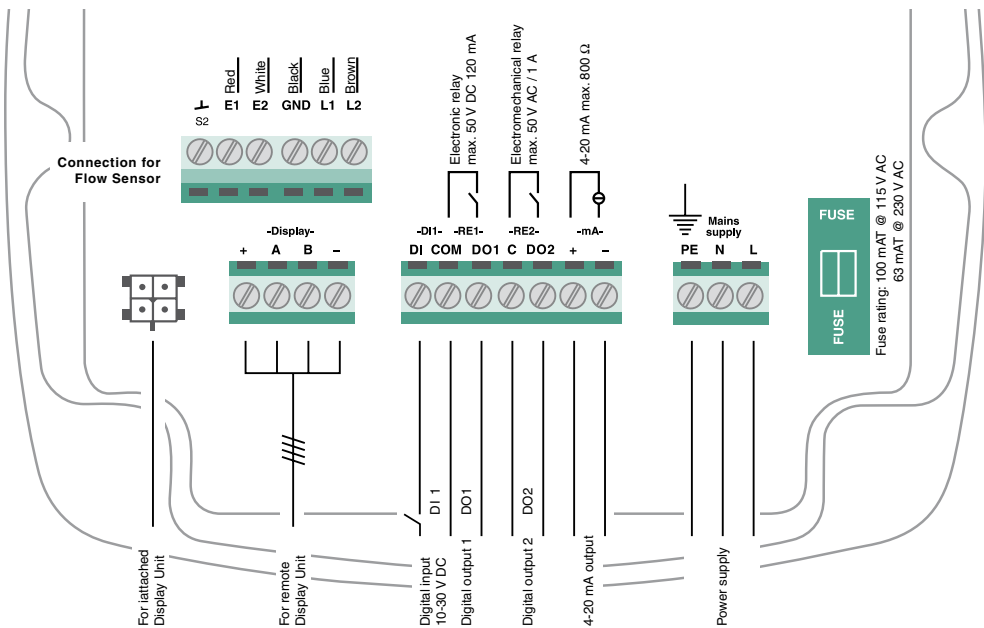


207935, MagFlux® Panel Mounting Bracket



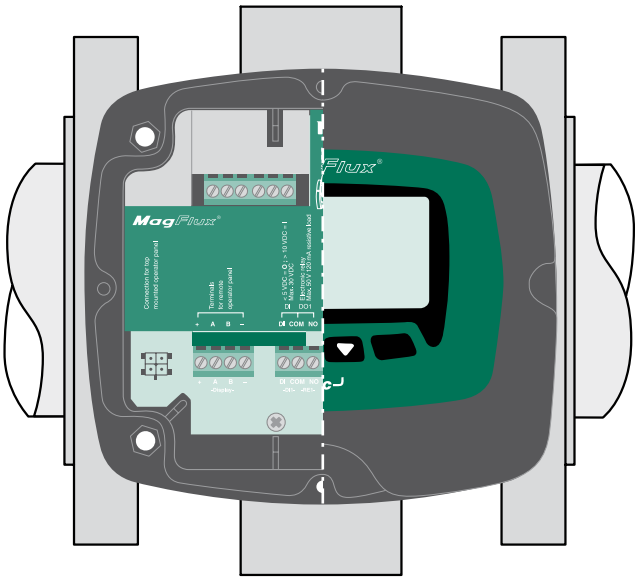
MagFlux® mounted in panel

Electrical Connections on the Converter





Example:
Compact Converter
and Display Unit on
Flow Sensor

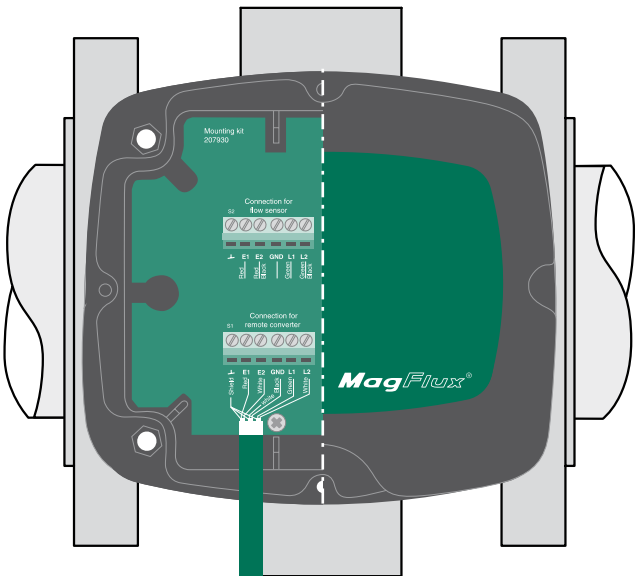


Order numbers with
this application:
207XXX MagFlux® Flowsensor

207920 MagFlux® Converter
with Display Unit for wall
mounting 230/115 V AC

Example:
Remote Converter,
Connection Box on
Flow Sensor

If the MagFlux® Sensor has to
be buried or will be permanently
under water, the Converter and
Display Unit must be remote
mounted and the electrical
connection to the Flow Sensor
must be potted using the Gel
Potting Kit part no. 579035.



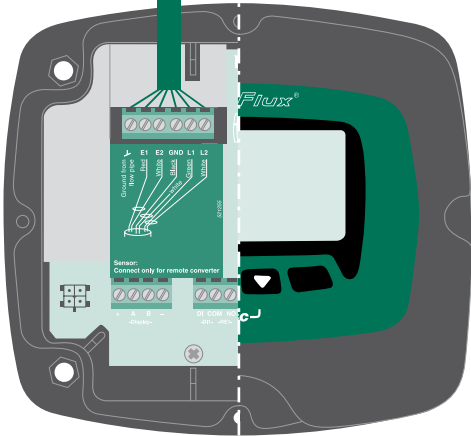
Converter and Display
Unit in Wall/Panel Housing

Order numbers with
this application:
207XXX MagFlux® Flowsensor

207925 MagFlux® Converter
with Display Unit for wall
mounting 230/115 V AC

691080 MagFlux® Sensor
Cable

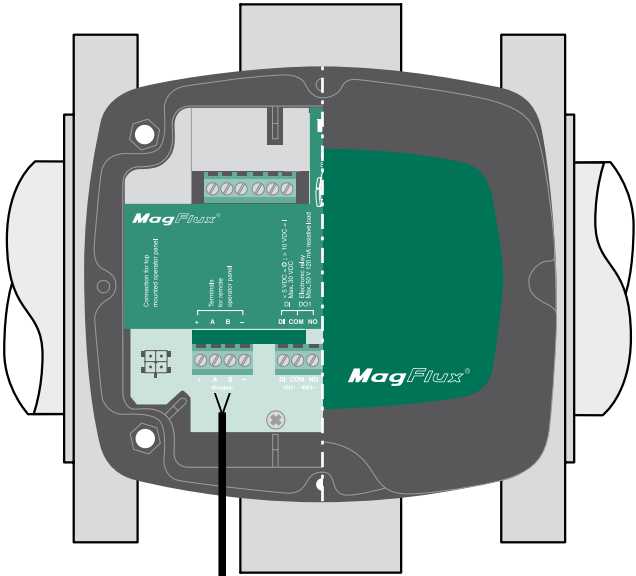
207930 MagFlux® Gel Potting
Kit IP68.





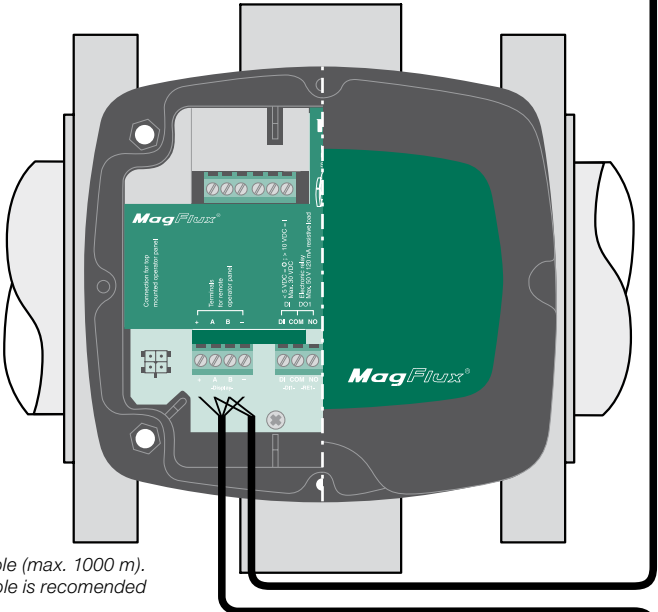
Example:
Remote Display and
Multiple Converter
Wiring

The communication between the Display Unit is carried out on 2-wire cable using a ModBus communication on RS-485 transmission lines.



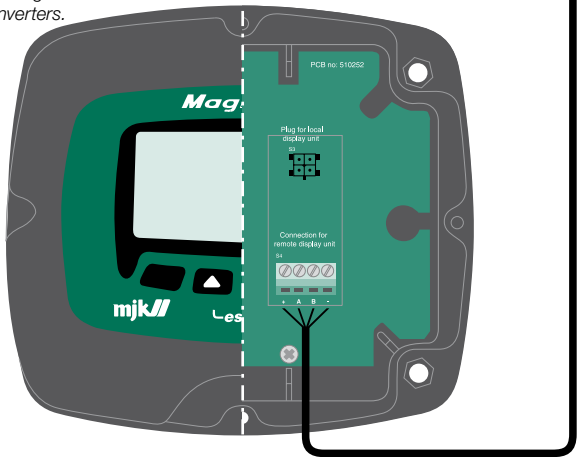
2-wire cable (max.1000 m).
Twisted shielded cable is recommended

Two additional wires supply power from one of the Converters to the Display Unit.



4-wire cable (max. 1000 m).
Twisted shielded cable is recommended

The Display Unit on wall mounting kit
The display unit can operate up to four Converters.



Order numbers with
this application:

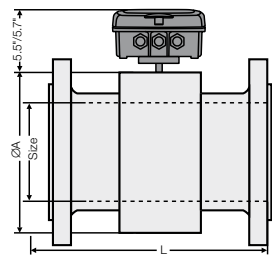
2 pc. 207XXX MagFlux®
Flowsensor

1 pc. 207910 MagFlux®
Converter (blind) for sensor
mounting 230/115 V AC

1 pc. 207925 MagFlux®
Converter with Display Unit for
wall mounting 230/115 V AC



Flow Sensor 7100/7200



Flow Sensor 7100
Housing, Carbon Steel
Lining, PTFE

Sizes and Ordering Information:					
Size:	Pressure:	A:	L:	Weight:	Order no.:
	PN ②		[mm]	[kg]	
15	40	140	200	5	207107
20	40	140	200	6	207110
25	40	140	200	7	207113
32	40	168	200	8	207116
40	40	168	200	9	207119
50	16	168	200	10	207122
65 ⑤	16	219	200	12	207125
80	16	219	200	13	207128
100	16	256	250	16	207131
125	16	273	250	19	207134
150	16	284	300	23	207137
200	16	332	350	30	207140
250	10	389	450	38	207143
300	10	440	500	50	207146
350	10	472	550	72	207149
400	10	523	600	96	207152
② PN 25-40-64, consult factory.					
⑤ From DN 65 and up, bouild in ground electrode.					

Specifications:	
Mounting:	Flange EN-1092-1
Materials:	
Housing:	Carbon steel
Flanges:	Carbon steel
Lining:	PTFE
Electrodes ③:	316 SS
Accuracy ④:	± 0,25 % (DN15 - 300) ± 0,5 % (DN350 - 400)
Media temp. range:	-40...150 °C
Short term:	(150 °C ≤ 60 min.)
Environmental temp. range:	-30...80 °C
Humidity:	100 % RH
Thermal insulation class:	H (180 °C)
Enclosure:	IP67 / 68
③ Hastelloy B, Hastelloy C and titanium, consult factory.	
④ Of measured value.	

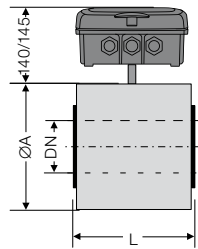
Flow Sensor 7200
Housing, Carbon Steel
Lining, Hard rubber

Sizes and Ordering Information:					
Size:	Pressure:	A:	L:	Weight:	Order no.:
	PN ②		[mm]	[kg]	
15	40	140	200	5	207207
20	40	140	200	6	207210
25	40	140	200	7	207213
32	40	168	200	8	207216
40	40	168	200	9	207219
50	16	168	200	10	207222
65 ⑤	16	219	200	12	207225
80	16	219	200	13	207228
100	16	256	250	16	207231
125	16	273	250	19	207234
150	16	284	300	23	207237
200	16	332	300	30	207240
250	10	389	300	38	207243
300	10	440	300	50	207246
350	10	472	300	72	207249
400	10	523	400	96	207252
450	10	574	400	102	207255
500	10	624	400	120	207258
600	10	726	400	150	207261
700	10	830	400	195	207264
800	10	932	400	250	207267
900	10	1034	400	290	207270
1000	10	1134	400	360	207273
1200	10	1337	600	540	207276
② PN 25-40-64, consult factory.					
⑤ From DN 65 and up, bouild in ground electrode.					

Specifications:	
Mounting:	Flange EN-1092-1
Materials:	
Housing:	Carbon steel
Flanges:	Carbon steel
Lining:	Hard rubber
Electrodes ③:	316 SS
Accuracy ④:	± 0,25 % (DN15 - 300) ± 0,5 % (DN350 - 500) ± 1,0 % (DN600 - 1000) ± 2,0 % (DN1000 - 1200)
Media temp. range:	-25...110 °C
Environmental temp. range:	-30...80 °C
Humidity:	100 % RH
Thermal insulation class:	H (180 °C)
Enclosure:	IP67 / 68
③ Hastelloy B, Hastelloy C and titanium, consult factory.	
④ Of measured value.	



Flow Sensor 7300/7400



Flow Sensor 7300
Housing, Carbon Steel
Lining, PTFE

Sizes and Ordering Information:					
Size:	Pressure:	A:	L:	Weight:	Order no.:
	PN	[mm]	[mm]	[kg]	
15	40	105	74	2	207307
20	40	105	74	2	207310
25	40	105	104	2	207313
32	40	105	104	2	207316
40	40	105	104	3	207319
50	16	105	104	3	207322
65 ⑤	16	127	104	3	207325
80	16	142	104	4	207328
100	16	162	104	4	207331
125	16		134	5	207334
150	16		134	5	207337
200	16		219	6	207340

⑤ From DN 65 and up, bouild in ground electrode.

Specifications:	
Mounting:	Wafer
Materials:	
Housing:	316 SS
Lining:	PTFE
Electrodes ③:	316 SS
Accuracy ④:	± 0,25 %
Media temp. range:	-40...120 °C
Short term:	(150 °C ≤ 60 min.)
Environmental temp. range:	-30...80 °C
Humidity:	100 % RH
Thermal insulation class:	H (180 °C)
Enclosure:	IP67
③ Hastelloy B, Hastelloy C and titanium, consult factory.	

Flow Sensor 7400
Housing, Carbon steel
Lining, Hard rubber

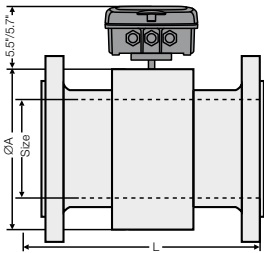
Sizes and Ordering Information:					
Size:	Pressure:	A:	L:	Weight:	Order no.:
	PN	[mm]	[mm]	[kg]	
15	40	105	74	2	207407
20	40	105	74	2	207410
25	40	105	104	2	207413
32	40	105	104	2	207416
40	40	105	104	3	207419
50	16	105	104	3	207422
65 ⑤	16	127	104	3	207425
80	16	142	104	4	207428
100	16	162	104	4	207431
125	16		134	5	207434
150	16		134	5	207437
200	16		219	6	207440

⑤ From DN 65 and up, bouild in ground electrode.

Specifications:	
Mounting:	Wafer
Materials:	
Housing:	Carbon steel
Lining:	Hard rubber
Electrodes ③:	316 SS
Accuracy ④:	± 0,25 %
Media temp. range:	-40...120 °C
Short term:	(150 °C ≤ 60 min.)
Environmental temp. range:	-30...80 °C
Humidity:	100 % RH
Thermal insulation class:	H (180 °C)
Enclosure:	IP67
③ Hastelloy B, Hastelloy C and titanium, consult factory.	



Flow Sensor 7600

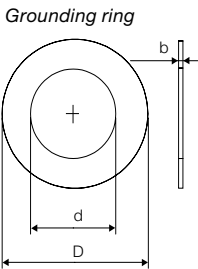


Flow Sensor 7600
Housing, Carbon Steel
Lining, Soft rubber

Sizes and Ordering Information:					
Size:	Pressure:	A:	L:	Weight:	Order no.:
	PN ②	[mm]	[mm]	[kg]	
15	40	140	200	5	297607
20	40	140	200	6	297610
25	40	140	200	7	297613
32	40	168	200	8	207616
40	40	168	200	9	207619
50	16	168	200	10	207622
65 ⑤	16	219	200	12	207625
80	16	219	200	13	207628
100	16	256	250	16	207631
125	16	273	250	19	207634
150	16	284	300	23	207637
200	16	332	300	30	207640
250	10	389	300	38	207643
300	10	440	300	50	207646
350	10	476	300	76	207649
400	10	523	400	96	207652
450	10	574	400	102	207655
500	10	624	400	120	207658
600	10	766	400	150	207661
700	10	830	400	195	207664
800	10	932	400	250	207667
900	10	1034	400	290	207670
1000	10	1134	400	360	207673
1200	10	1337	600	540	207676
② PN 25-40-64, consult factory.					
⑤ From DN 65 and up, bouild in ground electrode.					

Specifications:	
Mounting:	Flange EN-1092-1
Materials:	
Housing:	Carbon steel
Flanges:	Carbon steel
Lining:	Soft rubber
Electrodes ③:	316 SS
Accuracy ④:	± 0,25 % (DN15 - 300) ± 0,5 % (DN350 - 500) ± 1,0 % (DN600 - 1000) ± 2,0 % (DN1000 - 1200)
Media temp. range:	-25...110 °C
Environmental temp. range:	-30...80 °C
Humidity:	100 % RH
Thermal insulation class:	H (180 °C)
Enclosure:	IP67 / 68
③ Hastelloy B, Hastelloy C and titanium, consult factory.	
④ Of measured value.	

Grounding rings



Sizes and Ordering Information:						
Size:		[mm]			Weight:	Order no.:
		D:	d:	b:	[kg]	
15		50	22	6	0,06	207807
20		60	28	6	0,08	207810
25		71	35	6	0,1	207813
32		82	43	6	0,13	207816
40		92	49	6	0,16	207819
50		107	61	6	0,2	207822
65 ⑤		127	77	6	0,26	207825
80		142	90	6	0,32	207828
100		162	115	6	0,4	207831
125		192	141	6	0,5	207834
150		218	170	6	0,6	207837

Sizes and Ordering Information:						
Size:		[mm]			Weight:	Order no.:
		D:	d:	b:	[kg]	
200		273	220	6	0,8	207840
250		328	274	6	1,0	207843
300		378	325	6	1,2	207846
350		438	360	6	1,4	207849
400		489	411	6	1,6	207852
450		539	463	6	1,8	207855
500		594	514	6	2,0	207858

Specifications:	
Material:	AISI 316 SS
Wire:	2,5 mm ²



Flow Sensor Sizing

Min and max flow:								
DN:	Qmin:	Qmax:	DN:	Qmin:	Qmax:	DN:	Qmin:	Qmax:
	0,2 m/s	10 m/s		0,2 m/s	10 m/s		0,2 m/s	10 m/s
	[l/hr]	[l/hr]		[l/hr]	[l/sek]		[m³/h]	[m³/h]
3	5,09	254	20	226	3,14	65	2,39	119
6	20,4	1018	25	353	4,91	80	3,62	181
8	36,2	1810	32	579	8,04	100	5,65	283
10	56,5	2827	40	905	12,6	125	8,84	442
15	127	6362	50	1414	19,6	150	12,7	636
Min and max flow:								
DN:	Qmin:	Qmax:	DN:	Qmin:	Qmax:	DN:	Qmin:	Qmax:
	0,2 m/s	10 m/s		0,2 m/s	10 m/s		0,2 m/s	10 m/s
	[m³/h]	[m³/h]		[m³/h]	[m³/h]		[m³/h]	[m³/h]
200	22,6	1131	450	115	5726	900	458	22902
250	35,3	1767	500	141	7069	1000	565	28274
300	50,9	2545	600	204	10179	1200	814	40715
350	69,3	3464	700	277	13854			
400	90,5	4524	800	362	18095			

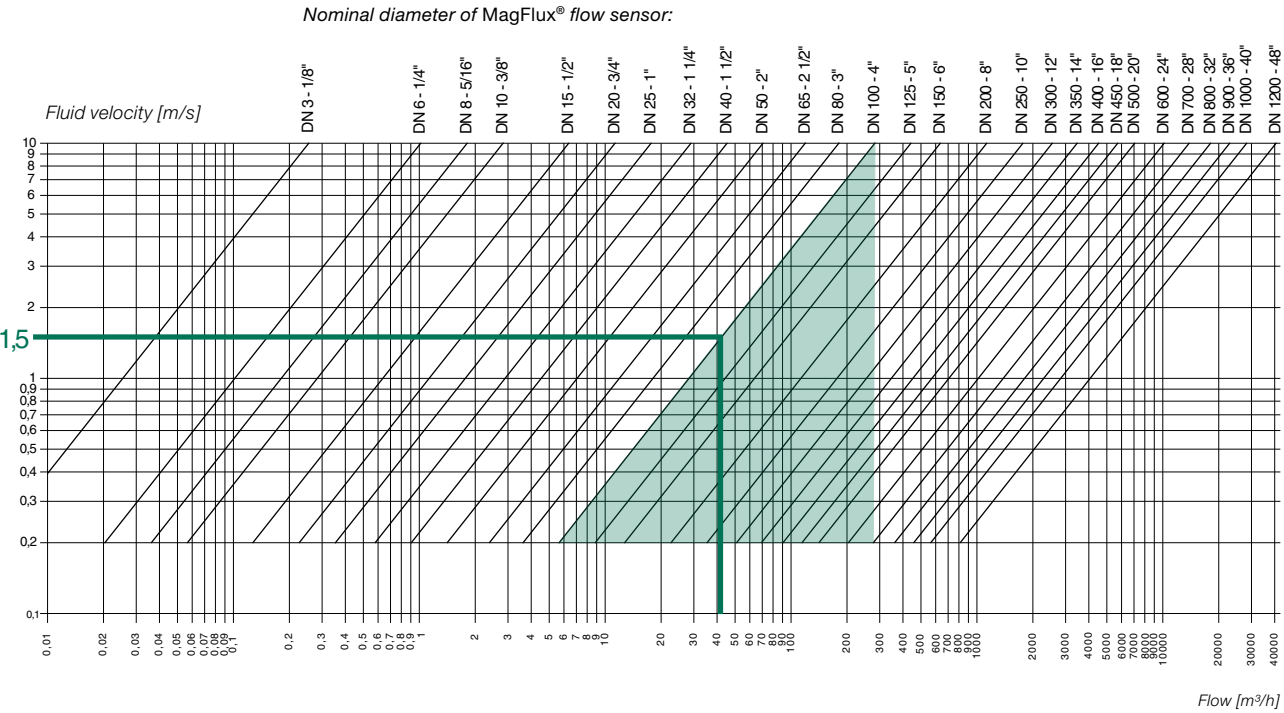
Flow Sensor Sizing

To calculate the correct size of Flow Sensor, the flow velocity should be between 1 and 3 m/s in order to achieve highest possible accuracy.

The flow curves and graphs below illustrate how the Flow Sensor is sized to get the required measuring accuracy.

Example:
A 50 m³/h volume of liquid passing through a 100 mm internal diameter pipe requires flow measurement. To select the correct MagFlux® Flow Sensor, the liquid velocity should be in the range 1 - 3 m/s for 50 m³/hr.

If, in this case, a MagFlux® Flow Sensor with the same internal diameter of the pipe is selected, the flow velocity will be 1.5 m/s at a flow rate of 42 m³/h. The diagram and table below shows that a liquid flow between 5,65 m³/h and 283 m³/h can be measured.

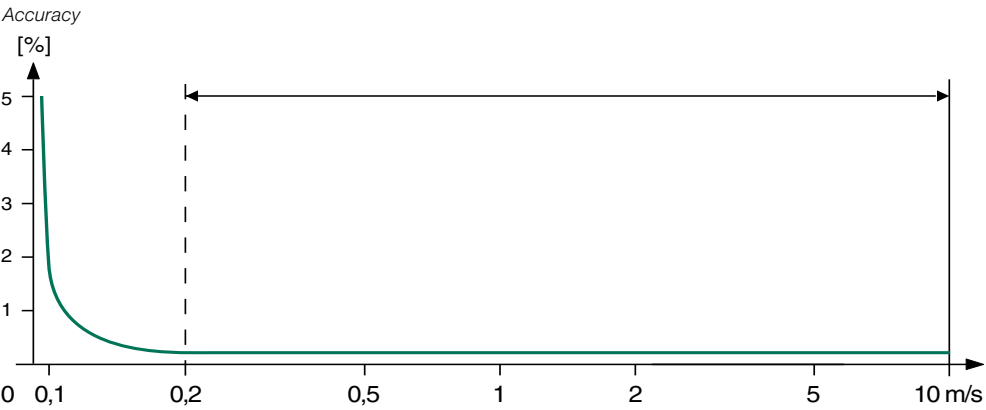


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Measurement Accuracy

Example:
If an 100 mm MagFlux® Flow Sensor is selected, the diagram shows the measuring accuracy available throughout the measuring range velocities of 0,2 - 10 m/s.



Reducing the Flow Meter Size

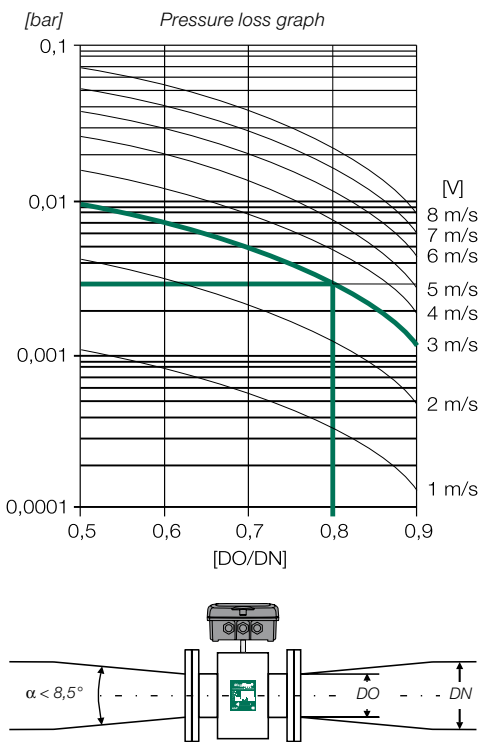
When the size of the Flow Meter is reduced to cause the flow to reach a sufficient velocity, the pipe size has to be reduced. This will cause a pressure loss which can be calculated using the pressure loss chart at the right.

When the MagFlux® Sensor is smaller than nominal pipe diameter, the pressure loss can be checked, using the pressure loss chart.

Example:
A MagFlux® Flow Sensor with an internal diameter of 80 mm is selected and the pipe size is 100 mm, the fluid velocity for a flow of approximately 50m³/h will increase to about 3 m/s.

Using a DN80 mm MagFlux® flow sensor, a smaller measurement range (from 3,62 m³/h to 181 m³/h) will be available.

The diagram shows that reducing the pipe size 100 mm to 80 mm will cause a pressure loss of 3 mbar (0,003 bar).

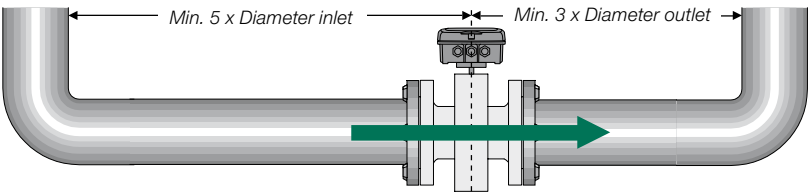


Sensor Mounting Conditions

Accurate flow measurement requires a minimum of five (5) pipe diameters of straight pipe upstream and three (3) pipe diameters

of straight pipe downstream from the center of the Flow Sensor. See diagram.

Minimum pipe diameter distances for accurate MagFlux® flow measurements:





About MJK

MJK Automation A/S develop and manufacture measuring and control equipment for control and monitoring of pumping stations, waste-water treatment plants, waterworks and other industries. All equipment is manufactured at our factory in Denmark.

MJK's mission is to develop and manufacture equipment for process- and environmental plants to contribute to a better and cleaner environment.

MJK is a limited company with parent company in Denmark and subsidiary companies:

- MJK Automation AS in Noway
- MJK Automation AB in Sweden
- MJK Automation B.V. in The Netherlands
- MJK North America, Inc. in USA
- MJK Automation P/L in Australia



MJK's domicile in Nærum, near Copenhagen, Denmark.

Our product programme includes:

- Level measurement
- Electromagnetic flow meters
- Pump controllers
- Open channel flowmeters and flumes
- pH-, redox- and temperature transmitters
- Turbidity- and suspended solids meters
- Indication and registration equipment
- Data transmission
- PC software for monitoring
- Liquid samplers

MJK supplies and service own equipment in more than 40 countries worldwide, through own companies or through authorized distributors.

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