OPTIFLUX 2000

Technical Datasheet

Electromagnetic Flow Sensor

- Engineered and manufactured for the water and wastewater industry
- All relevant approvals for potable water
- Long-term reliability and durability

KROHNE

Solution for the water and wastewater industry

The **OPTIFLUX 2000** electromagnetic flow sensor is the optimum solution for water and wastewater applications. Its long-term reliability and durability make it the standard flow sensor for the water market.

1 Flanged design
2 DVGW and ISO installation lengths
3 PP and hard rubber liners

Highlights

- Drinking water approvals including KTW, WRc, KIWA, ACS
- Proven and unsurpassed lifetime
- Maintenance free
- In-situ verification with KROHNE MagCheck
- Compliance with OIML R-49 and ISO 4064
- Optionally permanently submersible, buried underground

Industries

- Water
- Wastewater
- Pulp & Paper
- Minerals & Mining
- Iron, Steel & Metals
- Power plant

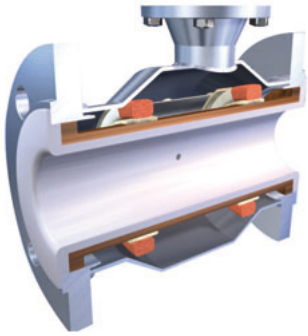
Applications

- Water distribution networks
- Irrigation
- Municipal watering
- Water purification
- Cooling stations
- District heating

OPTIFLUX 2000 for the water and wastewater industry

OPTIFLUX 2000 has been designed for measuring potable water and water with suspended particles. Throughout the history of our company, KROHNE development and application engineers have been continuously pushing the limits of feasibility in developing and testing new instruments. The results are innovations that go far beyond the requirements of the customer, thereby setting new standards for the market.

OPTIFLUX 2000 is designed for "commercial" use according to European Directive MI-001. The level of precision complies with the latest stipulations of the ISO/EN and MI-001 standards, with a ratio of 400 between Q1 and Q3 within the legal requirements.
However, OPTIFLUX 2000 also means "proved by KROHNE"; this covers specific trials, measurements and tests that go beyond the legal specifications – and on which our customers can rely 100 percent. For example, we subject the OPTIFLUX 2000 electronics to a series of extensive temperature change tests, in which the converter is exposed to cyclical fluctuations from -20…+65°C. Every OPTIFLUX 2000 meter that leaves our factory is first wet-calibrated on our officially certified calibration rigs (EN 17025).



Construction

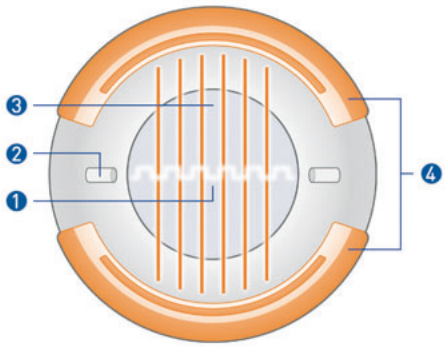
The OPTIFLUX 2000 measuring tube has a smooth, cylindrical shape. This design, consisting of a circular cross section (no internal or moving parts) and a homogeneous magnetic field, forms the basis for a flow-optimized pipe cross section, thereby providing reliable measurements that are largely independent of the flow profile. This design has obvious advantages. OPTIFLUX 2000 can measure the flow bidirectional. As an additional benefit, it optimizes the precision of the measurement results, thanks to high sampling rates. And it does this with minimum consumption, an indispensable advantage, for example during night time operation. In addition, the required straight inlet and outlet runs are only 3D or 2D.
The lining of the measuring tube is made of polypropylene or hard rubber and is resistant to corrosion, aging and abrasion. As a result, OPTILFUX 2000 is a food-grade water meter in accordance with KTW/DVGW-W270 and therefore also certified for drinking water. The surface and shape of the measuring tube also minimize mineral deposits, resulting in exemplary measurement quality – even over the long term.

Communication

Bulk water meters are installed in places like remote shafts, deep well-connecting chambers and public drinking water networks. The ability to read the measured results on-site may be standard, but it does not always meet the current and actual needs of the user or operator. That is why OPTIFLUX 2000 comes with optional, state-of-the-art fieldbus communication systems. The stored data is transmitted (e.g., once a day) by HART, Profibus, Fieldbus or Modbus, and then forwarded to a management system.

Design and performance

Electromagnetic water meters have many important advantages over their mechanical counterparts: outstanding long-term stability, maximum process reliability, no maintenance – to name just a few. As a result, OPTIFLUX 2000 can deliver precise and reliable measurements for many years.
Yet OPTIFLUX 2000 can do a whole lot more. The water meter has extensive factory-set diagnostic functions that provide continuous self-diagnosis in accordance with the applicable standards such as OIML R-49, EN 14154, ISO 4064 and MI-001. Converter operation is also monitored continuously, as are the sensor electrodes, the flow profile and electronic functions. Malfunctions and irregularities are detected and immediately displayed on the high-contrast, high-resolution display.



1. Voltage (induced voltage proportional to flow)
2. Electrodes
3. Magnetic field
4. Field coils

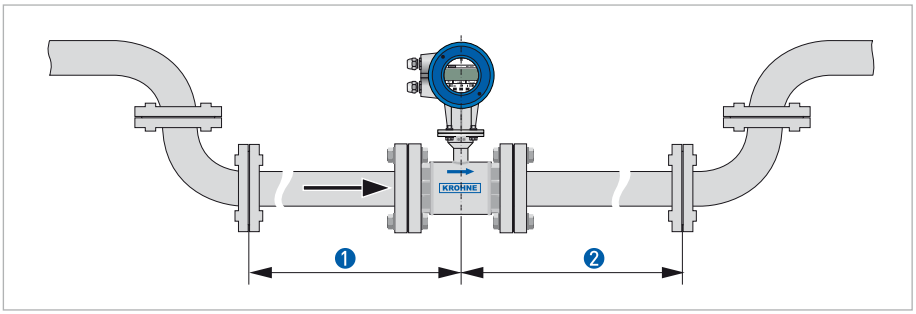
Operating principle

An electrically conductive fluid flows inside an electrically insulating pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage U is generated:
U = v * k * B * D, in which:
v = mean flow velocity
k = factor correcting for geometry
B = magnetic field strength
D = inner diameter of flow meter

The signal voltage U is picked off by electrodes and is proportional to the main flow velocity v and thus the flow rate q. The signal voltage is quite small (typically 1 mV at v = 3 m/s (10 ft/s) and field coil power of 1 W). Finally, a signal converter is used to amplify the signal voltage, filter it (separate from noise) and convert it into signals for totalising, recording and output processing.

Technical data

Installation conditions



1 ≥ 5DN
2 ≥ 2DN

Further installation conditions can be found in the Quick Start document.

Nominal diameter	VN14									VN15								VN16								
ASME [inch]	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	32"	36"	40"	48"	56"	64"	72"	80"
DN [mm]	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200	1400	1600	1800	2000

Nominal flange pressure

EN 1092-1 - PN 40	
EN 1092-1 - PN 25	
EN 1092-1 - PN 16	
EN 1092-1 - PN 10	
EN 1092-1 - PN 6	
ISO insertion length	
ASME B16.5 - 150 lbs RF	
ASME B16.5 - 300 lbs RF	
ASME B16.5 - 600 lbs RF	
ASME B16.5 - 900 lbs RF	
ASME B16.5 - 1500 lbs RF	
AWWA - class B or D FF	
JIS 10 K	
JIS 20 K	
	Larger than DN 2000 / ASME 80" on request
	AWWA flanges, DN 700 - 1000 / ASME 28" - 40" ≤ 10 bar
	AWWA flanges, DN 1200 - 2000 / ASME 48" - 80" ≤ 6 bar

Nominal diameter	VN14									VN15								VN16								
ASME [inch]	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	32"	36"	40"	48"	56"	64"	72"	80"
DN [mm]	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200	1400	1600	1800	2000

Liner

Polypropylene	
Hardrubber	
	See pressure and temperature limits for various liners

Electrodes

Hastelloy C4
Stainless steel 1,4571 (AISI 316 Ti)
Titanium

Grounding rings

Hastelloy C4
Stainless steel 1,4571 (AISI 316 Ti)
Titanium

Flanges

Steel 1.0460 (C 22,8)
Steel 1.0038 (RSt37-2)
Stainless steel 1.4404 (AISI 316 L)
Stainless steel 1.4571 (AISI 316 Ti)

Materials

Measuring tube - austenitic stainless steel
Housing (polyurethane coated) sheet steel
Housing stainless steel
Die-cast aluminium connection box (polyurethane coated)
Stainless steel connection box
Other materials on request

Nominal diameter	VN14									VN15								VN16								
ASME [inch]	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	32"	36"	40"	48"	56"	64"	72"	80"
DN [mm]	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200	1400	1600	1800	2000

Protection category

IP 66 / 67 eq. NEMA 4/4X / 6	■
IP 68 field eq. NEMA 6P	■
IP 68 factory eq. NEMA 6P	■

Approvals

Non-Ex	■
EEx zone 1 / 2	■
FM - class I div. 2	■
CSA - GP	■
CSA - class I div. 2	■
SAA - Aus Ex zone 2	
TIIS - zone 2	
	Please note the approvals are for flow sensors only.

Versions

Compact + IFC 300 C	■
Separate + IFC 300 F, R, W	■
Compact + IFC 010 C	■
Separate + IFC 010 W	■

Electrical conductivity

Min. conductivity	min. 20 µS/cm

■ standard ■ optional □ on request

Measuring accuracy

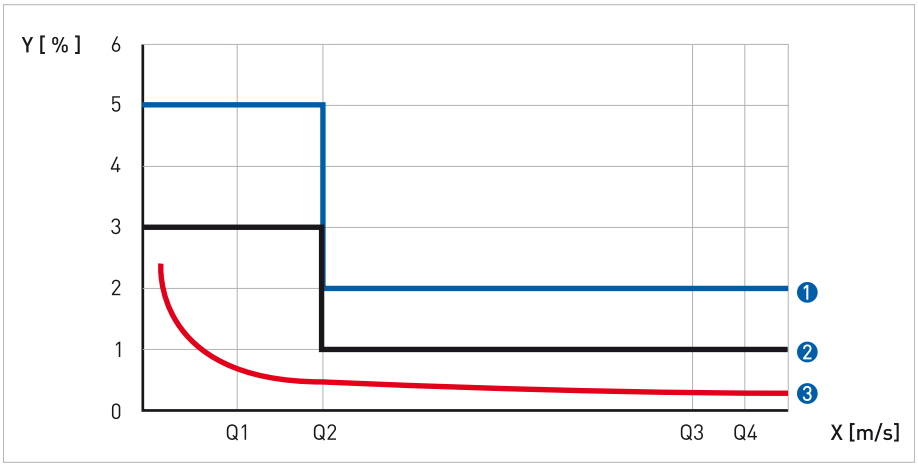


Figure 4-1: X (Flow velocity [m/s]); Y (Inaccuracy [%])

1. Demands according to EN 14154 OIML R-49 class 2
2. Demands according to EN 14154 OIML R-49 class 1
3. OPTIFLUX 2000

Temperature range

	Process [°C]		Ambient [°C]	
	min.	max.	min.	max.
Hardrubber				
Separate flow sensor (OPTIFLUX 2000 F)	-5	80	-40	65
Compact with IFC 300 (OPTIFLUX 2300 C)	-5	80	-40	65
Compact with IFC 010 (OPTIFLUX 2010 C)	-5	80	-25	60
Polypropylene				
Separate flow sensor (OPTIFLUX 2000 F)	-5	90	-40	65
Compact with IFC 300 (OPTIFLUX 2300 C)	-5	90	-40	65
Compact with IFC 010 (OPTIFLUX 2010 C)	-5	90	-25	60
	* Polypropylene available for DN 25 - 150			

	Process [°F]		Ambient [°F]	
	min.	max.	min.	max.
Hardrubber				
Separate flow sensor (OPTIFLUX 2000 F)	23	176	-40	149
Compact with IFC 300 (OPTIFLUX 2300 C)	23	176	-40	149
Compact with IFC 010 (OPTIFLUX 2010 C)	23	176	-13	140
Polypropylene				
Separate flow sensor (OPTIFLUX 2000 F)	23	194	-40	149
Compact with IFC 300 (OPTIFLUX 2300 C)	23	194	-40	149
Compact with IFC 010 (OPTIFLUX 2010 C)	23	194	-13	140
	* Polypropylene available for ASME 1" - 6"			

Metrological performance

DN	Q1	Q2	Q3	R	Q4
	(Q3 / R)	(Q1 * 1,6)		(Q3 / Q1)	(Q3 * 1,25)
[mm]	[m3/hr]	[m3/hr]	[m3/hr]		[m3/hr]
25	0,04	0,064	16	400	20
32…40	0,063	0,1	25	400	31,3
50	0,1	0,16	40	400	50
65	0,16	0,25	100	630	125
80	0,25	0,41	160	630	200
100	0,4	0,63	250	630	313
125…150	0,63	1,02	400	630	500
200	1	1,6	1000	1000	1250
250	1,6	2,56	1600	1000	2000
300	2,5	4	2500	1000	3125
350	5	8	2500	500	3125
400…450	8	12,8	4000	500	5000
500…600	12,6	20,2	6300	500	7875
650…750	20	32	10000	500	12500
800…950	32	51,2	16000	500	20000
1000…1200	50	80	25000	500	31250
1300…1500	80	128	40000	500	50000
1600…1700	100	160	40000	400	50000
1800…2100	160	256	40000	250	50000
2200…2500	250	400	40000	160	50000
2600…3000	400	640	40000	100	50000

Vacuum load

Liner	Diameter	Minimum operating pressure absolute in mbar (abs) at process temperature			
	[mm]	20°C	40°C	60°C	80°C
Polypropylene	DN25...150	250	250	400	400
Hardrubber	DN200...300	250	250	400	400
	DN350...1000	500	500	600	600
	DN1200...3000	600	600	750	750

Liner	Diameter	Minimum operating pressure absolute in psia at process temperature			
	[inch]	68°F	104°F	140°F	176°F
Polypropylene	1...6"	3.6	3.6	5.8	5.8
Hardrubber	8...12"	3.6	3.6	5.8	5.8
	14...40"	7.3	7.3	8.7	8.7
	48...120"	8.7	8.7	10.9	10.9

Dimensions and Weights

Nominal size		Dimensions [mm]							Approx. weight
DN	PN	L		H	W	T			
[mm]	[bar]	DIN	ISO			box	010	300	[kg]
DN25...150									
25	40	150	200	140	115	218	245	297	5
32	40	150	200	157	140	235	262	314	6
40	40	150	200	166	150	244	271	323	7
50	40	200	200	186	165	264	291	343	11
65	16	200	200	200	185	278	305	357	9
80	40	200	200	209	200	287	314	366	14
100	16	250	250	237	220	315	342	394	15
125	16	250	250	266	250	344	371	423	19
150	16	300	300	300	285	378	405	457	27
DN200...600									
200	10	350	350	361	340	439	466	518	34
250	10	400	450	408	395	486	513	565	48
300	10	500	500	458	445	536	563	615	58
350	10	500	550	510	505	588	615	667	78
400	10	600	600	568	565	646	673	725	101
450	10	600	-	618	615	696	723	775	111
500	10	600	-	671	670	749	776	828	130
600	10	600	-	781	780	859	886	938	165
DN700...2000									
700	10	700	-	898	895	976	1003	1055	248
800	10	800	-	1012	1015	1090	1117	1169	331
900	10	900	-	1114	1115	1192	1219	1271	430
1000	10	1000	-	1225	1230	1303	1330	1382	507
1200	6	1200	-	1417	1405	1495	-	1574	555
1400	6	1400	-	1619	1630	1697	-	1776	765
1600	6	1600	-	1819	1830	1897	-	1976	1035
1800	6	1800	-	2027	2045	2105	-	2184	1470
2000	6	2000	-	2259	2265	2337	-	2416	1860

Nominal size		Dimensions 150lbs [inch]						Approx. weight
ASME	PN	L	H	W	T			
[inch]	[psi]				box	010	300	[lbs]
DN1"...6"								
1"	284	5,91	5,39	4,25	8,46	9,53	11,57	18
1 1/2"	284	5,91	6,1	5	9,17	10,24	12,28	22
2"	284	7,87	7,05	5,98	10,12	11,18	13,23	29
3"	284	7,87	8,03	7,5	11,1	12,17	14,21	37
4"	284	9,84	9,49	9	12,56	13,62	15,67	51
5"	284	9,84	10,55	10	13,62	14,69	16,73	60
6"	284	11,81	11,69	11	14,76	15,83	17,87	75
DN8"...24"								
8"	284	13,78	14,25	13,5	17,32	18,39	20,43	95
10"	284	15,75	16,3	16	19,37	20,43	22,48	143
12"	284	19,69	18,78	19	21,85	22,91	24,96	207
14"	284	27,56	20,67	21	23,74	24,8	26,85	284
16"	284	31,5	22,95	23,5	26,02	27,09	29,13	364
18"	284	31,5	24,72	25	27,8	28,86	30,91	410
20"	284	31,5	26,97	27,5	30,04	31,1	33,15	492
24"	284	31,5	31,38	32	34,45	35,51	37,56	675
		Pressures are applicable at 20 °C (68 °F).						
		For higher temperatures, the pressure and temperature ratings are as per ASME B16.5 (up to 24") or ASME B16.47 (>24")						

Nominal size		Dimensions 150lbs [mm]						Approx. weight
ASME	PN	L	H	W	T			
[inch]	[psi]				box	010	300	[kg]
DN1"...6"								
1"	284	150	137	108	215	242	294	8
1 1/2"	284	150	155	127	233	260	312	10
2"	284	200	179	152	257	284	336	13
3"	284	200	204	190,5	282	309	361	17
4"	284	250	241	228,6	319	346	398	23
5"	284	250	268	254	346	373	425	27
6"	284	300	297	279,4	375	402	454	34
DN8"...24"								
8"	284	350	362	342,9	440	467	519	43
10"	284	400	414	406,4	492	519	571	65
12"	284	500	477	482,6	555	582	634	94
14"	284	700	525	533,4	603	630	682	129
16"	284	800	583	596,9	661	688	740	165
18"	284	800	628	635	706	733	785	186
20"	284	800	685	698,5	763	790	842	223
24"	284	800	797	812,8	875	902	954	306
		Pressures are applicable at 20 °C (68 °F).						
		For higher temperatures, the pressure and temperature ratings are as per ASME B16.5 (up to 24") or ASME B16.47 (>24")						

Nominal size		Dimensions 300lbs [inch]						Approx. Weight
ASME	PN	L	H	W	T			
[inch]	[psi]				box	010	300	[lbs]

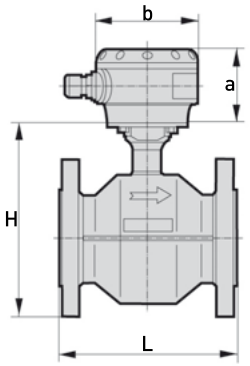
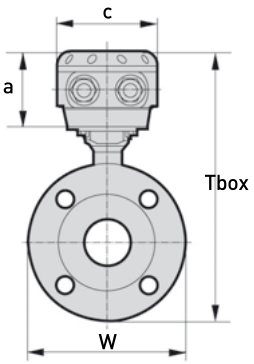
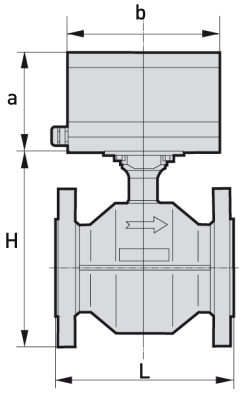
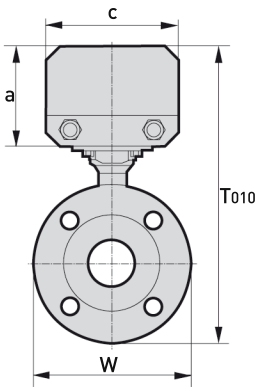
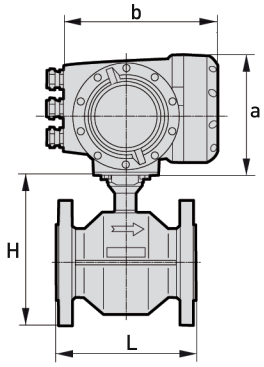
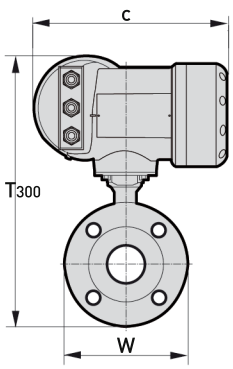
DN1"...6"

1"	741	5,91	5,71	4,87	8,78	9,84	11,89	18
1 1/2"	741	7,87	6,65	6,13	9,72	10,79	12,83	20
2"	741	9,84	7,32	6,5	10,39	11,46	13,5	29
3"	741	9,84	8,43	8,25	11,5	12,56	14,61	37
4"	741	11,81	10	10	13,07	14,13	16,18	51
6"	741	12,6	12,44	12,5	15,51	16,57	18,62	79

DN8"...24"

8"	741	15,75	15,04	15	18,11	19,17	21,22	157
10"	741	19,69	17,05	17,5	20,12	21,18	23,23	247
12"	741	23,62	20	20,5	23,07	24,13	26,18	375
14"	741	27,56	21,65	23	24,72	25,79	27,83	474
16"	741	31,5	23,98	25,5	27,05	28,11	30,16	639
20"	741	31,5	28,46	30,5	31,54	32,6	34,65	937
24"	741	31,5	33,39	36	36,46	37,52	39,57	1345
		Pressures are applicable at 20 °C (68 °F).						
		For higher temperatures, the pressure and temperature ratings are as per ASME B16.5 (up to 24") or ASME B16.47 (>24")						

Nominal size		Dimensions 300lbs [mm]						Approx. weight
ASME	PN	L	H	W	T			
[inch]	[psi]				box	010	300	[kg]
DN1"...6"								
1"	741	150	145	123,8	223	250	302	8
1 1/2"	741	200	169	155,6	247	274	326	9
2"	741	250	186	165,1	264	291	343	13
3"	741	250	214	209,6	292	319	371	17
4"	741	300	254	254	332	359	411	23
6"	741	320	316	317,5	394	421	473	36
DN8"...24"								
8"	741	400	382	381	460	487	539	71
10"	741	500	433	444,5	511	538	590	112
12"	741	600	508	520,7	586	613	665	170
14"	741	700	550	584,2	628	655	707	215
16"	741	800	609	647,7	687	714	766	290
20"	741	800	723	774,7	801	828	880	425
24"	741	800	848	914,4	926	953	1005	610
		Pressures are applicable at 20 °C (68 °F).						
		For higher temperatures, the pressure and temperature ratings are as per ASME B16.5 (up to 24") or ASME B16.47 (>24")						

Frontview OPTIFLUX 2000 F 	Sideview OPTIFLUX 2000 F 
a = 77 mm / 3,1" b = 111 mm / 4,4"	a = 77 mm / 3,1" c = 106 mm / 4,2"
Frontview OPTIFLUX 2010 C 	Sideview OPTIFLUX 2010 C 
a = 105 mm / 4,2 " b = 160 mm / 6,3"	a = 105 mm / 4,2" c = 140mm / 5,5"
Frontview OPTIFLUX 2300 C 	Sideview OPTIFLUX 2300 C 
a = 155 mm / 6,1" b = 202 mm / 7,8"	c = 260 mm / 10,2"

KROHNE Product Overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Mass flowmeters
- Ultrasonic flowmeters
- Vortex flowmeters
- Flow controllers
- Level measuring instruments
- Pressure gauges
- Temperature measuring instruments
- Water solutions & analysis
- Oil and gas turnkey solutions

Addresses:

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