



TIDALFLUX 4110 PF

Technical Datasheet

Electromagnetic flowmeter for partially filled pipes

- Measurement in partially filled pipes up to DN 1600 / 64"
- Patented, non-contact level measurement
- Measurement possible down to 10% filling of pipe
- Abrasion resistant liner
- No on-site calibration necessary

CE

KROHNE

Solution for partially filled pipes

TIDALFLUX flowmeters with integrated and non-contact capacitive level measuring system provides accurate flow measurement in partially filled pipes. TIDALFLUX is designed to measure reliably between 10% and 100% of the pipe cross section. The integrated level sensors behind the liner are in no contact with the liquid and are therefore insensitive against fat and oil swimming on the surface.



- 1 Various flange norms
- 2 Patented, capacitive and non-contact flow level measuring system, integrated in the liner
- 3 Separate Converter

Highlights

- For partially filled pipes in the water & wastewater industry
- Broad diameter range up to DN 1600 / 64"
- High abrasion resistance and chemical resistance
- Measurement possible between 10% and 100% filling of the pipe
- Electrodes for flow measurement are below 10% filling limit, therefore no blind folding by fat and oil swimming on the water surface
- Complete factory calibration - no on-site calibration necessary

Industries

- Water
- Wastewater

Applications

- For partially filled pipes instead of expensive siphon tube constructions
- Water and Wastewater
- Surface water
- Biological and chemical wastewater

Electromagnetic product range

OPTIFLUX converters: All converters fit to all sensors



- ❶ IFC 300 High-performance solution
- ❷ IFC 010 Economical solution

OPTIFLUX sensors



- ❶ OPTIFLUX 1000 Economical solution
- ❷ OPTIFLUX 2000 Solution for the water and wastewater industry
- ❸ OPTIFLUX 4000 Standard solution for the process industry
- ❹ OPTIFLUX 5000 Solution with high-tech ceramics
- ❺ OPTIFLUX 6000 Sanitary and hygienic solution

Special-purpose flowmeters



- ❶ WATERFLUX 2070 Battery powered watermeter solution
- ❷ OPTIFLUX 4040 C 2-wire solution
- ❸ TIDALFLUX 4110 PF Solution for partially filled pipelines
- ❹ BATCHFLUX 5015 C Solution for volumetric filling
- ❺ OPTIFLUX 7300 C Electrode-free solution

Measuring range and accuracies

Full scale range 100%	In pipe running full between 34 m ³ /h or 160 US Gal/min (minimum for DN 200 / 8") and 100000 m ³ /h or 400000 US Gal/min (maximum for DN 1600 / 64") equivalent flow velocity 0.3...12 m/s or 1...40 ft/s
Units	m ³ , litres or US Gallons per second, minute or hour, and 1 user-defined unit, e.g. litres per day or US million gallons per day
Error limits to reference conditions:	
Partially filled pipe	$v \geq 1 \text{ m/s (3,3 ft/s): } \leq 1\% \text{ of full-scale range}$
Full pipe	$v \geq 1 \text{ m/s (3,3 ft/s): } \leq 1\% \text{ of measured value}$
	$v < 1 \text{ m/s (3,3 ft/s): } \leq 0,5\% \text{ of MV} + 5 \text{ mm/s (0.5\% of MV} + 0.2 \text{ inches/s)}$
Reference conditions:	
Product	Water at 10...30°C / 50...86°F
Electrical conductivity	> 300 µS/cm
Power supply (line voltage)	U _{nom} (±2%)
Ambient temperature	20...22°C / 68...71.6°F
Warm-up time	60 min
Inlet / outlet runs	10 x DN / 5 x DN (DN= meter size)
Flow sensor	Properly grounded and centered

Technical data

Meter sizes and versions

Meter sizes	DN 200...1600 / 8"...64"
Connecting flanges:	
DIN 2501	DN 200...1600 / PN 6...10
ASME B16.5	8"...64" / 150 lbs
AWWA and others	On request
Protection category (IEC 520 / EN 60 529)	IP 67, equivalent to NEMA 6
Hazardous-duty version	Optionally Ex N, zone 2

Process data

Liquid product	Water, wastewater and chemical
Electrical conductivity	≥50 µS/cm
Flow level in pipe	Min. 10% of inside tube diameter
Process temperature	-5...60°C / +23...140°F
Ambient temperature	-25...60°C / -13...140°F
Operating pressure	max. 10 bar / 150 psig

Integrated flow measuring

Measuring principle	Electromagnetic flow measurement
Full-scale range $Q_{100\%}$	In pipe running full between 34 m ³ /h or 160 US Gal/min (minimum for DN 200 / 8") and 100 000 m ³ /h or 400 000 US Gal/min (maximum for DN 1600 / 64"); equivalent flow velocity 0.3...12 m/s or 1...40 ft/s
Electrode design	1 pair of electrodes, solidly fitted, surface polished
Power for field coils	From signal converter
Grounding rings	Available as an option

Integrated level measuring

Measuring principle	Capacitive level measurement, built into the measuring tube liner
Pipe fill	Min. 10% of inside tube diameter, outputs go to "zero" below 10% fill
Power for level measuring system:	
Voltage / frequency	230 / 115 VAC, 50...60 Hz, others on request 14 VA
Communication with signal converter	Via RS 485 interface
Electronics	Integral, mounted directly on the primary head
Cable entries	3 x M20x1.5 and 1 x PG 9, optionally 1/2" NPT or 1/2" PF

Materials of construction

Measuring tube	Stainless steel 1.4301 (or higher materials number) / AISI 304
Liner	PU, 12 mm / 0.47"
Electrodes	Hastelloy C4, others on request
Connecting flanges*	Steel 1.0038 (RST 37.2)
Converter housing*	Sheet steel
Electronics housing*	Cast aluminium
PG cable entries	Nickel- plated brass
Grounding rings (option)	Stainless steel 1.4571 / AISI 316 Ti
	* with polyurethane finish 143 RAL 9006

IFC 110 PF signal converter

Version

IFC 110 PF	Display version, with local display/ control elements (15 keys)
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Current output

Function	All operating data configurable Galvanically isolated from all input and output circuits
Current:	
Fixed ranges	0...20 mA and 4...20 mA
Variable ranges	for Q = 0%: I _{0%} = 0...16 mA for Q = 100%: I _{100%} = 4...20 mA for Q > 100%: I _{max} = 20...22 mA
Load	Min. 15 Ohm
Error identification	0 / 22 mA and variable

Pulse outputs (passive)

	P	A1
Function	For electronic totalizers All operating data configurable	For electromechanical totalizers All operating data configurable
Terminals	P / P	A1 / A (gnd)
Pulse rate	0...10000 pulses per s [=Hz], min, h,m ³ ,liter, etc., any scaling	0...50 pulses per s[= Hz], min, h,m ³ , liter, etc., any scaling
Electrical data	Galvanically isolated U ≤ 32 VDC / ≤ 24 VAC I ≤ 30 mA, any polarity	Galvanically isolated, but not from A2 U ≤ 32 VDC / ≤ 24 VAC I ≤ 100 mA, any polarity or U ≤ 32 VDC, I ≤ 200 mA, note polarity
Pulse width	Automatic: pulse duty cycle 1:1, max 10 000 pulses/s = 10 kHz Variable: 10 ms...1s, P _{100%} [pulses/s] = f _{max} [Hz] = 1 / (2 x pulse width) Digital pulse division, interpulse period non-uniform, therefore if frequency and cycle meters connected allow for minimum counting interval: gate time, totalizer 1000 / P100% [Hz]	

Status outputs (passive)

	D1 / D2 / A2	A1 (can also be operated as pulse output)
Function, set for	Trip point Automatic range change Error identification Overdriving Empty pipeline, < 10%	Trip point Automatic range change Error identification Overdriving Empty pipeline, < 10%
Terminals	D1 / D (gnd) D2 / D (gnd) A2 / A (gnd)	A1 / A (gnd) - -
	Please note: D (gnd) common reference potential for D1 and D2	
	A (gnd) common reference potential for A1 and A2	
Electrical data	Galvanically isolated U ≤ 32 VDC / ≤ 24 VAC I ≤ 100 mA, any polarity	Galvanically isolated, but not from A2 U ≤ 32 VDC / ≤ 24 VAC I ≤ 100 mA, any polarity or U ≤ 32 VDC, I ≤ 200 mA, please note polarity

Control inp C1 and C2 (passive)

Function, set for	Automatic range change, totalizer reset, error reset, start self-test, set outputs to min. values or hold last measured values of outputs.
Terminals	C1 / C (gnd) and C2 / C (gnd) (please note: C (gnd) common reference potential for C1 and C2)
Electrical data	Galvanically isolated, U = 8...32 VDC, I ≤ 10 mA, any polarity

Internal power supply

	for passive outputs and inputs and external receiver instruments
Terminals	E + and E -, please note polarity
Electrical data	galvanically isolated / U = 24 VDC / R _i = approx. 15 Ohm / I ≤ 100 mA

Time constant

	0.2...99.9 s, adjustable in increments of 0.1 second
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Local display

Display function	Actual flowrate, sum totalizers (7 digits) or 25 - character bar graph with percent display, status messages, level
Units: actual flowrate	m ³ /h, liter/s., US gallons/min or user- defined unit, e.g. hecto liter/h or US million gallons/day
Totalizer	m ³ , liter, or US gallons or user-defined unit, e.g. hecto liter or US million gallons (adjustable counting time till overflow)
Level	Percent of tube diameter
Language of plain texts	English, German, French, others on request
Display: 1st line	8- character, 7- segment, numerical and sign display, and symbols for key acknowledgement
2nd line	10- character, 14- segment, text display
3rd line	6 markers to identify status of measuring mode

Field power supply

Type	Pulsed bipolar DC field, galvanically isolated from all input and output circuits
Terminals	7 and 8, each 2x
Current / voltage	±0.125 A (±5%) / maximum 40 V
Clock frequency	1/36 to 1/6 of power frequency, configurable to the calibration data of the primary head

Mains power supply

Voltage range (without change over)	115 / 230 VAC
Frequency	48...63 Hz
Power consumption (incl. flow sensor)	12 W, typical (max. 18 W)

Field housing

Material	Die - cast aluminium with polyurethane finish
Temperature	Operation: -25...60°C / -13...140°F; storage: -40...60°C / -40...140°F
Protection category (IEC529 / EN60529)	IP 65, equivalent to NEMA 4/4x

Field power supply cable, not included in supply, to be provided by customer

Max. permissible length		Cable type	
[m]	[ft]	[mm ²]	AWG
≤ 150	≤ 500	2 x 0.75	2 x 18 AWG
≤ 300	≤ 1000	2 x 1.50	2 x 14 AWG
≤ 600	≤ 2000	4 x 1.50	4 x 14 AWG

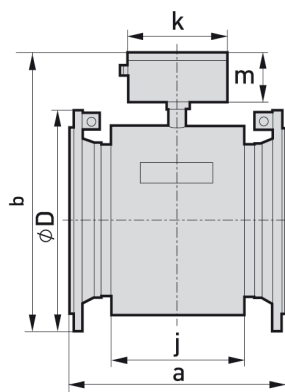
DS signal cable, with double shielding, 10 m / 30 ft cable in supply

Max. permissible length		Electrical conductivity
[m]	[ft]	[μS/cm]
≤ 100	≤ 330	≥ 50
≤ 200	≤ 660	≥ 100
≤ 600	≤ 2000	≥ 400

Data transmission cable, with single shielding, 3 x 0.75 mm² / 3 x 14 AWG, e.g. LiYCY, 10 m / 30 ft cable in supply, max. permissible length 600 m / 2000 ft.

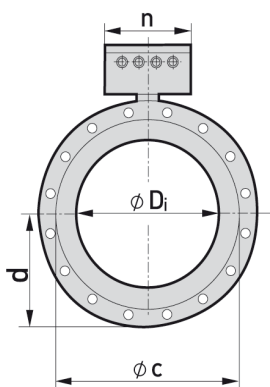
Dimensions and weights

Front view



k = 232 mm / 9.1"
m = 110 mm / 4.3"

Side view



n = 202 mm / 8"

Meter size		Dimensions [mm]							Approx. Weight
DIN 2501									
DN	PN	a	b	∅c	d	j	∅D	∅Di	[kg]
200	10	350	482	291	146	177	340	189	40
250	10	400	530	331	166	205	395	231	54
300	10	500	580	381	191	235	445	281	66
350	10	500	618	428	214	306	505	316	95
400	10	600	674	483	242	386	565	365	115
500	10	600	778	585	293	386	670	467	145
600	10	600	876	694	347	386	780	567	180
Bigger sizes (DN 700...1600) on request									

Meter size		Dimensions [inches]							Approx. weight
ASME B16.5									
inches	Class	a	b	∅c	d	j	∅D	∅Di	[lbs]
8	150	13.78	19.02	11.46	5.75	6.97	13.39	7.44	90
10	150	15.75	21.06	13.03	6.54	8.07	15.55	9.09	120
12	150	19.69	23.54	15	7.52	9.25	17.52	11.06	145
14	150	27.56	25.43	16.85	9.8	12.05	19.88	12.44	210
16	150	31.5	27.72	19.02	9.53	15.2	22.24	14.37	255
20	150	31.5	31.73	23.03	11.54	15.2	26.38	18.39	320
24	150	31.5	36.14	27.32	13.66	15.2	30.71	22.32	400
Bigger sizes (28"...64") on request									





KROHNE 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

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