



## OPTIMASS 3000

### Technical Datasheet

Sensor for mass flow

- For low flow rates
- Secondary pressure containment
- Sensor available in Hastelloy® and stainless steel
- Simple installation and start-up
- Common "footprint" for all 3 sizes
- Modular electronics concept



**KROHNE**

## The solution for low flow rates

OPTIMASS 3000 measures flow rates down to grams per minute with excellent zero stability. OPTIMASS 3000 reliably measures mass flow of liquids and gases, volume, density and concentration of liquids.



- 1 Comprehensive diagnosis capabilities
- 2 All standard process connections available, including hygienic type connections
- 3 Secondary pressure containment in stainless steel 316L
- 4 Same electronics for all sensors with redundant storage of calibration and sensor data
- 5 Modular electronics with all output options, see separate data sheet for details

## Highlights

- Z-shaped measuring tube
- Easily drained and easy to clean
- Optional heating jacket
- Simple installation and start-up
- Modular electronics concept: electronics and sensor easy to replace
- Data redundancy: accurate plug & play replacement of electronics

## Industries

- Wastewater
- Chemical
- Food & Beverage
- Paper & Pulp
- Pharmaceutical
- Water

## Applications

- Batching applications such as addition of additives
- Addition of carbon dioxide
- Flow measurement of bleaching and cleaning agents, additives, colorants, cosmetics

## Mass flowmeter product family

All meters consist of a sensor and a converter, which may be mounted integral to the sensor, or remotely, either with a field mount kit, a wall mount housing or a 19" rack mount module.

A sensor mount converter (MFC 010) with a Modbus<sup>®</sup> output only is also possible for OEM manufacturers or where the user does not require a converter with analogue outputs.

### Converter: Common hardware for all converters makes spares holding simpler



- ❶ MFC 300 C: Compact or integrally mounted on sensor
- ❷ MFC 300 F: Field mount up to 300 m / 1000 ft from sensor
- ❸ MFC 300 W: Wall mount for non-hazardous areas
- ❹ MFC 300 R: 19" Rack mount module for control room installation
- ❺ MFC 010: Sensor electronics with Modbus<sup>®</sup> output

### Sensor: Sensors for any applications



- ❶ OPTIMASS 1000: The general purpose solution for the process industry
- ❷ OPTIMASS 3000: The meter for low flow applications
- ❸ OPTIMASS 7000: The optimum solution for the chemical, food & beverage and pharmaceutical industry
- ❹ OPTIMASS 8000: The meter for high pressure and elevated temperatures
- ❺ OPTIMASS 9000: The high temperature solution up to 350°C / 660°F

## Technical Data

### Hastelloy (H) and stainless steel (S) versions: Operating data

Size	H01 / S01	H03 / S03	H04 / S04
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### Flow rate

Nominal flow rate [kg/h]	15	100	350
Nominal flow rate [lbs/min]	0.5	3.5	12.5
Maximum flow rate	130% of nominal flow rate		

### Accuracy

Accuracy, liquid	±0.1% of actual measured flow rate
Accuracy, gas	±0.5% of actual measured flow rate
Repeatability	Better than 0.05% plus zero stability (includes the combined effects of repeatability, linearity and hysteresis)
Zero stability	±0.015% of nominal flow rate with respective sensor size

### Reference conditions

Product	Water
Temperature	20°C / 68°F
Operating pressure	2 bar <sub>rel.</sub> / 29 psig

### Density

Measuring range	500...2000 kg/m <sup>3</sup> / 30...125 lbs/ft <sup>3</sup>
Accuracy	±2 kg/m <sup>3</sup> / ±0.13 lbs/ft <sup>3</sup>

### Temperature

Measuring range	-40...+150°C / -40...+300°F
Accuracy	±1°C / ±1.8°F

### Device specifications

Size	H01 / S01	H03 / S03	H04 / S04
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### Materials

Measuring tube	Hastelloy® C-22 / stainless steel 1.4435 / AISI 316L
Process connections	Hastelloy® C-22 / stainless steel 1.4435 / AISI 316L
Baseplate	Stainless steel 1.4435 / AISI 316L
Outer cylinder (secondary pressure containment)	Stainless steel 1.4435 / AISI 316L
Sensor electronics housing	Stainless steel 1.4435 / AISI 316L

### Nominal pressure at 20°C or 68°F

Measuring tube	-1...150 bar <sub>rel.</sub> / -14.5...2175 psig
Outer casing (secondary pressure containment)	-1...30 bar <sub>rel.</sub> / -14.5...435 psig

### Temperature

Process temperature	-40...+150°C / -40...+300°F
Ambient temperature - compact version	-40...+55°C / -40...+130°F
Ambient temperature - remote version	-40...+60°C / -40...+140°F

Size	H01 / S01	H03 / S03	H04 / S04
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**Process effects on the sensor**

Temperature	0.0075% of the nominal flow rate per 1°C / 0.0045% of the nominal flow rate per 1°F
Pressure	0.0175% of the nominal flow rate per 1 bar <sub>rel.</sub> / 0.001% of the nominal flow rate per 1 psig

**Approvals**

Size	H01 / S01	H03 / S03	H04 / S04
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**Mechanical**

Protection category (acc. to EN 60529)	IP 67; NEMA 4X
European Pressure Equipment directive	PED 97-23 EC (acc. to AD 2000 Regelwerk)

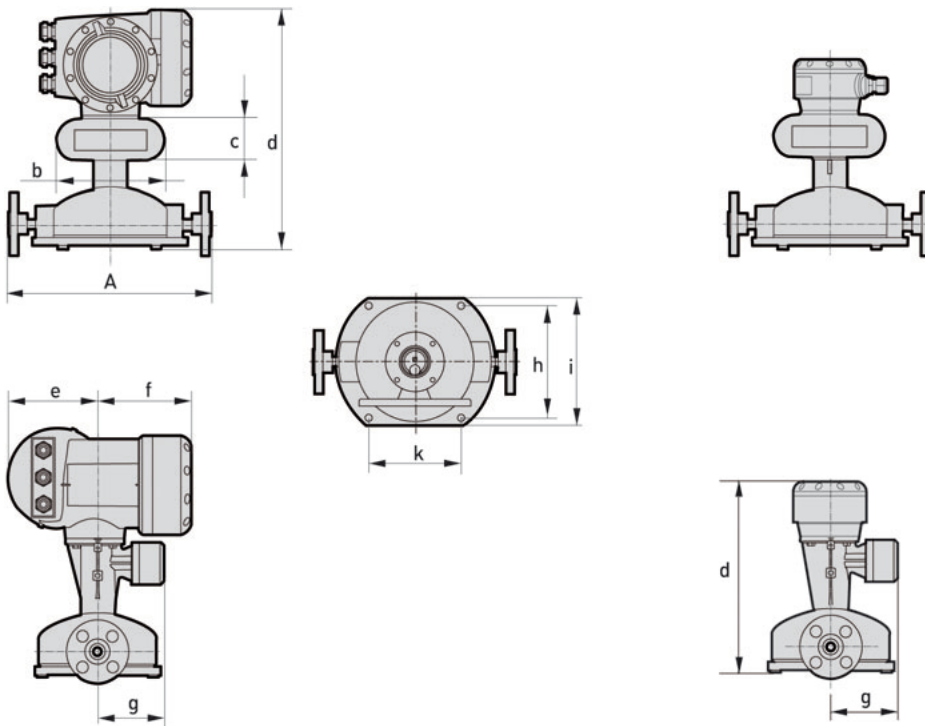
**ATEX (acc. to 94/9/EC)**

OPTIMASS 3300 C - With "flameproof" terminal compartment	II 2 G EEx d ib IIC T6...T1
	II 2 D Ex tD A21 IP6x T175°C
	II 2(1) G EEx d ib[ia] IIC T6...T1
	II 2(1) D Ex tD [iaD] A21 IP6x T175°C
OPTIMASS 3300 C - With "increased safety" terminal compartment	II 2 G EEx de ib IIC T6...T1
	II 2 D Ex tD A21 IP6x T175°C
	II 2(1) G EEx de ib[ia] IIC T6...T1
	II 2(1) D Ex tD [iaD] A21 IP6x T175°C
OPTIMASS 3000 and 3010 C	II 2 G EEx ib IIC T6...T1
	II 2 D Ex ibD 21 T165°C
MFC 300 F- With "flameproof" terminal compartment	II 2(1) G EEx d [ia] IIC T6
	II 2(1) D Ex tD [iaD] A21 IP6x T85°C
MFC 300 F- With "increased safety" terminal compartment	II 2(1) G EEx de [ia] IIC T6
	II 2(1) D Ex tD [iaD] A21 IP6x T85°C
Factory Mutual / CSA	Class I, Div 1 groups A, B, C, D
	Class II, Div 1 groups E,F,G
	Class III, Div 1 hazardous areas
	Class I, Div 2 groups A, B, C, D
	Class II, Div 2 groups F,G
	Class III, Div 2 hazardous areas

**Electromagnetic compatibility (EMC)**

to CE	EN 50081-1 (1992); EN 50082-2 (1994);
	Namur NE 21/5.95;
	89/336/EEC (EMC);
	72/73/EEC (Low Voltage Directive)

## Dimensions



①

① Compact version

② Remote version

②

Dimensions A in mm and inches for all available process connector lengths

Connection type	A	
	[mm]	[inch]
1/4" NPT(M)	256±3	10.1 ±0.1
ASME150	286±3	11.3 ±0.1
ASME300	286±3	11.3 ±0.1
ASME600	295±3	11.6 ±0.1
DN15 PN40	286±3	11.3 ±0.1
DN15 PN63	295±3	11.6 ±0.1
15A JIS 20K	286±3	11.3 ±0.1
DIN10 DIN32676	260±3	10.2 ±0.1
1/2" TRI-CLOVER Clamp	262±3	10.3 ±0.1

## Dimensions in mm

Dimensions [mm]	Size		
	H01 / S01	H03 / S03	H04 / S04
A	①	①	①
b	160		
c	60		
d (compact)	348		
d (remote)	269		
e	123.5		
f	137		
g	98.5		
h	156		
i	180		
k	132		
Measuring tube inner diameter	1.2	2.6	4.0

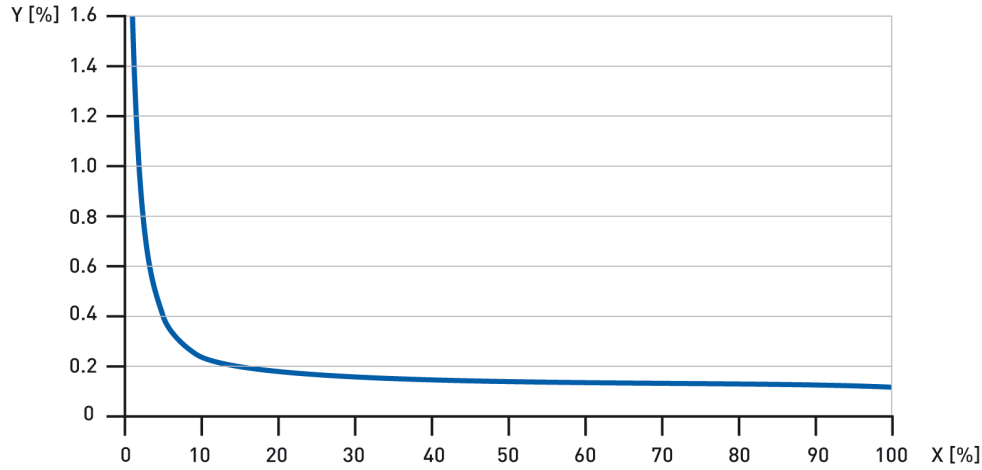
① depending on the process connection; see table for dimension A

## Dimensions in inches

Dimensions [mm]	Size		
	H01 / S01	H03 / S03	H04 / S04
A	①	①	①
b	6.3		
c	2.4		
d (compact)	13.7		
d (remote)	10.6		
e	4.9		
f	5.4		
g	3.9		
h	6.1		
i	7.1		
k	5.2		
Measuring tube inner diameter	0.05	0.1	0.2

① depending on the process connection; see table for dimension A

## Measuring accuracy



Y[%]: measuring error; X[%]: nominal flow rate

## Measuring error

The measuring error is obtained from the combined effects of accuracy and zero stability.

### Full-scale ranges and measuring errors

Full-scale ranges	100 : 1	20 : 1	10 : 1	5 : 1	2 : 1	1 : 1
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### Hastelloy® C-22, stainless steel 316L

Typical measuring error %	1,60	0,40	0,25	0,18	0,13	0,12
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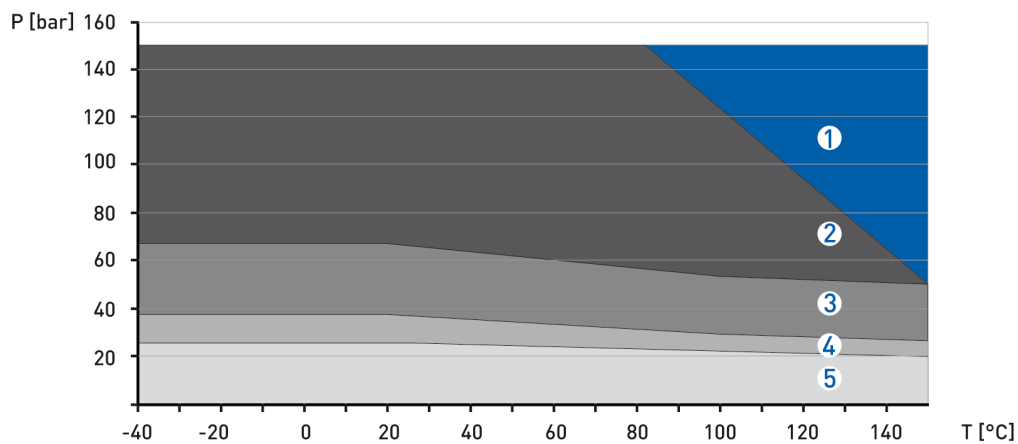


## Guidelines for maximum operating pressure

### Note:

Ensure that the meters are used within their operating limits. Observe the following illustrations.

### Flanged connections as per DIN 2501 for NPT screw-on connections: Pressure / temperature de-rating for stainless steel and Hastelloy® C22 meters



- ① NPT connection with Hastelloy® measuring tube
- ② NPT connection with stainless steel measuring tube
- ③ PN63 flanges
- ④ PN40 flanges
- ⑤ Secondary pressure containment up to 30 bar

### Note:

All hygienic type process connections rated to 10 barg / 145 psig at 20°C / 68°F.





## 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

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