



OPTIBATCH 4011 C Technical Datasheet

Mass flowmeter for process batching

- Reliable batching repeatability
- Excellent low flow stability
- Hygienic design for food, beverage and pharmaceutical applications



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1.1 Overview

The OPTIBATCH has been developed to compliment the OPTIMASS family of mass flowmeters, as a specialised meter for batching and filling machines.

As part of the Coriolis family of meters, the OPTIBATCH offers excellent long-term stability and reliability of mass flow, over long periods.



- ① Micro (M12) male connector providing all electrical connections.
- ② Hygienic flange and clamp connections as standard.
- ③ Welded outer casing.

Highlights

- Compact design
- Integrated electronics
- Excellent reliability and accuracy
- Hygienic design of process connections
- Excellent repeatability
- Stainless Steel 316L construction
- CIP / SIP to maximum 120°C / 248°F
- Welded outer casing, sealed to IP 67

Industries

- Food & Beverage
- Chemical
- Pharmaceutical industry
- Cosmetic
- Health care

Applications

- Filling machines
- Fast batching
- Ultra-pure water

1.2 Features and options

Features



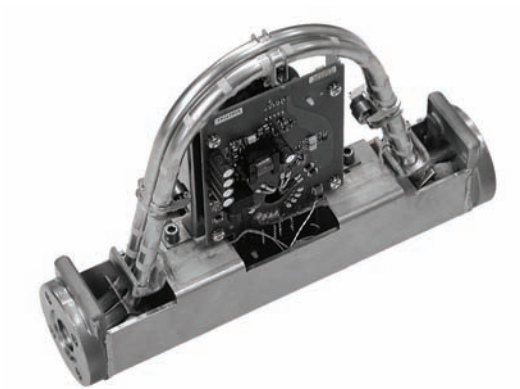
- Low pressure drop.
- Optimised signal to pressure drop ratio.
- Reliable and accurate.

Connection options



- DIN11864-2 hygienic flange connections, or a range of hygienic clamp connections.
- Bespoke fittings to the customer's specification.

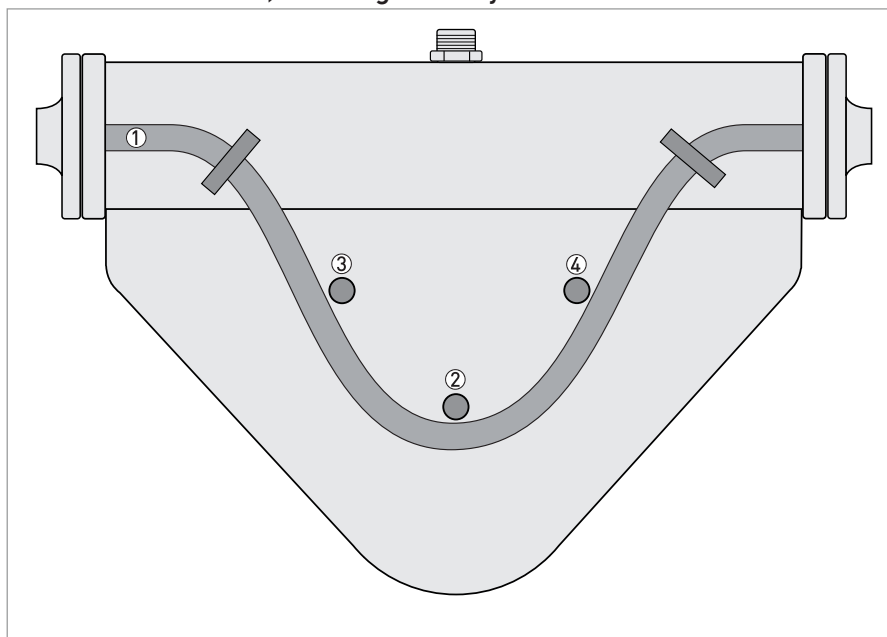
Integral electronics



- Integral electronics.
- Stand alone signal conversion.
- No requirement for a separate converter.

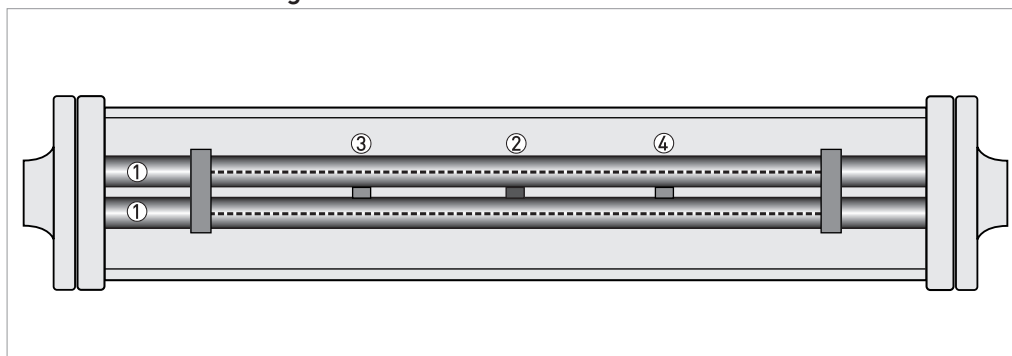
1.3 Measuring principle

Meter from the side, showing tube layout



- ① Measuring tubes
- ② Drive coil
- ③ Sensor 1
- ④ Sensor 2

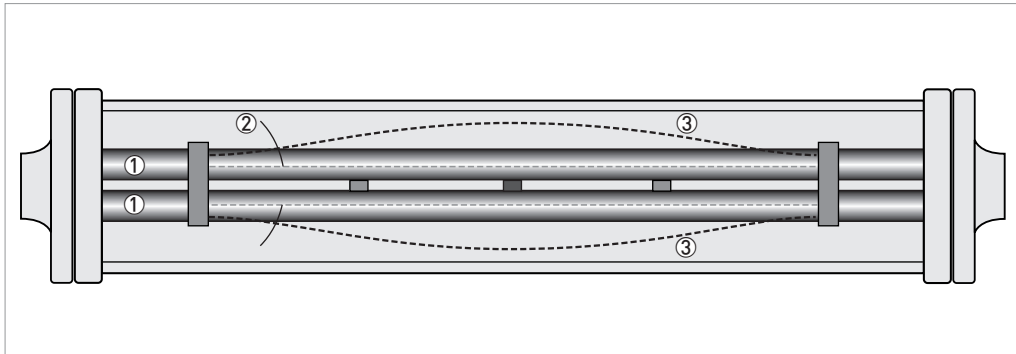
Static meter not energised and with no flow



- ① Measuring tubes
- ② Drive coil
- ③ Sensor 1
- ④ Sensor 2

A Coriolis twin-tube mass flowmeter consists of two measuring tubes (①) a drive coil (②) and two sensors (③ and ④) that are positioned either side of the drive coil.

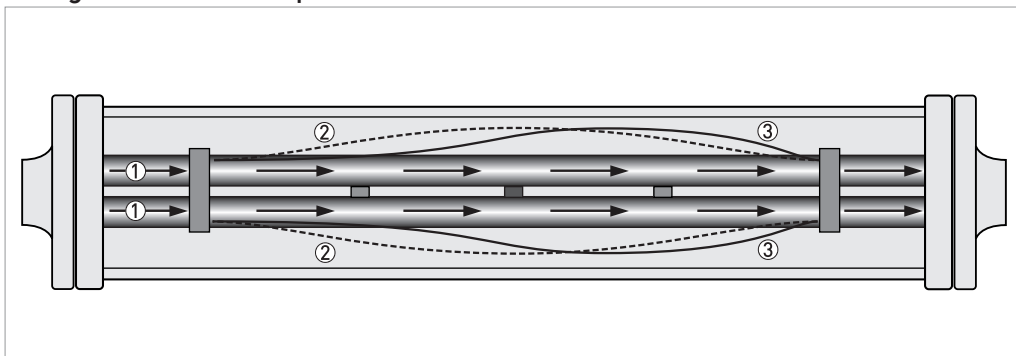
Energised meter



- ① Measuring tubes
- ② Direction of oscillation
- ③ Sine wave

When the meter is energised, the drive coil vibrates the measuring tubes causing them to oscillate and produce a sine wave (③). The sine wave is monitored by the two sensors.

Energised meter with process flow



- ① Process flow
- ② Sine wave
- ③ Phase shift

When a fluid or gas passes through the tubes, the Coriolis effect causes a phase shift in the sine wave that is detected by the two sensors. This phase shift is directly proportional to the mass flow.

Density measurement is made by evaluation of the frequency of vibration and temperature measurement is made using a Pt500 sensor.

2.1 Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).

Measuring system

Measuring principle	Coriolis mass flow
Application range	Measurement of liquids in batching and filling machines
Measured values	Mass
Calculated values	Volume

Design

Basic	System consists of a measuring sensor with integral converter to process the output signal
Features	Fully welded maintenance- free sensor with twin U-shaped measuring tube
Variants	
Compact version	Integral converter

Measuring accuracy

Mass	
$Q_{nom} \times 0.1 \leq Q$	$\pm 0.15\%$ of actual measured flow rate
$Q < Q_{nom} \times 0.1$	$\pm 0.1\%$ of actual measured flow rate + zero stability
Volume	
$Q_{nom} \times 0.1 \leq Q$	$\pm 0.2\%$ of actual measured flow rate
$Q < Q_{nom} \times 0.1$	$\pm 0.15\%$ of actual measured flow rate + zero stability
Zero stability	
Stainless Steel	0.005% of nominal flow
Repeatability (at reference condtions)	
Filling time	Standard deviation
$1.5 \text{ s} < \text{Filling time} \leq 3 \text{ s}$	0.13%
$3 \text{ s} < \text{Filling time} \leq 5 \text{ s}$	0.07%
$5 \text{ s} < \text{Filling time}$	0.04%
Reference conditions	
Warm-up time	15 min
Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig
Accreditation	UKAS to EN17025

Operating conditions

Nominal flow rates	
S08	10 kg/min / 22 lb/min
S10	22 kg/min / 48.4 lb/min
S15	72 kg/min / 158.4 lb/min
Ambient temperature	
Compact version	-40...+55°C / -40...+131°F
Process temperature	
Operating temperature	0...+100°C / 32...+212°F
SIP/CIP	Maximum +120°C / +248°F
	Maximum 1h duration
Nominal pressure at 20°C / 68°F	
Measuring tube	
Stainless Steel	-1...40 barg / -14.5...580 psig
Fluid properties	
Permissible physical condition	Liquids
Permissible gas content (volume)	Contact manufacturer for information.
Permissible solid content (volume)	Contact manufacturer for information.
Protection category (acc. to EN 60529)	IP 67, NEMA 6

Installation conditions

Inlet runs	None required
Outlet runs	None required

Materials

Stainless Steel meter	
Measuring tube	Stainless Steel 316L (1.4404)
Surface finish (wetted parts)	Standard Ra 0.8 µm
	Optional Ra 0.5 µm
Process connections	Stainless Steel 316L (1.4404)
Outer casing	Stainless Steel 316 (1.4401), hermetically sealed as standard
	Optional polishing of all externals

Process connections

Hygienic	
Tri-clover	½...1"
Tri-clamp DIN 32676	DN10...25
Tri-clamp ISO 2852	1"
Clamp IDF	10...15A
DIN 11864-2 Form A	DN20
Male thread DIN 11851	DN10...25
Male thread SMS	1"
Male thread RJT	1"

Electrical Connection

Connection	
Electrical connections	Micro (M12) male, 8 pole (Lumberg PRSFM 8/0.5M)
Power Supply	
Voltage	24 VDC $\pm 20\%$
Power consumption	3 W
Power supply type	Protected extra-low voltage (PELV)
Pulse/Frequency Output	
Pulse rate for Q = 100%	Maximum 10 kHz
	Factory set according to customer requirements
Pulse width	Selectable 1 kHz or 10 kHz symmetrical pulse
	Factory set according to customer requirements
Connection	External voltage: $U_{\text{ext}} \leq 30 \text{ VDC} / \leq 24 \text{ VAC}$
	Load rating: $I_{\text{max}} = 20 \text{ mA}$

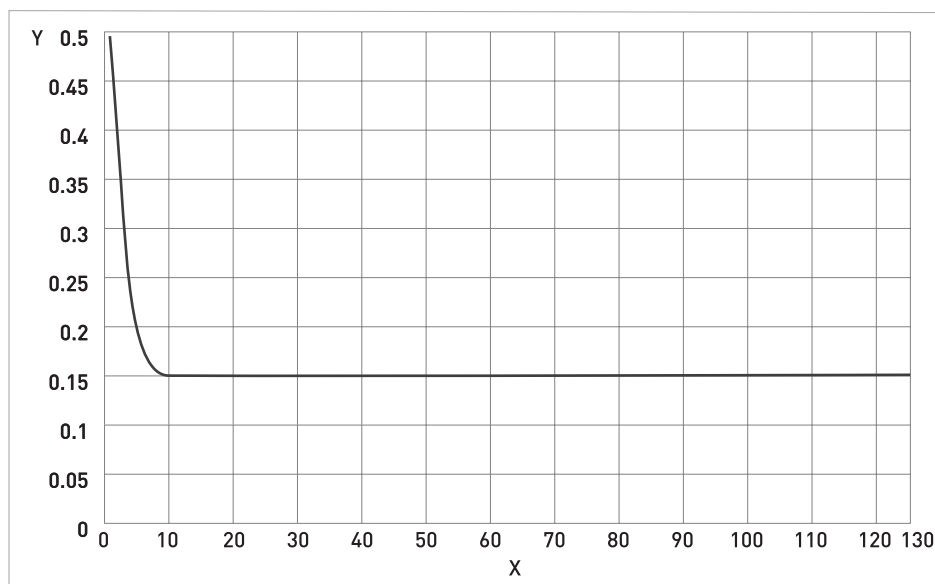
Configuration

Function	MODBUS connection for programming and configuration of full process parameters using software supplied
	Note: MODBUS and pulse / frequency output can not be used simultaneously
Type	RS485 Modbus RTU

Approvals

Mechanical	
Electromagnetic compatibility (EMC) acc. to CE	Namur NE 21/5.95
	2004/108/EC (EMC)
	2006/95/EC (Low Voltage Directive)
Hygienic	3A 28-03
	ASME BPE 2005
	Conforms with FDA guidelines
	EHEDG
Vibration	IEC 60068-2-6

2.2 Measuring accuracy



X Flow rate [%]

Y Measuring error [%]

Measuring error

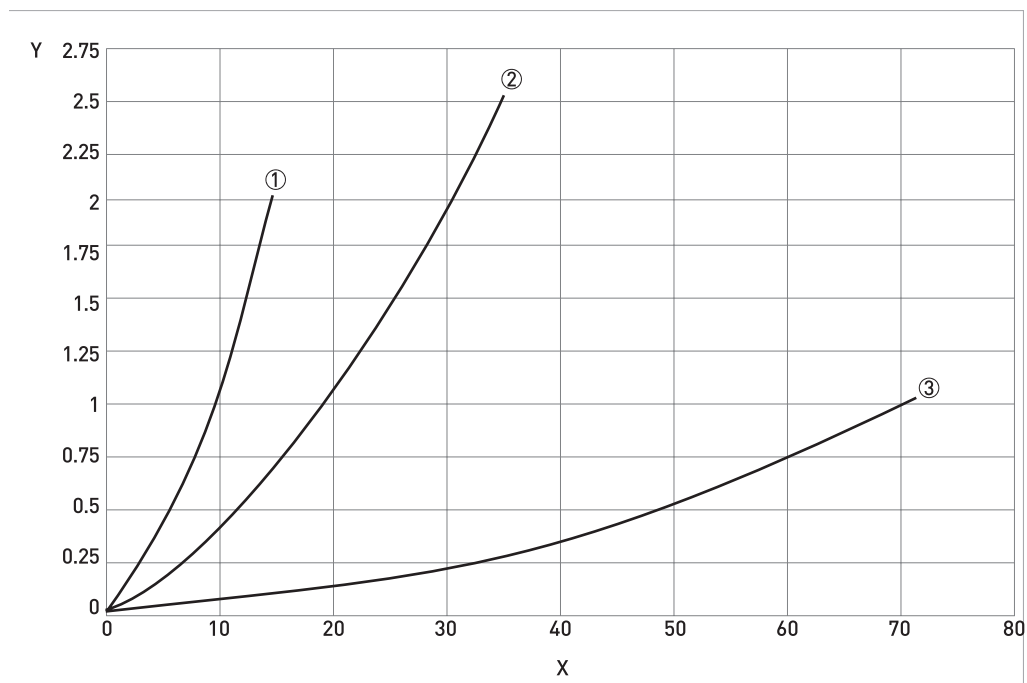
The measuring error is obtained from the combined effects of accuracy and zero stability.

Reference conditions

Product	Water
Temperature	+20°C / +68°F
Operating pressure	1 barg / 14.5 psig

2.3 Pressure drop

Metric



X Mass flow [kg / min]

Y Pressure [barg]

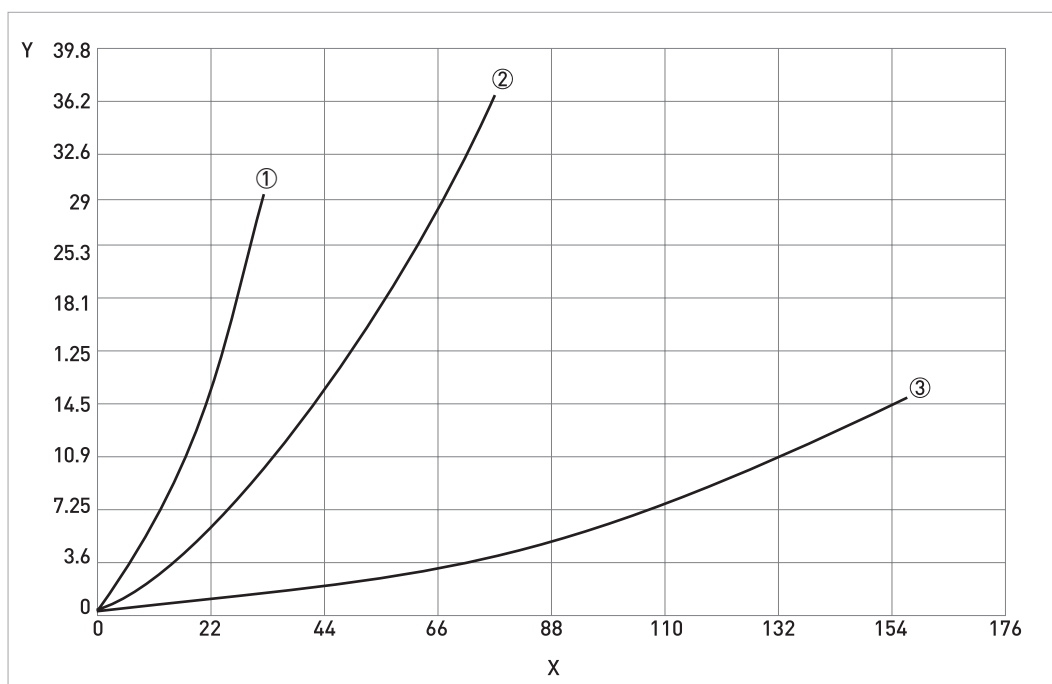
① S08

② S10

③ S15

Reference conditions

Meter	Product	Temperature
OPTIBATCH S08	Water	20°C
OPTIBATCH S10		
OPTIBATCH S15		

Imperial

X Mass flow [lb / min]

Y Pressure [psig]

① S08

② S10

③ S15

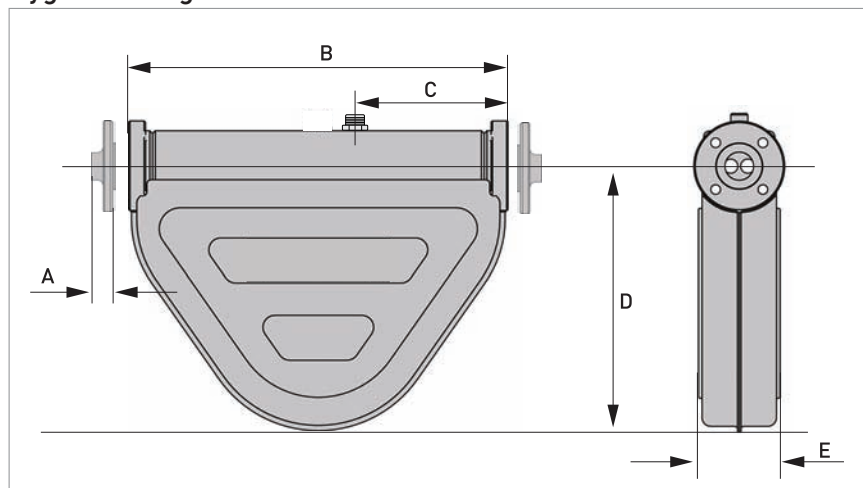
Reference conditions

Meter	Product	Temperature
OPTIBATCH S08	Water	68°F
OPTIBATCH S10		
OPTIBATCH S15		

2.4 Dimensions and weights

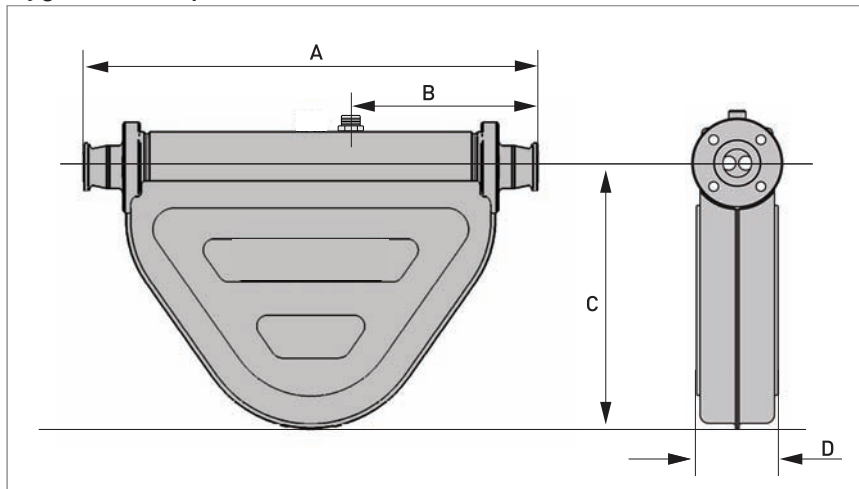
2.4.1 Dimensions

Hygienic flange



Meter	S08		S10		S15	
Connection	DN20 DIN11864-2		DN20 DIN11864-2		DN20 DIN11864-2	
	[mm]	[inches]	[mm]	[inches]	[mm]	[inches]
A	15	0.59	15	0.59	15	0.59
B	270	10.6	270	10.6	270	10.6
C	112	4.4	112	4.4	112	4.4
D	189	7.44	189	7.44	189	7.44
E	59.5	2.34	59.5	2.34	59.5	2.34

Hygienic clamp



Meter	S08 / S10				S15								
Connection	DN10 Clamp DIN32676	DN15 Clamp DIN32676	DN10 IDF Clamp (A type)	DN15 Tri-Clover	DN15 Clamp DIN32676	DN20 Clamp DIN32676	DN25 Clamp DIN32676	DN15 IDF Clamp (A type)	DN20 Tri-Clover	DN25 Tri-Clover	DN25 Clamp ISO2852	DN25 RJT	DN25 SMS
[mm]													
A	333				333								
B	144				144								
C	189				189								
D	59.5				59.5								
[inches]													
A	13.1				13.1								
B	5.7				5.7								
C	7.44				7.44								
D	2.34				2.34								

2.4.2 Weights

Meter	S08		S10		S15	
	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]
	2.9	6.38	2.9	6.38	2.9	6.38

3.1 Intended use

This flowmeter has been specifically designed for the fast batching measurement of mass or volume and is intended for use in filling machines or bespoke applications.

3.2 Mounting restrictions

3.2.1 General installation principles

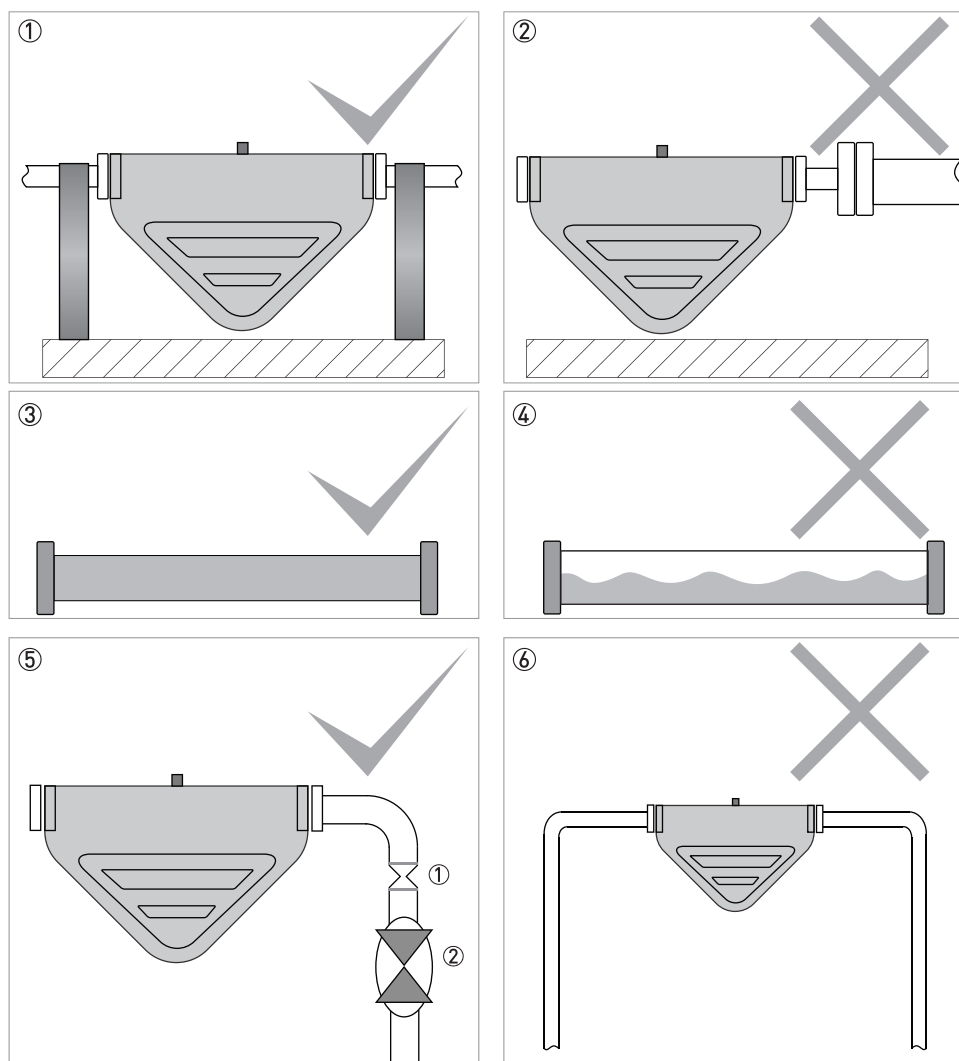


Figure 3-1: General mounting restrictions

- ① Fully support the weight of the meter. The meter can be supported with clamps close to the connecting flanges.
- ② Do not use extreme reductions in process pipework size.
- ③ Make sure that the process pipework is full at all times.
- ④ Do not let the flow fall in the process pipework. Low process flow will cause a measuring error.
- ⑤ If the meter has been installed with an open-ended down-pipe, Install an orifice plate or restrictor (①) to make sure that the pipework remains full during measurement. A fast-acting batch or shut-off valve (②) should also be installed downstream of the meter.
- ⑥ It is recommended that you DO NOT mount the meter at the highest point in the pipework because it can cause air / gas to collect in the meter.

3.2.2 Carousel installation

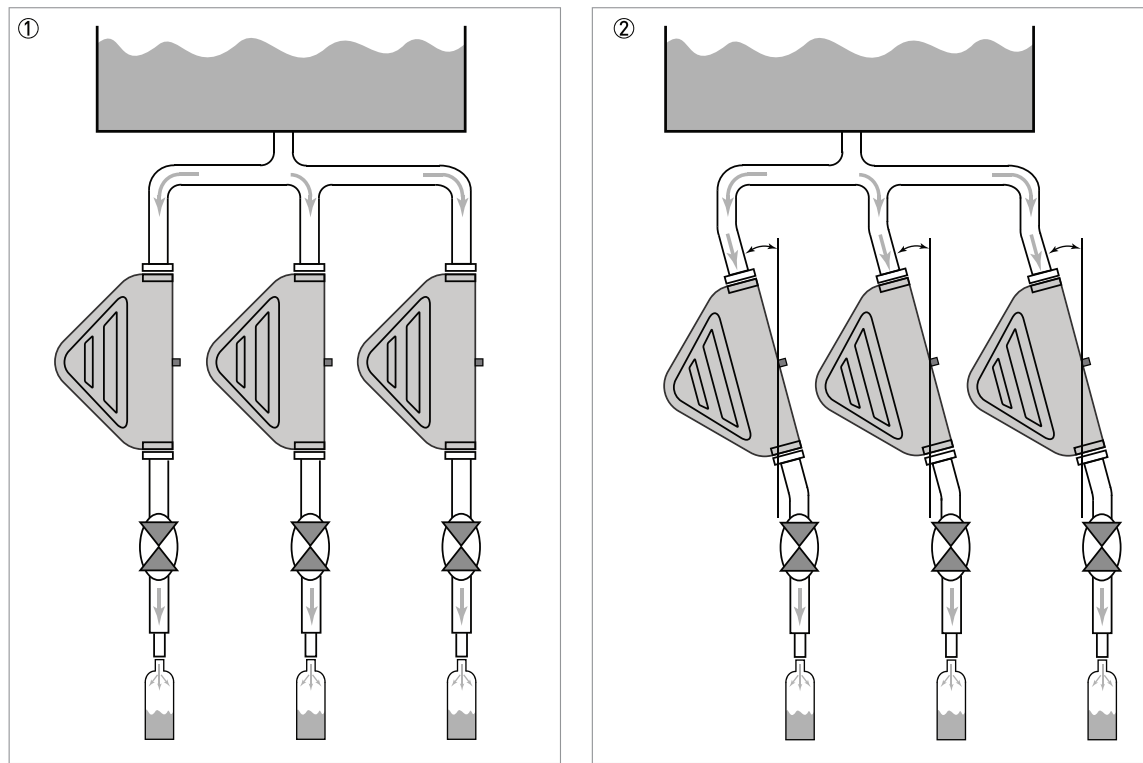


Figure 3-2: Carousel installation

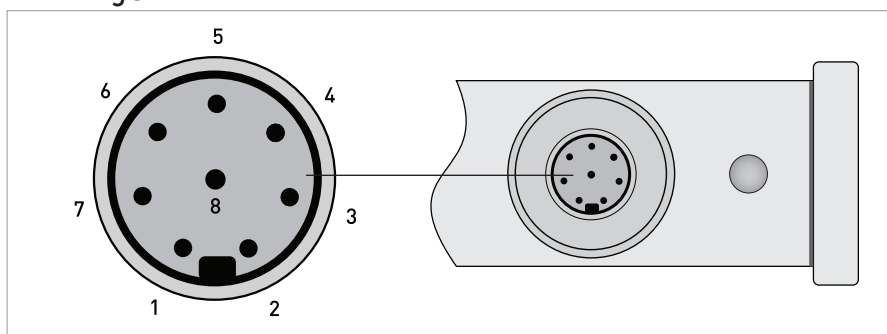
- ① Typical installation
- ② Installation showing the maximum offset angle which is 12° from the vertical

- Where the meter has to be installed at an angle, DO NOT exceed the maximum offset angle.
- If the maximum angle is exceeded, the meter will not self drain.

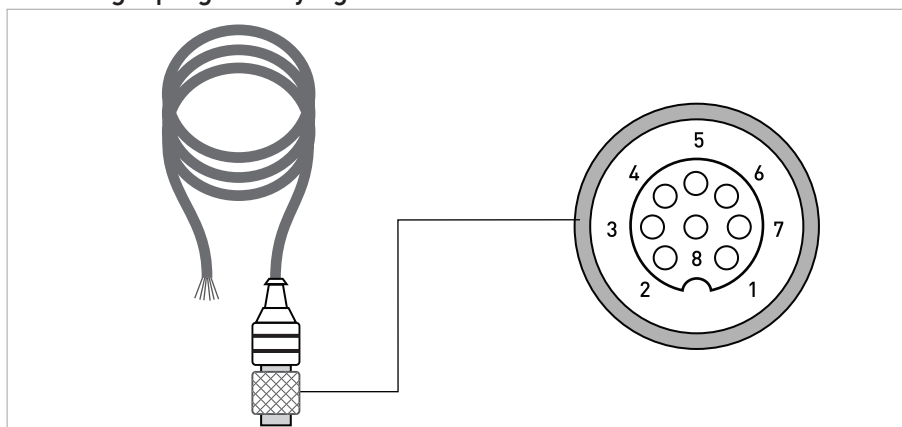
4.1 Lumberg connections

Electrical and signal connections to the flowmeter are through an 8 pin Lumberg® connector. To connect to the flowmeter, use a Lumberg® RKT 8-282/2 M (straight) or RKWT 8-282/2 M (90° elbow) plug and flying lead. An alternative plug connector with the same pin / keyway configuration, can also be used.

Lumberg® connector



Lumberg® plug and flying lead

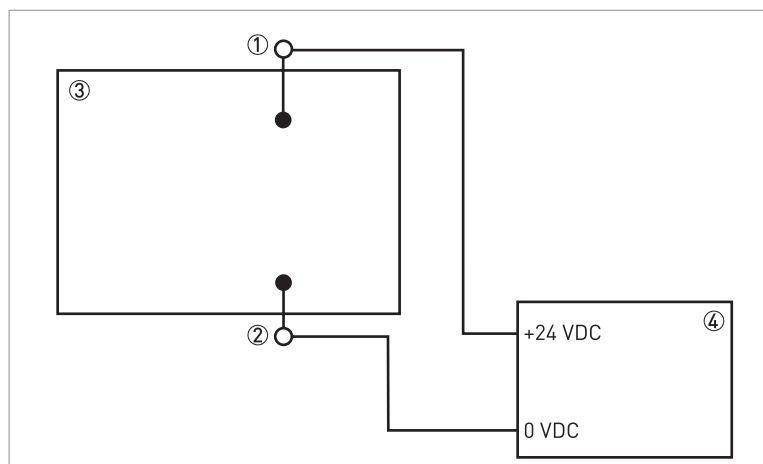


Plug / pin connections

Pin	Function	Colour
1	PSU + 24 V	White
2	RS485 A	Brown
3	RS485 B	Green
4	PSU + 0 V	Yellow
5	Pulse +	Grey
6	Pulse -	Pink
7	N / C	Blue
8	N / C	Screen

The pin / colour configurations shown in the table, are for the Lumberg® flying lead. Other manufacturers might use a different pin / colour configuration. If you are not using the Lumberg® flying lead, use the first two columns in the table to assign the correct function to each pin.

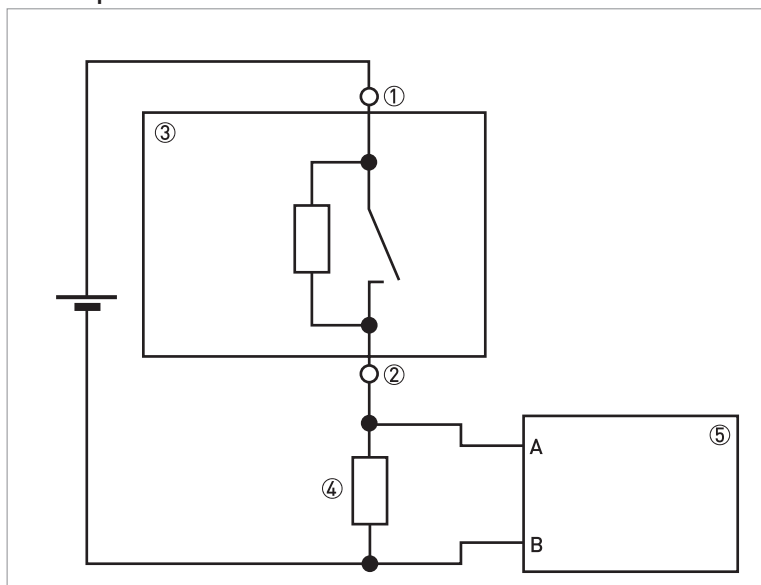
4.2 Power supply



- ① Connection plug pin 1
- ② Connection plug pin 4
- ③ Meter
- ④ Protected extra-low voltage (PELV) power supply

4.3 Schematic layout (pulse output)

Sink input



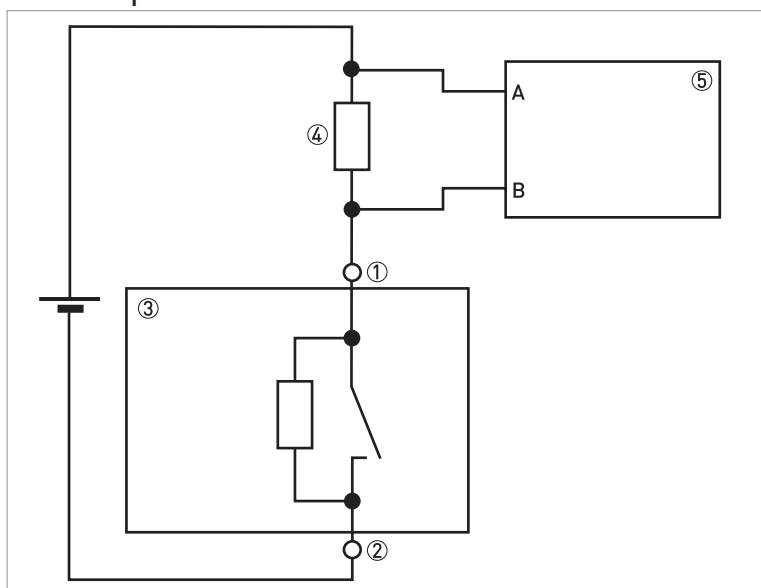
A Input
B Ground

- ① Connection plug pin 5
- ② Connection plug pin 6
- ③ Galvanically isolated pulse output of the meter
- ④ Load resistor. See table for typical values
- ⑤ Batch processor or PLC sink input with an impedance greater than 10 k Ω

Typical load resistor values

Input	Load resistor
5 V TTL input	330 Ω
10...24 V input	1 k Ω

Source input 10...24 V

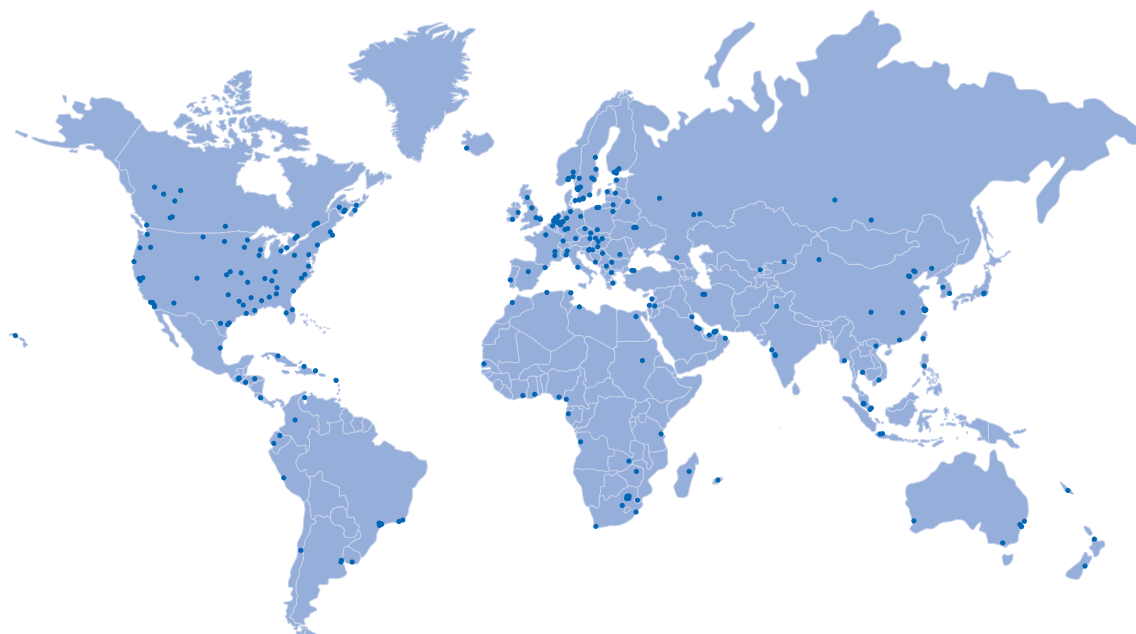


A V+
B Input

- ① Connection plug pin 5
- ② Connection plug pin 6
- ③ Galvanically isolated passive pulse output of the meter
- ④ Load resistor. Typical value is 1 k Ω
- ⑤ PLC source input with an impedance greater than 10 k Ω







KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature assemblies
- Pressure transmitters
- Analysis products
- Products and systems for the oil & gas industry
- Measuring systems for the marine industry

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