Technical
Information
TI 038D/06/en
No. 50084730

Coriolis Mass Flow Measuring System *promass 64*

Mass and volumetric measurement for custody transfer procedures (PTB and NMi approvals according to OIML R 117 / DIN 19217)

Flexible system
- Wide choice of materials for process connections and measuring pipes, compatible to the medium
- Simple installation
- Transmitter housing can be rotated to fit the orientation

Safe operation
- Self-emptying measuring pipes
- Secondary containment vessel as standard
- High electromagnetic compatibility (EMC)
- Self-monitoring with alarm function
- EEPROM stores data on power failure (no batteries required)
- ISO 9001 manufacturer, quality assured

Accurate measurement
- Mass and volumetric measurement within verifiable limits of error
- 20:1 operable flow range with verified instruments (Q_{min} / Q_{max})
- Excellent repeatability

Easy to operate
- Menu-driven dialogue for all parameters
- Two-line illuminated display
- Touch Control: remote operation without special equipment (protection not violated)

Install anywhere
- National approvals (PTB, NMi) for verifiable measurement of:
  – Liquids other than water
  – Combustible gases >100 bar
- Custody transfer totaliser and pulse output (phase shifted double pulse)
- Compact design
- Insensitive to plant vibration
- Rugged and shock-proof surfaces resistant to acids and alkalis
- IP 67 protection for compact and remote versions
- Measurement independent of fluid characteristics

Endress+Hauser
The Power of Know How

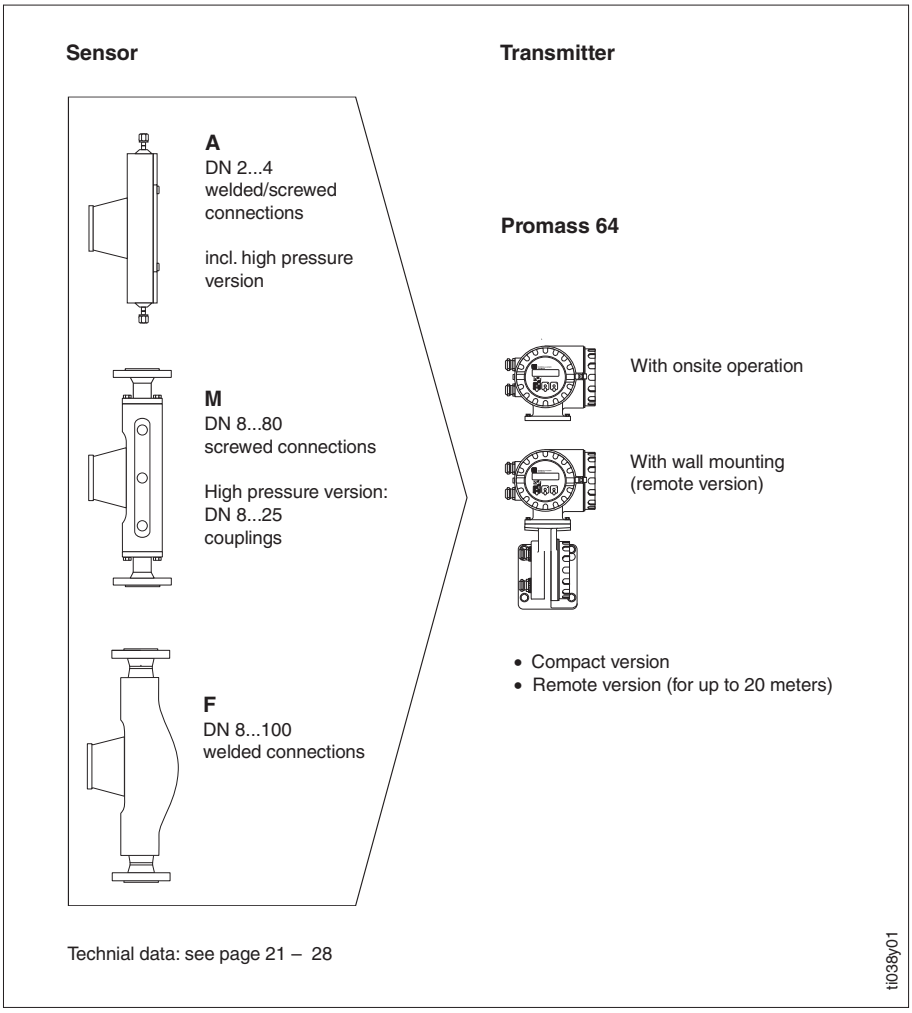
Measuring System

Fields of application
The Promass 64 system measures the mass and volume flow of fluids having widely differing characteristics:
- Chocolate, condensed milk, syrup
- Oils, fats
- Acids, alkalis
- Varnishes, paints
- Suspensions
- Pharmaceuticals
- Catalytic converters, inhibitors
- High pressure gases (>100 bar), etc.

Wherever the fluids mentioned are invoiced directly, a calibrated measuring system to determine either mass or volume flow is to be used.

Thus, Promass 64 is suitable for numerous custody transfer applications, e.g.
- to measure quantities of
  – mineral oils
  – alcohols
- for natural-gas refuelling, etc.

The system also measures the density and temperature of fluids.
The advantages of Coriolis mass flow meters are demonstrated by their successful use in food processing, the pharmaceutical industry, the chemical and petrochemical industries, waste disposal, energy production, etc.



The modular Promass measuring system

(Information on all Ex versions is available from your E+H Sales Centre on request).

Measuring system
The measuring system consists of:
- Promass 64 transmitter
- Promass A, M or F sensor

The Promass 64 measuring system is mechanically and electronically designed for maximum flexibility with the transmitters and sensors being combined in any variation.

Suitability for custody transfer approval
All Promass 64 flowmeters are delivered suitable for custody transfer approval. On site the measuring system will be calibrated by means of reference measurement, and through the metrology office inspection will be approved. They are thereupon sealed to safeguard this condition.

Sensor Function

Measuring principle

The measuring principle is based on the controlled generation of Coriolis forces. These forces are always present when both translational (straight line) and rotational (revolving) movement occur simultaneously.

$$\vec{F}_C = 2 \cdot \Delta m \, (\vec{\omega} \times \vec{v})$$

$\vec{F}_C$ = Coriolis force
Δm = mass of moving body
$\vec{\omega}$ = angular velocity
$\vec{v}$ = radial velocity in a rotating or oscillating system

The amplitude of the Coriolis force depends on the moving mass Δm, its velocity $\vec{v}$ in the system and therefore its mass flow.

The Promass uses an oscillation instead of a constant angular velocity $\vec{\omega}$ and two parallel measuring pipes, with fluid flowing through them, are made to oscillate in antiphase, so that they act like a tuning fork.

The Coriolis forces produced at the measuring pipes cause a phase shift in the pipe oscillation (see Fig. on left):
- When there is zero flow, i.e. with the fluid standing still, both pipes oscillate in phase **(1)**.
- When there is mass flow, the pipe oscillation is decelerated at the inlet **(2)** and accelerated at the outlet **(3)**.

As the mass flowrate increases, the phase difference also increases **(A-B)**. The oscillations of the measuring pipes are determined using electrodynamic sensors at the inlet and outlet.

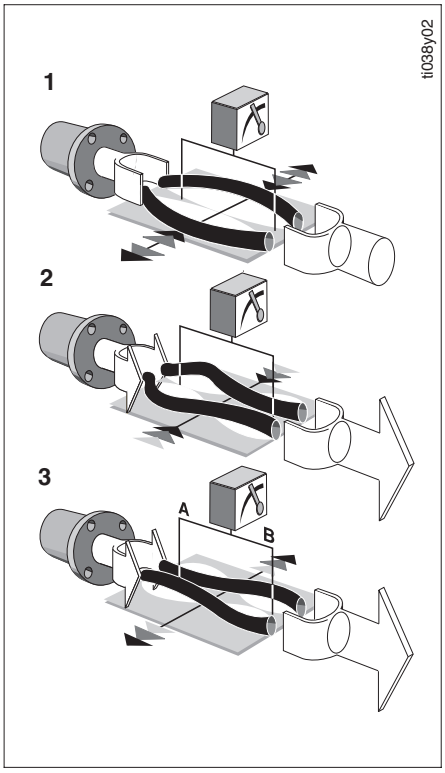
The measurement principle operates independent of temperature, pressure, viscosity, conductivity or flow profile.

Density measurement

The measuring pipes are continuously excited at their resonant frequency.
As the mass and therefore the density of the oscillating system changes (measuring pipes and fluid), the vibrating frequency is readjusted. The resonant frequency is thus a function of the density of the fluid and, because of this, a density signal can be obtained.

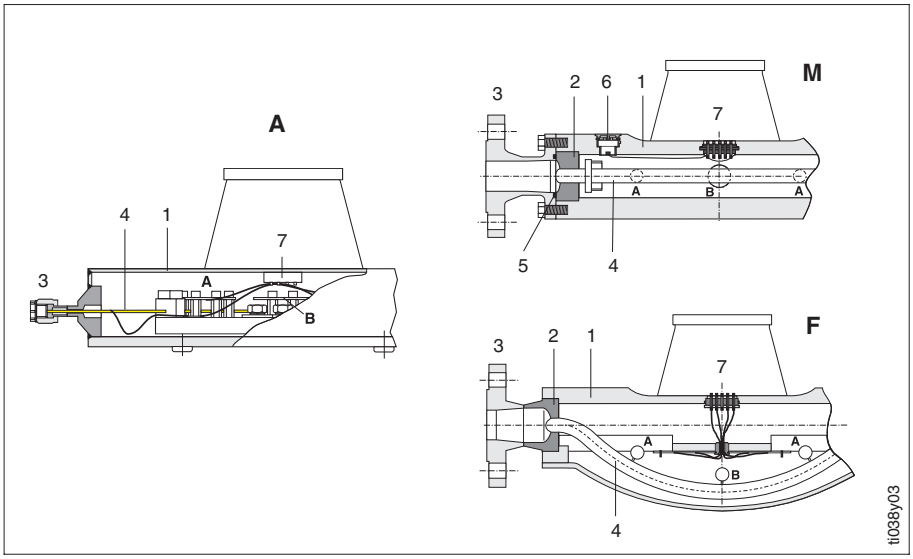
Temperature measurement

The temperature of the measuring pipes is determined in order to calculate the compensation factor due to temperature effects. This signal corresponds to the product temperature and is also available as an output.



The measuring principle: Phase shift of pipe vibration with mass flow (example for Promass M)

Unlike Promass M and F, Promass A only has a single measuring pipe. However, the measuring principle and function of all sensors are identical.



Sectional view of Promass A, M and F sensors

1 Housing/containment vessel
2 Manifold
3 Process connection
4 Measuring pipe(s)
A: 1 curved pipe
M: 2 straight pipes
F: 2 curved pipes
5 Gasket
6 Plug
7 Cable gland

A Electrodynamic sensors
B Excitation system

Transmitter Function

Function of the Promass 64
The Promass transmitter converts the measured values coming from the sensor into standardised output signals. A number of inputs and outputs are therefore available according to their configuration:
- Pulse output 1/2 (phase shifted)
- Status output, e.g. for error message
- Auxiliary input *
- Current output *
  (* with “Ex e” board only)

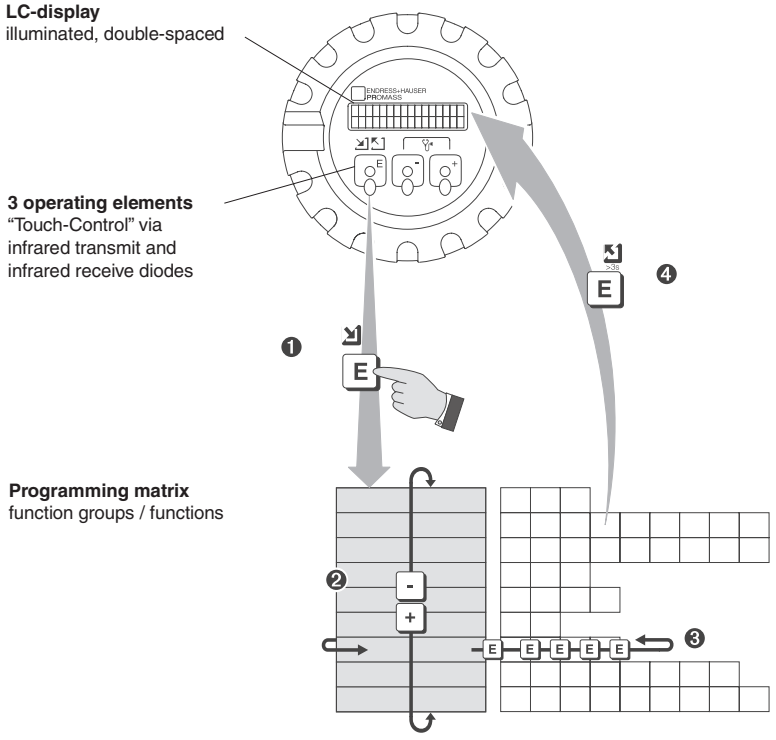
Display
Promass 64 has always a two-line, illuminated LC display. This enables two of the following measured values to be read simultaneously:
- Totalised flows
- Actual mass and volume flow
- Density, e.g. kg/m^3
- Temperature

The following are also displayed:
- Alarm messages (process faults)
- Error messages (instrument faults)
- Status messages
- Programming messages

Operation
With the E+H matrix-driven operation, configuration is very easy. With only three keypads, parameters and functions can be specifically chosen (see Figure below).

A number of languages are selectable for the display text. A help function is available at all times during programming.

Operational safety
- The Promass 64 measuring system fulfils the safety requirements according to EN 61010.
- The Promass 64 measuring system fulfils all general requirements for electromagnetic compatibility (EMC) according to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 as well as to NAMUR recommendations.
- Extensive self-monitoring of the measuring system gives complete operational safety.
- A lead sealing protects the verified Promass 64 against manipulation of standardised parameters.

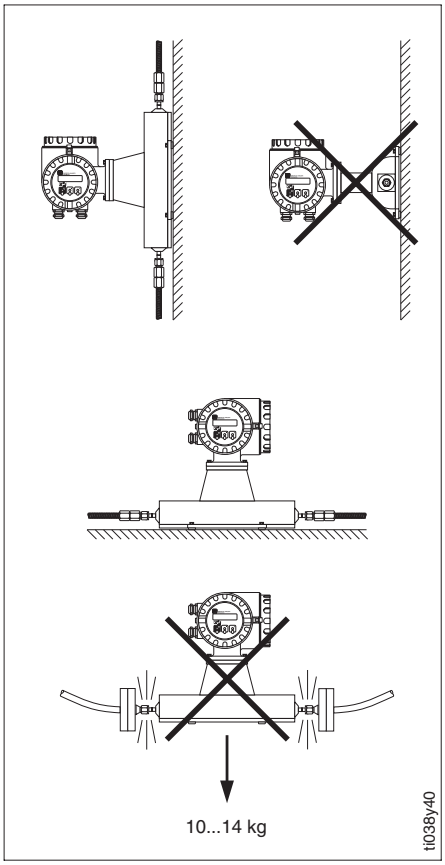


Selecting functions in the E+H programming matrix

Mounting

No special fittings such as brackets are needed. External forces are absorbed by the construction of the device, e.g. the secondary containment vessel. The high frequency oscillation of the measuring pipes ensures that operational function of the measuring system is unaffected by plant vibration.

When mounting, no special precautions need to be taken for turbulence-generating fittings (valves, bends T-pieces, etc.) as long as no cavitation occurs.



Orientation
Promass A

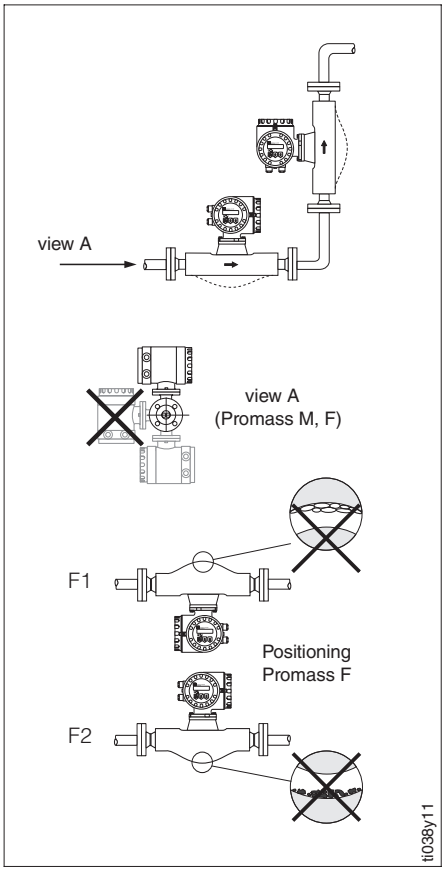
Orientation (Promass A)

Vertical
This is best with the flow direction upwards. Entrained solids sink downward and gases rise away from the measuring pipe. This also allows the measuring pipe to be completely drained and protects it from the build-up of solids.

Horizontal
When correctly installed, the transmitter housing is either above or below the piping. This assures that no gas bubbles may collect or solids be deposited in the curved measuring pipe.

Wall and post mounting
The sensor may not be suspendend in the piping, that is, without support or fixation to avoid excessive stress on the material around the process connection.

The sensor housing base plate allows table, wall, or post mounting. The post mounting requires a special mounting set.



Orientation
Promass M and F

Orientation (Promass M, F)

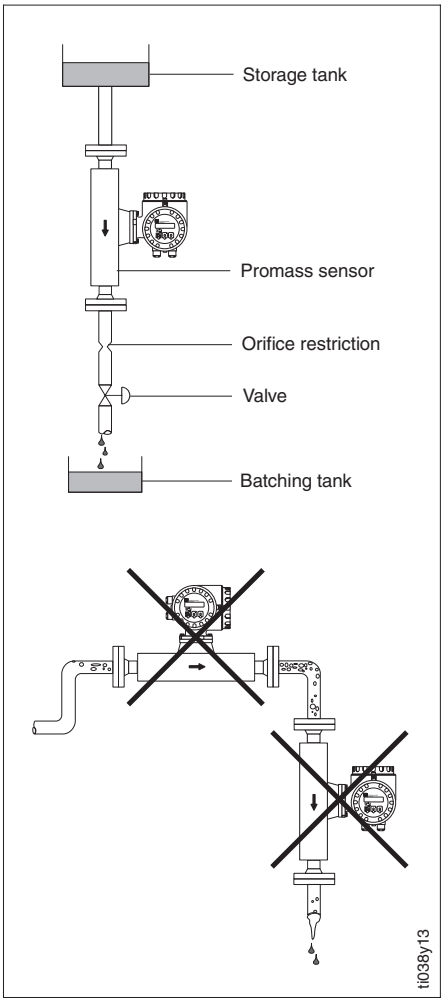
Vertical
This is best with the flow direction upwards. Entrained solids sink downward and gases rise away from the measuring pipes when the product is not flowing. This also allows the measuring pipes to be completely drained and protects them from the build-up of solids.

Horizontal
The measuring pipes must lie side by side. When correctly installed, the transmitter housing is either above or below the piping (see view A).

Promass F measuring pipes are slightly curved. Therefore, the sensor position is to be adapted to the fluid properties for horizontal installation:

F1: not suitable for outgassing products
F2: not suitable for products with solids content

Mounting



Mounting location (vertical piping)

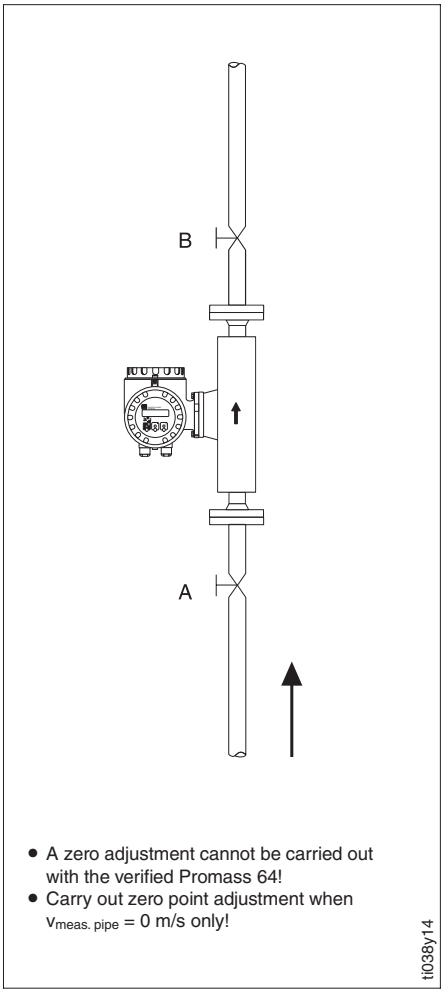
Mounting location

Air or entrained gases in the measuring pipe may cause errors in measurement and therefore the following mounting installations are to be avoided:

- Do not install at the highest point of the piping.
- Do not install directly upstream in a vertical pipeline before a free pipe outlet.

Correct installation is still possible using the recommendation in the adjacent Figure. Restrictions in the piping or an orifice with a smaller cross section than the measuring instrument can prevent the sensor from running empty during measurement.

Nominal diameter	Ø Orifice/ restriction
DN 2	1.5 mm
DN 4	3 mm
DN 8	6 mm
DN 15	10 mm
DN 25	14 mm
DN 40	22 mm
DN 50	28 mm
DN 80	50 mm
DN 100	65 mm



Static zero point adjustment, shutt-off valves

Zero point adjustment

To ensure accurate measurement also with very low flow rates, we recommend to carry out a zero point adjustment under process conditions.
The zero point adjustment should be carried out only with the measuring tubes full and with no flow.
This can be achieved with shut-off valves both upstream and downstream of the sensor (or use existing valves if present).

Normal operation

- Open valves A and B

*Zero point adjustment **with** pumping pressure*

- Open valve A
- Close valve B

*Zero point adjustment **without** pumping pressure*

- Close valve A
- Open valve B

Planning and Installation

System pressure
It is important to avoid cavitation as this can affect pipe oscillation.
No special measures need be taken for products which have properties similar to those of water under normal conditions.
With volatile liquids (hydrocarbons, solvents, liquefied gases) or liquids in suction lines, the vapour pressure of the liquid must not drop below a point where the liquid begins to boil.
It is also important not to release gases which are found naturally in many liquids. This can be prevented by ensuring that there is sufficient system pressure. Ideally the sensor should be mounted:
- on the pressure side of pumps (avoiding low pressure).
- at the lowest point of a vertical pipeline.

Corrosion resistance
With corrosive liquids, the chemical resistance of all wetted parts such as measuring pipes, gaskets and process connections must be thoroughly checked. This also applies to the liquids used for cleaning the Promass sensor.

Tracing, thermal insulation
With certain products heat transfer at the sensor must be avoided. A wide range of materials can be used for the necessary insulation.
Heating can be provided either electrically, e.g. by heating sheets, or supplied by copper pipes with heated water or steam. Heating elements for heat tracing are available for all sensors.

Caution!
Ensure that the meter electronics are not overheated. The connector between the sensor and the transmitter housings as well as the connection housing of the remote version must therefore *always* kept free.

Product temperature/Orientation
To ensure that the permitted ambient temperature range for the transmitter is not exceeded (–25...+60 °C) positioning is recommended as follows:

High temperature of product
- Vertical piping: Position A
- Horizontal piping: Position C

Low temperature of product
- Vertical piping: Position A
- Horizontal piping: Position B

Mounting on tank wagons
When used in Class I areas, such as measurement systems on tank wagons, the transmitter should be mounted with attenuated vibration in the driver's cab.

Flow rate and nominal diameter
The most suitable nominal diameter is selected by taking into account the measuring range required and the permitted pressure drop.
Standardised measuring points must be operated within a specified flow range (see table):

For liquids other than water

	Mass flow rate (ρ = 1 kg/dm^3)	
DN	Q_{min} (kg/min)	Q_{max} (kg/min)
2	0.1	2
4	0.4	8
8	1.5	30
15	5	100
25	15	300
40	35	700
50	50	1000
80	150	3000
100	200	4500

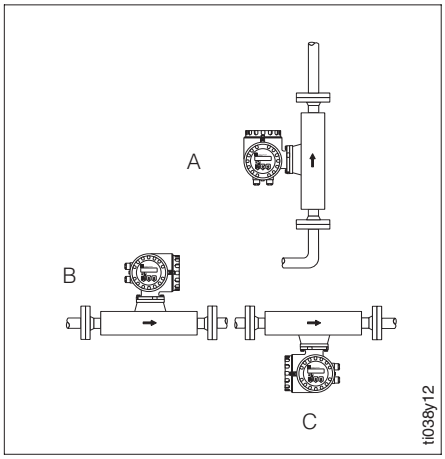
For CNG (PTB approval):

	Mass flow rate	
DN	Q_{min} (kg/min)	Q_{max} (kg/min)
8	0.1	10
15	0.3	40
25	1.0	100

"Applicator" design software
All important instrument data are contained in the E+H software in order to optimise the design of the measuring system.

The Applicator software is used for the following calculations:

- Nominal diameter of the sensor with regard to the characteristics of the medium such as viscosity, density, etc.
- Pressure loss downstream of the measuring point
- Converting mass flow to volumetric flow, etc.
- Simultaneous display of various nominal diameters



Pressure Loss

The pressure drop is dependent on the characteristics of the medium and its flowrate. The following formulae can be used to approximately calculate the pressure loss:

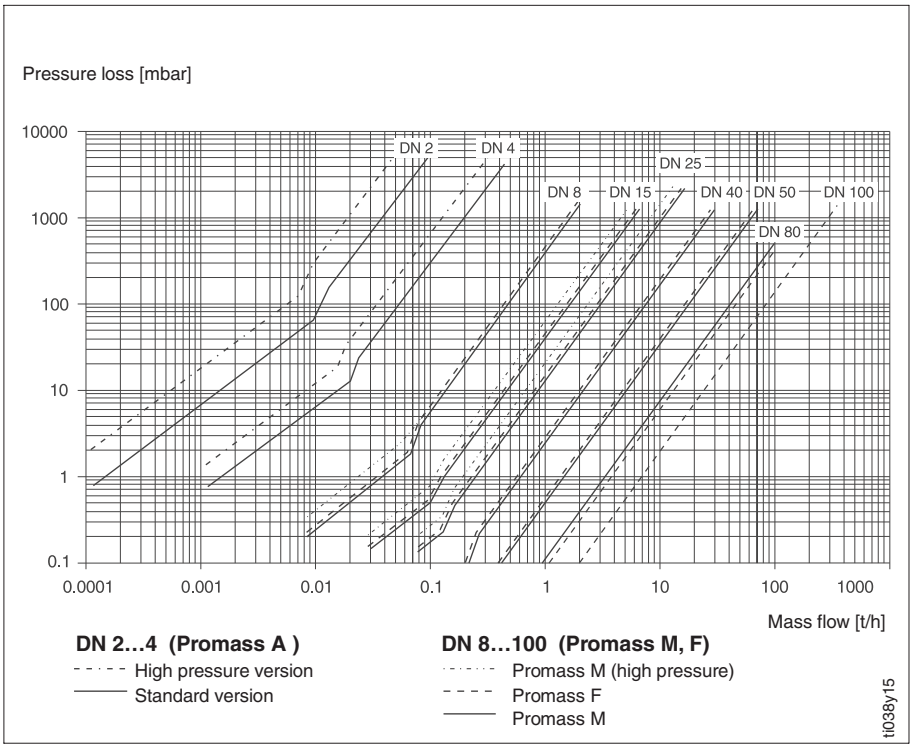
Note!
Calculations on pressure loss can be carried out using the Endress+Hauser "Applicator" software (see page 7).

	Promass A	**Promass M, F**
Reynolds No.	$Re = \frac{4 \cdot \dot{m}}{\pi \cdot d \cdot \upsilon \cdot \rho}$	$Re = \frac{2 \cdot \dot{m}}{\pi \cdot d \cdot \upsilon \cdot \rho}$
$Re \geq 2300$	$\Delta p = K \cdot \upsilon^{0.25} \cdot \dot{m}^{1.75} \cdot \rho^{-0.75}$	$\Delta p = K \cdot \upsilon^{0.25} \cdot \dot{m}^{1.85} \cdot \rho^{-0.86}$
$Re < 2300$	$\Delta p = K1 \cdot \upsilon \cdot \dot{m}$	$\Delta p = K1 \cdot \upsilon \cdot \dot{m} + \frac{K2 \cdot \upsilon^{0.25} \cdot \dot{m}^2}{\rho}$

Δp = pressure loss [mbar]
υ = kinematic viscosity [m^2/s]
$\dot{m}$ = mass flowrate [kg/s]
ρ = fluid density [kg/m^3]
d = internal diameter of measuring tubes [m]
K...K2 = constants dependent on the nominal diameter

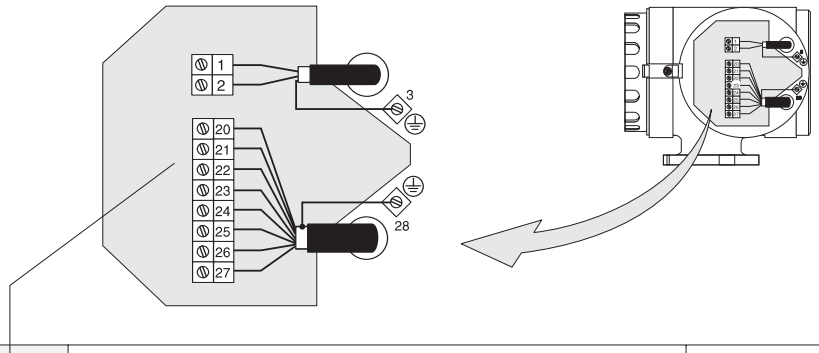
	Diameter	d [m]	K	K1	K2
Promass A	DN 2	$1.80 \cdot 10^{-3}$	$1.6 \cdot 10^{10}$	$2.4 \cdot 10^{10}$	–
	DN 4	$3.50 \cdot 10^{-3}$	$9.4 \cdot 10^{8}$	$2.3 \cdot 10^{9}$	–
Promass A (high press.)	DN 2	$1.40 \cdot 10^{-3}$	$5.4 \cdot 10^{10}$	$6.6 \cdot 10^{10}$	–
	DN 4	$3.00 \cdot 10^{-3}$	$2.0 \cdot 10^{9}$	$4.3 \cdot 10^{9}$	–
Promass M	DN 8	$5.53 \cdot 10^{-3}$	$5.2 \cdot 10^{7}$	$8.6 \cdot 10^{7}$	$1.7 \cdot 10^{7}$
	DN 15	$8.55 \cdot 10^{-3}$	$5.3 \cdot 10^{6}$	$1.7 \cdot 10^{7}$	$9.7 \cdot 10^{5}$
	DN 25	$11.38 \cdot 10^{-3}$	$1.7 \cdot 10^{6}$	$5.8 \cdot 10^{6}$	$4.1 \cdot 10^{5}$
	DN 40	$17.07 \cdot 10^{-3}$	$3.2 \cdot 10^{5}$	$1.2 \cdot 10^{6}$	$1.2 \cdot 10^{5}$
	DN 50	$25.60 \cdot 10^{-3}$	$6.4 \cdot 10^{4}$	$4.5 \cdot 10^{5}$	$1.3 \cdot 10^{4}$
	DN 80	$38.46 \cdot 10^{-3}$	$1.4 \cdot 10^{4}$	$8.2 \cdot 10^{4}$	$3.7 \cdot 10^{3}$
Promass M (high press.)	DN 8	$4.93 \cdot 10^{-3}$	$6.06 \cdot 10^{7}$	$1.42 \cdot 10^{8}$	$2.80 \cdot 10^{7}$
	DN 15	$7.75 \cdot 10^{-3}$	$8.00 \cdot 10^{6}$	$2.54 \cdot 10^{7}$	$1.45 \cdot 10^{6}$
	DN 25	$10.20 \cdot 10^{-3}$	$2.70 \cdot 10^{6}$	$8.95 \cdot 10^{6}$	$6.33 \cdot 10^{5}$
Promass F	DN 8	$5.35 \cdot 10^{-3}$	$5.70 \cdot 10^{7}$	$9.60 \cdot 10^{7}$	$1.90 \cdot 10^{7}$
	DN 15	$8.30 \cdot 10^{-3}$	$5.80 \cdot 10^{6}$	$1.90 \cdot 10^{7}$	$10.60 \cdot 10^{5}$
	DN 25	$12.00 \cdot 10^{-3}$	$1.90 \cdot 10^{6}$	$6.40 \cdot 10^{6}$	$4.50 \cdot 10^{5}$
	DN 40	$17.60 \cdot 10^{-3}$	$3.50 \cdot 10^{5}$	$1.30 \cdot 10^{6}$	$1.30 \cdot 10^{5}$
	DN 50	$26.00 \cdot 10^{-3}$	$7.00 \cdot 10^{4}$	$5.00 \cdot 10^{5}$	$1.40 \cdot 10^{4}$
	DN 80	$40.50 \cdot 10^{-3}$	$1.10 \cdot 10^{4}$	$7.71 \cdot 10^{4}$	$1.42 \cdot 10^{4}$
	DN 100	$51.20 \cdot 10^{-3}$	$3.54 \cdot 10^{3}$	$3.54 \cdot 10^{4}$	$5.40 \cdot 10^{3}$

Pressure loss data **inclusive** interface measuring tube(s) / piping.



Pressure loss with water

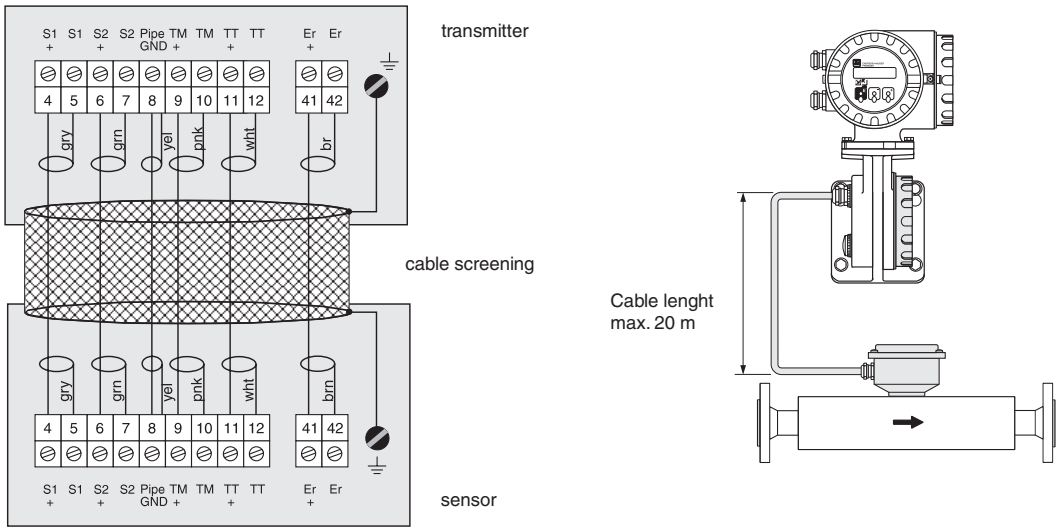
Power supply, in- and outputs



Notes!
- Technical data on Ex instruments are given in separate documentation available from Endress+Hauser on request.
- Use screened cabling for the signal cable.
- Ground the signal cable screening at Terminal 28
- When used in Environmental Class I areas, such as measurement systems on tank wagons, the operator should ensure that the power supply is stable, e.g. by using a normal filter or separate battery power supply.

Terminal	"Ex e" board (Non-Ex - / EEx d - / EEx de - version)	"Ex i" board (intrinsically safe pulse and status output)
3	Ground connection (protective earth)	Ground connection (protective earth)
1 / 2	L1 for AC N L+ for DC power supply L–	L1 for AC N L+ for DC power supply L–
20 / 21	Current output active, 0/4…20 mA, R_L < 700 Ω	–
22 / 23	Status output relay, max. 30 V DC / 0.1 A	Status output Open Emitter, max. 30 V DC / 25 mA
24 / 25	Auxiliary input 3…30 V DC, R_i = 1.8 kΩ configurable, e.g. for resetting error messages or positive zero return	–
23 / 26	Pulse output A f_{max} = 500 Hz, active/passive active: 24 V DC, 25 mA (250 mA during 20 ms) passive: 30 V DC, 25 mA (250 mA during 20 ms)	Pulse output A Open Emitter, f_{max} = 500 Hz passive, 30 V DC, 25 mA (250 mA during 20 ms)
23 / 27	Pulse output B 90° or 180° phase shifted in relation to pulse output A, f_{max} = 500 Hz, active: 24 V DC, 25 mA (250 mA during 20 ms) passive: 30 V DC, 25 mA (250 mA during 20 ms) Terminal 23 = Common ground for pulse output A/B and status output	Pulse output B Open Emitter, 90° or 180° phase shifted in relation to pulse output A, f_{max} = 500 Hz, passive, 30 V DC, 25 mA (250 mA during 20 ms) Terminal 23 = Common supply for pulse output A/B and status output
28	Ground connection (signal cable screen)	Ground connection (signal cable screen)

Remote version



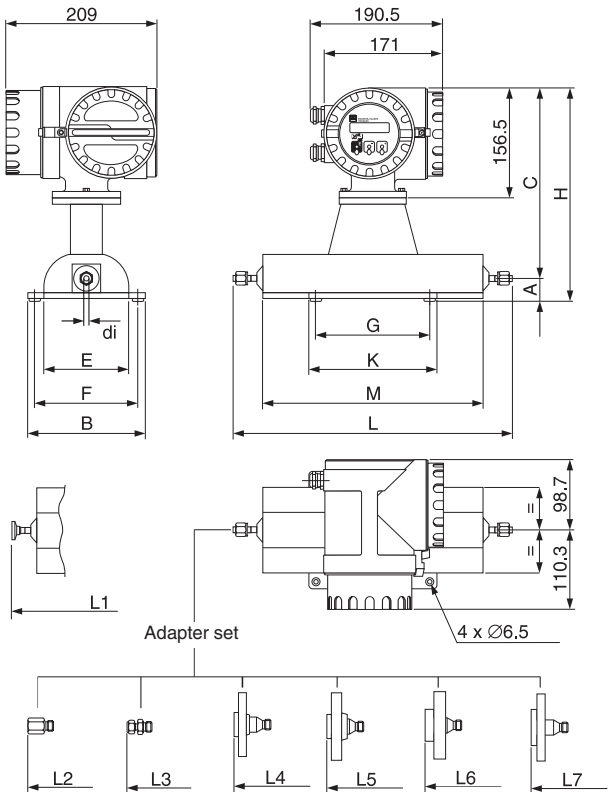
gry = grey; grn = green; yel = yellow; pnk = pink; wht = white; brn = brown

Cable specifications for the remote version
6 x 0.38 mm² PVC cable with common screening and individually screened cores.
Conductor resistance: ≤ 50 Ω/km; Capacitance: core/screen ≤ 420 pF/m

ti030e37

Dimensions
Promass 64 A

Compact version



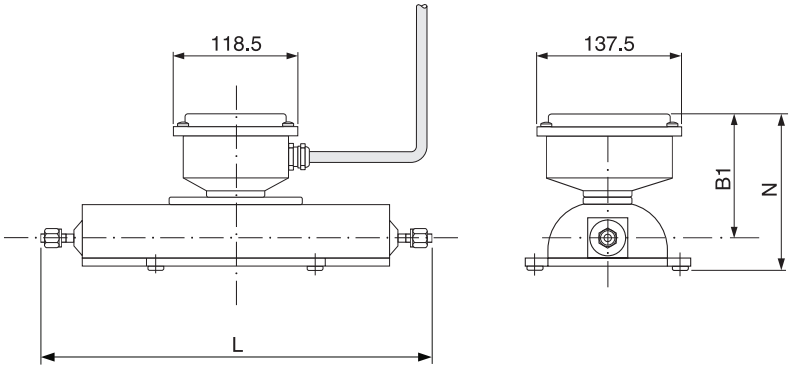
Flange connections with “lap joint flanges”

Process connections	L 4-VCO-4 fittings	L1 ½" Tri-Clamp	L2 ¼" NPT-F	L3 SWAGELOK DN 2: ⅛" or ¼" DN 4: ¼"	L4 L5 ½" flange (ANSI)		L6 L7 DN 15 flange (DIN, JIS)	
					Cl 150	Cl 300	PN 40	10K
DN 2	372	378	443	441.6	475	475	475	475
DN 4	497	503	568	571.6	600	600	600	600

Diameter DIN	Diameter ANSI	di	A	B	C	E	F	G	H	K	M	Weight [kg]
DN 2	1/12"	1.8	32	165	269.5	120	145	160	301.5	180	310	11
DN 2*	1/12"	1.4	32	165	269.5	120	145	160	301.5	180	310	11
DN 4	⅛"	3.5	32	195	279.5	150	175	220	311.5	240	435	15
DN 4*	⅛"	3.0	32	195	279.5	150	175	220	311.5	240	435	15

Weight for compact version; All dimensions in [mm]; * High pressure version

Remote version (dimensions of the transmitter: see page 12)



Diameter DIN	Diameter ANSI	B1 [mm]	N [mm]	L
DN 2	1/12"	122	154	Dimensions dependent on the process connections (see above)
DN 4	⅛"	132	164	

Note!
Dimensions of Ex instruments are given in separate documentation available from E+H on request.

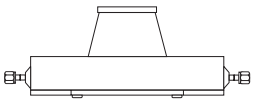
Dimensions in [mm]
Promass 64 A

Wetted parts materials

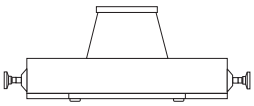
Measuring tube:	SS 1.4539 (904L), Alloy C-22 2.4602 (N 06022)
4-VCO-4 fittings	SS 1.4539 (904L), Alloy C-22 2.4602 (N 06022)
$^1/_2$" Tri-Clamp	SS 1.4539 (904L)
Adapter sets:	
$^1/_8$" or $^1/_4$" SWAGELOK	SS 1.4401 (316)
$^1/_4$" NPT-F	SS 1.4539 (904L), Alloy C-22 2.4602 (N 06022)
Flange:	
DIN, ANSI, JIS	SS 1.4539 (904L), Alloy C-22 2.4602 (N 06022) lap joint flanges (not wetted) in SS 1.4404 (316L)
Gasket (O-ring):	Viton (–15...+200 °C), EPDM (–40...+160 °C) Silicone (–60...+200 °C), Kalrez (–30...+210 °C)

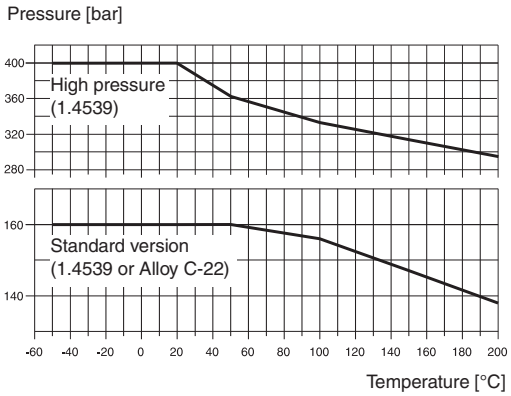
Without adapter set

4-VCO-4 fittings



$^1/_2$" Tri-Clamp





Tri-Clamp:
The material load limit is exclusively determined by the material properties of the Tri-Clamp used. This clamp is not included in the shipment.

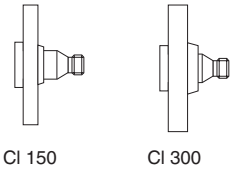
ti038y42

With adapter set

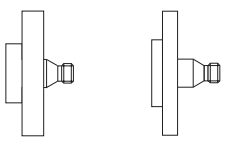
$^1/_4$" NPT-F

$^1/_8$" or $^1/_4$" SWAGELOK

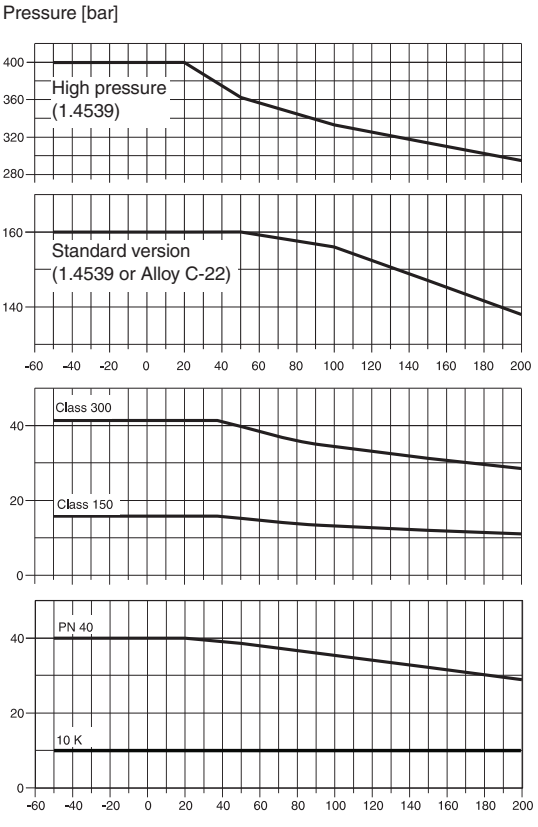
Flanges (ANSI, DIN, JIS) *



Cl 150 Cl 300



PN 40 10K



ti038y43

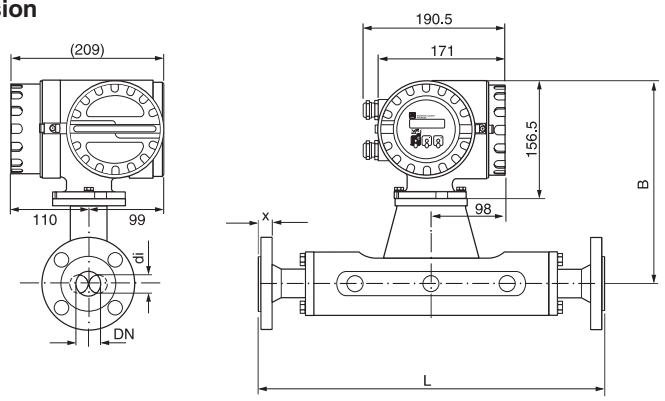
Material load curves Promass A

* with $^1/_2$" or DN 15 flanges as standard

Dimensions
Promass 64 M, F

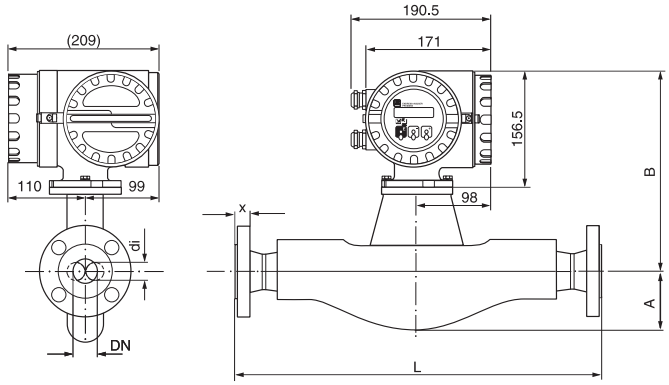
Compact version

Promass M
DN 8...80



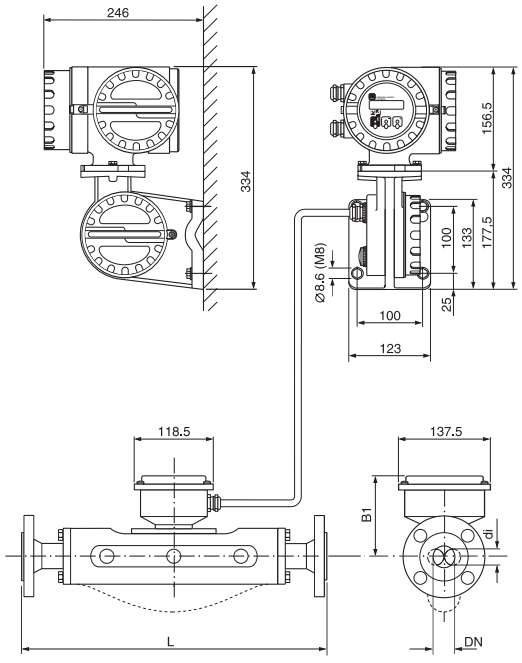
ti038y19

Promass F
DN 8...100



ti038y20

Remote version



ti038y38

Diameter DIN	Diameter ANSI	L	x	A [mm]	B [mm]	B1 [mm]	di [mm]	Weight*** [kg]
DN 8	3/8"	Dimensions dependent on the process connections (see following pages)		75	262.5 (262.5)	113.0 (113.0)	5.53 (5.35)	11 (11)
DN 15	1/2"			75	264.5 (262.5)	114.5 (113.0)	8.55 (8.30)	12 (12)
DN 25	1"			75	268.5 (262.5)	119.0 (113.0)	11.38 (12.00)	15 (14)
DN 40	1 1/2"			105	279.5 (267.5)	130.0 (118.0)	17.07 (17.60)	24 (19)
DN 50	2"			141	289.5 (279.5)	140.0 (130.0)	25.60 (26.00)	41 (30)
DN 80	3"			200	305.5 (301.0)	156.0 (151.5)	38.46 (40.50)	67 (55)
DN 100*	4" *			–	305.5 (301.0)	156.0 (151.5)	38.46 (40.50)	71 (61)
DN 100	4"			247	– (320.0)	– (163.0)	– (51,20)	– (96)
DN 150**	6" **			247	– (320.0)	– (163.0)	– (51,20)	– (108)

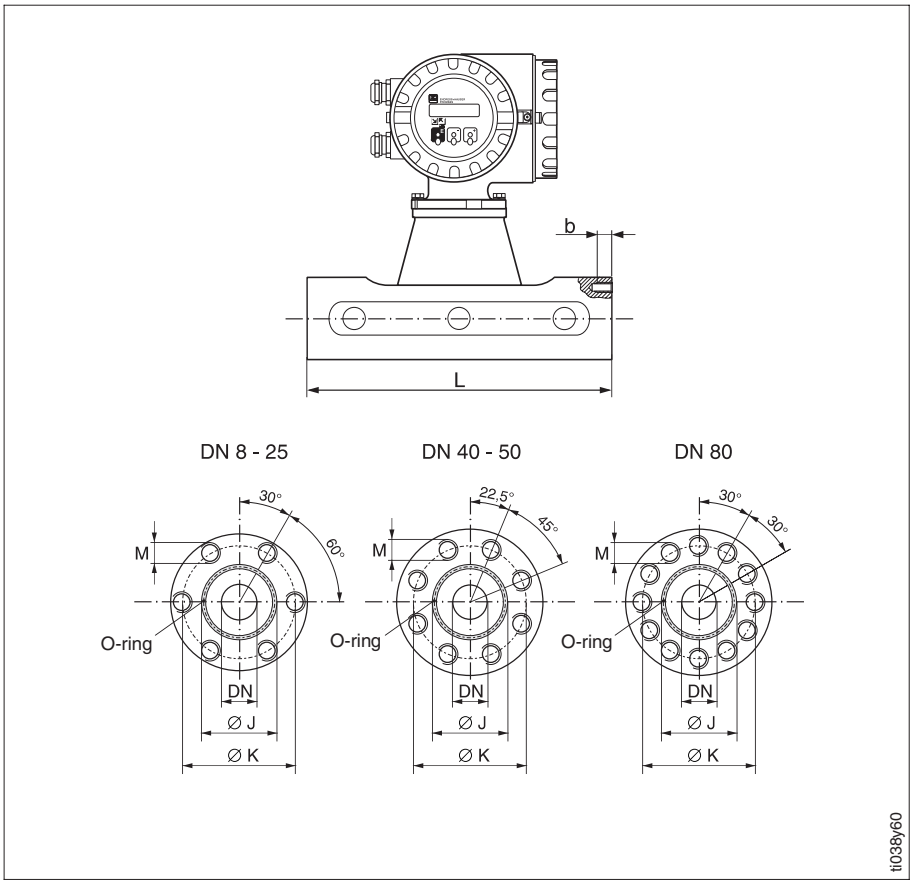
(...) Dimensions for Promass F; DN 8: with DN 15 flanges as standard;
* DN 100 / 4": nominal diameter DN 80 / 3" with DN 100 / 4" flanges;
** DN 150 / 6": nominal diameter DN 100 / 4" with DN 150 / 6" flanges;
*** Weight for the compact version

Note!
Dimensions of Ex instruments are given in separate documentation available from E+H on request.

Dimensions in [mm]
Promass 64 M, F

Dimensions

Promass 64 M (without Process Connections)



Diameter DN		Dimensions			Coupling		Minimum screw depth	Torque	Lubricated thread	O-ring	
DIN	ANSI	∅ L [mm]	∅ J [mm]	∅ K [mm]	Screws M	Depth b [mm]	[mm]	[Nm]	yes/no	Diam. [mm]	Inside ∅ [mm]
DN 8	3/8"	256	27	54	6 x M 8	12	10	30.0	no	2.62	21.89
DN 8*	3/8"	256	27	54	6 x M 8	12	10	19.3	yes	2.62	21.89
DN 15	1/2"	286	35	56	6 x M 8	12	10	30.0	no	2.62	29.82
DN 15*	1/2"	286	35	56	6 x M 8	12	10	19.3	yes	2.62	29.82
DN 25	1"	310	40	62	6 x M 8	12	10	30.0	no	2.62	34.60
DN 25*	1"	310	40	62	6 x M 8	12	10	19.3	yes	2.62	34.60
DN 40	1 1/2"	410	53	80	8 x M 10	15	13	60.0	no	2.62	47.30
DN 50	2 "	544	73	94	8 x M 10	15	13	60.0	yes	2.62	67.95
DN 80	3 "	644	102	128	12 x M 12	18	15	100.0	yes	3.53	94.84

* High pressure version; Permissible thread: A4 - 80; Lubricant: Molykote P37

Process Connections Promass 64 M, F DIN 2501

Promass M

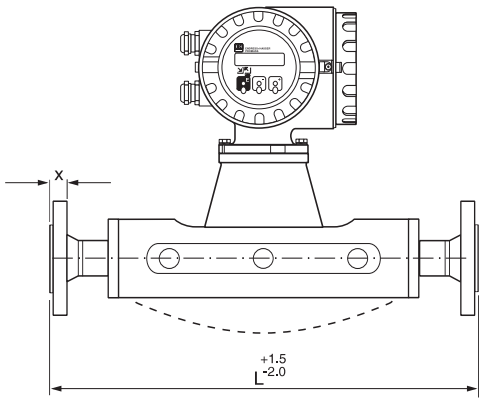
Flange material:	SS 1.4404 (316L), titanium Grade 2
Gasket material:	O-ring in Viton (–15...+200 °C), Kalrez (–30...+210 °C), Silicone (–60...+200 °C), EPDM (–40...+160 °C), FEP coated (–60...+200 °C)

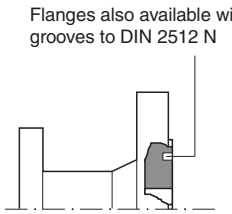
Promass F

Flanges material:	(DN 8...100) SS 1.4404 (316L), (DN 8...80) Alloy C-22 2.4602 (N 06022)
Welded process connection:	no internal gaskets

Surface finish of the flanges

For PN 16, PN 40:	DIN 2526 Form C, R_a 6.3...12.5 µm
For PN 64, PN 100:	DIN 2526 Form C, R_a 1.6...3.2 µm



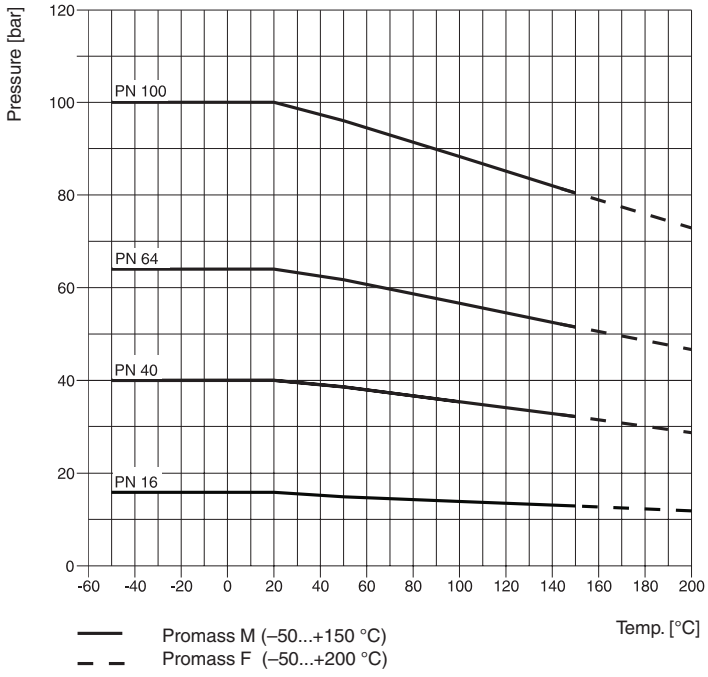


ti038y21

Diameter	PN 16		PN 40		PN 64		PN 100	
	L [mm]	x [mm]	L [mm]	x [mm]	L [mm]	x [mm]	L [mm]	x [mm]
DN 8 *	–	–	370	16	400	20	400	20
DN 15 *	–	–	404	16	420	20	420	20
DN 25	–	–	440	18	470	24	470	24
DN 40	–	–	550	18	590	26	590	26
DN 50	–	–	715	20	724	26	740	28
DN 80	–	–	840	24	875	28	885	32
DN 100 **	874	20	874	24	–	–	–	–
DN 100	1128	20	1128	24	1128	30	1128	36
DN 150 ***	1168	22	1168	28	–	–	–	–

DN 8: with DN 15 flanges as standard; DN 100: only for Promass F available;
* DN 8, DN 15: also available with DN 25, PN 40 flanges (L = 440 mm, x = 18 mm);
** DN 100: nominal diameter DN 80 with DN 100 flanges;
*** DN 150: nominal diameter DN 100 with DN 150 flanges

Pressure limitations due to fluid temperature



ti038y22

Process Connections Promass 64 M, F ANSI B16.5

Promass M

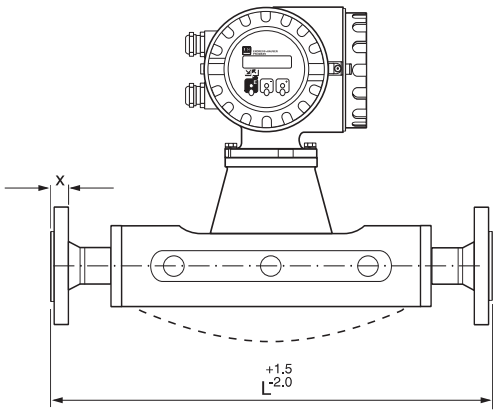
Flange material:	SS 1.4404 (316L), titanium Grade 2
Gasket material:	O-ring in Viton (–15...+200 °C), Kalrez (–30...+210 °C), Silicone (–60...+200 °C), EPDM (–40...+160 °C), FEP coated (–60...+200 °C)

Promass F

Flange material:	(DN 8...100) SS 1.4404 (316L), (DN 8...80) Alloy C-22 2.4602 (N 06022)
Welded process connection:	no internal gaskets

Surface finish of the flanges

For Class 150, 300, 600: R_a 3.2...6.3 µm

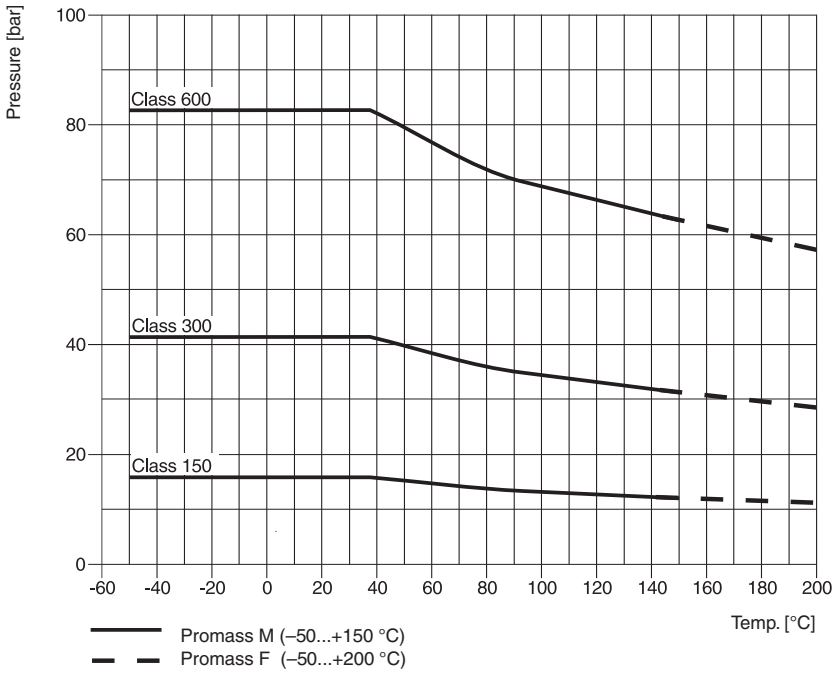


ti038y23

Diameter		Cl 150		Cl 300		Cl 600	
ANSI	DIN	L [mm]	x [mm]	L [mm]	x [mm]	L [mm]	x [mm]
3/8"	DN 8	370	11.2	370	14.2	400	20.6
1/2"	DN 15	404	11.2	404	14.2	420	20.6
1"	DN 25	440	14.2	440	17.5	490	23.9
1 1/2"	DN 40	550	17.5	550	20.6	600	28.7
2"	DN 50	715	19.1	715	22.3	742	31.8
3"	DN 80	840	23.9	840	28.4	900	38.2
4" *	DN 100 *	874	23.9	894	31.7	–	–
4"	DN 100	1128	23.9	1128	31.7	1158	48.4
6" **	DN 150 **	1168	25.4	–	–	–	–

3/8": with 1/2" flanges as standard; 4 " / DN 100: only for Promass F available;
* 4"/DN 100: nominal diameter 3"/DN 80 with 4"/DN 100 flanges;
** 6"/DN 150: nominal diameter 4"/DN 100 with 6"/DN 150 flanges

Pressure limitations due to fluid temperature



ti038y24

Process Connections Promass 64 M, F JIS B2238

Promass M

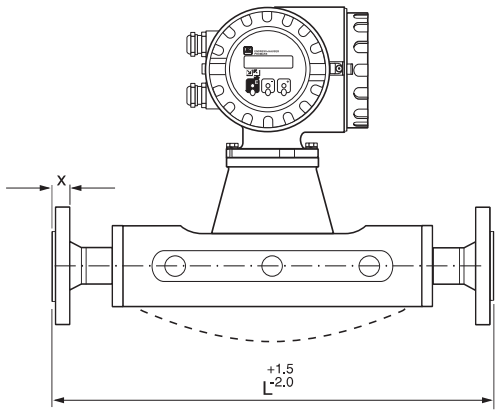
Flange material:	SS 1.4404 (316L), titanium Grade 2
Gasket material:	O-ring in Viton (–15...+200 °C), Kalrez (–30...+210 °C), Silicone (–60...+200 °C), EPDM (–40...+160 °C), FEP coated (–60...+200 °C)

Promass F

Flange material:	(DN 8...100) SS 1.4404 (316L), (DN 8...80) Alloy C-22 2.4602 (N 06022)
Welded process connection:	no internal gaskets

Surface finish of the flanges

For 10K, 20K, 40K, 63K: R_a 3.2...6.3 µm

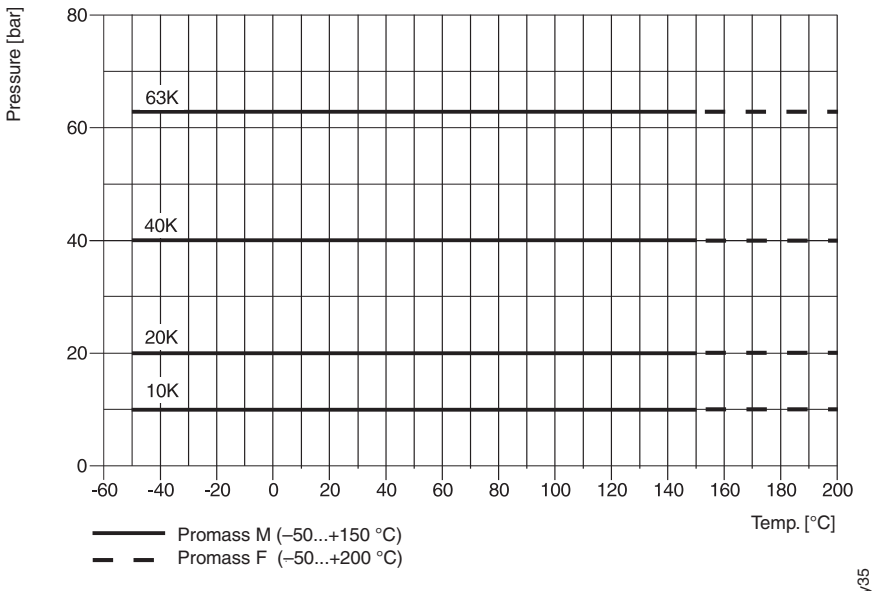


ti038y23

Diameter	10K		20K		40K		63K	
	L [mm]	x [mm]	L [mm]	x [mm]	L [mm]	x [mm]	L [mm]	x [mm]
DN 8	–	–	370	14	400	20	420	23
DN 15	–	–	404	14	425	20	440	23
DN 25	–	–	440	16	485	22	494	27
DN 40	–	–	550	18	600	24	620	32
DN 50	715	16	715	18	760	26	775	34
DN 80	832	18	832	22	890	32	915	40
DN 100 *	864	18	–	–	–	–	–	–
DN 100	1128	18	1128	24	1168	36	1168	44
DN 150 **	1168	20	–	–	–	–	–	–

DN 8: with DN 15 flanges as standard;
DN 100: only for Promass F available;
* DN 100: nominal diameter DN 80 with DN 100 flanges;
** DN 150: nominal diameter DN 100 with DN 150 flanges

Pressure limitations due to fluid temperature



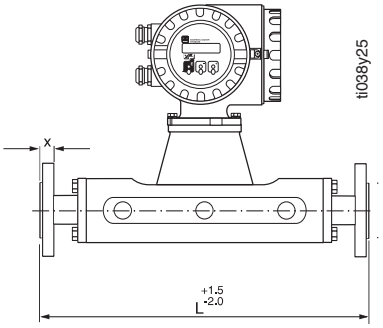
ti038y35

PVDF Process Connections Promass 64 M

PVDF process connections (DIN 2501 / ANSI B16.5 / JIS B2238)

Flange material: PVDF

Gasket material: O-ring in Viton (–15...+200 °C), Kalrez (–30...+210 °C), Silicone (–60...+200 °C), EPDM (–40...+160 °C)

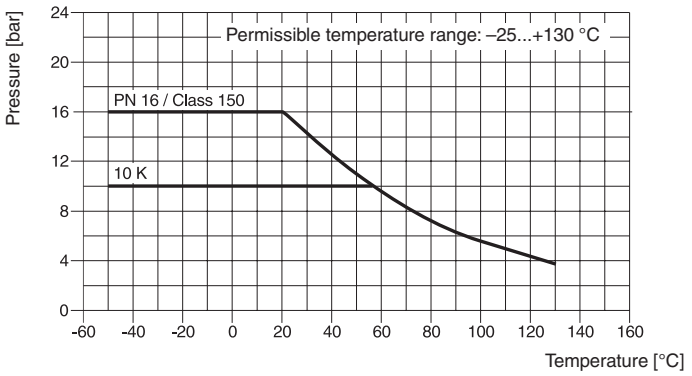


Diameter		PN 16 / Cl 150 / 10K	
DIN	ANSI	L [mm]	x [mm]
DN 8	3/8"	370	16
DN 15	1/2"	404	16
DN 25	1"	440	18
DN 40	1 1/2"	550	21
DN 50	2"	715	22

DN 8 resp. 3/8": instrument fitted with DN 15 resp. 1/2" flanges

Caution!
- When using PVDF process connections
  - Use only gaskets with a hardness Shore A ≤ 75
  - Use only the specified screw tightening torques (see Operating Manual)
- For large diameters and heavy dead weights: sensor must be supported

Pressure limitations due to fluid temperature



ti038y27

Sanitary Process Connections Promass 64 M, F

Hygienic coupling DIN 11851/SMS 1145

Promass M (connections with internal gaskets)

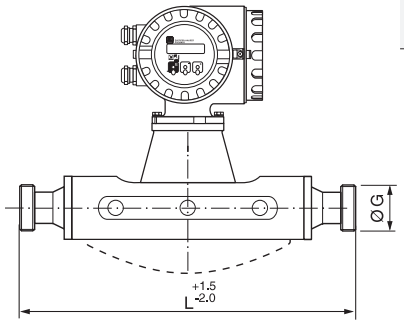
Coupling: SS 1.4404 (316L)

Gasket: Silicone (–60...+200 °C) or EPDM (–40...+160 °C) flat gasket, FDA licensed gasket materials

Promass F (completely welded version)

Coupling: SS 1.4404 (316L)

Welded process connection: no internal gaskets

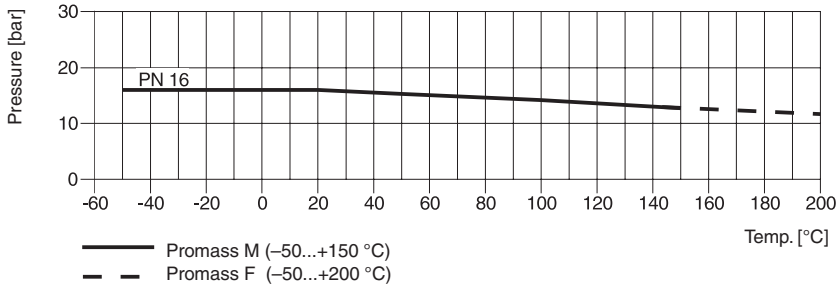


Diameter	L [mm]	Ø G DIN 11851	Ø G SMS 1145
DN 8	367	Rd 34 x 1/8"	Rd 40 x 1/6"
DN 15	398	Rd 34 x 1/8"	Rd 40 x 1/6"
DN 25	434	Rd 52 x 1/6"	Rd 40 x 1/6"
DN 40	560	Rd 65 x 1/6"	Rd 60 x 1/6"
DN 50	720	Rd 78 x 1/6"	Rd 70 x 1/6"
DN 80 M	815	Rd 110 x 1/4"	–
DN 80 M	792	–	Rd 98 x 1/6"
DN 80 F	900	Rd 110 x 1/4"	Rd 98 x 1/6"
DN 100 *	1128	Rd 130 x 1/4"	Rd 132 x 1/6"

DN 8: with DN 15 connections as standard;
* DN 100: only for Promass F available;
3 A-version available with $R_a \leq 0.8$ µm

ti038y28

Pressure limitations due to fluid temperature



ti038y29

Hygienic coupling: Dimensions and material load curve

Tri-Clamp

Promass M (connections with internal gaskets)

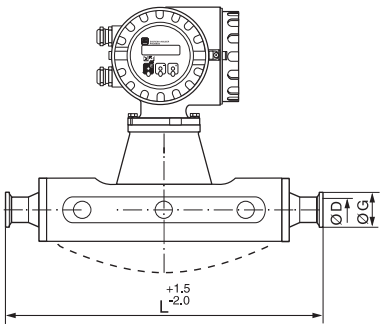
Coupling: SS 1.4404 (316L)

Gasket: Silicone (–60...+200 °C) or EPDM (–40...+160 °C) flat gasket, FDA licensed gasket materials

Promass F (completely welded version)

Coupling: SS 1.4404 (316L)

Welded process connections: no internal gaskets



Diameter DIN	Diameter ANSI	Clamp	L [mm]	Ø G [mm]	Ø D [mm]
DN 8	3/8"	1/2"	367	25.0	9.5
DN 8	3/8"	1"	367	50.4	22.1
DN 15	1/2"	1/2"	398	25.0	9.5
DN 15	1/2"	1"	398	50.4	22.1
DN 25	1"	1"	434	50.4	22.1
DN 40	1 1/2"	1 1/2"	560	50.4	34.8
DN 50	2"	2"	720	63.9	47.5
DN 80 M	3"	3"	801	90.9	72.9
DN 80 F	3"	3"	900	90.9	72.9
DN 100 *	4"	4"	1128	118.9	97.4

3/8" and 1/2": with 1" connections as standard;
* DN 100 / 4": only for Promass F available;
3 A-version available with $R_a \leq 0.8$ µm

Pressure limitations due to fluid temperature

The material load limit is exclusively determined by the material properties of the Tri-Clamp used. This clamp is not included in the shipment.

ti038y30

Tri-Clamp: Dimensions and material load

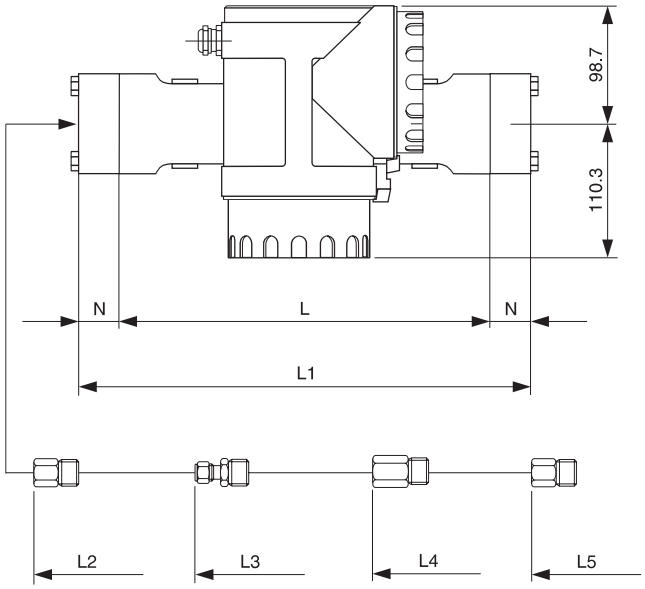
Dimensions
Process Connections

Promass 64 M
(high pressure)

Wetted parts materials

Measuring pipes:	titanium Grade 9
Connector:	SS 1.4404 (316L)
Fittings:	SS 1.4401 (316)
Gasket:	O-ring in Viton (–15...+200 °C), Silicone (–60...+200 °C)

Couplings and connectors optimized for CNG (Compressed Natural Gas) applications.



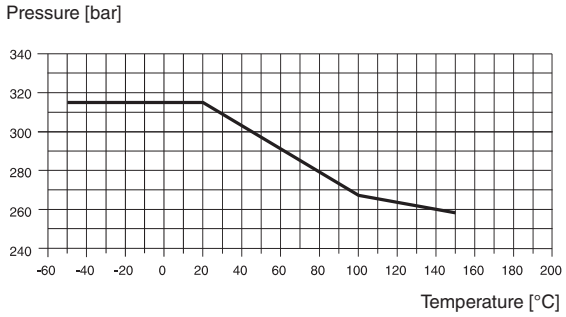
ti038y48

	N	L without connector	L1 with connector	L2 G 3/8"	L3 VCO with 1/2" SWAGELOK	L4 1/2" NPT	L5 3/8" NPT
DN 8	24	256	304	355.8	366.4	370	355.8
DN 15	24	286	334	385.8	396.4	400	385.8
DN 25	34	310	378	429.8	440.4	444	429.8

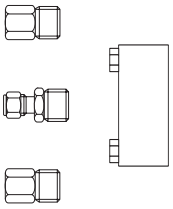
all dimensions in mm

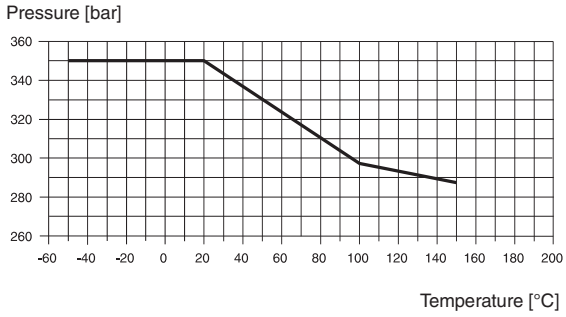
Pressure limitations due to fluid temperature

1/2" NPT



Connector, G 3/8", VCO with 1/2" SWAGELOK, 3/8" NPT



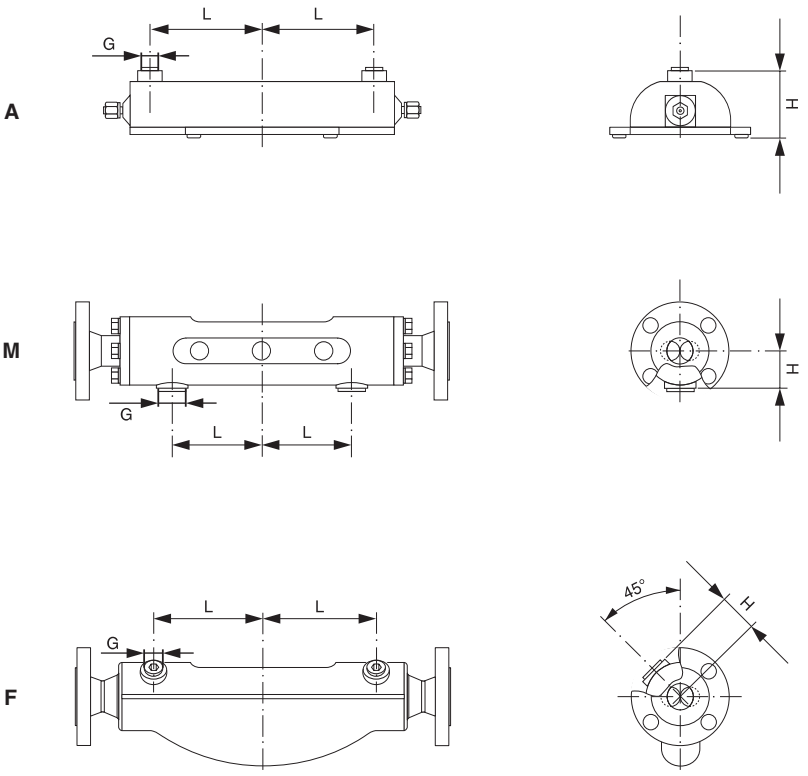


ti038y49

Technical Data

Purge Connection
Pressure Vessel Control

Promass Sensor



Diameter		Promass A		Promass M		Promass F		Connection
DIN	ANSI	L [mm]	H [mm]	L [mm]	H [mm]	L [mm]	H [mm]	G
DN 2	1/12"	130.0	87.0	–	–	–	–	1/2" NPT
DN 4	1/8"	192.5	97.1	–	–	–	–	1/2" NPT
DN 8	3/8"	–	–	85	44.0	108	47	1/2" NPT
DN 15	1/2"	–	–	100	46.5	110	47	1/2" NPT
DN 25	1"	–	–	110	50.0	130	47	1/2" NPT
DN 40	1 1/2"	–	–	155	59.0	155	52	1/2" NPT
DN 50	2"	–	–	210	67.5	226	64	1/2" NPT
DN 80	3"	–	–	210	81.5	280	86	1/2" NPT
DN 100	4"	–	–	–	–	342	100	1/2" NPT

Technical Data

Application

Instrument name

Flowmeter “Promass 64” for custody transfer operations

Instrument function

Mass and volumetric totalisation of liquids other than water (with custody transfer) and burnable gases for a pressure range >100 bar in closed piping.

Function and system design

Measuring principle

Mass flow measurement according to the Coriolis measuring principle (see page 3)

Measuring system

Instrument family “Promass 64” consisting of:

- Transmitter: Promass 64
- Sensor: Promass A (DN 2, 4), standard and high pressure version
  Promass F (DN 8, 15, 25, 40, 50, 80, 100)
  Promass M (DN 8, 15, 25, 40, 50, 80)
  Promass M high pressure (DN 8, 15, 25)

Two versions are available:
- Compact version
- Remote version (max. 20 m)

Input variables

Measured variables

- Mass flow rate (is proportional to the phase difference of two sensors in the measuring pipe which detect differences in its oscillation)
- Medium density (is proportional to the resonance frequency of the measuring pipes)
- Medium temperature (is measured with temperature sensors)

Measuring range (Qmin / Qmax) in custody transfer

Mass meter for liquids

Sensor type	DN [mm]	Mass flow (relate to1,0 kg/dm^3) Q_{min} [kg/min]	Q_{max} [kg/min]	smallest measuring quantity [kg]
A	2	0.1	2	0.05
A	4	0.4	8	0.20
F, M	8	1.5	30	0.50
F, M	15	5.0	100	2.00
F, M	25	15.0	300	5.00
F, M	40	35.0	700	20.00
F, M	50	50.0	1000	50.00
F, M	80	150.0	3000	150.00
F	100	200.0	4500	200.00

Mass meter for compressed natural gas applications (CNG)

Sensor type	DN [mm]	Mass flow Q_{min} [kg/min]	Qmax [kg/min]	smallest measuring quantity [kg]	max. pressure [bar]
M / M*	8	0.1	10	0.2	250 / 350*
M / M*	15	0.3	40	0.5	250 / 350*
M / M*	25	1.0	100	2.0	250 / 350*

* Promass M (high pressure version)

Volumetric meter for liquids (also LPG)

Sensor type	DN [mm]	Volume flow (relate to 1,0 kg/dm^3) Q_{min} [l/min]	Q_{max} [l/min]	smallest measuring quantity [l]
A	2	0.1	2	0.05
A	4	0.4	8	0.20
F	8	1.5	30	0.50
F	15	5.0	100	2.00
F	25	15.0	300	5.00
F	40	35.0	700	20.00
F	50	50.0	1000	50.00
F, M	80	150.0	3000	150.00
F	100	200.0	4500	200.00

Input variables (continued)	
Operable flow range	20 : 1 with verified flowmeters.
Auxiliary input (with "Ex e" board only)	U = 3...30 V DC, R_i = 1.8 kΩ, pulsed or level mode, configurable for reset totalizer 2, error reset, positive zero return or full scale switching.
Output variables	
Output signal	***With "Ex e" electronics board*** • *Status output* Relay max. 30 V DC / 0.1 A. Configurable for error message, empty pipe detection, full scale switching, flow direction, limit value. The output is automatically set to "error message" for custody transfer. • *Current output* 0/4...20 mA, also acc. to NAMUR recommendations; R_L < 700 Ω; freely assignable to different measured values, time constant freely selectable (0.01...100.00 s), full scale value selectable, temperature coefficient typ. 0.005% o.f.s./°C o.f.s. = of full scale • *Pulse output A* active/passive, f_{max} = 500 Hz, R_L > 100 Ω active: 24 V DC, 25 mA (250 mA during 20 ms) passive: 30 V DC, 25 mA (250 mA during 20 ms) standard variables, pulse value and output signal type selectable • *Pulse output B* 90 ° or 180 ° phase shifted to pulse output A, f_{max} = 500 Hz, active/passive, R_L > 100 Ω, active: 24 V DC, 25 mA (250 mA during 20 ms) passive: 30 V DC, 25 mA (250 mA during 20 ms) ***With "Ex i" electronics board*** • *Status output* Open Emitter, max. 30 V DC / 25 mA, configurable (see above) • *Pulse output A* Open Emitter, passive, 30 V DC, 25 mA, f_{max} = 500 Hz, R_L >100 Ω; standard variables, pulse value and output signal type selectable • *Pulse output B* Open Emitter, 90 ° or 180 ° phase shifted to pulse output A, passive: 30 V DC, 25 mA, f_{max} = 500 Hz, R_L > 100 Ω
Signal on alarm	The following applies until the fault has been cleared: *Current output:* failure mode selectable *Pulse outputs:* no pulse output signals; both totalizers inactive *Status output:* the output is open on error (automatically configured to "ERROR" in custody transfer)
Load	R_L < 700 Ω (current output)
Creep suppression	Switch points for low flow selectable. Hysteresis = 50% of the low flow.
Accuracy	
Reference conditions	Error limits based on ISO / DIS 11631: • 20...30 °C; 2...4 bar • Calibration facilities based on national standards • Zero point calibrated under operating conditions • Field density calibration carried out (or special density calibration)

Accuracy (continued)

Measured error

- *Mass flow:*
  Promass
  A, M, F ± 0.10% ± [(zero stability / flow rate) x 100]% of rate

- *Volume flow:*
  Promass
  A, M ± 0.25% ± [(zero stability / flow rate) x 100]% of rate
  F ± 0.15% ± [(zero stability / flow rate) x 100]% of rate

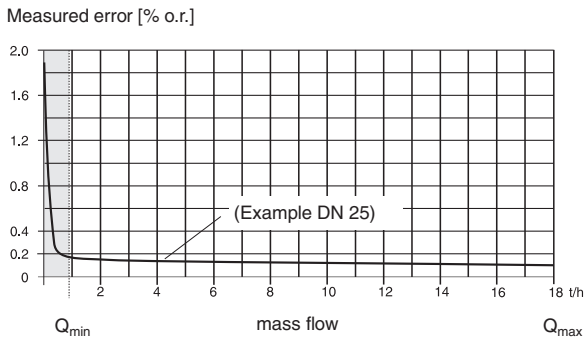
  Zero stability → see table below

Note!
Additional measuring error of the current output: ± 5 µA (typical)

Diameter [mm]	Full scale [t/h] resp. [m^3/h]	Zero stability Promass A, M, F [kg/h] resp. [l/h]
DN 2	0.100	0.0050
DN 4	0.450	0.0225
DN 8	2.0	0.1000
DN 15	6.5	0.3250
DN 25	18.0	0.90
DN 40	45.0	2.25
DN 50	70.0	3.50
DN 80	180.0	9.00
DN 100	350.0	14.00

Example for calculating the measuring error:
Promass F → ± 0.10% ± [(zero stability / flow rate) x 100]% of rate
DN 25; Flow rate = 3.6 t/h = 3600 kg/h

Measuring error → $\pm 0.10\% \pm \frac{0.9\ kg/h}{3600\ kg/h} \cdot 100\% = \pm 0.125\%$



Caution!
Q_{min} and Q_{max} are specified for custody transfer measurement (see page 7, 21)

- *Density (Liquid):*
  Standard calibration:
  Promass A, M ± 0.02 g/cc (1 g/cc = 1 kg/l)
  Promass F ± 0.01 g/cc

- *Special density calibration (optional):*
  (calibration range: 0.8...1.8 g/cc; 5...80 °C)
  Promass A, M ± 0.002 g/cc
  Promass F ± 0.001 g/cc

- *Field density calibration:*
  Promass A, M ± 0.0010 g/cc
  Promass F ± 0.0005 g/cc

- *Temperature:*
  Promass A, M, F ± 0.5 °C ± 0.005 · T (T = medium temp. in °C)

Accuracy (continued)

Repeatability

- *Mass flow:*
  Promass
  A, M, F ± 0.05% ± [1/2 x (zero stability/flow rate) x 100]% of rate

- *Volume flow:*
  Promass
  A, M ± 0.10% ± [1/2 x (zero stability/flow rate) x 100]% of rate
  F ± 0.05% ± [1/2 x (zero stability/flow rate) x 100]% of rate

Zero stability → see Table on page 23

Example for calculating the repeatability:
Promass F
F → ± 0.05% ± [1/2 x (zero stability / flow rate) x 100]% of rate
DN 25; Flow rate = 3.6 t/h = 3600 kg/h

Repeatability → $\pm 0.05\% \pm {}^{1}/_{2} \cdot \frac{0.9\ \text{kg/h}}{3600\ \text{kg/h}} \cdot 100\% = \pm 0.0625\%$

- *Density (Liquid):*
  Promass A, M ± 0.00050 g/cc (1 g/cc = 1 kg/l)
  Promass F ± 0.00025 g/cc

- *Temperature:*
  Promass A, M, F ± 0.25 °C ± 0.0025 · T

  (T = medium temperature in °C)

Process effects

- *Process temperature effect:*
  The below value represents the zero point error due to changing process temperature away from temperature at which a zero point adjustment was carried out:
  Promass A, M, F typical = ± 0,0002% of full scale / °C

- *Process pressure effect:*
  The below defined values represent the effect on accuracy of mass flow due to changing process pressure away from calibration pressure (values in % of rate / bar).

DN [mm]	Promass A flow rate % o.r.** / bar	Promass M flow rate % o.r.** / bar	Promass M*** flow rate % o.r.** / bar	Promass F flow rate % o.r.** / bar
1	none	—	—	—
2	none	—	—	—
4	none	—	—	—
8	—	0.009	0.006	none
15	—	0.008	0.005	none
15 *	—	—	—	—
25	—	0.009	0.003	none
25 *	—	—	—	—
40	—	0.005	—	–0.003
40 *	—	—	—	—
50	—	none	—	–0.008
80	—	none	—	–0.009
100	—	—	—	–0.012

* DN 15, 25, 40 “FB” = Promass I mit vollem Nennweitenquerschnitt
** o.r. = of rate
*** Promass M (high pressure version)

Operating conditions

Installation conditions

Installation instructions	Orientation: vertical or horizontal Restrictions on installation and other recommendations: see page 5 – 7
Inlet and outlet sections	Installation site is independent of inlet and outlet sections.
Connection cable length	Remote version: max. 20 m

Operating conditions (continued)

Ambient conditions

Ambient temperature	–25...+60 °C Promass 64 transmitter –25...+60 °C Promass A, F, M, M (high pressure) sensors • Depending on the product temperature, certain installation positions are to be observed to ensure that the permitted ambient temperature range for the transmitter is not exceeded (see page 7). • An all-weather cover should be used to protect the housing from direct sunlight when mounting in the open. This is especially important in warmer climates and with high ambient temperatures.
Storage temperature	–40...+80 °C
Environmental class	B, C, I acc. to OIML R117, DIN 19217 B = For a fixed instrument installed in a building. C = For a fixed instrument outdoors. I = For a mobile instrument, especially that which is mounted on a truck.
Degree of protection (EN 60529)	Transmitter: IP 67; NEMA 4X Sensors: IP 67; NEMA 4X (Promass A, F, M, M high pressure)
Shock resistance	according to IEC 68-2-31
Vibrational resistance	up to 2 g, 10...150 Hz according to IEC 68-2-6
Electromagnetic compatibility (EMC)	acc. to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 as well as to NAMUR recommendations

Medium conditions

Medium temperature	• *Sensor* Promass A –50...+200 °C Promass F –50...+200 °C Promass M –50...+150 °C Promass M –50...+150 °C (high pressure) • *Gaskets* Viton (–15…+200 °C), EPDM (–40…+160 °C), Silicone (–60…+200 °C), Kalrez (–30…+210 °C), FEP coated (–60…+200 °C)
Nominal pressure *Material load diagrams: see page 11, 14 – 19*	• *Promass A* Fittings: max. 160 bar (standard version), max. 400 bar (high pressure version) Flanges: DIN PN 40 / ANSI Cl 150, Cl 300 / JIS 10K Containment vessel: 25 bar bzw. 375 psi • *Promass F* Flanges: DIN PN 16...100 / ANSI Cl 150, Cl 300, Cl 600 / JIS 10K, 20K, 40K, 63K Containment vessel: DN 8...80: 25 bar resp. 375 psi DN 100: 16 bar resp. 250 psi DN 8...50: optional 40 bar resp. 600 psi • *Promass M* Flanges: DIN PN 40...100 / ANSI Cl 150, Cl 300, Cl 600 / JIS 10K, 20K, 40K, 63K Containment vessel: 40 bar (optional 100 bar) resp. 600 psi (optional 1500 psi) • *Promass M (high pressure version)* Measuring pipes, connector, fittings: max. 350 bar Containment vessel: 100 bar resp. 1500 psi
Pressure loss	Dependent on nominal diameter and sensor type (see page 8)

Technical Data

Mechanical construction	
Design, dimensions	See page 10 ff.
Weights	See page 10, 12
Materials	• *Transmitter housing* Powder-coated die-cast aluminium • *Sensor housing / containment vessel* Promass A, F: Surfaces resistant to acids and alkalis, SS 1.4301 (304) Promass M: Surfaces resistant to acids and alkalis, DN 8...50: chemically nickel-plated steel DN 80: SS 1.4313 Promass M: (high pressure) Surfaces resistant to acids and alkalis, chemically nickel-plated steel • *Sensor connection housing (remote version)* SS 1.4301 (304) • *Process connections:* see page 11, 14 – 19 • *Measuring pipes* Promass A: SS 1.4539 (904L), Alloy C-22 2.4602 (N 06022) Promass M: DN 80: Titanium Grade 2 DN 8...50: Titanium Grade 9 Promass M (high pressure): DN 8...25: Titanium Grade 9 Promass F: DN 8...100: SS 1.4539 (904L), DN 8...80: Alloy C-22 2.4602 (N 06022) • *Gaskets:* see page 11, 14 – 19
Process connections	• Promass A: *Welded process connections:* 4-VCO-4 fittings, ½" Tri-Clamp *Screw-on process connections:* Flanges (DIN 2501, ANSI B16.5, JIS B2238), NPT-F and SWAGELOK fittings • Promass F: *Welded process connections:* Flanges (DIN 2501, ANSI B16.5, JIS B2238) *Sanitary connections: Tri-Clamp,* Hygienic coupling DIN 11851 / SMS 1145 • Promass M: *Screw-on process connections:* Flanges (DIN 2501, ANSI B16.5, JIS B2238) *Sanitary connections: Tri-Clamp,* Hygienic coupling DIN 11851 / SMS 1145 • Promass M: (high pressure) *Screw-on process connections:* G ⅜", ½" NPT, ⅜" NPT fittings and ½" SWAGELOK coupling, connector with 7/8 14UNF internal thread
Electrical connection	*Wiring diagramm:* see page 9 *Cable glands (in-/outputs; remote version):* PG 13.5 cable glands (5…15 mm) or $^1/_2$" NPT, M20 x 1.5 (8…15 mm), G$^1/_2$" threads for cable glands *Cable specifications (remote version):* see page 9

Technical Data

User interface	
Operation	• 2 switches for custody transfer mode (electronics compartment has to be opened) • On-site operation with 3 operating elements for setting all instrument functions in the E+H programming matrix (see page 4)
Display	LC-display, illuminated, double-spaced with 16 characters each
Communication	none
Power supply	
Supply voltage, Frequency	*Transmitter:* 85...260 V AC (50...60 Hz) 20... 55 V AC, 16...62 V DC *Sensor:* is supplied by the transmitter
Power consumption	AC: <15 VA (incl. sensor) DC: <15 W (incl. sensor)
Power supply failure	Bridges min. 1 power cycle (22 ms). • EEPROM saves measuring system data on power failure (no batteries required). • DAT = exchangeable data storage module which stores all sensor data such as calibration data, nominal diameter, sensor version, etc. When replacing the transmitter or its electronics, the old DAT module is simply inserted into the new transmitter. When the system is restarted, the measuring point then operates using the variables stored in the DAT.
Certificates and approvals	
Ex approvals	Information on presently available Ex versions (e.g. CENELEC, SEV, FM, CSA) can be supplied by your E+H Sales Centre on request. All explosion protection data are given in separate documentation available on request.
Verification of accuracy	NMi and PTB approval for measuring the mass and volumetric flow of liquids other than water and pressurised gases. Flowmeter certified to OIML R105 / R117, DIN 19217 (for details see page 28)
CE mark	By attaching the CE mark, Endress+Hauser confirms that the Promass 64 measurement system has been successfully tested and fulfils all legal requirements of the relevant EC directives.
Order information	
Accessories	• Post mounting set for Promass A: DN 2: Order No. 50077972 DN 4: Order No. 50079218 • Post mounting set for remote transmitter housing: Order No. 50076905
Supplementary documentation	Operating Manual Promass 64 (BA 031D/06/en) System Information Promass (SI 014D/06/en)
Other standards and guidelines	
EN 60529	Degree of protection by housing (IP code)
EN 61010	Protection Measures for Electronic Equipment for Measurement, Control, Regulation and Laboratory Procedures
EN 50081	Part 1 and 2 (interference emission)
EN 50082	Part 1 und 2 (interference immunity)
NAMUR	Association of Standards for Control and Regulation in the Chemical Industry

Custody Transfer Approval Promass 64

PTB approval					
		for liquids other than water for			for high pressure (CNG) application
Instrument	DN	Mass meter	Volume meter	Density meter	Mass meter
Promass A	02...04	YES	YES	YES	NO
Promass F	08...100	YES	YES	YES	NO
Promass M	08...50	YES	NO	NO	NO
Promass M	80	YES	YES	YES	NO
Promass M (high pressure) for CNG-applications	08...25	NO	NO	NO	YES
Promass M for CNG-applications	08...25	NO	NO	NO	YES

NMi approval			
		for liquids other than water for	
Instrument	DN	Mass meter	Volume meter
Promass A	02...04	YES	YES
Promass F	08...100	YES	YES
Promass M	08...80	YES	YES
Promass M (high pressure) for CNG-applications	08...25	NO	NO
Promass M for CNG-applications	08...25	NO	NO

Subject to modification

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