Technical
Information
TI 034D/06/e
No. 50077302

Electromagnetic Flow Measuring System *promag 39*

Modular construction
- Providing cost-effective measurement for all applications

Operational security
- ISO 9001 manufacturer, quality assured
- High electromagnetic compatibility
- High operating integrity through self-monitoring
- Data protection with EEPROM on power failure (without batteries)

Easily configured
- Menu-driven operation for all parameters via the operating elements
- Two-line display
- Rackbus/Rackbus RS 485/HART®

Measure precisely
- Measuring error: ±0.5%
- 1000:1 operable flow range
- Excellent repeatability

Install anywhere
- Robust, shock-resistant aluminium housing, resistant to acids and caustics
- IP 67 protection, optional IP 68 for sensor
- Transmitter in 19" rack version, IP 20
- Wide size range DN 2…2000 (1/12…78")
- Flanged version with ISO meter lengths
- Modular hygienic sensor for the food and pharmaceutical industry
- Ex versions for use in Ex zones 1 and 2

Endress+Hauser

Nothing beats know-how

Promag
Measuring System

Fields of application
The Promag 39 measuring system makes cost-effective, precise electromagnetic flow measurement possible. All liquids with a minimum conductivity of 5 µS/cm can be measured:
- acids, caustics, pastes, slurries, pulps
- potable water, waste water, sewage
- milk, beer, wine, mineral water, yoghurt, molasses

Modular design
Mechanically and electronically, the Promag 39 measuring system is constructed in a modular fashion. Through the exchange of electronic boards, the measuring facility can be expanded at any time. In this way, the meter can be optimally equipped and modified.
The transmitter is mounted separately from the sensor.

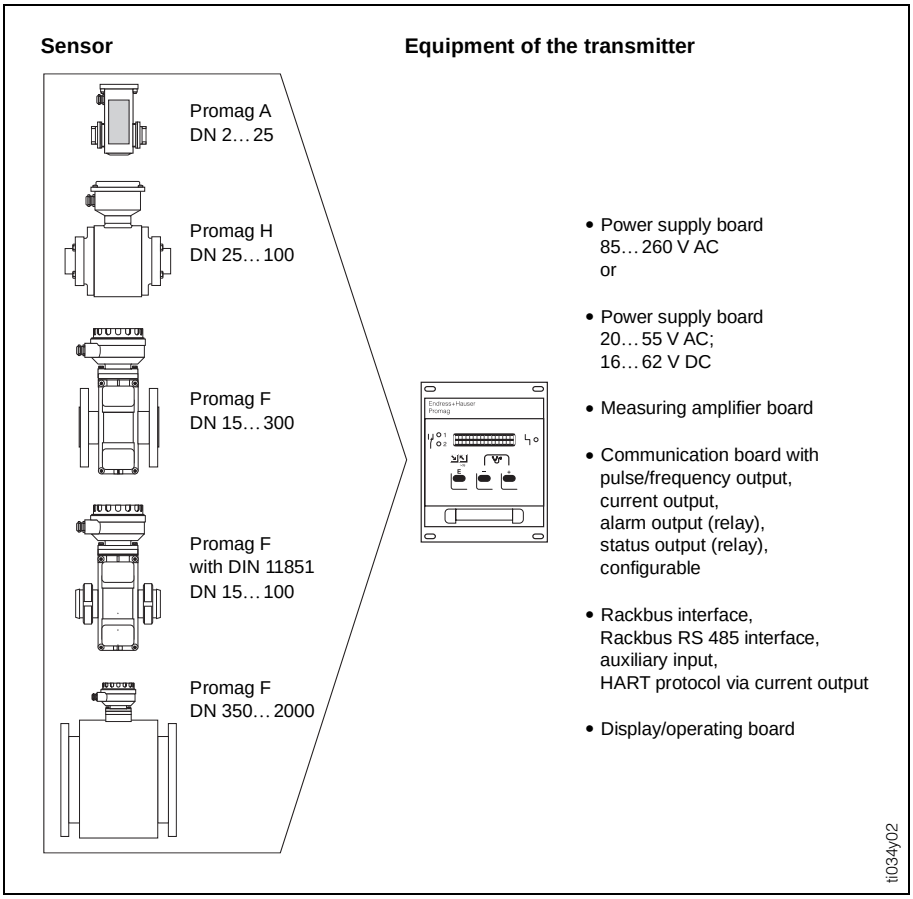
Promag 39 measuring transmitter
- E+H-matrix driven operation with two-line display and three keypads
- all inputs and outputs are galvanically isolated from the power supply, the measuring circuit and each other
- easier and safer transmitter exchange, since the sensor data is archived in plugable DAT memory blocks (EEPROM)
- digital interface
- HART communication
- auxiliary input

Promag A measuring sensor
Diameters: DN 2…25 ($1/12$…1")
Several process connections
Liner: PFA Teflon®

Promag H measuring sensor
Diameters: DN 25…100 (1…14")
Several process connections
Liner: PFA

Promag F measuring sensor
Diameters: DN 15…2000 ($1/2$…78")
Process connections: flanges (DIN, ANSI, JIS), DIN 11851 thread
Liners: PTFE, soft rubber, hard rubber

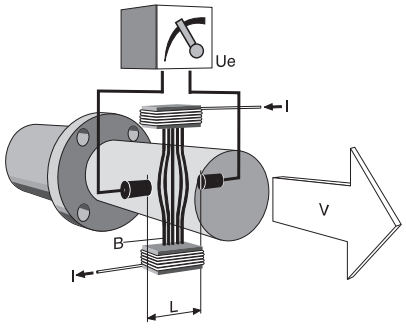
Ex versions
Promag 39 is available in a number of Ex versions for use in Ex Zone 1 and 2. More information is given in the appropriate Ex documentation. Your E+H representative will be pleased to help you.



Function

Measuring principle

According to Faraday's Law of Magnetic Induction, a voltage is induced into a conductor which moves in a magnetic field. With the electromagnetic measuring principle, the flowing fluid is the moving conductor. The induced voltage is proportionally related to the flow rate. Using the pipe cross-sectional area, the flow volume is calculated.
The DC magnetic field is generated by a switched direct current of alternating polarity. Together with the patented "Integrated Autozero Circuit", this guarantees a stable zero point, and makes the measurement fluid-independent and insensitive to entrained solid particles. Every meter is factory-calibrated with the most modern calibration rigs, traceable to national standards. There is no need for it to be adapted to suit changing media.



$U_e = B \cdot L \cdot v$
$Q = v \cdot A$

U_e = induced voltage
B = magnetic induction (magnetic field)
L = distance between electrodes
v = flow velocity
Q = volume flow

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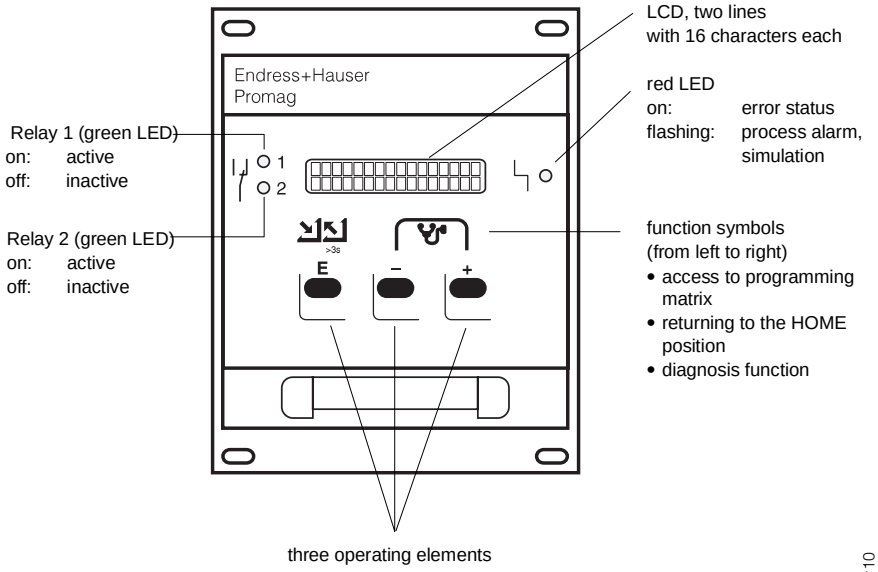
Operation

The Promag 39 is furnished with a two-line LC display. With the E+H-matrix driven operation, configuration is very easy. With only three keypads, over 60 parameters can be specifically chosen and modified, e.g.:

- technical units
- current output functions
- totaliser functions
- pulse and frequency output functions
- relay functions
- limit values
- batching functions with integral preset counter
- display parameters
- creep suppression
- single and bidirectional measurement
- auxiliary input (batching, totaliser reset, dual range measurement, measured value suppression MVS)

12 languages are selectable for the display text. A help function (diagnosis function) is available during programming.



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Frontview Promag 39
Display and operating elements

Function

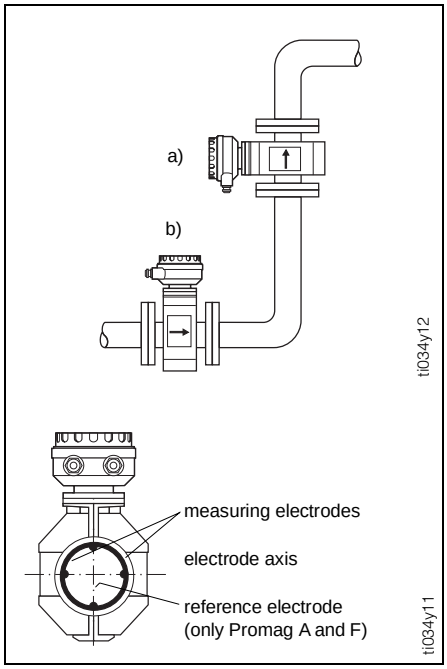
1000 : 1 operable flow range
The Promag 39 amplifier has very high measuring dynamics of over 1000 : 1 which enables it to measure the velocity of a fluid from below 10 mm/s to greater than 10 m/s with a specified accuracy. With pulsating flows, even peak flows of up to 12.5 m/s will not overload the system above the set final value. Thus, there is no falsification of the measured value, provided that outputs are not overloaded.

Communication
As a standard, the Promag 39 measuring system can communicate to higher-level systems with the following interfaces:
- Direct communication to a personal computer and the E+H Rackbus world is possible via the RS 485 interface.
- HART protocol (SMART technology) will be realised on the current output.

Operational security
- A comprehensive self-monitoring facility of the measuring system assures high safety. Resulting error messages are annunciated at the alarm output.
- All data of the measuring system is safely stored in the EEPROM (without batteries).
- The Promag 39 measuring system fulfils all general requirements for electromagnetic compatibility acc. to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 as well as the NAMUR recommendations.
- For rinsing procedures, the measured values can be suppressed by an external voltage at the auxiliary input.

Installation

In order to measure correctly and to prevent damage, please observe the following installation instructions.

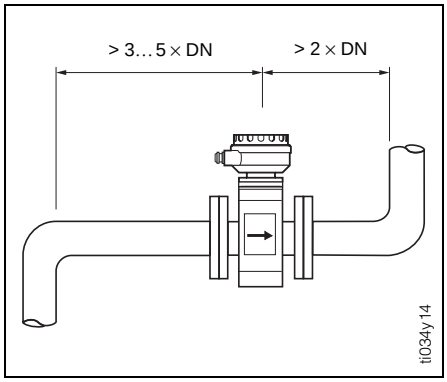


Mounting position (as preferred)

a) Vertical orientation:
Optimum, with flow direction upward. At no flow, heavier entrained solids sink downward and lighter fatty contents rise away from the electrode area.

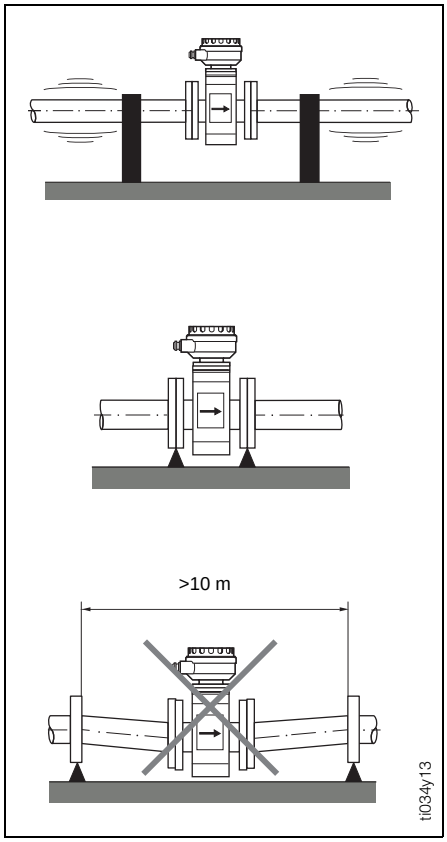
b) Horizontal orientation:
Electrode axis must be horizontal. This prevents brief insulation of the electrodes by entrained air bubbles.

Position of the electrode axis:
The plane in which the electrode axis lies is identical for the measuring sensors Promag A, H and F.



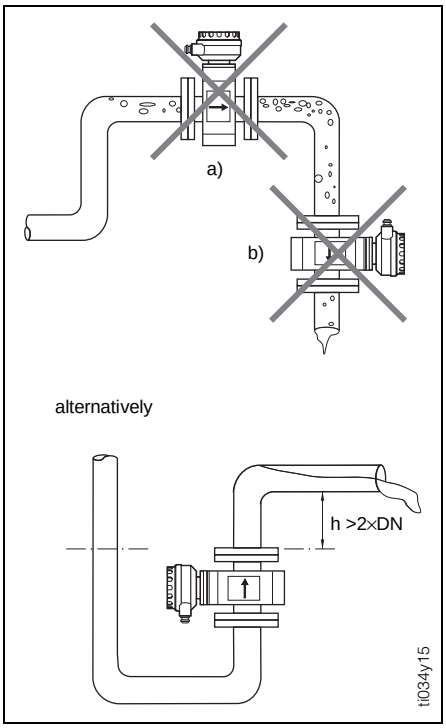
Inlet and outlet runs
The sensor should be mounted away from turbulence-generating components (e.g. valves, elbows, T-junctions) whenever possible.

Inlet lengths: > 3…5 × DN
Outlet lengths: > 2 × DN
DN = pipe diameter



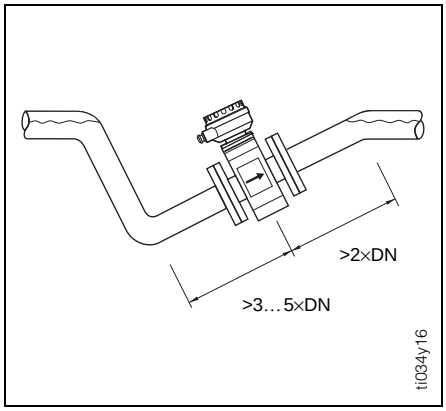
Vibration
- Fasten the piping before and after the sensor.
- With free runs of piping over 10 m long, mechanical supports are recommended to minimise external forces.

Installation



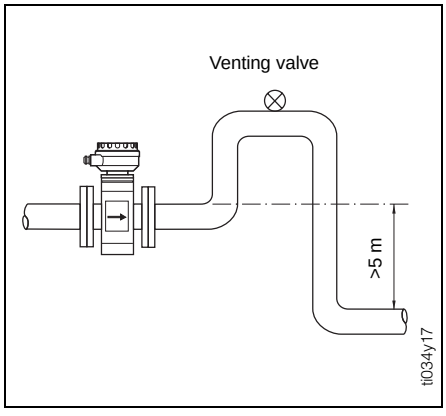
Mounting location
Correct measurement is only possible with a full pipe. For this reason the following locations are to be avoided:

a) No installation at the highest point (air accumulation)
b) No installation immediately before an open pipe outlet in a downward line. The alternate installation suggestion nevertheless makes such an application possible.

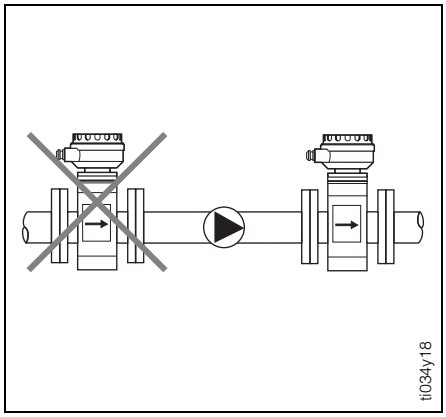


Partially full pipes
For inclines, a mounting similar to a drain should be planned. Do not mount at the lowest point (danger of solids accumulation).

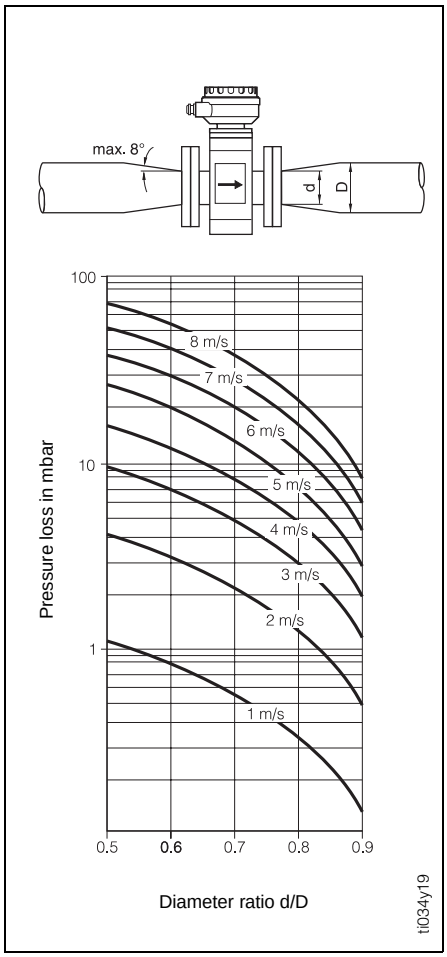
Note:
Inlet and outlet lengths should also be maintained here.



Downward pipe
With the installation suggestion opposite (siphon, vent valve after the sensor), no partial vacuum exists, even in downward pipe >5 m.



Pump installation
Danger of vacuum!
If possible avoid mounting the sensor on the pump suction side .

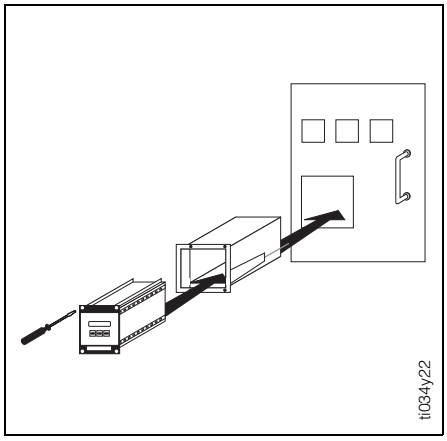


Adaptor pieces
With the help of the appropriate adaptor pieces (DIN 28545 reducers and expanders) the sensor can be mounted in a pipeline of a larger diameter. For slowly flowing fluids, the resulting higher velocity increases the measuring accuracy.

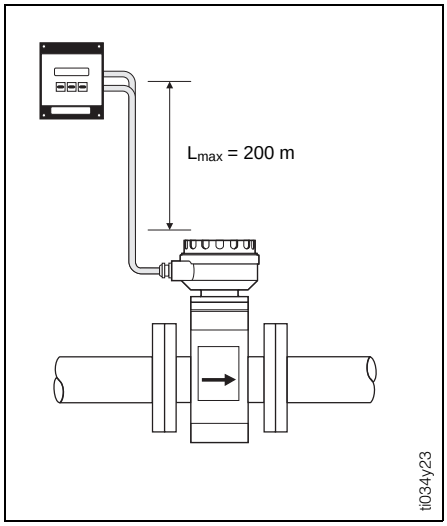
The nomogram opposite serves to determine the approximate pressure loss.

Procedure:
1. Determine the d/D diameter ratio
2. From the nomogram, read the pressure loss depending on the flow rate and the d/D ratio.

Note:
The nomogram is valid for liquids whose viscosities are similar to water.



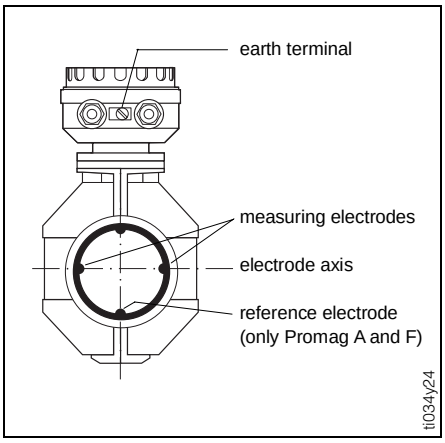
Mounting of the transmitter
The separate installation of transmitter and sensor is advantageous because:
- it assures improved accessibility
- requires less space
- copes better with extreme fluid and ambient temperatures (see page 21 for temperature ranges)
- or strong vibrations (>2 g/2 h per day; 10…100 Hz)



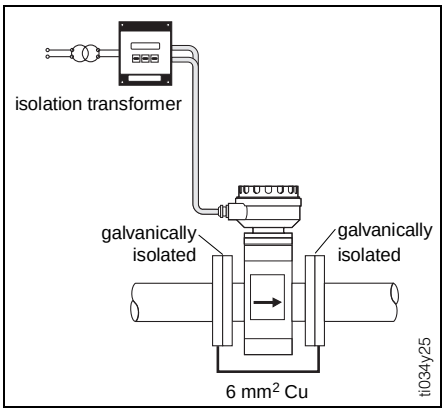
Notes:
- The maximum admissible cable length L_{max} between sensor and transmitter for non-Ex applications is 200 m and independent from fluid conductivity provided minimum conductivity is 5 µS/cm.
- Do not lay cable in the vicinity of electrical machinery or switchgear.
- Ensure potential equalisation between sensor and transmitter.

Grounding

Potential equalisation
The sensor and the fluid must be at approximately the same electrical potential, so that the measurement is accurate and that no galvanic corrosion of the electrodes takes place. In most cases, the sensor's built-in reference electrode or the metallic pipeline ensures the required potential equalisation.
With a fitted reference electrode and for fluids carried in grounded metal piping it is therefore sufficient to connect the earth terminal of the connecting housing on the sensor to the potential equalising line.
The Promag A is always fitted with a reference electrode; it is optional with Promag F.
The Promag H sensor has no reference electrode because there is always a metallic connection to the fluid.

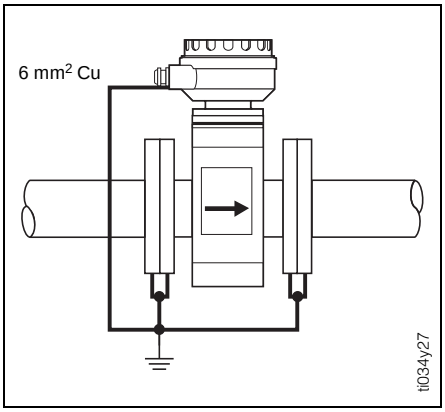


The following describes potential equalisation in special cases:



Potential equalisation for lined pipes with cathodic protection

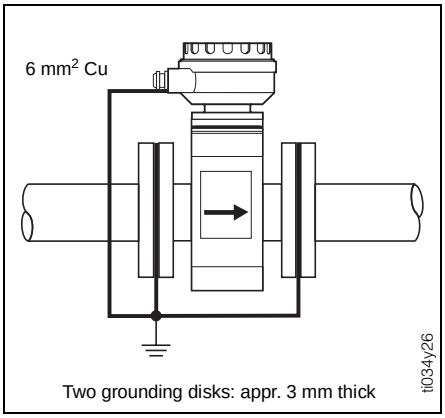
Potential equalisation for lined pipes with cathodic protection
If the fluid cannot be grounded for operational reasons, the meter must be installed with isolation from pipework and ground. Please observe the local electrical regulations for such an installation.
Take care with the mounting materials used to ensure that no electrical path to the meter exists and that the material can withstand the torques.



Equalisation currents in ungrounded metal pipes resp. grounding in areas with strong electrical interference

Equalising currents in ungrounded metal pipes
The fluid may be grounded. Ensure an electrical connection from flange to flange and to the meter.

Grounding in areas with strong electrical interference
To ensure full electromagnetic compatibility, it is advisable to provide two flange-to-flange links and to connect them jointly with the connection housing to earth potential.



Grounding in plastic or lined piping

Plastic or lined piping
This wiring will be necessary if no reference electrode is present or if the fluid must be grounded due to potential equalisation currents.
Pay attention to the corrosion resistance of the grounding rings!

Diameter Selection

Diameter selection
As a rule, the pipeline diameter determines the sensor diameter.

A necessary increase in velocity can be achieved through a reduction of the sensor diameter (see page 7). The higher installation expense is normally balanced by the lower sensor cost.

The flow rate (v) has to be matched to the physical properties of the fluid:
- v <2 m/s:
  abrasive fluids (potter's clay, lime milk, ore slurry)
- v >2 m/s:
  fluids forming coating (wastewater sludge, etc.)

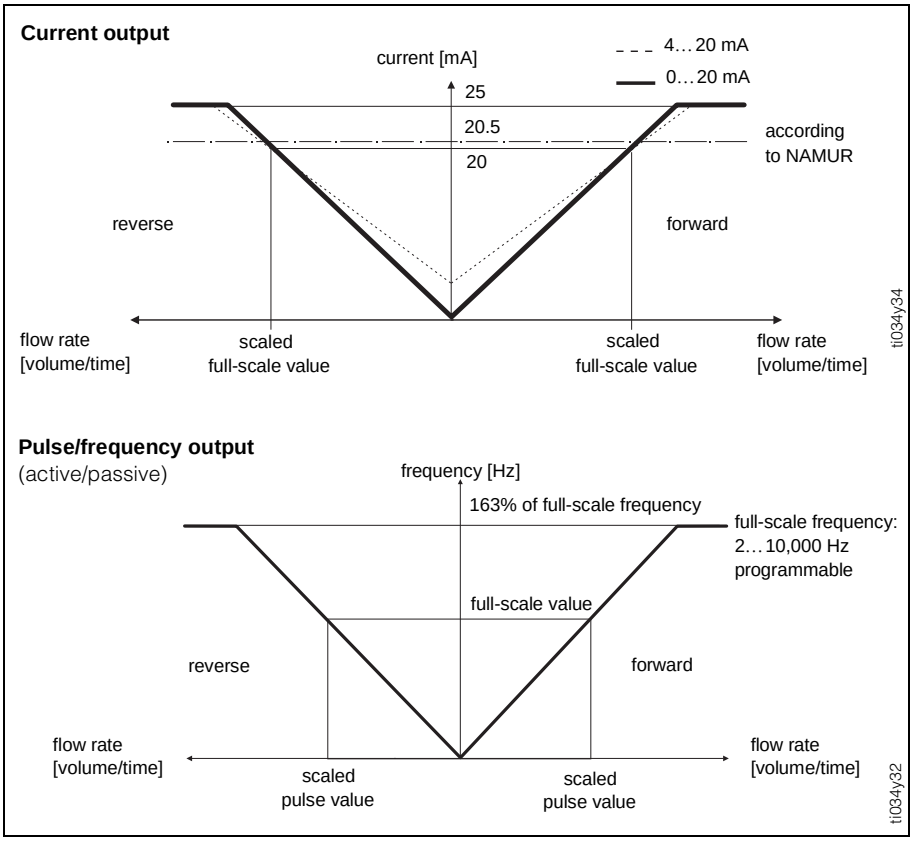
Diameter DN		Minimum full-scale value	Factory setting full-scale value	Maximum full-scale value
[mm]	[inch]	(scaling at v ~0.3 m/s)	(scaling at v ~2.5 m/s)	(scaling at v ~10 m/s)
2	1/12"	0.0034 m^3/h	0.0283 m^3/h	0.1131 m^3/h
4	5/32"	0.0136 m^3/h	0.1131 m^3/h	0.4524 m^3/h
8	5/16"	0.0543 m^3/h	0.4524 m^3/h	1.8096 m^3/h
15	1/2"	0.1909 m^3/h	1.5904 m^3/h	6.3617 m^3/h
25	1"	0.5310 m^3/h	4.4179 m^3/h	17.671 m^3/h
32	1 1/4"	0.8686 m^3/h	7.2382 m^3/h	28.953 m^3/h
40	1 1/2"	1.3572 m^3/h	11.310 m^3/h	45.239 m^3/h
50	2"	2.1206 m^3/h	17.671 m^3/h	70.686 m^3/h
65	2 1/2"	3.5838 m^3/h	29.865 m^3/h	119.46 m^3/h
80	3"	5.4287 m^3/h	45.239 m^3/h	180.96 m^3/h
100	4"	8.4823 m^3/h	70.686 m^3/h	282.74 m^3/h
125	5"	13.254 m^3/h	110.45 m^3/h	441.79 m^3/h
150	6"	19.085 m^3/h	159.04 m^3/h	636.17 m^3/h
200	8"	33.929 m^3/h	282.74 m^3/h	1131.0 m^3/h
250	10"	53.014 m/h	441.79 m^3/h	1767.1 m^3/h
300	12"	76.341 m/h	636.17 m^3/h	2544.7 m^3/h
350	14"	103.91 m/h	865.90 m^3/h	3463.6 m^3/h
400	16"	135.72 m/h	1131.0 m^3/h	4523.9 m^3/h
450	18"	171.77 m/h	1431.4 m^3/h	5725.6 m^3/h
500	20"	212.06 m^3/h	1767.1 m^3/h	7068.6 m^3/h
600	24"	305.36 m^3/h	2544.7 m^3/h	10179 m^3/h
700	28"	415.63 m^3/h	3463.6 m^3/h	13854 m^3/h
750	30"	477.13 m^3/h	3976.1 m^3/h	15904 m^3/h
800	32"	542.87 m^3/h	4523.9 m^3/h	18096 m^3/h
900	36"	687.07 m^3/h	5725.6 m^3/h	22902 m^3/h
1000	40"	848.23 m^3/h	7068.6 m^3/h	28274 m^3/h
1050	42"	935.17 m^3/h	7793.1 m^3/h	31172 m^3/h
1200	48"	1221.5 m^3/h	10179 m^3/h	40715 m^3/h
1350	54"	1545.9 m^3/h	12882 m^3/h	51530 m^3/h
1400	56"	1662.5 m^3/h	13854 m^3/h	55418 m^3/h
1500	60"	1908.5 m^3/h	15904 m^3/h	63617 m^3/h
1600	64"	2171.5 m^3/h	18096 m^3/h	72382 m^3/h
1700	66"	2451.4 m^3/h	20428 m^3/h	81713 m^3/h
1800	72"	2748.3 m^3/h	22902 m^3/h	91609 m^3/h
2000	78"	3392.9 m^3/h	28274 m^3/h	113097 m^3/h

1 m^3 = 1000 litres

Transmitter Outputs

Current and pulse output
The current and pulse output will be scaled within the range of v = 0…10 m/s (max. 12.5 m/s).
The end value scaling allocates a user-specified flow rate to the 20 mA current and to the full-scale frequency value. The measuring facility is capable of measuring in both flow directions, i.e. bidirectional or in one direction only.
Current and pulse output values are always positive (= unipolar). Up to the set end value (0/4…20 mA or 0...10 kHz), strict linearity predominates.

For the current output a maximum peak up to 25 mA is possible and for the pulse/ frequency output up to 163% of the set full-scale frequency. The current output can be operated according to NAMUR recommendations. It is enabled by simple programming.
The factory calibration is standard and carried out in one direction (forward); optional for both directions. The configurable status output annunciates the corresponding flow direction.

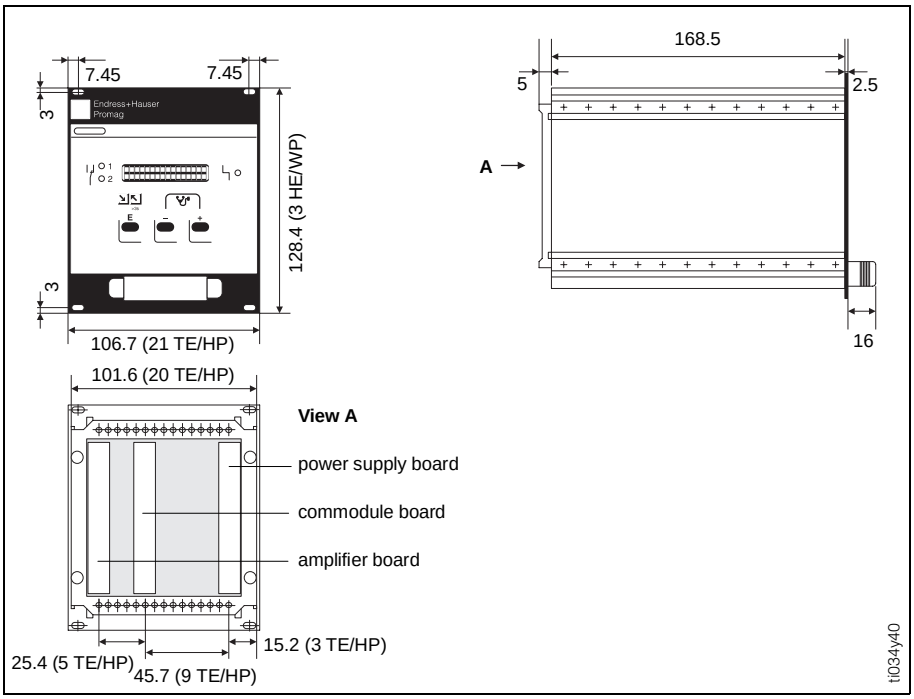


Alarm output (relay 1)
Resulting system errors or power supply failures are immediately announced via a separate alarm output. Corresponding error messages appear on the transmitter display.
Existing error messages can be systematically interrogated and their causes determined.
All functions of relay 2 may also be assigned to relay 1.

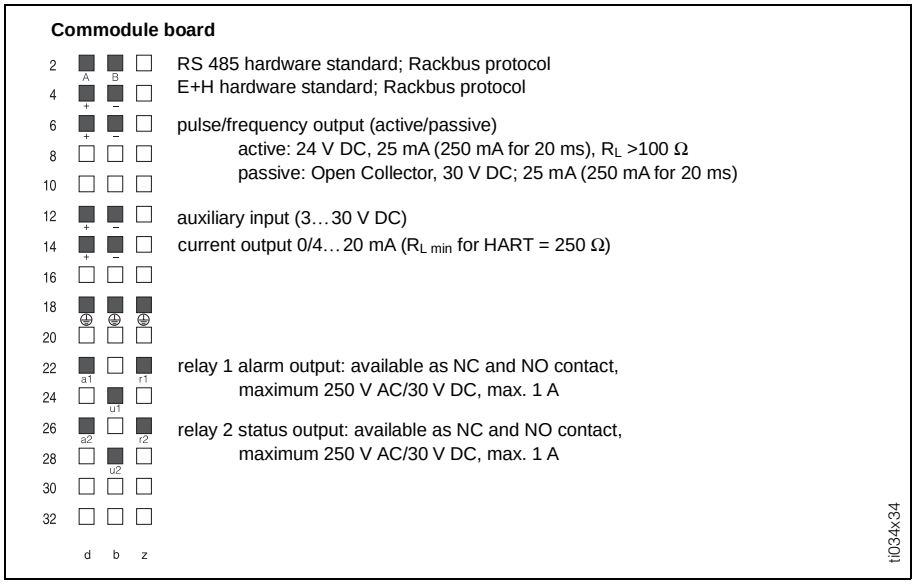
Relay switching
In case of error relay 1 and 2 are de-energized.

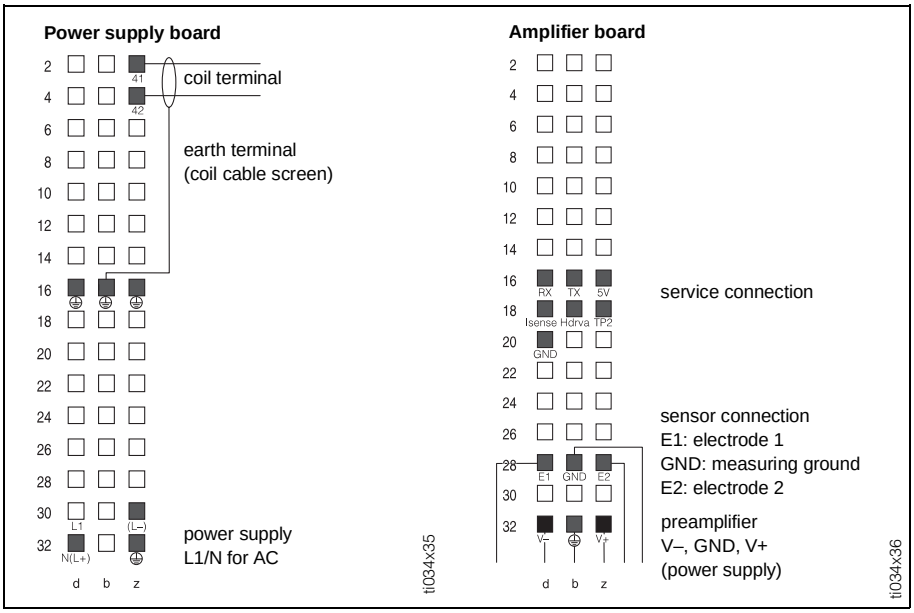
Status output (relay 2)
The status output offers the user additional possibilities to optimally set the Promag 39 system to the process conditions.
One out of 5 possible functions can be allocated to this relay output:
- limit value (safety MIN/MAX)
- flow direction recognition
- automatic switching between two current value ranges
- batching (filling; batching precontact on relay 1)
- exceeding the measuring range v ≥12.5 m/s

Electrical Connection



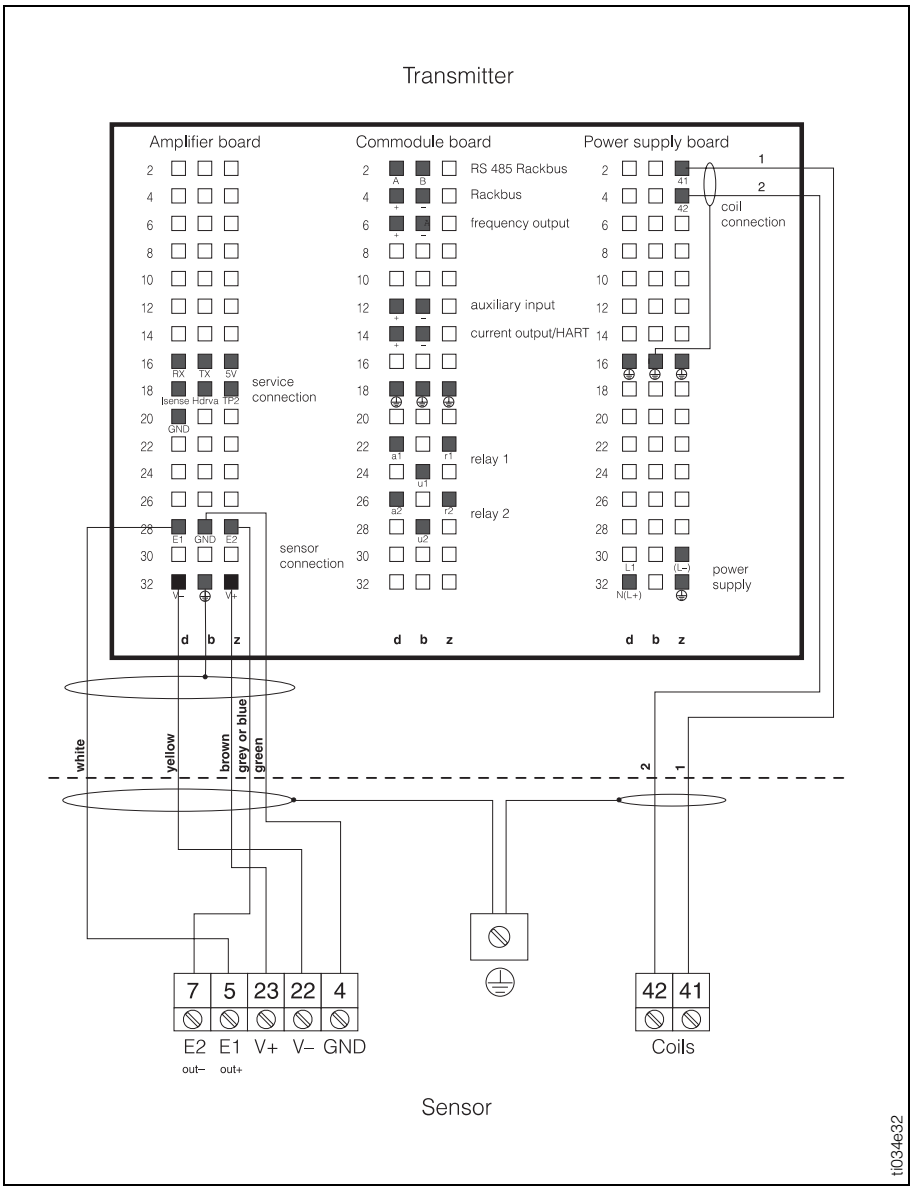
Wiring synopsis Promag 39 A, Promag 39 H and Promag 39 F

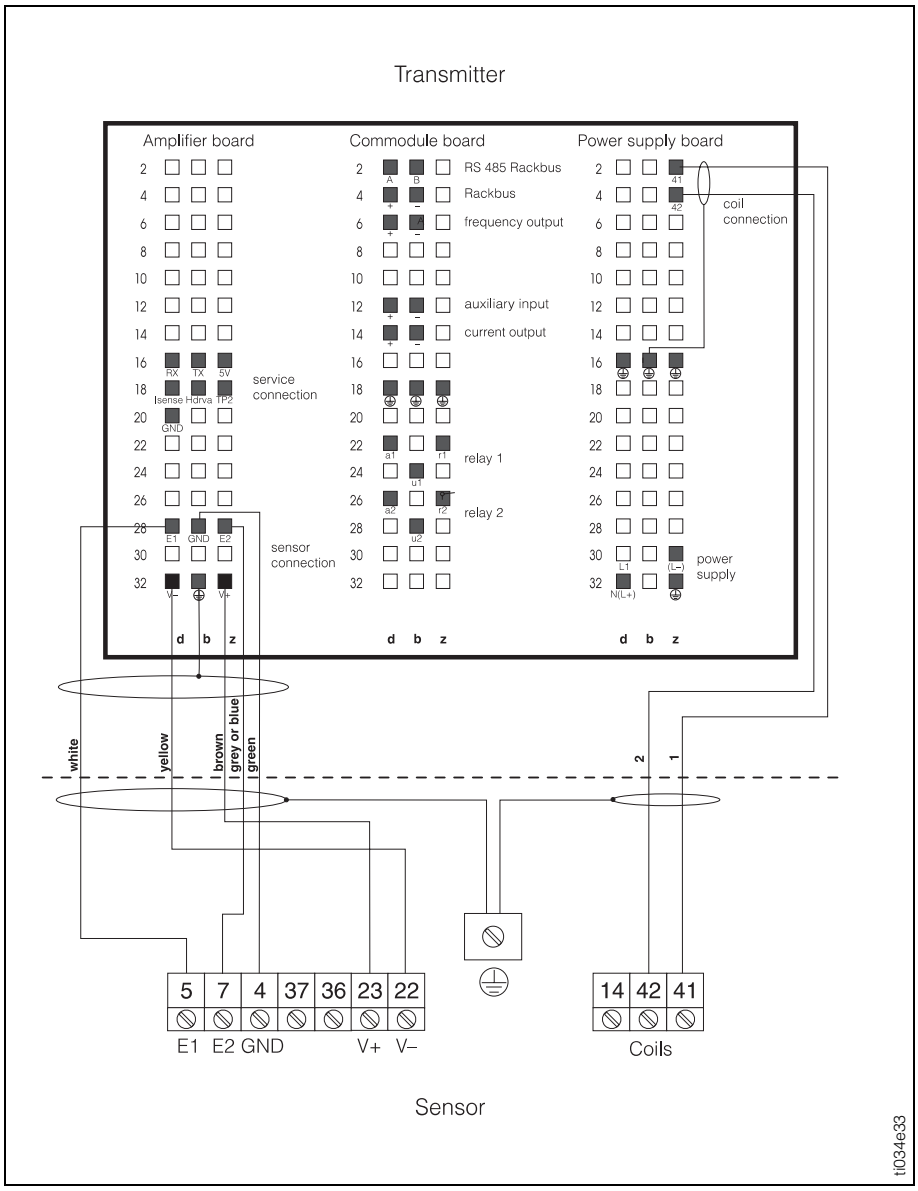




Electrical Connection Remote Version

Promag 39 A





Cable specifications

Coil cable: 2×0.75 mm^2 PVC cable with common shield
Conductor resistance: ≤37 Ω/km
Capacitance: core/core, shield earthed ≤120 pF/m
Permanent operating temperature –20...+70 °C

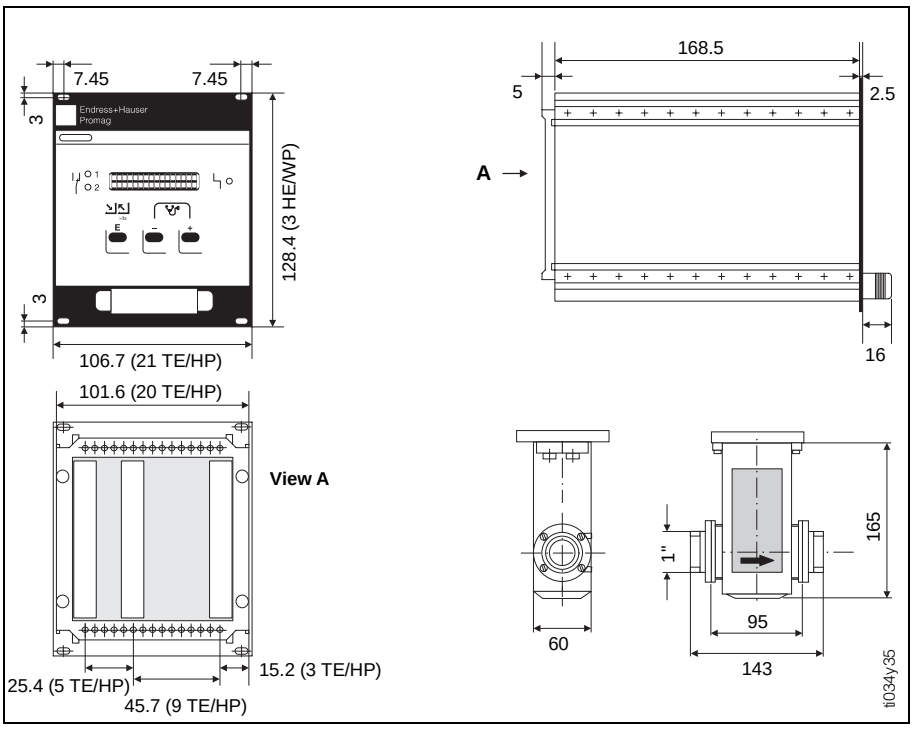
Signal cable: 5×0.5 mm^2 PVC cable with common shield
Conductor resistance: ≤37 Ω/km
Capacitance: core/core, shield earthed ≤120 pF/m
Permanent operating temperature –20...+70 °C

Note:
If Promag H is used with a fluid temperature of +150 °C, the cables must be heat-resistant to an ambient temperature of +80 °C.

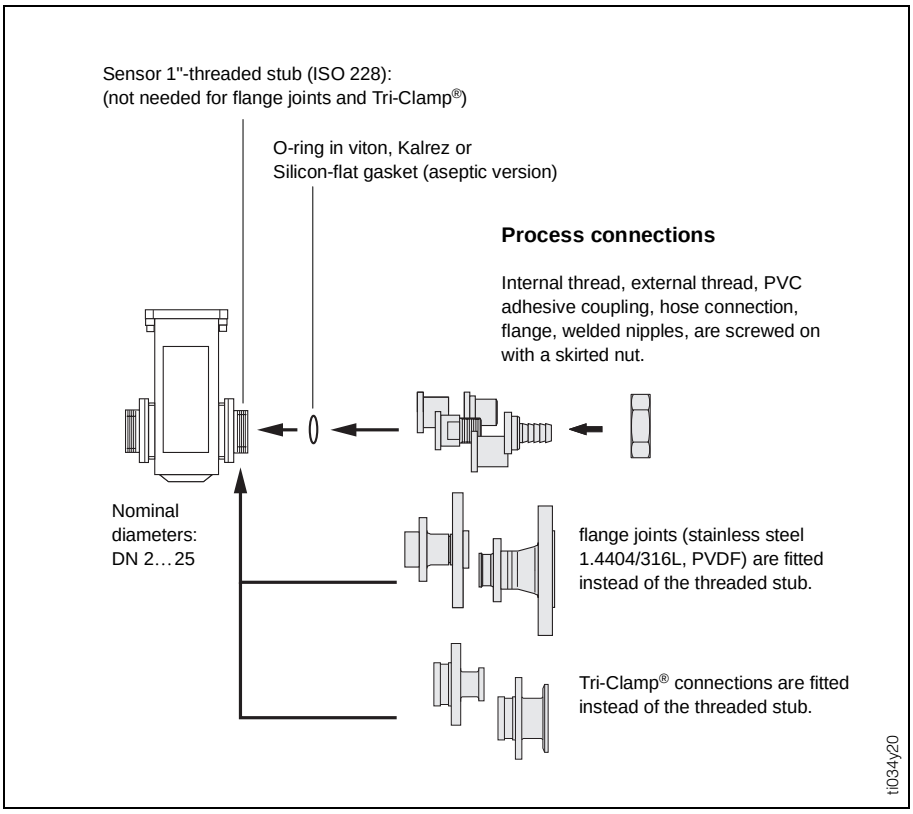
Dimensions

Promag 39 A
DN 2…25

The dimension and weights of Ex versions can differ from those stated here. Please refer to the Ex documentation. Your E+H representative will be pleased to help you.



Weight:
Transmitter Promag 39: 1 kg
Sensor Promag A: 1 kg

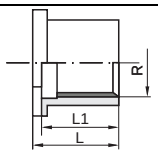


Process connections
Promag A

Process Connections

Promag A

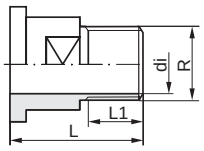
Internal thread



DN	L	L1	R
2...15	20	18	1/2"
25	45	22	1"

(thread norm ISO 228/DIN 2999)

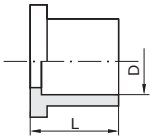
External thread



DN	L	L1	di	R
2...15	35	13.2	16.1	1/2"
25	50	16.8	22.0	1"

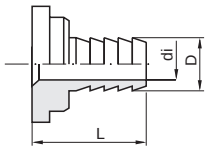
(thread norm ISO 228/DIN 2999)

PVC-adhesive sleeve



DN	L	D
2...15	19	20
25	66	25
25	69	32

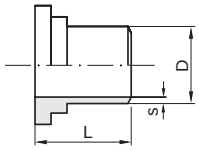
Hose fitting



DN	L	D	di	LW
2...15	30	14.5	8,9	13
2...15	30	17.5	12.6	16
2...15	30	21.0	16.1	19

(LW = hose inner diameter)

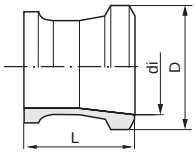
Weld nipple DN 2...15



DN	L	D	s
2...15	20	21.3	2.6

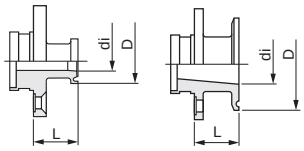
(dimensions for sanitary version identically)

Weld nipple DN 25



DN	L	D	di
25	30	33.7	26

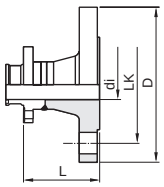
Tri-Clamp®
1.4404/316L
stainless steel



DN		L	D	di
2...8	1/2"	24	25	9.5
15	3/4"	24	25	16
2...8	1"	24	50.4	22.1
15	1"	24	50.4	22.1
25	1"	24	50.4	22.1

Flange
1.4404/316L stainless steel
with DIN 2501/ANSI B16.5/
JIS B2210 dimensions

DN 2...15:
with DN 15 or 1/2" flanges
DN 25:
with DN 25 or 1" flanges



DIN 2501, PN 40 flanges

DN	L	D	di	LK
2...15	52.5	95	17.3	65
25	52.5	115	28.5	85

ANSI B16.5 flanges

DN	Class 150				Class 300			
	L	D	LK	di	L	D	LK	
2...15	62.5	88.9	60.5	15.7	67.0	95.2	66.5	
25	68.3	108.0	79.2	26.7	74.7	123.9	88.9	

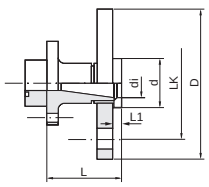
JIS B2210 flanges

DN	L	D	di	LK
2...15	62.5	95	16	70
25	62.5	115	25	90

face-to-face lengths (DIN) as per DVGW (200 mm)

Flange
PVDF with DIN 2501/ANSI B16.5/
JIS B2210 dimensions

DN 2...15:
with DN 15 or 1/2" flanges
DN 25:
with DN 25 or 1" flanges



DIN 2501/ANSI B16.5/JIS B2210 flanges
PN 16/Class 150/10K

DN	L	L1	D	d	di	LK DIN	LK ANSI	LK JIS	LK D
2...15	52.5	6	95	34	16.2	65	60	70	95
25	52.5	7	115	50	27.2	85	79	90	125

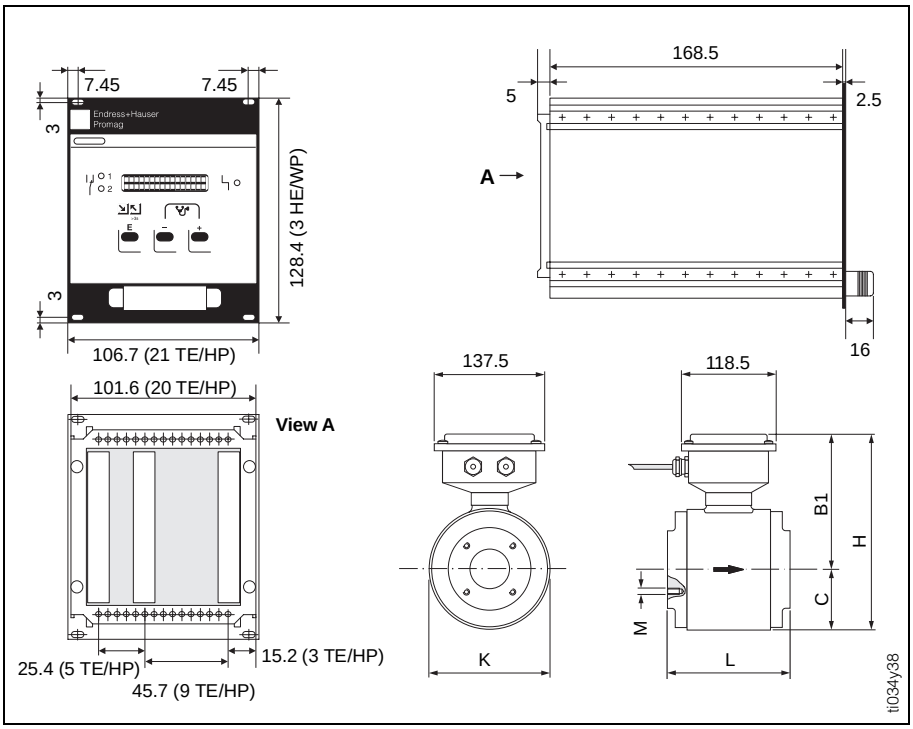
Length:
2 x L + 143 mm
2 x L + 95 mm (for flanged and Tri-Clamp® version)

y27-01..09

(all dimensions in mm)

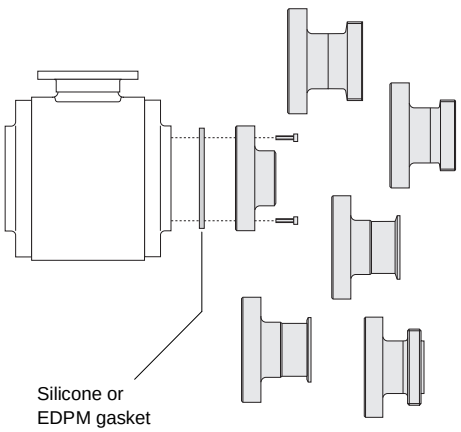
Dimensions

Promag 39 H
DN 25…100



DN		PN			L	C	K	H	B1	M	Weight
[mm]	[inch]	DIN [bar]	ANSI [lbs]	JIS	[mm]	[mm]	[mm]	[mm]	[mm]	(thread)	[kg]
25	1"	16	150	20K	140	64	128	222.5	158.5	M6	6.0
40	$1\frac{1}{2}$"	16	150	20K	140	64	128	222.5	158.5	M8	6.5
50	2"	16	150	10K	140	76.5	153	247.5	171	M8	9
65	–	16	–	10K	140	76.5	153	247.5	171	M8	9
80	3"	16	150	10K	200	101.5	203	297.5	196	M12	19
100	4"	16	150	10K	200	101.5	203	297.5	196	M12	18.5

Sensor
Promag H



Process connections

Weld nipples, Tri-Clamp®, DIN 11851, ISO 2852, ISO 2853 or SMS are fastened to the sensor with screws (already fitted when delivered).

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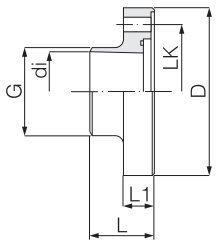
Process connections
Promag H

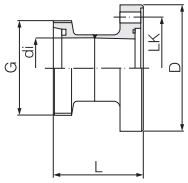
Process Connections
Promag H

Welded nipple



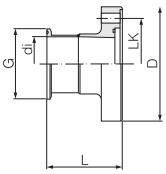
DN	D	G	di	L	L1	LK
25	75	27	22.6	42	19	56
25 DIN	79	31	26	42	19	60
40	92	40	35.3	42	19	71
40 DIN	92	43	38	42	19	71
50	105	55	48.1	42	19	83.5
50 DIN	105	55	50	42	19	83.5
65	121	66	59.9	42	21	100
65 DIN	121	72	66	42	21	100
80	147	79	72.6	42	24	121
80 DIN	147	87	81	42	24	121
100	168	104	97.5	42	24	141.5
100 DIN	168	106	100	42	24	141.5

DIN 11851



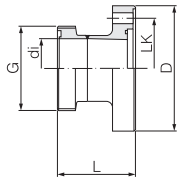
DN	di	G	D	L	LK
25	26.0	52×⅙"	79.0	68	56
40	38.0	65×⅙"	92.0	72	71
50	50.0	78×⅙"	105.0	74	83.5
65	66.0	95×⅙"	121.0	78	100
80	81.0	110×¼"	147.0	83	121
100	100.0	130×¼"	168.0	92	141.5

Tri-Clamp®



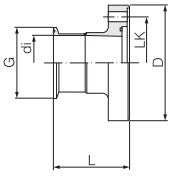
DN	di	G	D	L	LK
25	22.1	50.4	75.0	68.6	56
40	34.8	50.4	92.0	68.6	71
50	47.5	63.9	105.0	68.6	83.5
65	60.2	77.4	121.0	68.6	100
80	72.9	90.9	147.0	68.6	121
100	97.4	118.9	168.0	68.6	141.5

SMS 1145



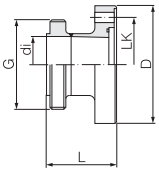
DN	di	G	D	L	LK
25	22.5	40×⅙"	75.0	60	56
40	35.5	60×⅙"	92.0	63	71
50	48.5	70×⅙"	105.0	65	83.5
65	60.5	85×⅙"	121.0	70	100
80	72.0	98×⅙"	147.0	75	121
100	97.6	132×⅙"	168.0	70	141.5

ISO 2852



DN	di	G	D	L	LK
25	22.6	50.5	75.0	68.50	56
40	35.6	50.5	92.0	68.50	71
50	48.6	64.0	105.0	68.50	83.5
65	60.3	77.5	121.0	68.50	100
80	72.9	91.0	147.0	68.50	121
100	97.6	119.0	168.0	68.50	141.5

ISO 2853



DN	di	G	D	L	LK
25	22.6	52×⅙"	75.0	61.50	56
40	35.6	65×⅙"	92.0	61.50	71
50	48.6	78×⅙"	105.0	61.50	83.5
65	60.3	95×⅙"	121.0	61.50	100
80	72.9	110×¼"	147.0	61.50	121
100	97.6	130×¼"	168.0	61.50	141.5

Face-to-face lengths:
DN 25… 65 → 2 × L + 136 mm
DN 80…100 → 2 × L + 196 mm

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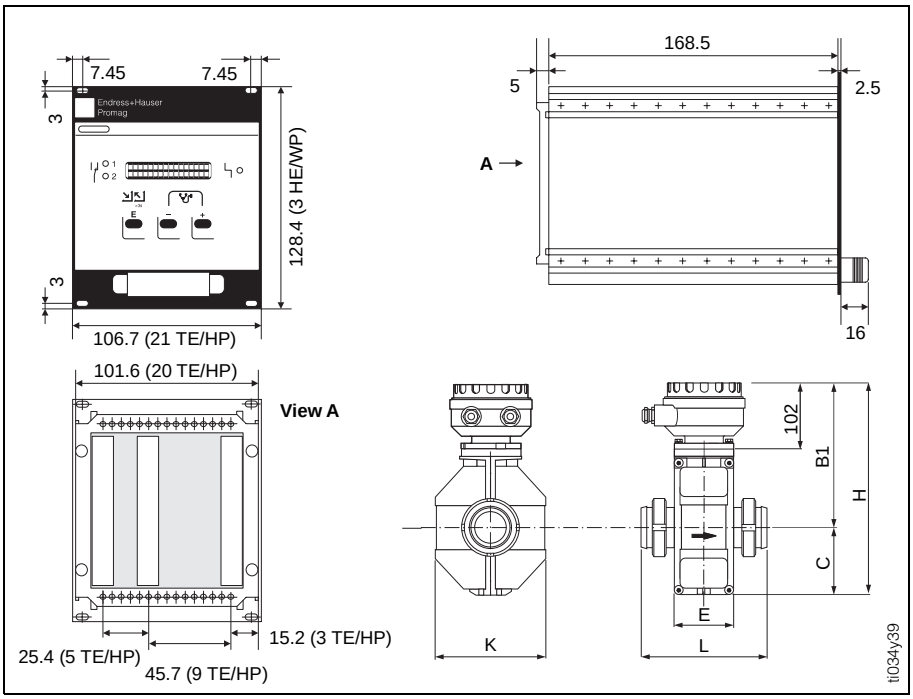
Dimensions

Promag 39 F
DIN 11851 Coupling
DN 15…100

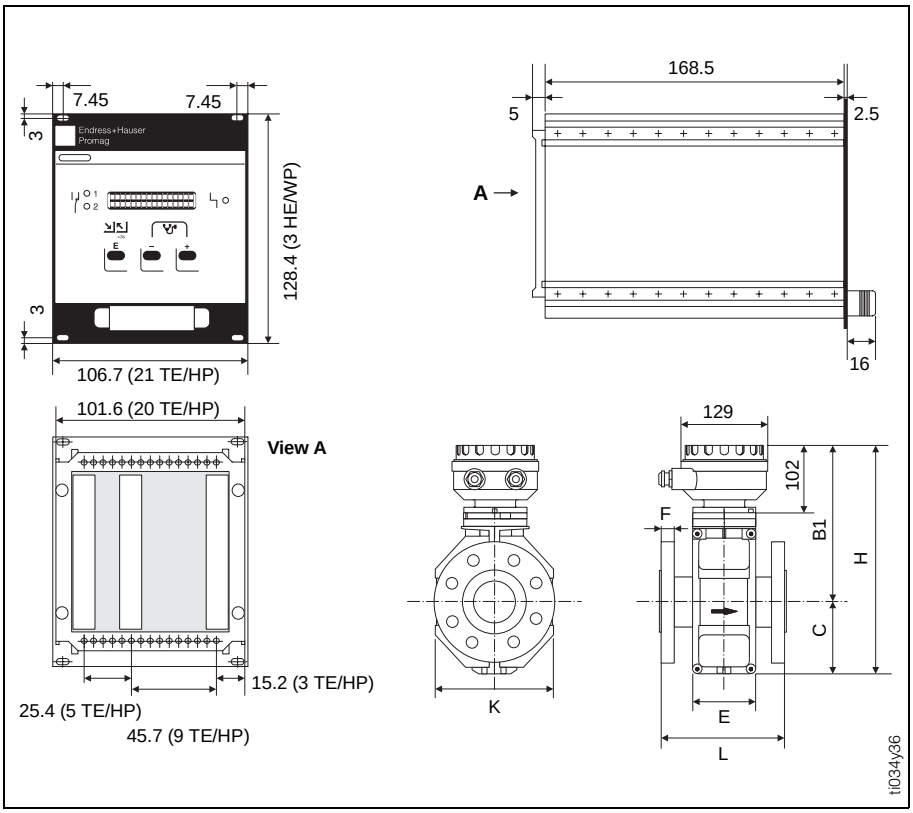


DN [mm]	L [mm]	B1 [mm]	C [mm]	K [mm]	E [mm]	H [mm]	Weight PN10/ANSI [kg]
15	200	202	84	120	94	286	4.1
25	200	202	84	120	94	286	4.7
32	200	202	84	120	94	286	4.7
40	200	202	84	120	94	286	7.0
50	200	202	84	120	94	286	8.2
65	200	227	109	180	94	336	9.5
80	200	227	109	180	94	336	11.5
100	250	227	109	180	94	336	13.5

Weight
Promag 39 transmitter: 1 kg
Promag F sensor (DIN 11851): see table above

Dimensions

Promag 39 F
DN 15…300



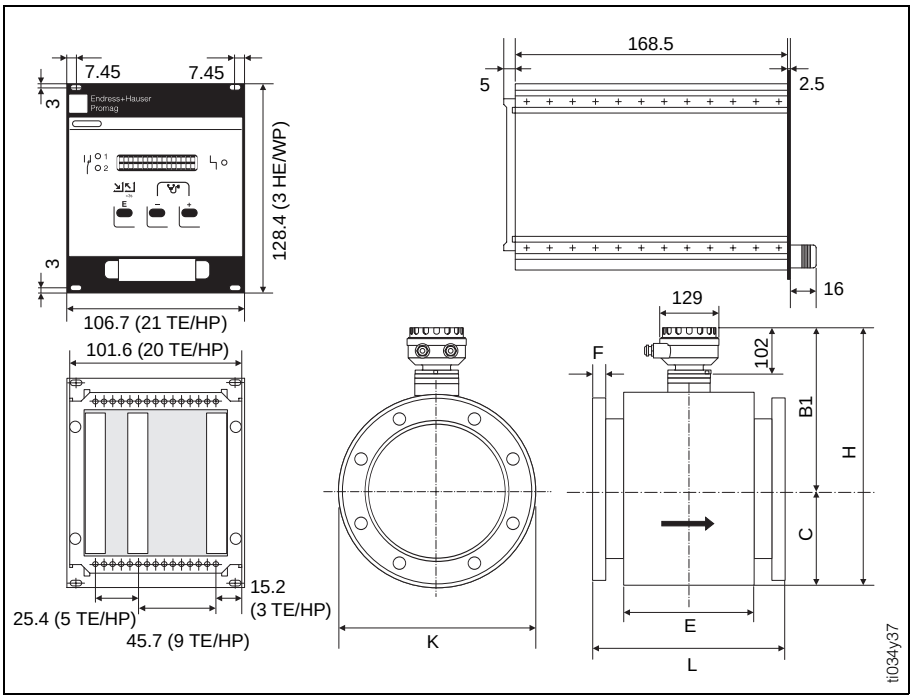
DN		PN			L[1]	C	D	E	F		H	B1	Weight[2]
		DIN	ANSI	JIS					DIN	ANSI			
[mm]	[inch]	[bar]	[lbs]		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	½"	40	150	20K	200	84	120	94	14	11.2	286	202	4.3
25	1"	40	150	20K	200	84	120	94	16	14.2	286	202	5.3
32	–	40	–	20K	200	84	120	94	18	–	286	202	6.0
40	1½"	40	150	20K	200	84	120	94	18	17.5	286	202	7.4
50	2"	40	150	10K	200	84	120	94	20	19.1	286	202	8.6
65	–	16	–	10K	200	109	180	94	18	–	336	227	10.0
80	3"	16	150	10K	200	109	180	94	20	23.9	336	227	12.0
100	4"	16	150	10K	250	109	180	94	22	23.9	336	227	14.0
125	–	16	–	10K	250	150	260	140	24	–	417	267	19.5
150	6"	16	150	10K	300	150	260	140	24	25.4	417	267	23.5
200	8"	10	150	10K	350	180	324	156	26	28.4	472	292	33.3
250	10"	10	150	10K	450	205	400	166	28	30.2	522	317	46.5
300	12"	10	150	10K	500	230	460	166	28	31.8	572	342	55.5

[1] The face-to-face length is independent of the pressure rating.
[2] for compact version

Weight
Promag 39 transmitter: 1 kg
Promag F sensor: see table above

Dimensions

Promag 39 F
DN 350…2000



DN		PN			L[1]	C	K	E	F			H	B1	Weight[2]	Weight
[mm]	[inch]	DIN [bar]	ANSI [lbs]	AWWA [Class]	[mm]	[mm]	[mm]	[mm]	DIN [mm]	ANSI [mm]	AWWA [mm]	[mm]	[mm]	PN10/ ANSI [kg]	PN 6 [kg]
350	14"	10	150	–	550	282	564	276	26	34.9	–	683.5	401.5	110	–
400	16"	10	150	–	600	308	616	276	26	36.5	–	735.5	427.5	130	–
450	18"	–	150	–	650	333	666	292	–	39.7	–	785.5	452.5	240	–
500	20"	10	150	–	650	358.5	717	292	28	42.9	–	836.5	478.0	170	–
600	24"	10	150	–	780	410.5	821	402	28	47.6	–	940.5	530.0	230	–
700	28"	10	–	D	910	512	1024	589	30	–	33.3	1143.5	631.5	350	–
750	30"	–	–	D	975	512	1024	626	–	–	34.9	1143.5	631.5	450	–
800	32"	10	–	D	1040	533.5	1067	647	32	–	38.1	1186.5	653.0	450	–
900	36"	10	–	D	1170	610	1220	785	34	–	41.3	1339.5	729.5	600	–
1000	40"	10	–	D	1300	686	1372	862	34	–	41.3	1491.5	805.5	720	–
1050	42"	–	–	D	1365	712	1424	912	–	–	44.5	1543.5	831.5	1050	–
1200	48"	6	–	D	1560	811	1622	992	28	–	44.5	1741.5	930.5	1200	900
1350	54"	–	–	D	1755	912	1824	1252	–	–	54.0	1943.5	1031.5	2150	–
1400	-	6	–	–	1820	987	1974	1252	32	–	–	2093.5	1106.5	1800	1450
1500	60"	–	–	D	1950	1011	2022	1392	–	–	57.2	2141.5	1130.5	2600	–
1600	-	6	–	–	2080	1056	2112	1482	34	–	–	2231.5	1175.5	2500	1800
1650	66"	–	–	D	2145	1093	2186	1482	–	–	63.5	2305.5	1212.5	3700	–
1800	72"	6	–	D	2340	1188	2376	1632	36	–	66.7	2495.5	1307.5	3300	2500
2000	78"	6	–	D	2600	1238	2476	1732	38	–	69.9	2595.5	1357.5	4100	3100

[1] Thickness of the flange face includes sealing strip. The face to face length is independent of the pressure rating.
[2] Weight for compact version DIN PN 10. If DIN version is not available, then ANSI or AWWA compact version.

Weight
Promag 39 transmitter: 1 kg
Promag F sensor: see table above

Temperature Ranges Promag 39 F

Temperature ranges of the sensor
The maximum permissible ambient and medium temperatures must be complied with in all cases. When installed outdoors, a waterproof hood should be provided to protect against direct solar radiation and increase the operational life of the instruments.

Promag A
Ambient temperature: –20…+ 60 °C
Medium temperature: –20…+130 °C PFA

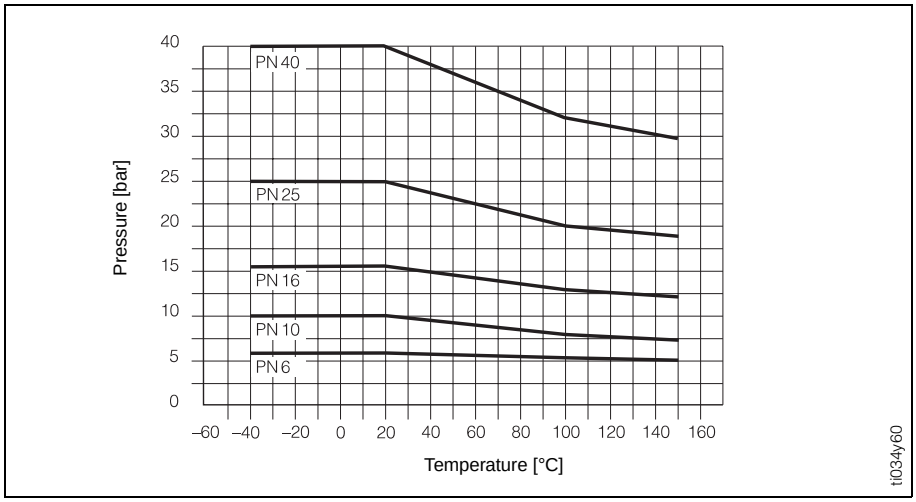
Promag H
Ambient temperature: –20…+ 60 °C
Medium temperature: –20…+150 °C PFA
–20…+130 °C (with EPDM gasket)

Promag F
Ambient temperature: –20…+ 60 °C
Medium temperature: –40…+130 °C PTFE (Teflon)
–20…+120 °C soft rubber (EPDM)
0…+ 80 °C hard rubber

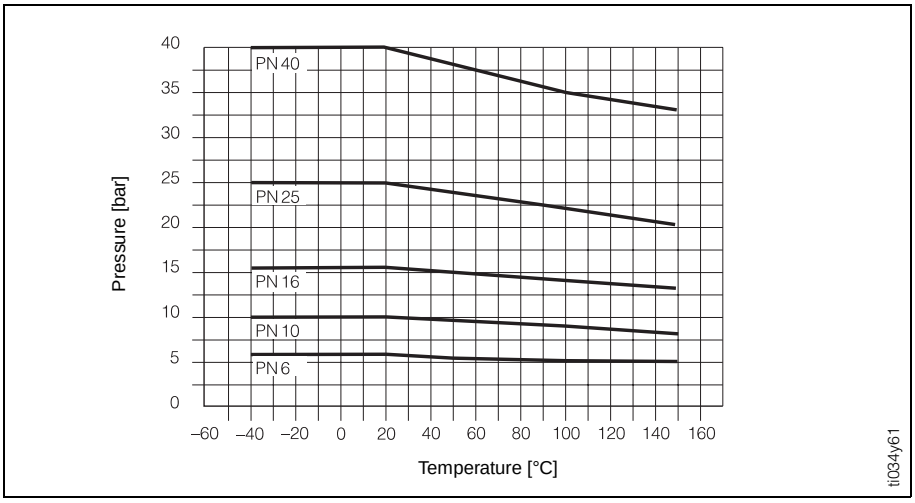
Temperature ranges of the transmitter Promag 39
Ambient temperature: –20…+50 °C
Medium temperature: 0…+50 °C

Load Diagrams Promag F

Pressure limitations due to fluid temperature (DIN 2413 and 2505)
Flange material: steel 37.2

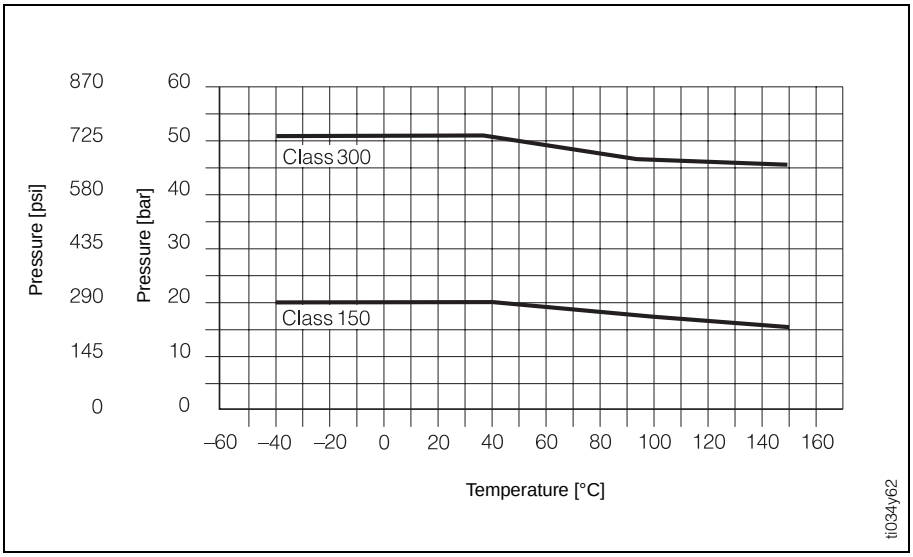


Pressure limitations due to fluid temperature (DIN 2413 and 2505)
Flange material: stainless steel 1.4571

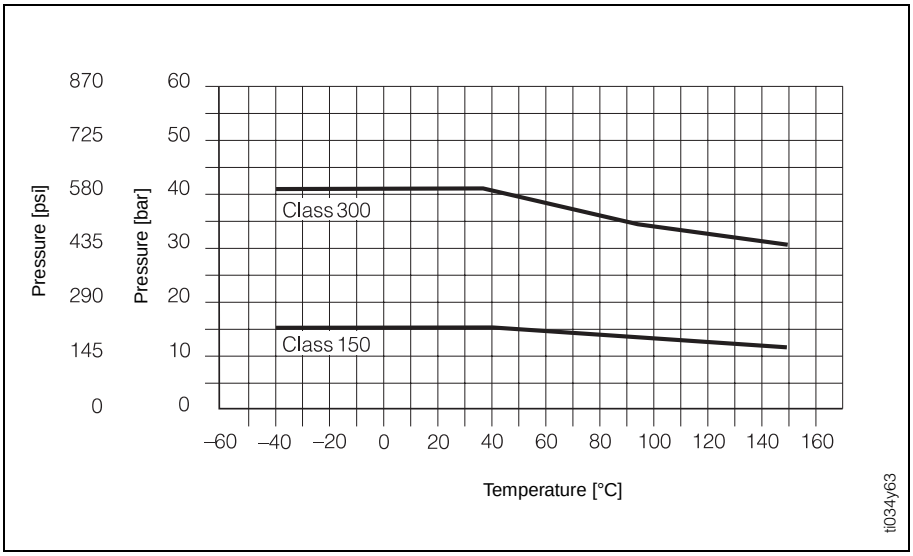


Load Diagrams Promag F

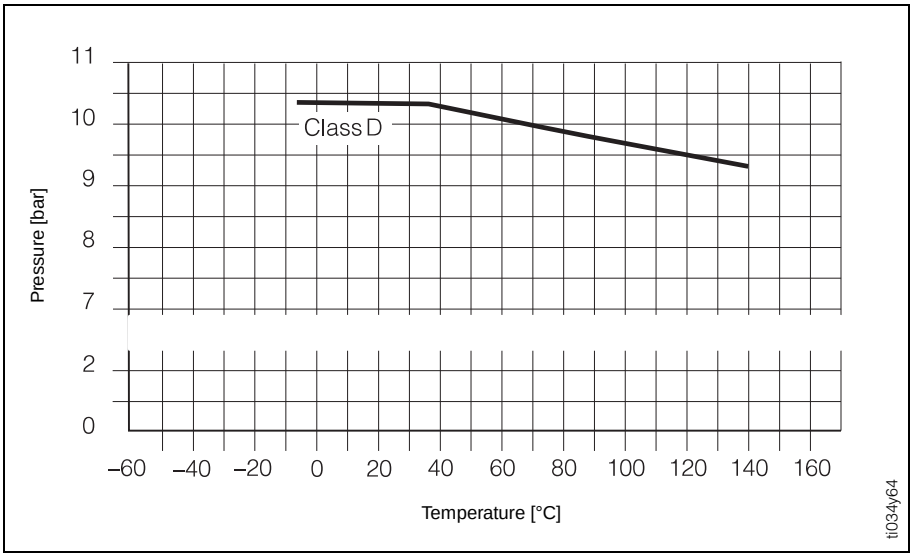
Pressure limitations due to fluid temperature (ANSI B16.5)
Flange material: steel A 105



Pressure limitations due to fluid temperature (ANSI B16.5)
Flange material: steel 316L

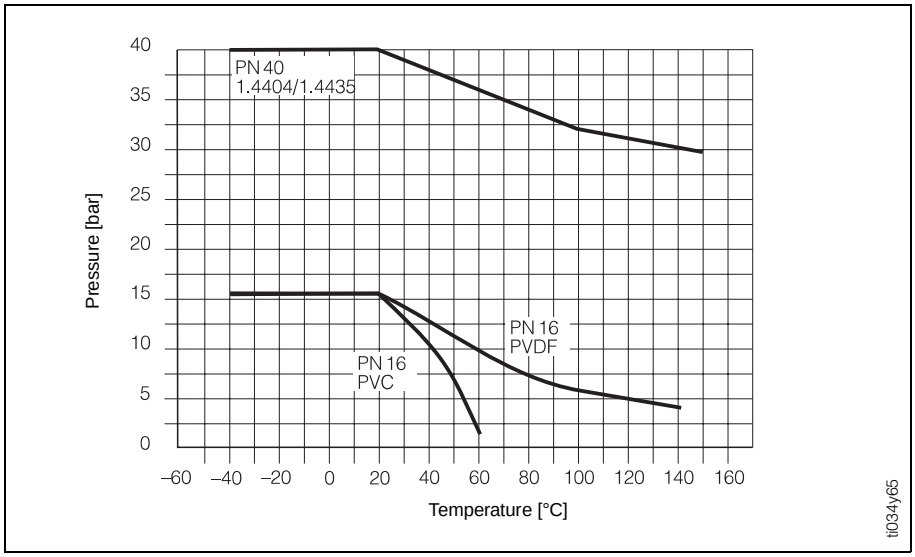


Pressure limitations due to fluid temperature (AWWA C207, Class D)
Flange material: steel A 105



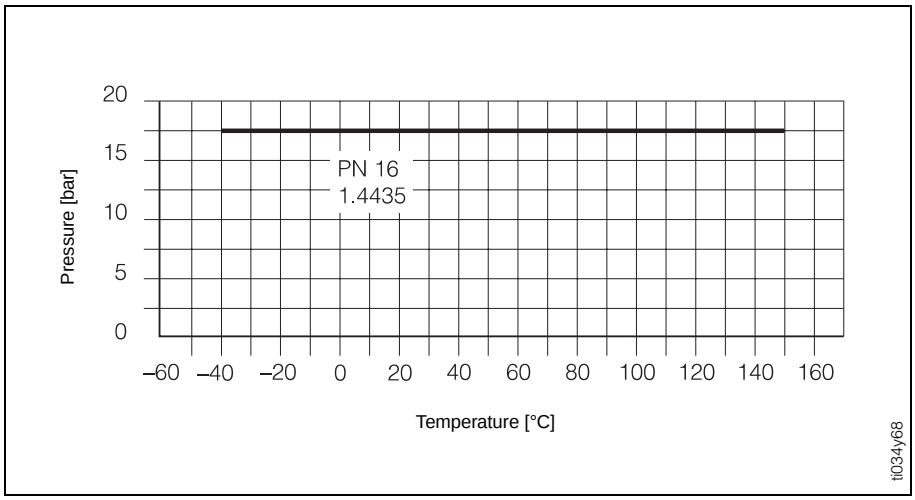
Promag A

Pressure limitations due to fluid temperature
Flange material: steel 1.4404/1.4435, PVDF, PVC



Promag H

Pressure limitations due to fluid temperature
Flange material: steel 1.4435



Technical Data
Measuring Sensor

	Promag A	Promag H	Promag F
Nominal diameter	DN 2, 4, 8, 15, 25	DN 25…100	DN 15…2000
Nominal pressure	PN 40	PN 16	DIN: PN 6 (DN 1200…2000) PN 10 (DN 200…1000) PN 16 (DN 65…150) PN 40 (DN 15…50) PN 16/25 (DN 200…300), option PN 40 (DN 65…100), opt. ANSI: Class 150 (½…24") Class 300 (½…6"), option AWWA: Class D (28…48") JIS: 10K (DN 50…300) 20K (DN 15…40) 20K (DN 50…300), option
Process connection	internal and external thread, PVC adhesive coupling, hose connection, welded nipples for pipelines according to DIN 11850, Tri-Clamp®, flange connection (DIN, ANSI, JIS)	Welded nipples for OD-tube, SMS, JIS, ISO and DIN 11850 piping, DIN 11851 coupling, SMS coupling, ISO 2853 coupling, Tri-clamp® connection, ISO connection	flange connection (DIN, ANSI, JIS) milk coupling to DIN 11851 (DN 15…100)
Flange material	DIN: stainless steel 1.4404 PVDF ANSI: 316L; PVDF JIS: SUS 316L; PCDF Threaded stubs: 1.4435; PVC	1.4435 / 316L	DIN: St. 37.2, 1.4571 stainless steel ANSI: A 105, 316L AWWA: A 105, A 36 JIS: S20C, SUS 316L
Fluid temperature range (lining)	–20…+130 °C PFA	–20…+150 °C PFA –20…+130 °C (with EPDM gasket)	DN 15…600: –40…+130 °C PTFE DN 25…2000: –20…+120 °C soft rubber DN 65…2000: 0…+80 °C hard rubber
Ambient temperature range	–20…+60 °C	–20...+60 °C	–20…+60 °C
Electrode material	1.4435, Platinum/Rhodium 80/20, Titanium, Hastelloy C-22, Tantalum	1.4435	1.4435, Platinum/Rhodium 80/20, Hastelloy C-22, Tantalum
Electrodes fitted	Measuring and reference electrodes	Measuring and empty pipe detection electrodes	DN 15…2000: measuring, reference and EPD electrodes (standard for 1.4435 and Hastelloy C-22)
Minimum conductivity	5 µS/cm	5 µS/cm	5 µS/cm
Gasket material	Viton Kalrez (option) Silicone (aseptic version)	EPDM, Silicone	–
Housing material	1.4435 incl. threaded stub (see also page 15)	1.4301	DN 15…300: powder-coated die-cast aluminium DN 350...2000: varnished steel
Protection type	IP 67 (IP 68 option) NEMA 4X; (NEMA 6P for option)	IP 67 NEMA 4X	IP 67 (IP 68 option) NEMA 4X; (NEMA 6P for option)
CIP-suitable	yes (see also max. temp.)	yes (see also max. temp.)	yes (see also max. temp.)
SIP-suitable	–	yes (see also max. temp.)	–
Power supply	the sensor is supplied by the transmitter		
Explosion-protected version	Ex-zone 2 acc. to VDE 0165 CENELEC: sensor for Ex-zone 1, transmitter Ex-zone 2	Ex-zone 2 acc. to VDE 0165 FM/CSA: Class I, Div. 2	CENELEC: EEx d/de; Ex-zone 2 acc. to VDE 0165 FM/CSA: Class I, Div. 1 FM/CSA: Class I, Div. 2
Approvals	–	3A approval EHEDG-tested	–
Cable entries	PG 11 cable glands (5…12 mm)	PG 13.5 cable glands (5…15 mm)	PG 13.5 cable glands (5…15 mm)

Technical Data Transmitter

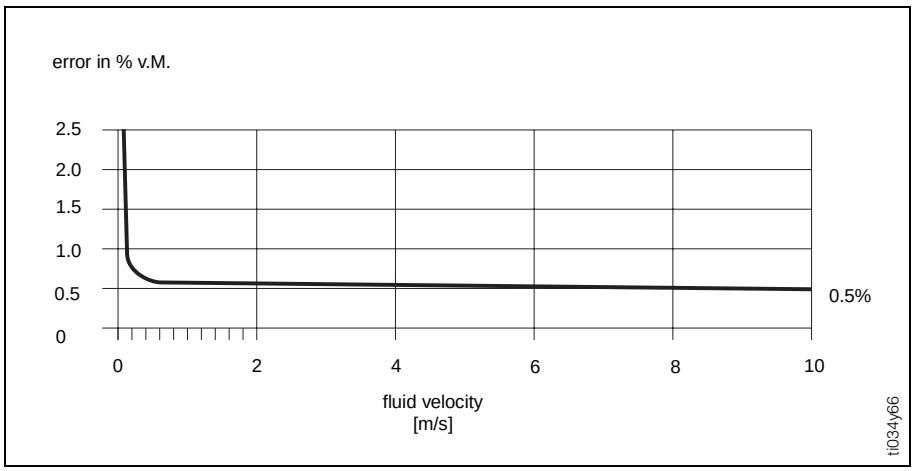
Promag 39 transmitter / measuring system

Housing	19" rack cassette 21 TE (128×106×196)
Protection type	IP 20
Ambient temperature	operation: –25…+50 °C display: 0…+50 °C
Resistance to shock and vibration	acceleration up to 2 g/2 h per day; 10…100 Hz (complete measuring system)
Cable entries	spring contact DIN 41612 F 48
Power supply	85…260 V AC, 45…65 Hz 20…55 V AC, 16…62 V DC power supply failure: bridging at least 1 main cycle (22 ms)
Power consumption	AC: <15 VA (incl. sensor) DC: <15 W (incl. sensor)
Electrical isolation	input and outputs galvanically isolated from the supply, from the sensor and one another
Full-scale value scaling	0.3…10 m/s
Current output	0/4…20 mA adjustable, galvanically isolated, R_L <700 Ω (with HART at least 250 Ω) time constant can be chosen, scaleable full-scale value, temperature coefficient typically: 0.005% o.r./°C
Pulse/frequency output	choice of active/passive, galvanically isolated, active: 24 V DC, 25 mA (250 mA for 20 ms), R_L >100 Ω passive: open collector, 30 V DC, 25 mA (250 mA for 20 ms) frequency output: f_{End} = selectable to 10 kHz, pulse/pause ratio 1:1, pulse width max. 2 s pulse output: choice of value per pulse, pulse polarity selectable, pulse width adjustable (50 ms…2 s); above a frequency of 1/(2× pulse width) the pulse/pause ratio is 1:1.
Error output	relay 1, NC and NO contact available, max. 250 V AC/30 V DC, max. 1 A, galvanically isolated, programmable for error, limit value 1, exceeding measure range (v ≥12.5 m/s), dual range mode, batching or direction of flow
Status output	relay 2, NC and NO contact available, max. 250 V AC/30 V DC, max. 1 A, galvanically isolated, programmable for limit value 2, exceeding measuring range (v ≥12.5 m/s), dual range mode, batching or direction of flow
Communication	RS 485 interface (Rackbus protocol) or Rackbus (Rackbus protocol) and SMART (HART protocol via current output)
Data backup on power failure	EEPROM saves data of measuring system (without battery required) in the event of a power failure
Display	LCD, two lines (16 characters each).
Compatibility with interference (EMC)	according to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2, and NAMUR recommendations (complete measuring system)
Explosion-protected version	CENELEC: Sensor Ex zone 1 or 2; Transmitter Ex zone 2 acc. to VDE 0165

Error Limits

Measuring uncertainty under reference conditions

Pulse output	±0.5% o.r. ±0.01% o.f.s. (f.s. = 10 m/s)
Current output	plus typ. ±5 µA
Repeatability	±0.1% o.r. ±0.005% o.f.s.
Power supply	within the specified range, supply fluctuations have no influence



Reference conditions (DIN 19200 and VDI/VDE 2641)

Medium temperature	+28 °C ±2 K
Ambient temperature	+22 °C ±2 K
Warmup time	30 minutes
Installation at reference conditions	inlet lengths >10 × DN outlet lengths >5 × DN The sensor and transmitter are grounded. The sensor is centred in the piping.

Supplementary Documentation

☐ Promag 30 Technical Information	TI 026D/06/e
☐ Promag 33 Technical Information	TI 027D/06/e
☐ Promag 35 Technical Information	TI 035D/06/e
☐ Promag 30 Operating Manual	BA 008D/06/e
☐ Promag 33 Operating Manual	BA 009D/06/e
☐ Promag 35 Operating Manual	BA 021D/06/e
☐ Promag 39 Operating Manual	BA 024D/06/e
☐ Promag System Information	SI 010D/06/e
☐ Promag 30/33 Ex documentation CENELEC	EX 001D/06/A2
☐ Promag 30/33 Ex documentation SEV	EX 004D/06/C2
☐ Promag 30/33 Ex documentation FM	EX 006D/06/A2

Subject to modification

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