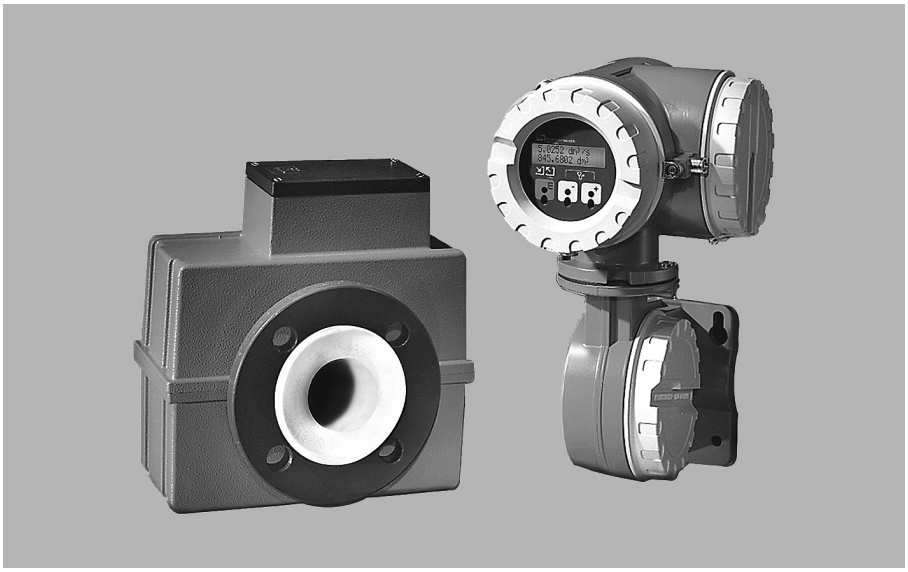
Technical
Information
TI 035D/06/en
No. 50075884

Electromagnetic Flow Measuring System *promag 35*



Applications
Promag 35 S solves complex flow problems and is used to measure
- fluids with a high solids content, e.g. slushed pulp with a solids content of up to 15%, yoghurt with pieces of fruit,
- highly abrasive fluids, e.g. ore slurries, coal washings and
- low-conductive fluids.

High operating safety
- Guaranteed zero-point stability
- High electromagnetic compatibility (EMC)
- Self-monitoring function, combined diagnostic and alarm function
- Guaranteed quality, ISO 9001 certified
- EEPROM protects data (without back-up battery) in case of supply failure
- High corrosion resistance assured by the use of Hastelloy C-22 as electrode material
- Top measuring reliability assured by a full set of electrodes (measuring, reference, and EPD electrodes)

Accurate measurement
- Measuring deviation ±0.5% or ±0.2%
- Measuring range 1000:1
- Excellent repeatability
- Rackbus RS 485, HART® or PROFIBUS

Simple configuration
- Menu-driven operation
- Touch control: operation from outside without tools
- Two-line, illuminated display

Universal installation
- Robust, shock-resistant aluminium housing, resistant to acids and caustics
- Type of protection: IP 65 for remote and compact version
- Nominal diameter range DN 15…600
- Flange version

Endress+Hauser
Nothing beats know-how

Measuring System

Areas of application
The Promag 35 S measuring system is used whenever the electromagnetic flowmeter has to meet high requirements.
It is particularly suitable for fluids with a high solids content, high abrasiveness, and a highly inhomogeneous distribution of additives and chemicals, etc.
Most fluids with a minimum conductivity of ≥ 1 µS/cm can be measured. Demineralised waters with a minimum conductivity of ≥ 20 µS/cm can be measured.
For difficult-to-measure fluids, Promag 35 S is mainly used for the following applications:

Modular design
The Promag 35 S measuring system is based on a modular design – mechanically as well as electronically. An expansion of the measuring installation is possible based on an exchange of electronic modules.

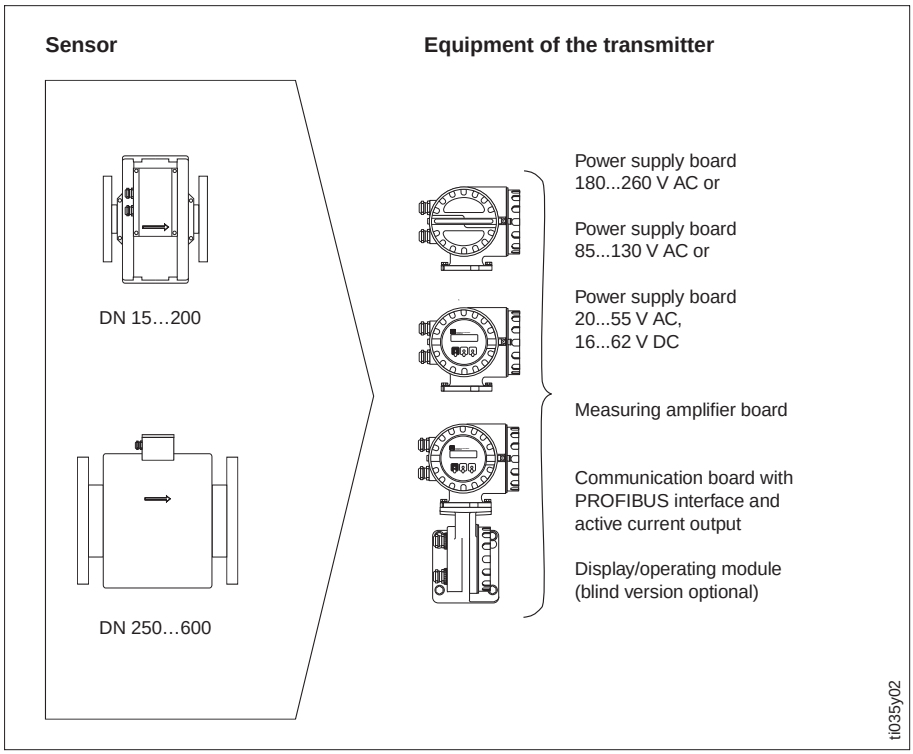
The measuring device can be delivered as a compact or remote version:
- Compact version: Sensor and transmitter form one mechanical unit.
- Remote version: The transmitter is mounted separately from the sensor.

Pulp and paper industry	• Pulp with a solids content of up to 15% • Cellulose • Additives/chemicals
Mining industry	• Ore slurries • Coal washings
Cement industry	• Cement, concrete, pastes
Food industry	• Yoghurt with pieces of fruit • Fruit mash
Wastewater industry	• Slurries of up to 30% dry solids

Promag S sensor

Nominal diameter:	DN 15...600 (1...24")
Process connection:	flanges DIN, ANSI, JIS
Lining:	PTFE, soft and hard rubber; (NR, PU etc. on request)

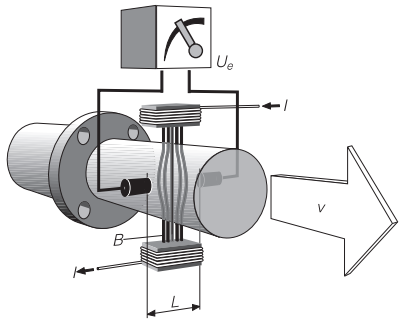
Promag 35 transmitter
- Operating menu with illuminated two-line display and three optical operating elements (touch control).
- All inputs and outputs are galvanically isolated from the supply, the measuring circuit, and from each other.
- Simple and safe exchange of the transmitter as the sensor data is stored in a plug-type DAT component (EEPROM).



Function

The measuring principle

According to Faraday's law, a voltage is induced in a conductor moving in a magnetic field.
For the respective magnetic-inductive measuring principle, the flowing electrically conductive liquid corresponds to the moving conductor. The voltage thus induced is proportional to the flow rate and is fed to the measuring amplifier by two measuring electrodes. Flow volume calculations are based on the pipe diameter.
The direct-current magnetic field is generated by a switched direct current of alternating polarity. Along with the patented "integrating auto-zero circuit", this guarantees a stable zero point and renders the measurement independent of the measured liquid and indifferent to the entrained solids.
Each device is calibrated at the factory on state-of-the-art calibration facilities based on international standards.
No adjustment to changing fluids is necessary.



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

U_e = induced voltage
B = magnetic induction (magnetic field)
L = distance between electrodes
v = flow velocity
Q = volume flow
A = pipe cross-section

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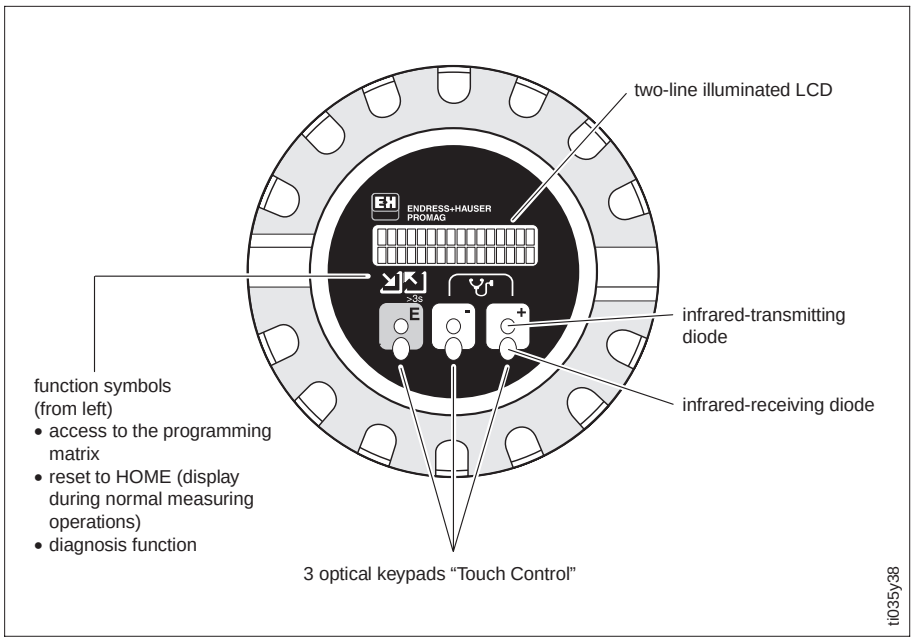
Operation

The Promag 35 transmitter is equipped with an illuminated two-line LCD.
Parameterisation is menu-driven and, therefore, very simple.
Three operating controls allow you to access and change all functions in the operating matrix, e.g.:

- measuring units
- current output functions
- totaliser functions
- pulse/frequency output functions
- relay functions
- limit values
- batching function with integrated pre-selection counter
- display parameters
- creep suppression
- empty pipe detection (EPD)
- unidirectional and bidirectional measurements
- auxiliary input (batching, totaliser reset, dual range measurement, measured-value suppression MVS).

You may select any of the 12 available display languages and use the auxiliary (diagnosis) function during parameterisation.



Front view of Promag 35: display and operating elements

Function

1000:1 operable flow range
The Promag 35 measuring amplifier has a very large measuring range of more than 1000:1. It measures rates of 0 m/s to more than 10 m/s at the specified measuring accuracy.
In case of pulsing flow conditions, the amplifier will not be overdriven even above the set limit and up to peak velocities of up to 12.5 m/s. Thus, there is no corruption of measured values provided the outputs are not overloaded.

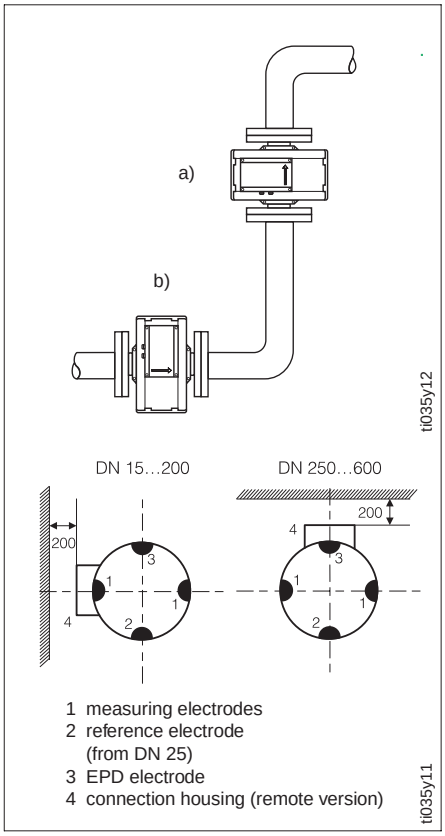
Communication
The Promag 35 can communicate with higher level control systems using an application-specific interface:
- Direct communication with personal computers and the E+H Rackbus environment (Modbus, Profibus, Fipbus) is possible via a Rackbus RS 485 interface.
- The current output is available for the HART protocol using SMART technology.
- Promag 35 is also available as PROFIBUS version for direct connection to process control systems via segment couplers.

Remote operation using these interfaces can also be carried out with the E+H programm “Commuwin II”. Detailed information on this is available from your local E+H Sales Centre.

Operational security
- An extensive self-monitoring function assures a high level of operational reliability. Any malfunctions are reported via the alarm output.
- In case of a power supply failure, all measuring-system data are safely stored in the EEPROM (without back-up battery).
- The Promag 35 S measuring system fulfils the safety requirements acc. to EN 61010 and all general requirements for electromagnetic compatibility (EMC) acc. to EN 50081 Parts 1 and 2 / EN 50082 Parts 1 and 2, as well as the respective NAMUR recommendations.
- Hastelloy C-22 and other electrode materials are used to assure high corrosion resistance.
- A constant reference to the fluid (reference electrode) as well as an integrated empty-pipe detection (EPD) function help avoid measuring errors and assure highly reliable measurements.

Installation

Please note the following mounting instructions to ensure correct measurements and avoid damage to the measuring installation.

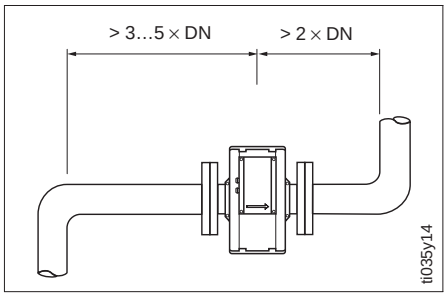


Mounting position (as preferred)

a) Vertical position:
Optimum position for upward flow direction. Entrained solids will sink. Fatty particles will rise out of range of the measuring electrodes if the fluid stops flowing.
For the *separate version*, the PGs are always pointing downward (inlet side).

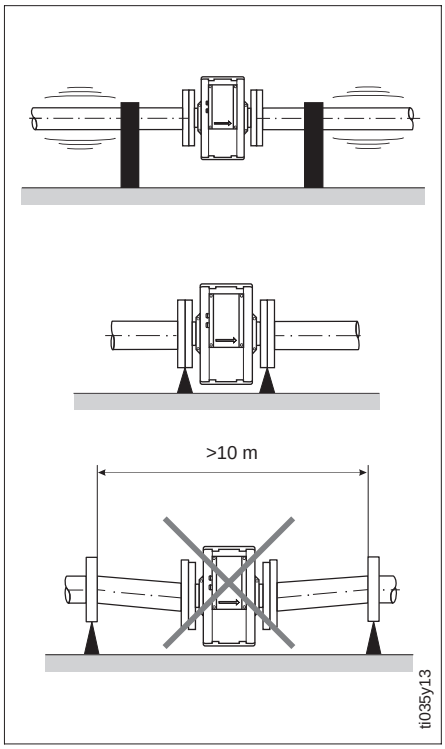
b) Horizontal position:
The electrode axis has to be horizontal. Any brief isolation of the electrodes due to entrained air bubbles is avoided.
For the *compact version*, transmitter PGs have to be either oriented downwards or laterally, independent of the mounting position.

Position of the electrode axis:
The position of the electrode axis is based on the nominal diameter and has to be respected.



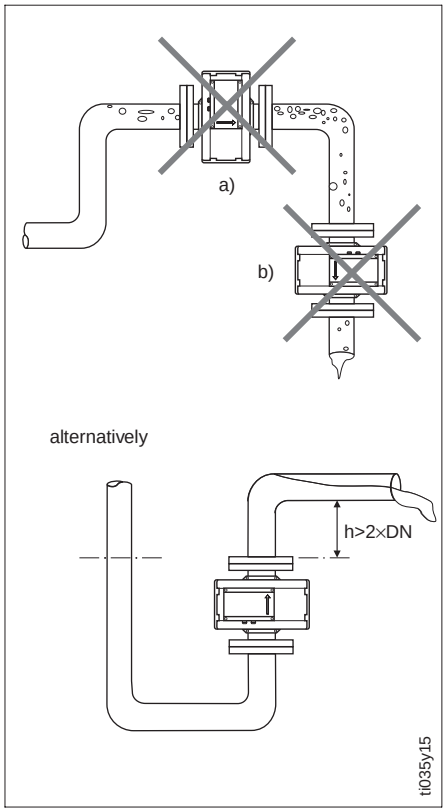
Inlet and outlet runs
If possible, the sensor is to be mounted in front of any fittings causing turbulences such as valves, elbows, T-pieces, etc.

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



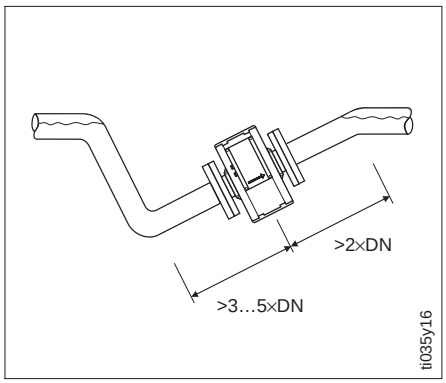
Vibration
- Fix pipe in front and behind of the sensor.
- Excessive vibration necessitates a separate mounting of sensor and transmitter.
- With free runs of piping over 10 m long, mechanical supports are recommended to minimise external forces.

Installation



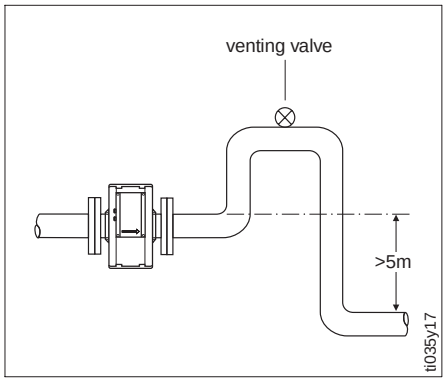
Mounting location
Accurate measurements are only possible provided pipes are filled. Therefore, the following installation sites have to be avoided:

a) No installation at the highest point (accumulation of air).
b) No installation immediately in front of a free pipe outlet in a downward pipe. However the alternative installation shown allows such an installation site.

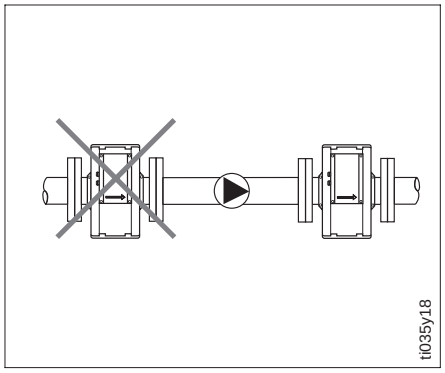


Partially filled pipes
Use a siphon-type installation in case of gradients. Do not mount sensors at the lowest point (solids may accumulate). An EPD device already integrated into the measuring pipe, depending on the electrode material, offers additional safety in such cases.

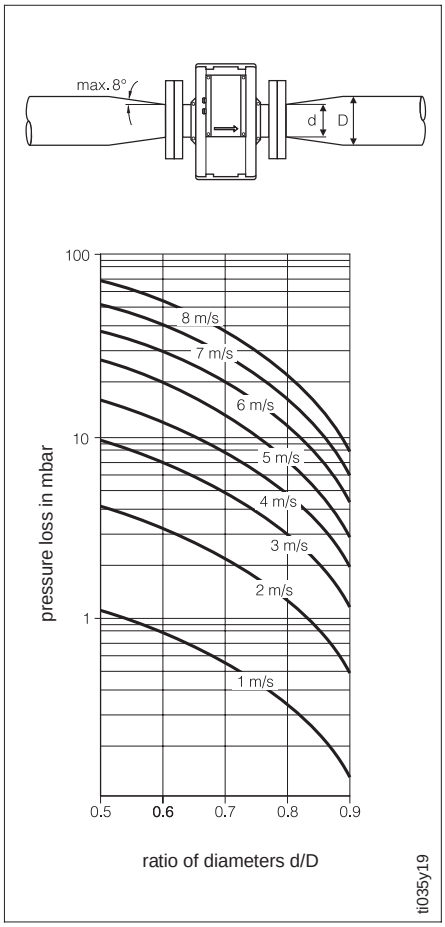
Here, too, inlet and outlet pipe runs are to be respected.



Downward pipe
If installed as shown on the right (siphon, ventilating valve behind the sensor), even a downward pipe >5 m will not cause a partial vacuum.



Installation of pumps
Do not install sensor on the inlet side of the pumps, as a vacuum might be created.



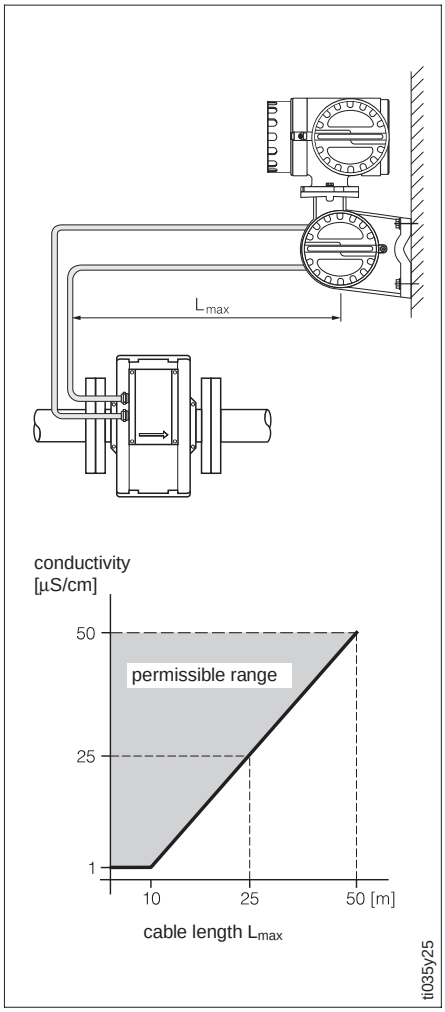
Adapters

The sensor may be installed in pipes with a larger diameter thanks to adapters (reducers and expanders) acc. to DIN 28545. The resulting increase of the flow rate also increases measuring accuracy in case of sluggishly flowing liquids.

The nomogram shown on the left helps determine the resulting decrease of pressure.

Procedure:
1. Determine diameter ratio d/D.
2. Read out the pressure drop depending on the flow rate and the d/D ratio from the nomogram.

Note:
The nomogram is applicable to fluids with a water-type viscosity.



Mounting of remote version

- The overall conductor resistance ($R_{cu\ max}$) of the coil-loaded cable has to be ≤2.5 Ω, also for cable lengths >50 m.
  With the coil-loaded cable available from E+H, the maximum admissible distance is L_{max} = 50 m between sensor and transmitter.
- The admissible cable length of L_{max} between sensor and transmitter at a distance of ≥10 m is determined by the fluid conductivity.
- Fix cable duct or install in armoured conduits. If fluid conductivity is very low, cable movements will affect the cable capacities and thus the measured signal.
- Do not install cables close to electrical machines or circuit elements.
- Assure potential equalisation between sensor and transmitter.

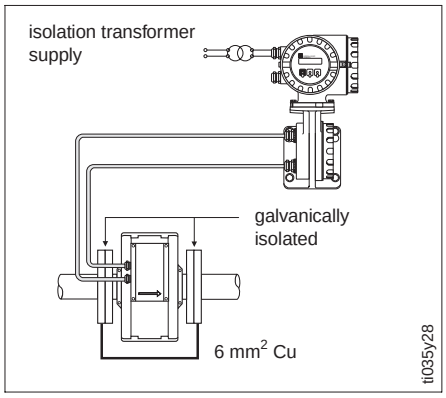
Please note the cable specifications listed on page 12.

Grounding

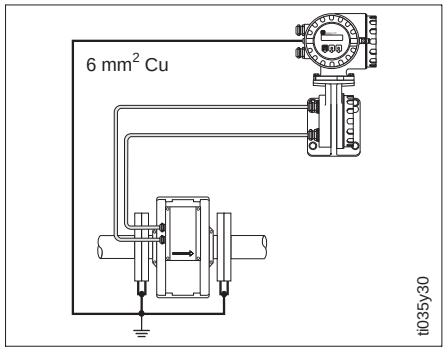
Potential equalisation
The sensor and the fluid have to have a more or less equal potential to assure accurate measurement and to avoid galvanic corrosion damage to the electrodes.
As a rule, the reference electrode integrated in the sensor or the metal pipe assures the necessary potential equalisation. If a reference electrode is present and for fluids flowing in grounded metal pipes, it is, therefore, sufficient to connect the earth terminal of the Promag 35 transmitter to the potential equalisation.

Depending on the electrode material, the Promag S sensor is already equipped with a reference electrode. If not, it is available as an option.
For DN 15, earth disks are to be used.

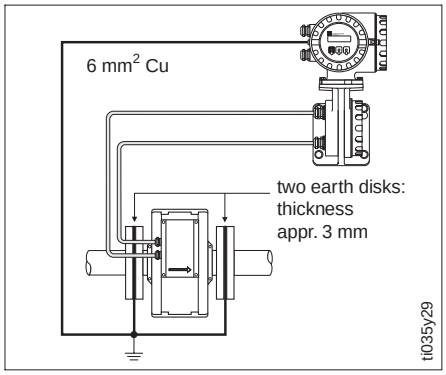
See below for a description of the potential equalisation for some special cases.



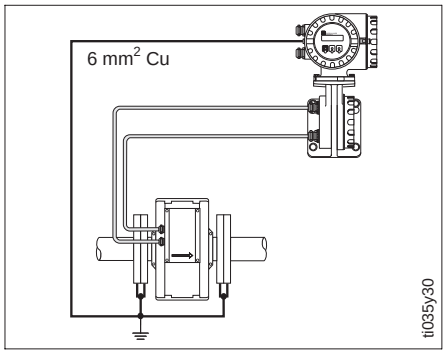
Potential equalisation in lined pipelines with cathodic protection
If – due to operational reasons – the fluid cannot be grounded, the measuring device has to be installed in a potential-free manner. Please note the regulations applying to potential-free or floating installations (e.g. VDE 0100). Please take care that no conductive connection to the measuring device is created by the mounting material used, and that the mounting material is able to resist the screw-tightening moment.



Equalisation current in metallic ungrounded pipelines
The fluid may be grounded. Check the electrical connection from flange to flange and to the measuring device.



Plastic or lined pipelines
This type of wiring is necessary if there is no reference electrode, or if the fluid has to be grounded due to equalising currents. Make sure the earth disks are resistant to corrosion. Use the same material for the earth disks as for the reference electrodes, as the electrodes might otherwise – in extreme cases – be destroyed by galvanic degradation.



Grounding in areas with strong electrical interference
In order to fully utilise the electromagnetic compatibility (EMC) of the Promag 35 S device, we recommend two flange-to-flange connections connected them to the earth potential along with the transmitter housing.

Diameter Selection

As a rule, the pipe diameter determines the sensor diameter.

A necessary increase of the flow rate is arrived at by a decrease of the sensor diameter. As a rule, the resulting higher installation expenditure is compensated for by the lower costs of the measuring device itself.

The flow rate (v) is also to be based on the fluid properties:

- v < 2 m/s: with abrasive fluids, e.g. potter's clay, lime sludge, ore slurry
- v > 2 m/s: with coating fluids, e.g. sewage sludges, etc.

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)
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^3/h	441.79 m^3/h	1767.1 m^3/h
300	12"	76.341 m^3/h	636.17 m^3/h	2544.7 m^3/h
350	14"	103.91 m^3/h	865.90 m^3/h	3463.6 m^3/h
400	16"	135.72 m^3/h	1131.0 m^3/h	4523.9 m^3/h
450	18"	171.77 m^3/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

1 m^3 = 1000 litres

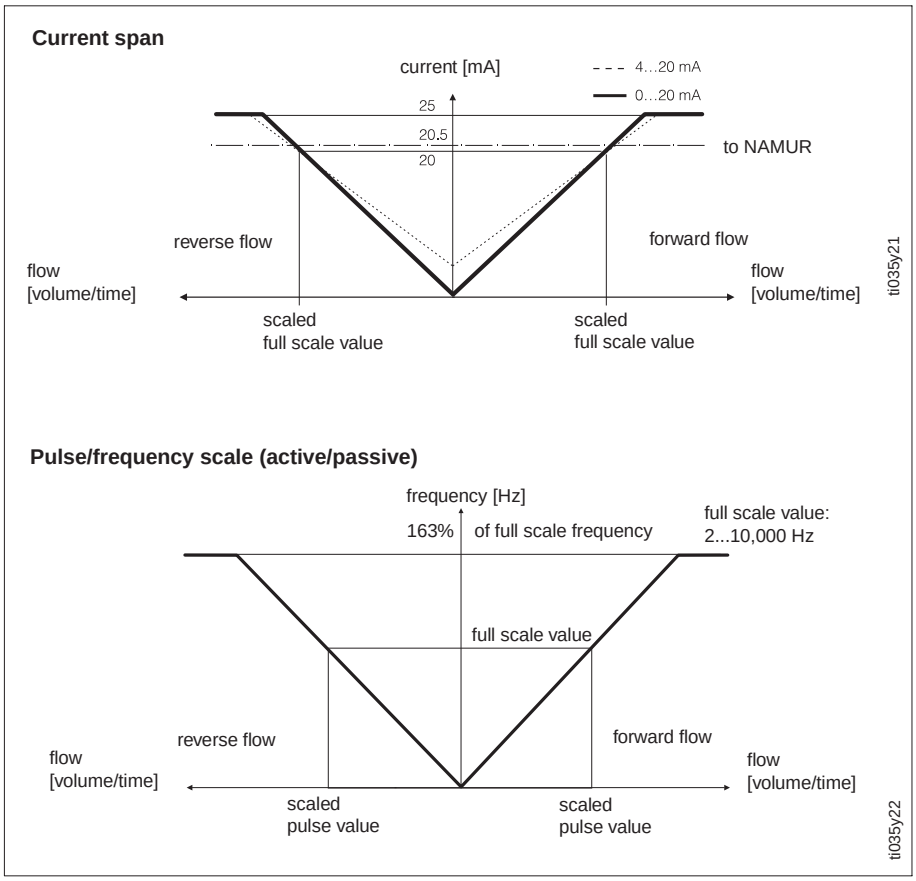
"Applicator" design software
All important instrument data are contained in the E+H software in order to optimise the design of the measuring system.
The Applicator software is used for the following calculations:

- Nominal diameter of the sensor with regard to the characteristics of the fluid such as viscosity, density, etc.
- Pressure loss downstream of the measuring point
- Simultaneous display of calculation examples for various nominal diameters

Transmitter Outputs (HART, RS 485)

Current and pulse output
Current and pulse outputs are scaled within a range of v = 0…10 m/s (max. 12.5 m/s). Final value scaling assigns the flow quantity specified by the user to the 20 mA current or final frequency. The measuring facility is able to measure in both flow directions: bidirectionally or unidirectionally. The current or pulse output values are always positive. Up to the set final value (0/4…20 mA or 0…10 kHz), strict linearity governs.

Maximum modulation is possible for the current output up to 25 mA, for the pulse/frequency output up to 163% of the final frequency. In addition, the current output may be operated according to NAMUR recommendations. This is done by simple programming. The standard works calibration is unidirectional (forwards); as an option, bidirectional.
The configurable status output reports the respective flow direction.



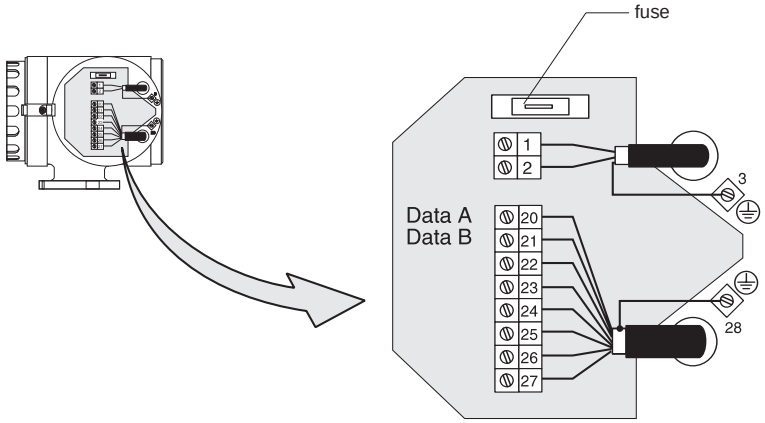
Relay switching behaviour
Relay 1 releases in case of error; relay 2 equally, e.g. if the selected batching quantity or the limit is reached. As standard version, the NC contact is freed for relay 1, and the NO contact for relay 2. This configuration may be altered by way of a plug-in jumper on the communication board.

Alarm output (relay 1)
Any system errors or power supply failures are immediately reported via the separate alarm output. The respective error reports are shown on-screen, too. The diagnostic function allows the user to systematically scan faults and malfunctions and to determine their cause. All functions of relay 2 may also be assigned to relay 1.

Status output (relay 2)
The status output offers users additional possibilities to optimally adjust the Promag 35 measuring installation to specific process conditions. One out of six possible functions may be assigned to this relay output:
- limit status (MAX or MIN safety)
- detection of flow direction
- empty pipe detection (EPD)
- automatic final-value switch-over
- batching/filling (pre-batch contact at relay1)
- measuring overrange v ≥12.5 m/s

Electrical Connection

Power supply, in- and outputs

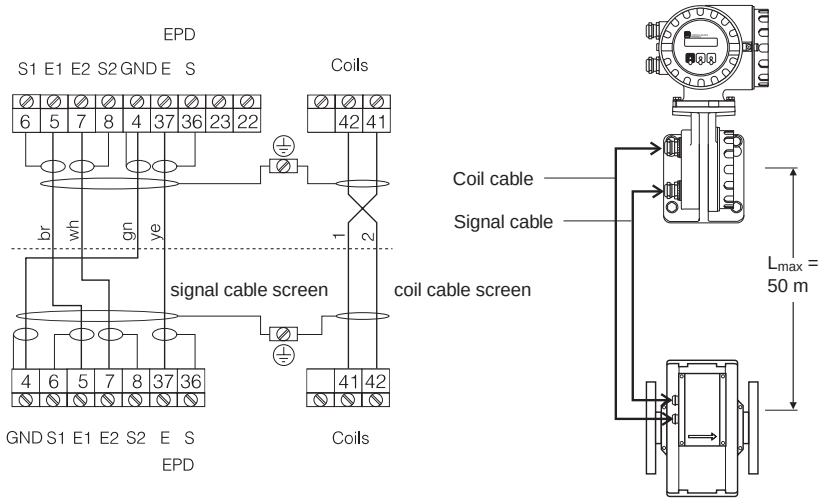


Note!
Depending on the order information, the transmitter electronics contain different boards:
– HART
– RS 485
– PROFIBUS PA

	Board: "HART" interface	Board: "RS 485" interface
3	Ground connection (ground wire)	Ground connection (ground wire)
1 **2**	L1 for AC N L+ for DC power supply L–	L1 for AC N L+ for DC power supply L–
20 **21**	Pulse/frequency output active/passive, f_{max} = 10 kHz active: 24 V DC, 25 mA (250 mA/20 ms) passive: 30 V DC, 250 mA	Input/ output RS 485 or auxiliary input A +/– B –/+ 3...30 V DC
22 **23**	Relay 1 max. 60 V AC/0.5 A max. 30 V DC/0.1 A can be configured: e.g. for failure	Relay 1 max. 60 V AC/0.5 A max. 30 V DC/0.1 A can be configured: e.g. for failure
24 **25**	Relay 2 max. 60 V AC/0.5 A max. 30 V DC/0.1 A can be configured: e.g. for limit value	Relay 2 max. 60 V AC/0.5 A max. 30 V DC/0.1 A can be configured: e.g. for limit value
26 **27**	Current output 1 active, 0/4...20 mA R_L <700 Ω with HART protocol	Current output or Pulse/frequency output active, 0/4...20 mA, R_L <700 Ω active/passive, f_{max} = 10 kHz active: 24 V DC, 25 mA (250 mA/20 ms) passive: 30 V DC, 250 mA
28	Ground connection (screen of signal cable)	Ground connection (screen of signal cable)

	Board: "PROFIBUS PA" interface
3	Ground connection (ground wire)
1 **2**	L1 for AC N L+ for DC power supply L–
20 **21**	not used
22 **23**	Current output active, 0/4...20 mA, R_L <350 Ω
24 **25**	not used
26 **27**	Bus PROFIBUS PA (EN 50 170, Volume 2, PROFIBUS; IEC 1158-2)
28	Ground connection (screen of signal cable)

Electrical Connection Remote Version



Cable specifications

Coil cable: 2 x 0.75 mm² PVC cable with common screen
Conductor resistance ≤12.5 Ω/km
Capacitance: core/core, screen grounded ≤120 pF/m
Permanent operation temperature: –20...+70 °C
(Cable length and additional information: see page 7 "Mounting of remote version")

Signal cable: 3 x 0.38 mm² PVC cable with common screen and separately screened cores
With EPD (Empty Pipe Detection) 4 x 0.38 mm² PVC cable
Conductor resistance: ≤50 Ω/km
Capacitance: core/screen ≤420 pF/m
Permanent operation temperature: –20...+70 °C
(Cable length and additional information: see page 7)

Cable specifications for use in areas with severe electrical interference

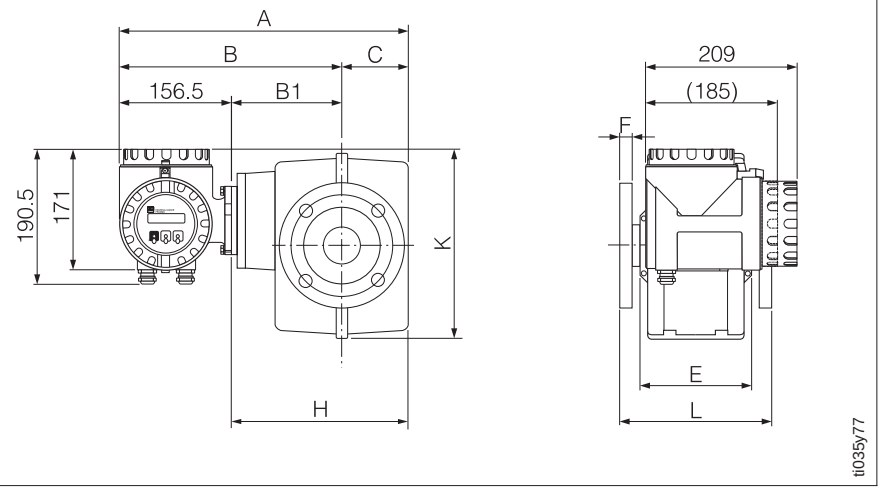
The Promag 35 S measuring system fulfils all general requirements for electromagnetic compatibility (EMC) according to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 as well as to NAMUR recommandations.

With the remote-mounted version the signal and the coil cables between the sensor and transmitter must always be screened and earthed at both ends. This is done at the earth terminals inside the connection housing of sensor and transmitter.

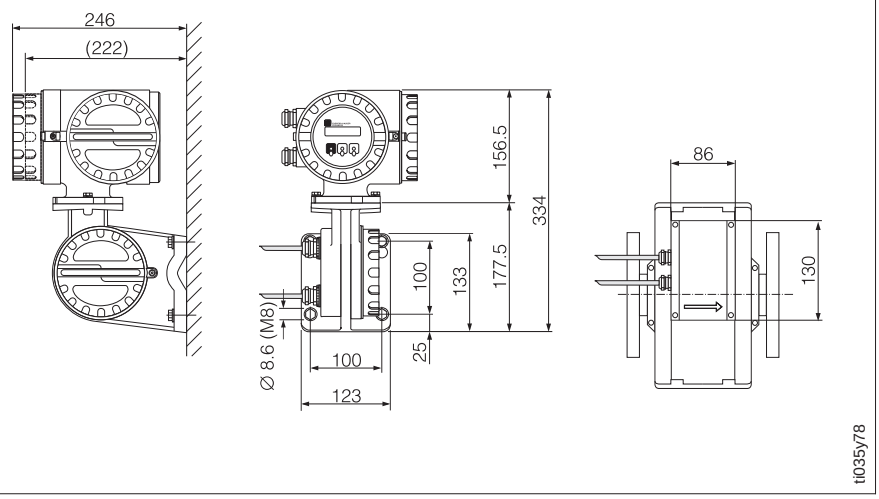
Dimensions

Promag 35 S
DN 15...200

Compact version



Remote version



DN		PN			L		A	B	C	K	E		F			H	B1	Weights*
[mm]	[inch]	DIN [bar]	ANSI [lbs]	JIS	DIN/ANSI [mm]	JIS [mm]	[mm]	[mm]	[mm]	[mm]	PTFE [mm]	HG/WG [mm]	DIN [mm]	ANSI [mm]	JIS [mm]	[mm]	[mm]	[kg]
15	½"	40	150	–	156/152	–	361	291.5	69.5	200	94.2	–	14	12	–	194.5 (204.5)	125 (135)	6
25	1"			20K		228					121.2		14	15	20			8
32	–	16	150	20K	202/202	228	409	315.5	93.5	247.6	121.2	120	16	16	20	242.5	149	10
40	1½"			20K		228					121.4		16	18	20	(252.5)	(159)	11
50	2"			10K		202					121.8		18	20	18			12
65	–			10K							165.9		18	23	18	284.5 (294.5)	170 (180)	25
80	3"	16	150	10K	272/272	272	451	336.5	114.5	308.6	166.8	164	20	24	20			26
100	4"			10K							167.2		22	24	22			27
125	–			10K							205.6		24	24	24	409 (419)	232 (242)	63
150	6"	16	150	10K	332/332	332	575.5	398.5	177.0	401.8	207.8	202	24	26	24			66
200	8"			10K							208.0		26	29	26			69

* Weights for sensor

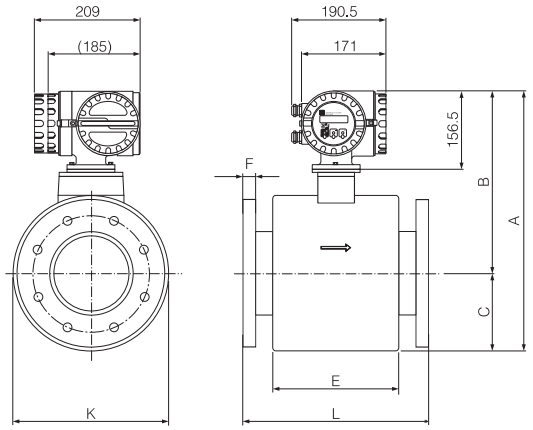
Weights for transmitter:
Compact version: 3 kg
Remote version with wall mounting: 5 kg

H / B1: Dimensions in () valid for compact version

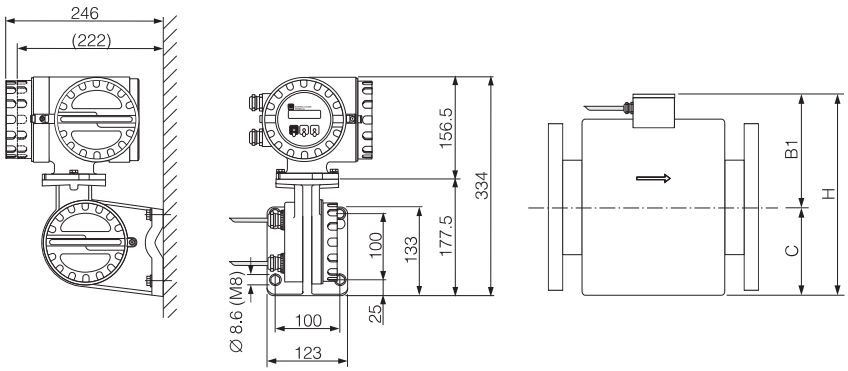
Dimensions

Promag 35 S
DN 250...600

Compact version



Remote version

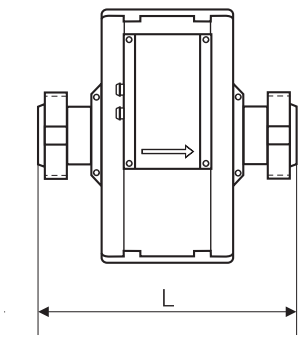


DN		PN			L		A	B	C	K	E		F			H	B1	Weights*
[mm]	[inch]	DIN [bar]	ANSI [lbs]	JIS	DIN/ANSI [mm]	JIS [mm]	[mm]	[mm]	[mm]	[mm]	PTFE [mm]	HG/WG [mm]	DIN [mm]	ANSI [mm]	JIS [mm]	[mm]	[mm]	[kg]
250	10"				450/450		658.5	446.5	212.0	424	338	338	28	30.5		497	285	73
300	12"				480/480		709.5	473	236.5	473	358	364	28	32		548	311.5	100
350	14"				530/530		773.5	505.5	268.0	536	404	410	30	35		612	344	125
400	16"	10	150	–	580/580	–	837.5	537.6	299.9	598	453	450	32	37	–	676	376.1	150
450	18"				690/690		870.5	554.5	316.0	632	531	528	32	42		709	393	180
500	20"				690/710		927.5	583.5	344.0	688	531	528	34	43		766	422	200
600	24"				820/820		1038.5	639.5	399.0	798	665	683	36	45		877	478	250

* Weights of sensor (weights for transmitter: see page 13)

Pipe Fittings
DIN 11851

DN 25...100



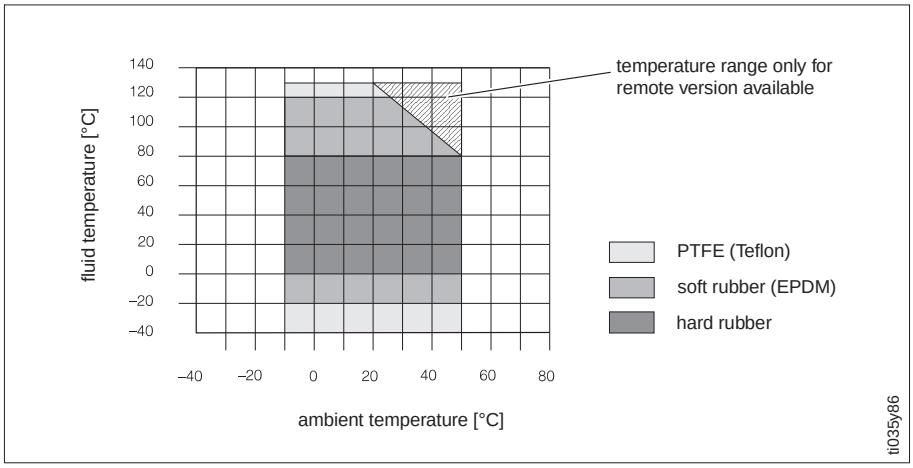
Pipe fittings according to DIN 11851
(milk coupling)

DN	PN	L (mm)
25...50	16	210
65...100		310

Temperature Ranges Promag S

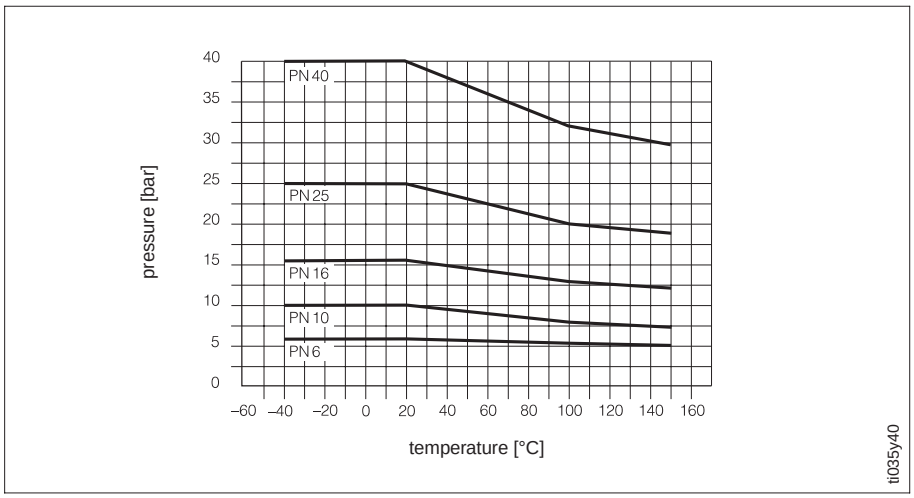
Sensor temperature ranges
Maximum admissible ambient and fluid temperatures must be adhered to.
For open-air mounting, a weatherproof covering is to be included as protection against direct sunlight. The life of the devices may thus be substantially prolonged.

With high fluid and ambient temperatures it is necessary to mount the Promag S sensor and Promag 35 transmitter separately (risk of the electronics becoming overheated, see Figure below).

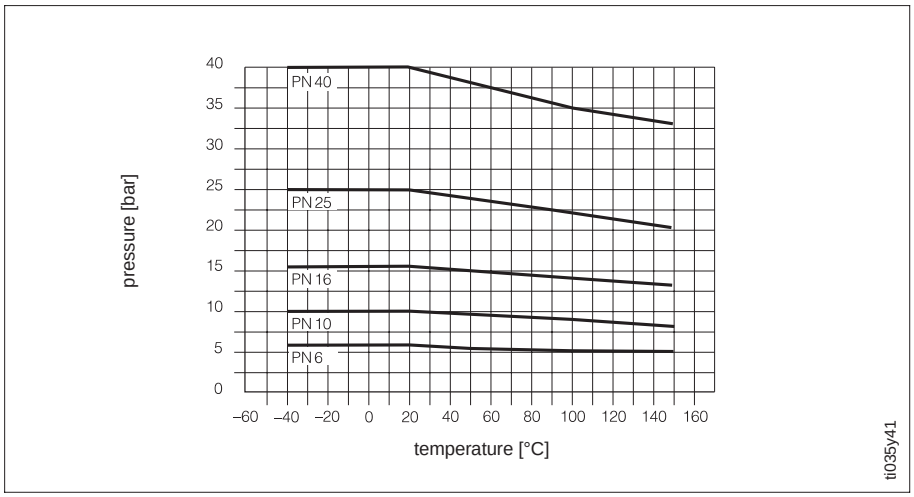


Load Diagrams

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

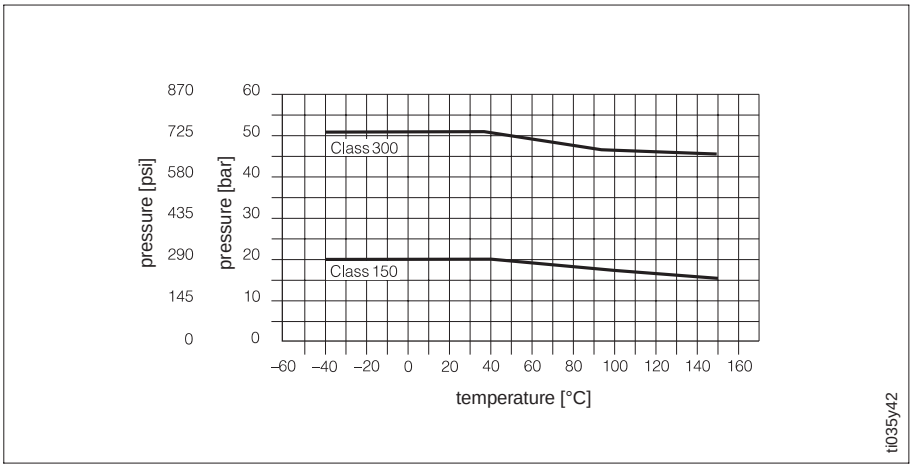


Pressure limitations due to fluid temperature (DIN 2413 and 2505)
Flange material: stainless steel 1.4435

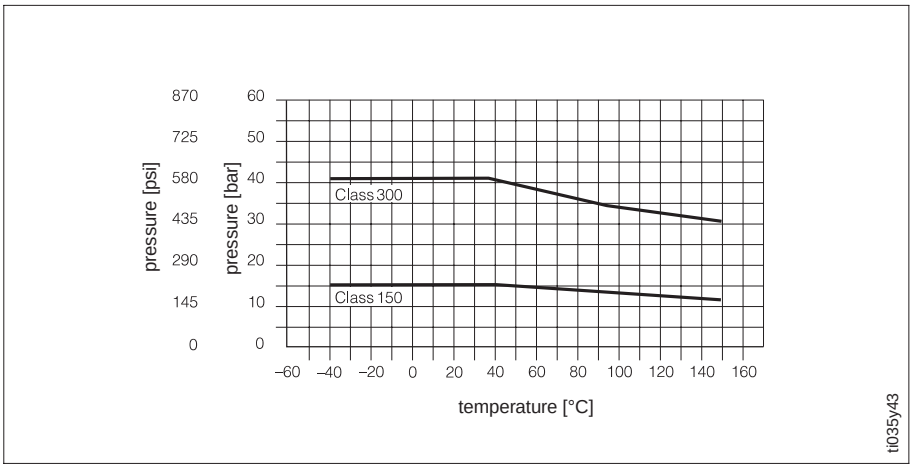


Load Diagrams Promag S

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



Technical Data Sensor

Promag S sensor

Nominal diameter	DN 15…600
Nominal pressure	DIN: PN 10 (DN 200…600) PN 16 (DN 25…150) PN 40 (DN 15) PN 25 (DN 200…600), option PN 40 (DN 25…600), option ANSI: Class 150 (½…8") Class 150 (10…24"), option Class 300 (½…24"), option JIS: 10K (DN 50…200, ½…24") 20K (DN 25…40, ½…24") 20K (DN 50…200), option
Process connection	flange connection: DIN; ANSI; JIS pipe fittings according to DIN 11851: milk coupling (DN 25…100)
Flange material	DIN: St. 37.2, stainless steel St. 1.4435 ANSI: A 105, 316L JIS: S 20C, SUS 316L
Fluid temperature range electrode material	–40…+130 °C PTFE (DN 15…600) –20…+120 °C soft rubber (DN 65…600) 0…+ 80 °C hard rubber (DN 65…600) –40…+ 65 °C NR (on demand) PU (on demand)
Ambient temperature range	–10…+50 °C
Electrode material	Hastelloy C-22, Tantalum
Electrodes fitted	DN 15…600: Hastelloy C-22, Measuring, reference and EPD electrodes
Minimum conductivity	≥ 1 µS/cm (fluids in general) ≥ 20 µS/cm (demineralised water)
Gasket material	–
Housing material	DN 15...200: powder-coated die-casting aluminium DN 250...600: varnished steel
Type of protection	IP 65 (EN 60529); IP 67/68 option NEMA 4X
CIP-suitable	yes (see also max. temperature)
Power supply	the sensor is supplied by the transmitter
Cable entries	PG 11 cable glands (5...12 mm) or NPT½", M20 x 1.5 (8...15 mm), G½" threads for cable glands

Technical Data Transmitter

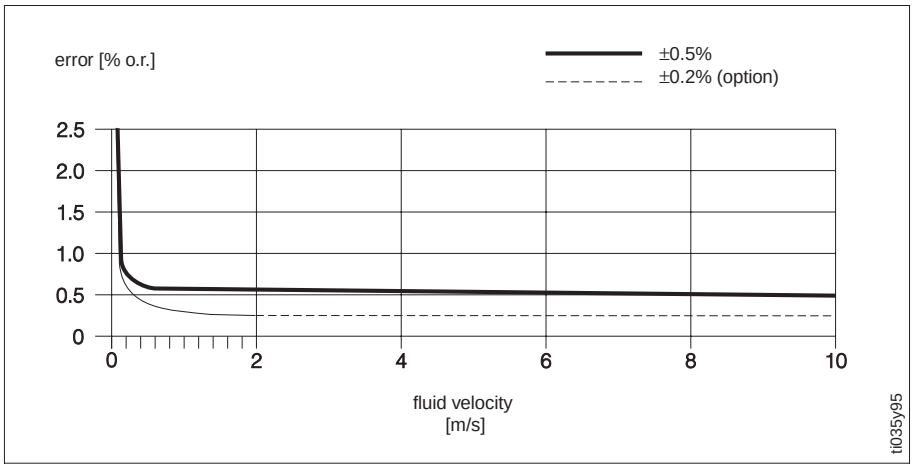
Promag 35 transmitter

Housing material	powder-coated die-cast aluminium
Type of protection	IP 67 (EN 60529), NEMA 4X
Ambient temperature	–20…+60 °C –20…+50 °C (with 20…55 V AC; 16…62 V DC)
Resistance to shock and vibration	testet to EN 61010 and IEC 68-2-6 (complete measuring system)
Cable entries	power supply cable and signal cable (outputs) PG 13.5 cable glands (5…15 mm) or NPT½", M20 x 1.5 (8…15 mm), G½" threads for cable glands
Power supply	180…260 V AC, 45…65 Hz 85…130 V AC, 45…65 Hz 20…55 V AC, 45...65 Hz, 16…62 V DC power supply failure: bridging at least 1 main cycle (22 ms)
Power consumption	AC: <35 VA (incl. sensor) DC: <35 W (incl. sensor)
Galvanical 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 type: 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.
Alarm output	relay 1, either NC or NO contact available, factory setting: NO contact brought out max. 60 V AC/30 V DC, max. 0.5 A AC/0.1 A DC, galvanically isolated, programmable for: error, error + EPD, limit value 1, empty pipe detection (EPD), exceeding measuring range (v ≥12.5 m/s), dual range mode, batching or direction of flow
Status output	relay 2, either NC or NO contact available, factory setting: NC contact brought out max. 60 V AC/30 V DC, max. 0.5 A AC/0.1 A DC, galvanically isolated, programmable for: limit value 2, exceeding measuring range (v ≥12.5 m/s), dual range mode, batching, EPD (empty pipe detection) or direction of flow
Communication	RS 485 interface (Rackbus protocol) or SMART (HART protocol via current output) or PROFIBUS
Data backup	EEPROM saves data of measuring system in the event of a power failure (without battery required)
Display	LCD, illuminated, 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)
Approvals	CSA, General Purpose (85-130 V AC)

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 ±5 µA (typical)
Repeatability	±0.1% o.r. ±0.005% o.f.s.
Options	±0.2% o.r. ±0.05% of Q_k Q_k = desired reference flow rate for the calibration (v = 2…10 m/s); state Q_k if ordering o.r. = of reading o.f.s. = of full scale
Power supply	within the specified range, voltage supply fluctuation exerts no influence



Reference conditions (DIN 19200 and VDI/VDE 2641)

Medium temperature	+28 °C ±2 K
Ambient temperature	+22 °C ±2 K
Warm-up time	30 minutes
Installation at reference conditions	inlet length > 10 × DN outlet length > 5 × DN Sensor and transmitter are grounded. Sensor is centred in the piping.

Supplementary Documentation

☐ Promag System Information	SI 010D/06/en
☐ Promag 35 PROFIBUS Operating Manual	BA 035D/06/en

Subject to modification

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