OPERATION AND MAINTENANCE MANUAL

FOR

WASTEWATER TREATMENT PLANT

HAMLET OF PANGNITUNG

DEAPRTMENT OF COMMUNITY AND GOVERNMENT SERVICES

GOVERNMENT OF NUNAVUT

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Operating instructions

Sewage Receiving Tank

The sewage receiving tank is a fabricated aluminum tank, divided into two equal halves, each with a volume of approximately 7.6 m^3 (2000 USG). This tank is insulated with urethane foam and is heat-traced with hydronic tubing. In the event of failure of the hydronic heat-trace, a secondary, electric heat-trace circuit is also installed as a back-up. ***Note – this back-up circuit is not wired in*** - if the hydronic circuit fails, the electric circuit will have to be temporarily connected to the designated 120/1/60 circuit in the main circuit breaker panel board.

A 6-inch (150 mm) Cam-lock reducing to 4-inch (100 mm) inlet receives the raw sewage from the trucks and a pair of "Goulds" 1 ½ HP submersible sewage pumps, mounted on slide-out bases, pumps the raw sewage to the "IPEC" screen. Four "Flygt" float switches are installed in this tank. The lowest switch is the "off" switch, which will shut the pumps off at about 4 inches or 100 mm from the bottom. The next higher switch turns the first pump on, the third switch turns on the high water alarm and the fourth switch starts the second pump. Under normal operation, the high water alarm should not go off. If the alarm turns on, either the liquid is being dumped too quickly or the first pump has failed. This is an important part of the process and the operation of these pumps must be closely watched.

A 4-inch Andress & Hauser magnetic flow meter is installed in the discharge pipe between the raw sewage pumps and the screen. This flow meter records the amount of sewage received and also gives the operator an indication about how well the pumps are operating.

The raw sewage is pumped to the IPEC screen where the non-organic materials such as plastics, paper, rags, etc. are removed; the liquid drains through into the second half of the tank. The solids are washed to remove the fecal matter and are then compacted in the screenings press. The screenings are deposited in the screenings bag. Once enough screenings have been discharged into the bag, tie-off the top of the bag, cut it off and dispose of the bag. Tie a knot in the end of the new tube and form a new bag. The operator is the best one to determine when there are enough screenings in the bag as he has to move and dump the bag.

A timer in the IPEC control panel will occasionally turn on the high pressure spray to clean the screen. If you find that the screen is becoming plugged, adjust this timer to either run longer or more frequently.

The second half of the receiving tank has two pumps that are similar to the first half installed in it. Note that the two sets of pumps are not inter-changeable. The raw sewage pumps have smaller impellers and they will not develop the same pressure as the screened sewage pumps. This is because the screened pumps have to pump to the top of the equalization tank.

is vital to the treatment process and careful observation of this biomass will give the operator a good indication of the treatment plant's operation.

Unless otherwise directed by the manufacturer, do not wash off the developed biomass.

The final clarifier is also a simple component, consisting of the hopper-bottom tank, two scum pumps, two sludge pumps and the outlet weir. The purpose of the final clarifier is to remove the sloughed biomass (sludge) and any floating scum.

The scum pump tanks should be adjusted so that the upper lip of the tank is approximately 1-inch (25 mm) below the water surface. When a scum pump comes on, the surface water and any floating scum is drawn into the tank and pumped out to the flow equalization tank. The scum pumps should be adjusted to turn on approximately every two hours and run for one minute.

The sludge pumps draw the settled sludge from the bottom of the clarifier hoppers and pump it to the sludge digester. These pumps are also timer-controlled and should be initially set to turn on every hour and run for one minute. By minimizing the amount of sludge in the hoppers, less scum will be produced.

The operator should ensure that the outlet weir is kept clean and that the weir is level so that an equal amount of water flows over both ends.

The effluent from the clarifier goes through a magnetic flow meter, similar to the flow meter installed on the raw sewage tank inlet. A portion of the effluent is diverted into a small water tank and this is used to provide high-pressure wash water for the IPEC screen.

The balance of the effluent is discharged through the outfall pipe to the ocean. The operator should monitor the heat-trace system of the outfall pipe to ensure that it doesn't freeze.

Sludge System

The sludge system consists of the sludge transfer pumps, the aerated sludge digester and the Envirodyne sludge bagger. The sludge system is designed to remove the accumulated sludge from the treatment plant, stabilize it to reduce the odour and then de-water it so the sludge can be more easily disposed of.

The final clarifier sludge pumps are controlled with timers in the control panel and were initially set to run for one minute every hour. This time can be increased or reduced, depending on the amount of sludge produced by the treatment plant. The amount of sludge produced will be affected by the amount of sewage treated, the "strength" of the sewage, the type of food that the residents eat as well as other factors so the operator should pay attention to the operation of the sludge system.

The sludge digester tank is continuously aerated; this will keep the solids mixed and also, this aeration will stabilize the sludge by reducing the remaining organic matter in the sludge. If the sludge is not digested by this aeration, it will produce very bad odours

- alternate the digester blowers once a week to equalize the wear on each blower
- regularly record the discharge pressure vs. tank depth to monitor the blowers' operation. If this changes, it may signify that a diffuser has failed.
- detailed bagger maintenance instructions are included in the Envirodyne manual, but as a minimum ensure that the headbox is kept clean and the polymer tank is kept free of debris.
- regularly check the operation of the filtrate return sump pump
- keep close records of the amount of polymer and the number of sludge bags that you have in stock. Ensure that there are enough in stock.

Control Panel

The main control panel controls the entire sewage treatment process (except for the IPEC screen and compactor). You can start or stop all of the process equipment from the main control panel. You can check how much liquid is in either the EQ tank or the sludge digester from the control panel.

There are no components inside of the panel that require any maintenance. All motors (except for the Envirodyne sludge bagger) operate on 600 volt power - 600 volts can kill you if you are not careful!

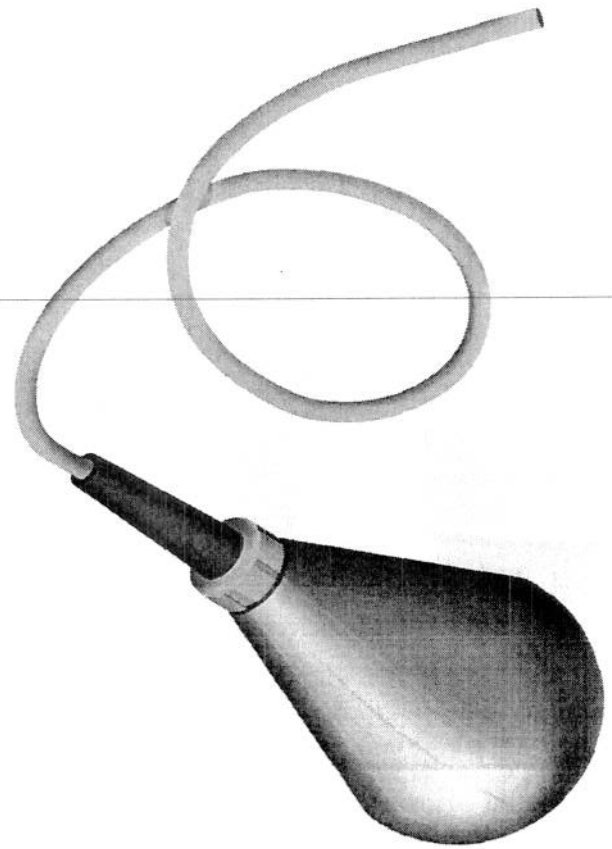
All 600 volt maintenance must only be done by a certified electrician!

Hamlet personnel are not allowed to do any 600 volt electrical maintenance in this plant

FLYGT

Technical specification

ENM-10 Level regulator



Flygt

ITT Industries

PRODUCT DESCRIPTION

The simplest possible method for level control! A mechanical switch in a plastic casing, freely suspended at the desired height from its own cable. When the liquid level reaches the regulator, the casing will tilt and the mechanical switch will close or break the circuit, thereby starting or stopping a pump or actuating an alarm device. No wear, no maintenance! In sewage pumping stations, for ground water and drainage pumping — in fact, for most level control applications — the ENM-10 is the ideal solution.

The regulator casing is made of polypropylene and the cable is sheathed with a special PVC compound. The plastic components are welded and screwed together. Adhesive is never used. Impurities and deposits will not adhere to the smooth casing.

This level regulator is available in different versions, depending upon the medium in which it is to be used. As standard, the regulator can be obtained with 6, 13, 20, 30 or 50 metres (20, 42, 65, 100 or 167 feet) of cable for liquids with specific density between 0.95 and 1.10 g/cm³; for other specific densities, the regulator is only available with 20 metres (65 ft) of cable. The regulator can withstand up to 60°C (140°F).

Dimensions

For density g/cm³	Regulator length mm (in)	Diameter mm (in)
0.65—0.80	194 (7 $^{10}/_{16}$)	100 (4)
0.80—0.95	177 (7)	100 (4)
0.95—1.10	162 (6 $^{3}/_{8}$)	100 (4)
1.05—1.20	142 (5 $^{9}/_{16}$)	100 (4)
1.20—1.30	133 (5 $^{1}/_{4}$)	100 (4)
1.30—1.40	130 (5 $^{2}/_{16}$)	100 (4)
1.40—1.50	126 (5)	100 (4)

Technical data

Liquid temperature:	min. 0°C (32°F) max. 60°C (140°F)
Liquid density:	min. 0.65 g/cm³ max. 1.5 g/cm³
Degree of protection:	IP68, 20 m (65 ft)
Interrupting capacity of micro switch:	AC, resistive load, 250V 10A AC, inductive load, 250V 3A cos φ = 0.5 DC, 30V 5A

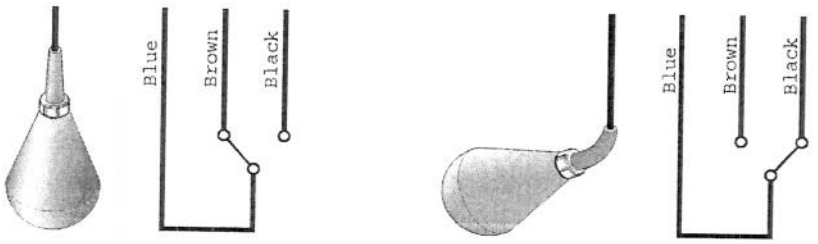
Note that local regulations may limit the voltage.

Approvals:	CSA, SEMKO, NEMKO, CE Approved according to EN61058
Weight:	approx. 2 kg (4.5 lb) for a standard density regulator with 20 m cable.

Materials

Body:	polypropylene
Bending relief:	EPDM rubber
Cable:	special compound PVC or chlorinated polyethylene CPE rubber

Colour code



CHEMICAL RESISTANCE LIST

The liquid in which level regulation is practiced most frequently is, of course, water. Of the millions of regulators in use all over the world today, it is estimated that nine out of ten work in water.

However, with a float body of polypropylene, a cable of PVC or CPE and a bending relief of EPDM rubber, the ENM-10 is virtually insensitive to many aggressive liquids.

The table shows how resistant the ENM-10 equipped with either PVC or CPE cable, is to different chemicals at two different temperatures. The classification is broken down into the following categories:

0 = No effect, 1 = Minor to moderate and 2 = Severe effect. The sign — means that information is not available.

Keep in mind also that the density of the liquid determines the bouyancy of the regulator. The ENM-10 is made for seven different densities. See page 2.

Always observe local regulations:
Take particular note of:
- risk of fire/explosion
- hygiene requirements

Acids	PVC cable		CPE cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Acetic Acid 50%	1	2	0	0
Acetic Acid 75%	2	2	0	0
Benzoic Acid	2	2	0	0
Boric Acid 5%	0	—	0	0
Butyric Acid	2	2	2	2
Chromic Acid 10%	0	2	2	2
Citric Acid	0	1	0	0
Hydrobromic Acid 5%	1	2	0	0
Hydrochloric Acid 10%	0	1	0	1
Hydrochloric Acid 37%	1	2	0	2
Hydrocyanic Acid 10%	0	0	1	2
Hydrofluoric Acid 5%	0	2	0	1
Hypochloric Acid	1	2	2	2
Maleic Acid	2	2	2	2
Nitric Acid 5%	1	1	1	1
Nitric Acid 65%	2	2	2	2
Oleic Acid	1	2	2	2
Oxalic Acid 50%	1	1	1	2
Phosphoric Acid 25%	0	0	1	2
Phosphoric Acid 85%	0	0	1	2
Sulphuric Acid 10%	1	2	1	2
Sulphuric Acid 78%	2	2	2	2
Tannic Acid	0	0	0	0
Tartaric Acid	1	1	1	1
Bases				
Ammonium Hydroxide	0	—	0	0
Calcium Hydroxide	0	0	0	0
Potassium Hydroxide	1	2	0	0
Sodium Hydroxide	1	2	0	0

Salts	PVC cable		CPE cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aluminium Chloride	0	0	0	0
Calcium Sulphate	0	0	0	0
Calcium Chloride	0	0	0	0
Calcium Nitrate	0	0	0	0
Copper Chloride	0	0	0	0
Copper Sulphate	0	0	0	0
Ferric Chloride	0	0	0	0
Ferrous Sulphate	0	0	0	0
Magnesium Chloride	0	0	0	0
Potassium Sulphate	0	0	0	0
Potassium Nitrate	0	0	0	0
Potassium Carbonate	1	1	1	1
Potassium Bicarbonate	0	0	0	0
Sodium Sulphate	0	0	0	0
Sodium Chloride	0	0	0	0
Sodium Nitrate	0	0	0	0
Sodium Bicarbonate	0	0	0	0
Sodium Carbonate	0	0	0	0
Tin Chloride	1	1	1	1
Zinc Sulphate	0	0	0	0
Zinc Chloride	0	0	0	0
Oils				
Castor Oil	1	1	1	1
Cocoanut Oil	0	—	0	2
Corn Oil	2	2	2	2
Diesel Oil	2	2	2	2
Linseed Oil	2	2	2	2
Mineral Oils	2	2	2	2
Olive Oil	1	1	1	1
Silicone Oils	0	0	0	0

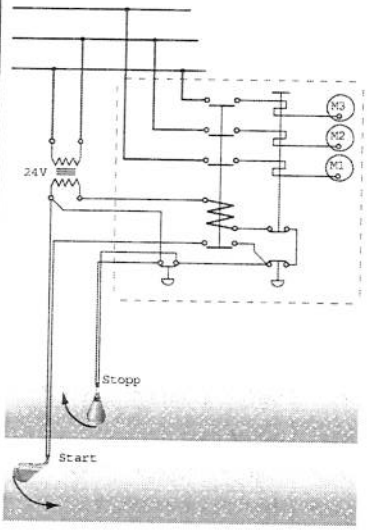
Solvents and miscellaneous	PVC cable		CPE cable	
	20°C (68°F)	60°C (140°F)	20°C (68°F)	60°C (140°F)
Aceton	2	2	2	2
Aniline	2	2	1	2
Benzene	2	2	2	2
Butyl Alcohol	2	2	0	1
Carbon Tetrachloride	2	2	2	2
Chlorobenzene	2	2	2	2
Chloroform	2	2	2	2
Ethyl Alcohol	2	2	0	1
Ethyl Ether	2	2	2	2
Ethyl Acetate	2	2	2	2
Ethylene Dichloride	2	2	2	2
Ethylene Chloride	2	2	2	2
Formaldehyde 37%	1	2	0	0
Gasoline	2	2	2	2
Kerosene	2	2	2	2
Methyl Alcohol	2	2	0	0
Methyl Ethyl Ketone	2	2	2	2
Methylene Chloride	2	2	2	2
Nitrobenzene	2	2	2	2
Phenol	2	2	2	2
Toluene	2	2	2	2
Trichlorethylene	2	2	2	2
Turpentine	2	2	2	2
Xylene	2	2	2	2
Gases				
Carbon Dioxide	0	0	0	0
Carbon Monoxide	0	0	0	0
Chlorine (wet)	2	2	2	2
Hydrogen Sulphide	0	0	1	1
Sulphur Dioxide (wet)	1	1	2	2

0 = No effect, 1 = Minor to moderate, 2 = Severe effect. — = No information available.

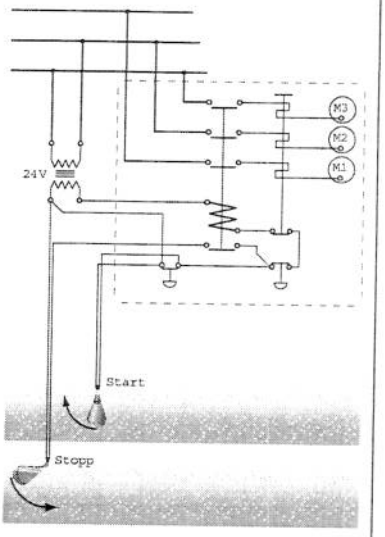
Wiring alternative

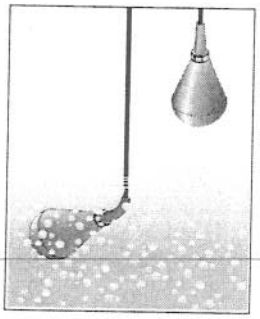
To conform to local regulations, the level regulators are normally connected through a transformer to a low-tension control circuit. Two regu-lators are used — one for starting and one for stopping. A third regulator can be connected if an alarm is required at a given level. Identical regulators can be used for all functions.

A. Connected for emptying
Connect the blue and black leads.
Insulate the brown lead.

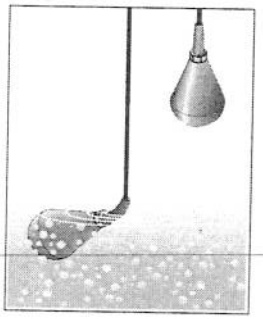


B. Connected for filling
Connect the blue and brown leads.
Insulate the black lead.

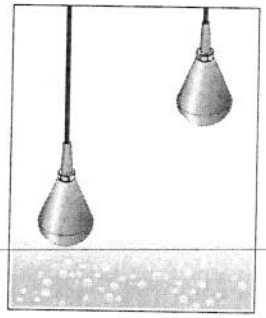




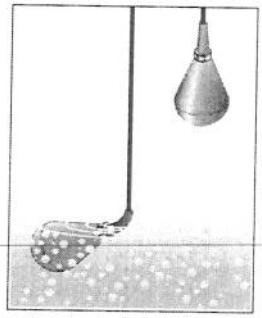
Let the level drop . . .



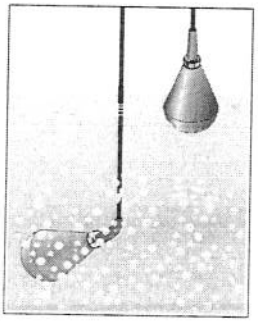
. . . to the lowest permissible point.



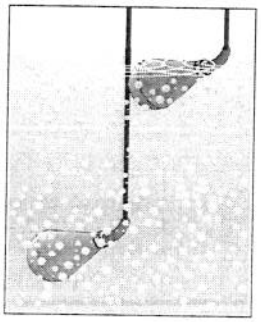
The regulator will then react . . .



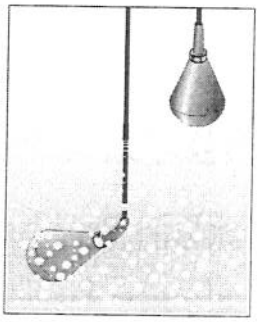
. . . so the process is reversed.



At the highest permissible point . . .



. . . level regulator II reacts . . .



. . . in the opposite fashion.

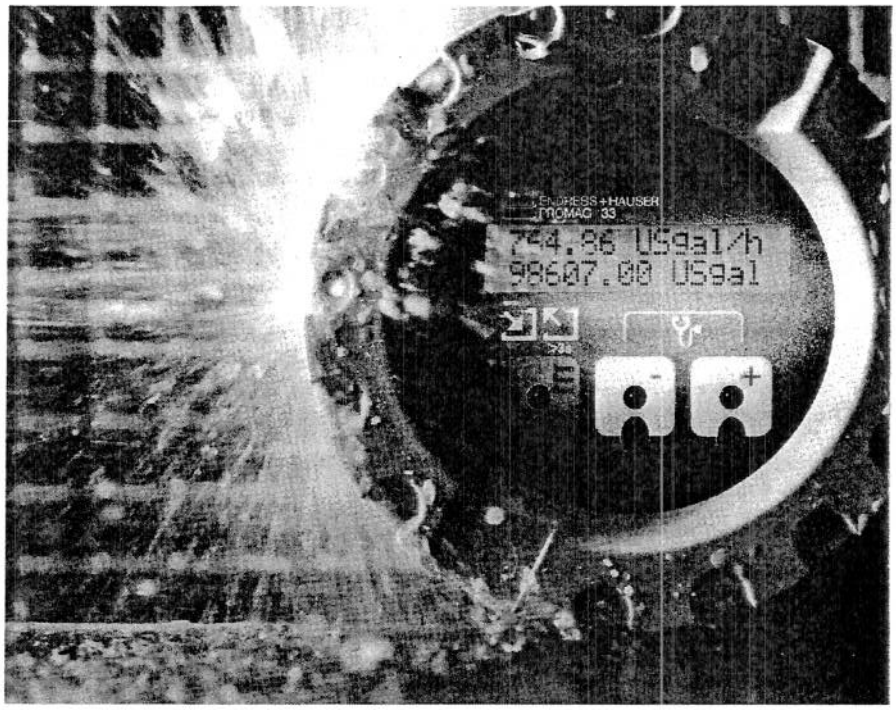
FLYGT

www.flygt.com

ENM-10.04.06. Eng. 2M. 05.02 © ITT FLYGT AB 891480

Technical information
TI 027D/24/ae

Electromagnetic Flow Measuring System *promag 30/33/39*



Modular construction
- Providing cost-effective measurement for liquid flow applications

Operational security
- ISO 9001 manufacturer, quality assured
- Full electromagnetic compatibility (EMC)
- Reliable operation through self-diagnostics
- EEPROM saves data (without batteries) on power failure
- Positive Zero Return
- Empty pipe detection
- Galvanically isolated inputs/outputs

Measure precisely
- Measuring error: ±0.5 % or ±0.2 %
- Excellent repeatability
- Bi-directional flow measurement

Easily configured
- Parameters adjusted by miniature switches (Promag 30)
- Calibration simplified through touch control operation (Promag 33)
- Two-line, illuminated display (Promag 33)

Install anywhere
- Integral grounding electrode
- Shock-resistant aluminum housing, resistant to acids and caustics
- NEMA 4X protection for compact and remote versions
- Wide size range $^{1}/_{12}$"-78"
- Flanged version with ISO meter lengths
- Meets 3-A Sanitary standards ($^{1}/_{12}$"-4")
- FM Approved Non-incendive, Class I, Division 2, Groups A-D, dust-ignition proof, Class II, Division I, Groups E-G
- FM Approved, Class I, II & III, Div. 1 Groups A-G sensors available

Quality made by Endress+Hauser

ISO 9001

Endress+Hauser

The Power of Know How

Equipment of the measuring transmitter

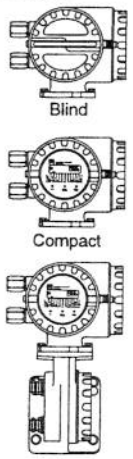
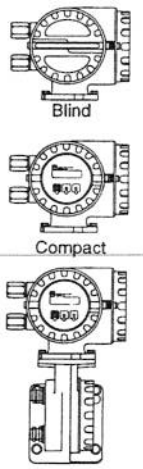
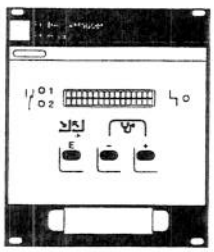
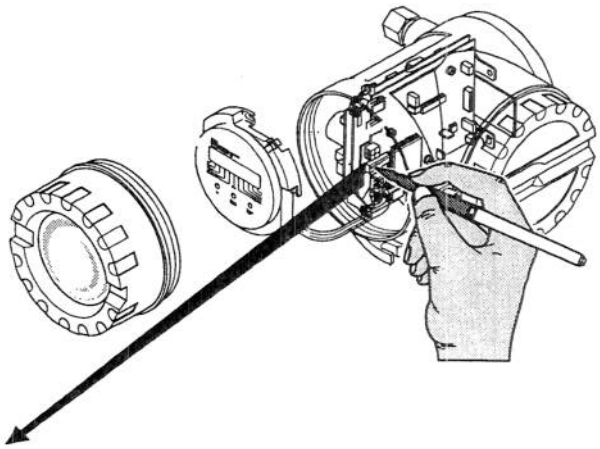
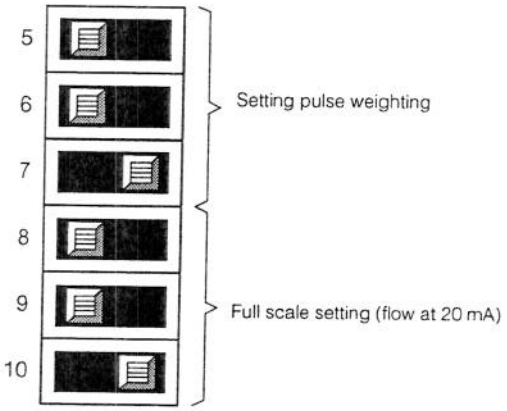
Measuring sensor	Transmitter	Transmitter Functions	Transmitter Features
Promag A 1/12" - 1" Promag D 1" - 4" Promag H 1" - 4" Promag F 1/2" - 12" Promag F 14" - 78"	Promag 30  Blind Compact Remote	• Power supply board 85 to 260 V AC or 16 to 62 V DC • Amplifier board with Pulse output, Current output, Status output Auxiliary input • Local display/operating (optional)	When the application demands neither an E+H matrix driven operation nor digital communication, the Promag 30 comes into its own. It has the same highly developed measuring electronics and is operated using internal miniature switches.
	Promag 33  Blind Compact Remote	• Power supply board 85 to 260 V AC or 16 to 62 V DC • Measuring amplifier board • Communication board with pulse/frequency output, current output, HART protocol via current output alarm output (relay), configurable status output (relay), configurable or • Communication board with current or pulse/frequency output alarm output (relay), configurable status output (relay), configurable Rackbus RS 485 interface or auxiliary input • Display/operating module (Blind version possible: without display/operating module)	The Promag 33 measuring system expands the advantages of the Promag 30: • E+H Matrix-driven operation • Two-line, illuminated display • Batching with integrated preset counter • Communication ability • Empty Pipe Detection
	Promag 39 	• Power supply board 85 to 260 V AC or 16 to 62 V DC • Measuring amplifier board • Communication board with pulse/frequency output, current output, alarm output (relay), status output (relay), configurable • Rackbus interface, RS 485 interface, auxiliary input, HART protocol via current output • Display/operating module	All of the features of the Promag 33 in a remote rackmount, panel mount, or NEMA 4X wall mount enclosure

Figure 1

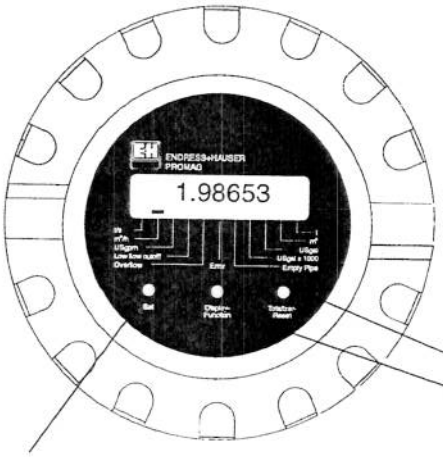




Miniature switches 5-10
Factory settings

ti026y19

Figure 3
Promag 30
Setting functions



LCD, 8-character
All measured values, operating and status indications are shown here.
11 Display Segments
The segments provide clear information on engineering units and current instrument function:

- Engineering units
- Low flow cutoff activated
- Velocity of fluid > 41 ft./sec
- System error
- Empty pipe detection

Totalizer reset

Display function

- Current flow rate
- Current totalized display
- Alternate between flowrate/totalizer display
- Empty pipe detection
- Empty pipe calibration
- Full pipe calibration
- Display test

Set
This key is used for carrying out the following operatons:
Selecting engineering units
Switching on/off empty pipe detection
Starting the empty/full pipe calibration

ti026y03

Figure 4
Promag 30 front view, display and keypads

Installation

Installing the Sensor

The Promag sensor can be mounted vertical or horizontal. To optimize sensor performance and maintain accuracies, the following guidelines are recommended.

Orientation

a) The optimum mounting is vertical, with the process flowing upward. At no flow, heavier entrained solids sink downward and lighter fatty contents rise away from the measuring electrode area. This prevents buildup and corrosion of the electrode surface.

b) For horizontal mounting, the electrode axis must lie horizontal. This prevents short term measurement errors due to entrained air bubbles.

Note: The electrode axis plane is the same for all measuring sensors A, D, H, and F.

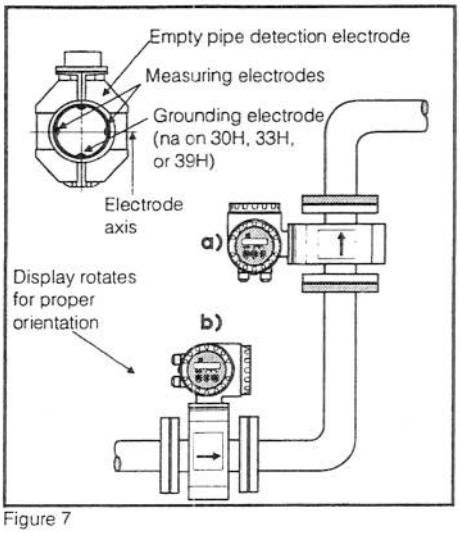


Figure 7

Inlet and outlet runs

The sensor should be mounted away from turbulence-generating components such as valves, elbows, and t-sections whenever possible.

Inlet lengths:	>3 to 5 x D (D=pipe diameter)
Outlet lengths:	>2 x D

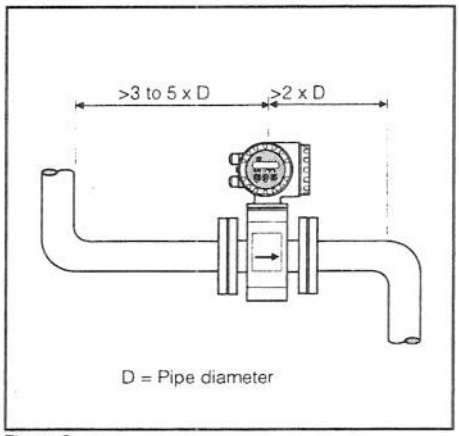


Figure 8

Downward pipe

With the installation suggestion in Figure 9 (siphon, vent valve after the sensor), no partial vacuum exists, even in downward pipe > 15 feet.

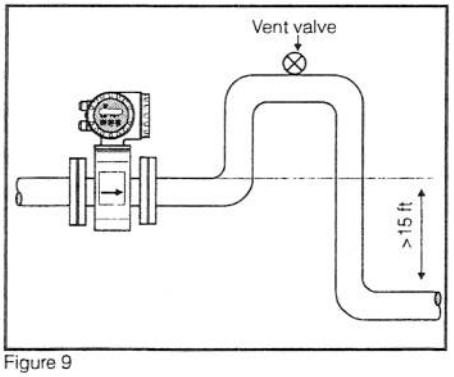


Figure 9

Vibration

Piping should be supported before and after the sensor where vibration is present. Excessive vibration requires the remote mounting of the transmitter.

When the sensor is mounted in piping runs over 33 feet long, mechanical supports are recommended at the sensor location to minimize sagging due to sensor weight or pipe vibrations.

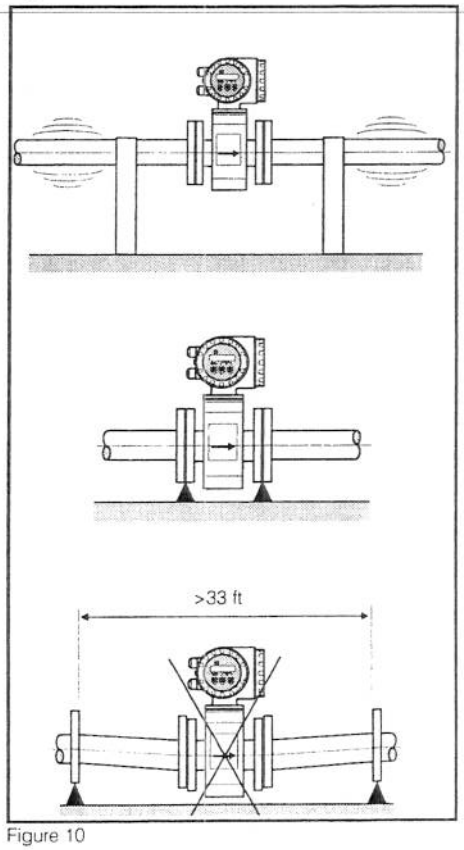


Figure 10

Installing Remote Transmitter

Mounting of remote version

Necessary where there is:

- Poor access
- Lack of space
- Extreme fluid and ambient temperatures (see Technical Data)
- Excessive vibration (>2g/2 h per day, 10 - 100 Hz)

Note:

- For distances between sensor and transmitter of ≥ 33 feet, the permitted cable length (L_{max}) is determined by the fluid conductivity.
- With the optional empty pipe detection (EPD) the maximum possible cable length between transmitter and sensor is limited to 33 feet.
- Do not lay cable in the vicinity of electrical machinery or switchgear. The relevant cable specifications are listed in the "Wiring" chapter.
- Ensure potential equalization between sensor and transmitter.
- If signal cable is customer-supplied, ensure that the following maximum cable capacitance (Ca) and inductance (La) are not exceeded:

	Hazardous	
Area Group	(Ca)	(La)
A & B	2.5µF	10mH
C	7.5µF	39mH
D	20.0µF	84mH

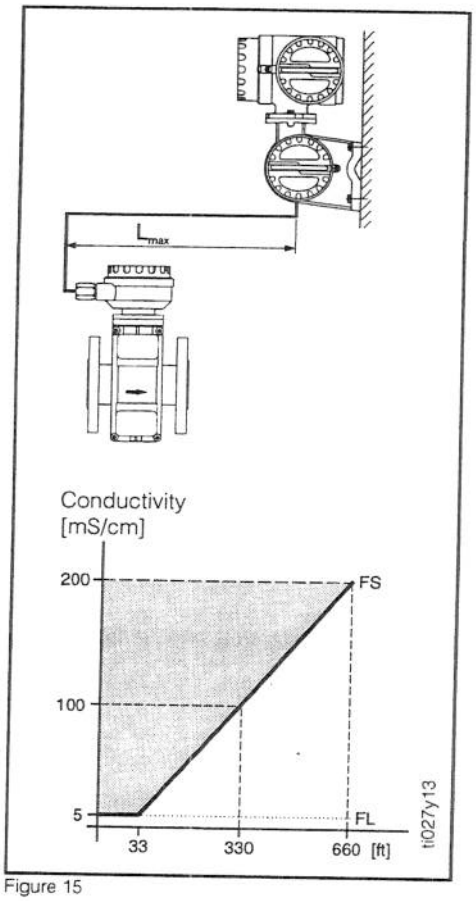


Figure 15

Mounting of the remote transmitters

The separate installation of transmitter and sensor is advantageous because:

- it assures improved accessibilty
- requires less space
- copes better with extreme fluid and ambient temperatures (see page 34 for temperature ranges)
- or strong vibrations (>2 g/2 h per day; 10 to 100 Hz)

To panel mount the Promag 39 transmitter, use accessory no. 50075239, which also requires an additional wiring connector kit.

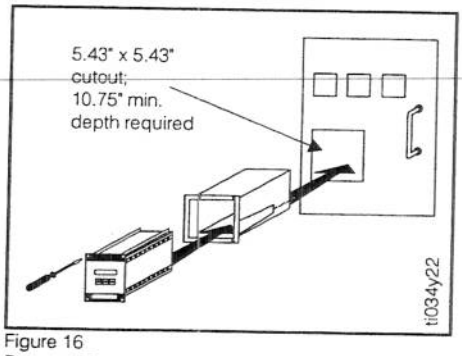


Figure 16
Promag 39 transmitter panel mounting option

Note:

- The maximum admissible cable length L_{max} between sensor and FL transmitter for non-Ex applications is 656 ft. 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 equalization between sensor and transmitter.
- Promag 39 not available with D sensor

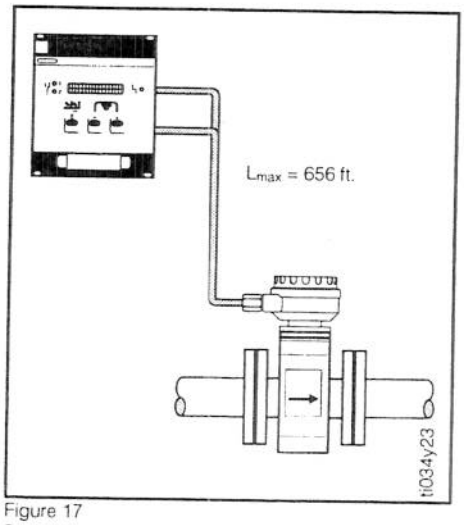


Figure 17
Promag 39 transmitter mounting

Installation

Grounding

Grounding

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 grounding electrode (Fig. 21) ensures the required potential equalization. For this reason, it is sufficient to connect the Promag's ground lug to local ground.
The Promag A, D, and F are always fitted with a reference electrode. There is no reference electrode with Promag H as there is always a metallic connection to the product.
For the remote version, this connection takes place via the ground terminal in the sensor wiring compartment.
The following describes potential equalization in special cases:

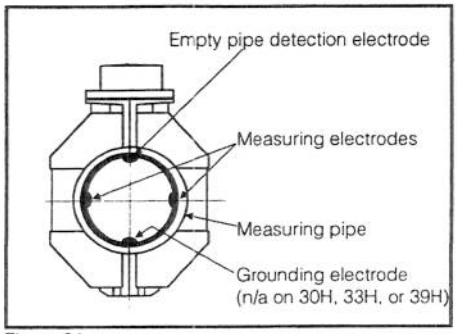


Figure 21

Potential equalization in lined pipelines with cathodic protection

When the fluid cannot be grounded for operational reasons, the meter must be installed isolated from pipework and ground. Please observe the local electrical regulations for such an installation (Fig. 22).

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.

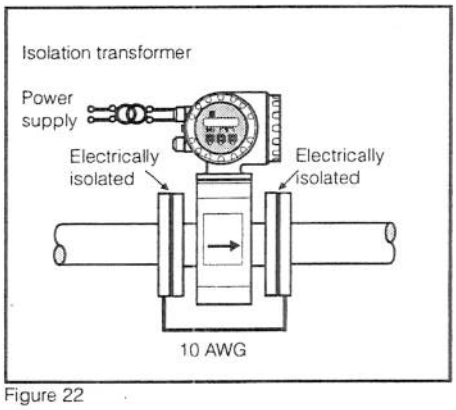


Figure 22

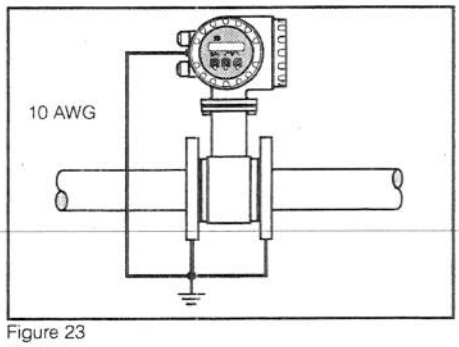


Figure 23

Equalization current in metallic ungrounded pipelines

The fluid can be grounded. Ensure an electrical connection from flange to flange and to the meter (Fig. 23, 25).

Plastic or lined pipeline

This wiring will be necessary if the fluid must be grounded due to potential equalization currents (Fig. 24).
Pay attention to the corrosion resistance of the grounding rings!

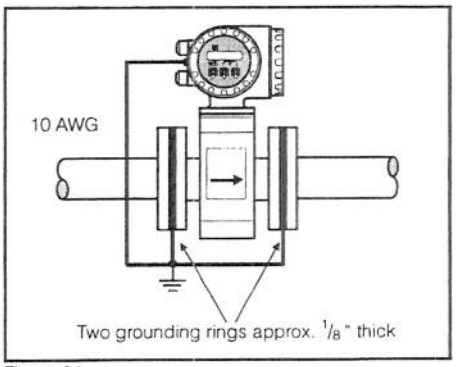


Figure 24

Grounding in areas with strong electrical interference

To ensure full electromagnetic compatibility, a flange to flange connection, together with the meter to earth potential is recommended (Fig. 25).

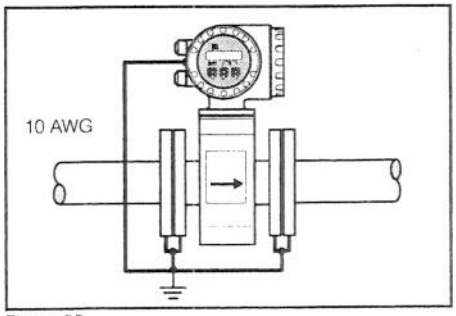


Figure 25

Installation

Diameter Selection

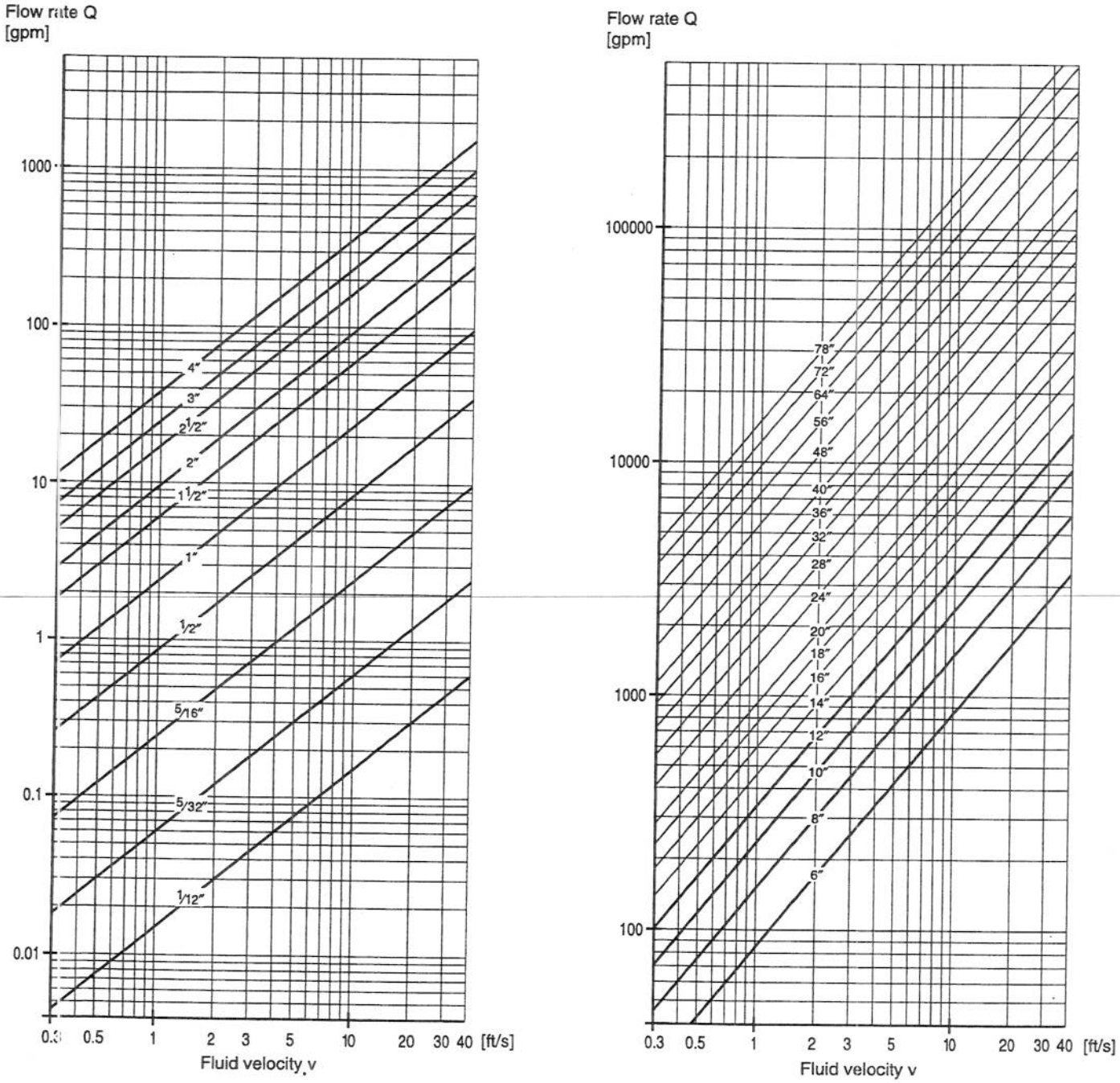


Figure 26

Promag 30
Status output (Open Collector)
The status output can be selectively configured for:
Error messages
System errors (fault)
Process errors (alarm)
Power supply failure
Exceeding measuring range when: v ≥ 41 ft./sec
Flow direction indication

The status output operates as a fail-safe output, i.e., during normal error-free operation, the output is closed (transistor conducting).

Auxiliary input
- Positive Zero Return
  With the use of an external voltage (3 - 30 V DC), the auxiliary input controls the status of the current and pulse outputs. As long as the voltage is present, the current output is set to 0/4 mA and the pulse output to the initial value (transistor not conducting), and the totalizer is stopped.

Applicaton example:
Interrupt of the measuring operation during pipeline cleaning.

- Totalizer reset:
  The auxiliary input can be reconfigured as an external reset for the totalizer using a jumper (with the local display option only). With an external voltage (3 - 30 V DC), the totalizer value can be reset to "0".

Promag 33/39
Alarm output (Relay 1)
A system error or a power failure is indicated by the alarm output.
Corresponding error messages appear on the transmitter display.
Existing error messages can be viewed for system diagnosis.
All Relay 2 functions can also be assigned to Relay 1.

Auxiliary input
Applying a 3 to 30 V DC voltage enables the following functions to be activated:
- Level control
  - Dual range end value 1 <—> 2 (Current output 1)
  - Positive zero return
- Pulse control
  - Activate batching cycle
  - Reset totalizer to zero

Status output (Relay 2)
The Promag 33 status output relay provides one of six possible functions to monitor the process:
- Limit value (safety MIN/MAX)
- Flow direction recognition
- Empty pipe detection (full/empty pipe)
- Automatic switching between two current value ranges
- Batching (filling) (pre-batch contact at Relay 1)
- Exceeding the measuring range v ≥ 41 ft/sec.

Relay switching
Relays 1 and 2 can be configured normally open or closed by means of a jumper on the applicable communications circuit board.

Promag 33 (RS485/Aux.)

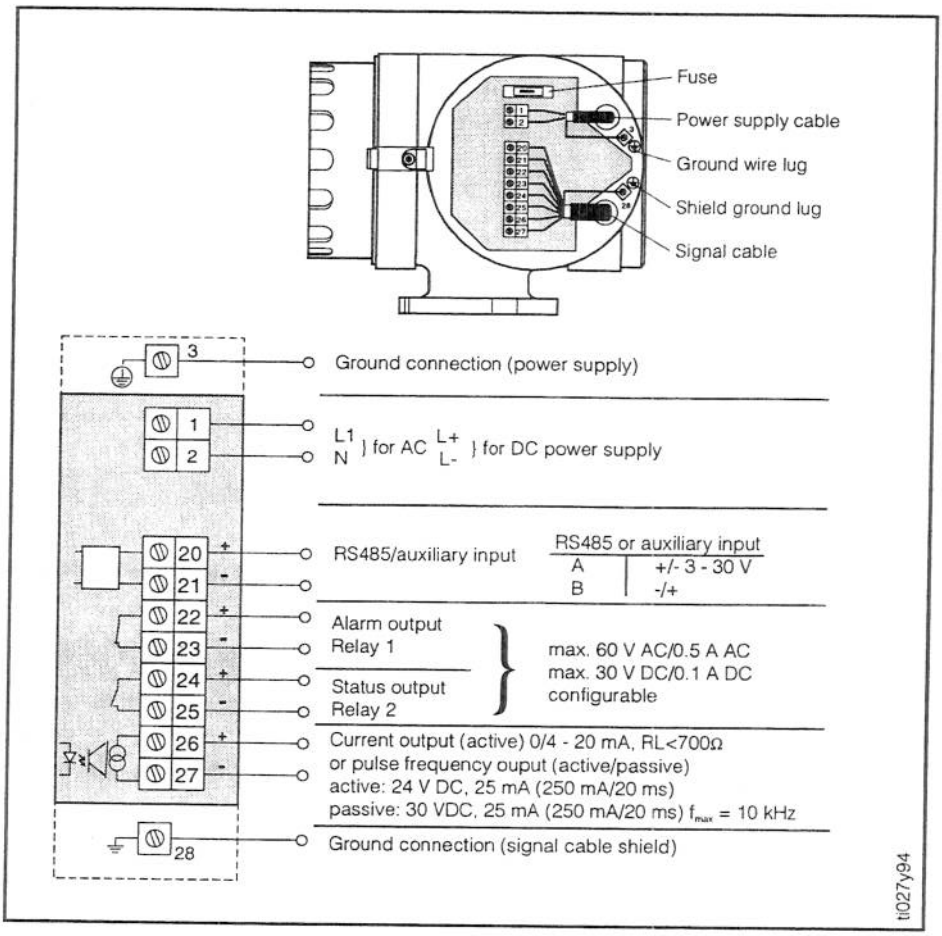


Figure 31
Electrical connection of Promag 33 power supply, input and output signals (with RS485 communication module)

Connections

Transmitters with a Rackbus link are connected to a process control system via the gateways MODBUS ZA 672, PROFIBUS ZA 673 (with an additional plug-in board for PROFIBUS) or FIP ZA 674.
Transmitters with HART protocols are connected directly via the Commubox. The appropriate driver (DDE server) can be selected with ordering

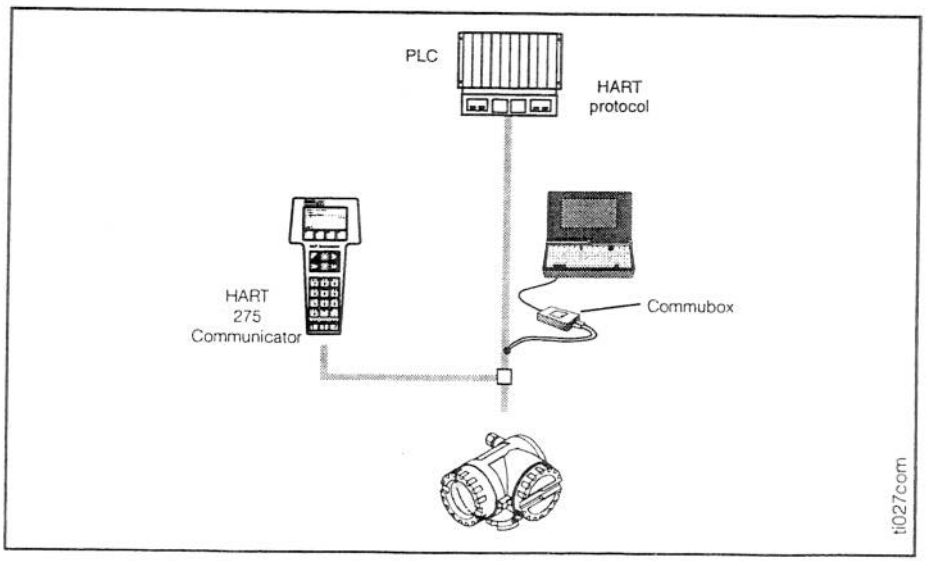
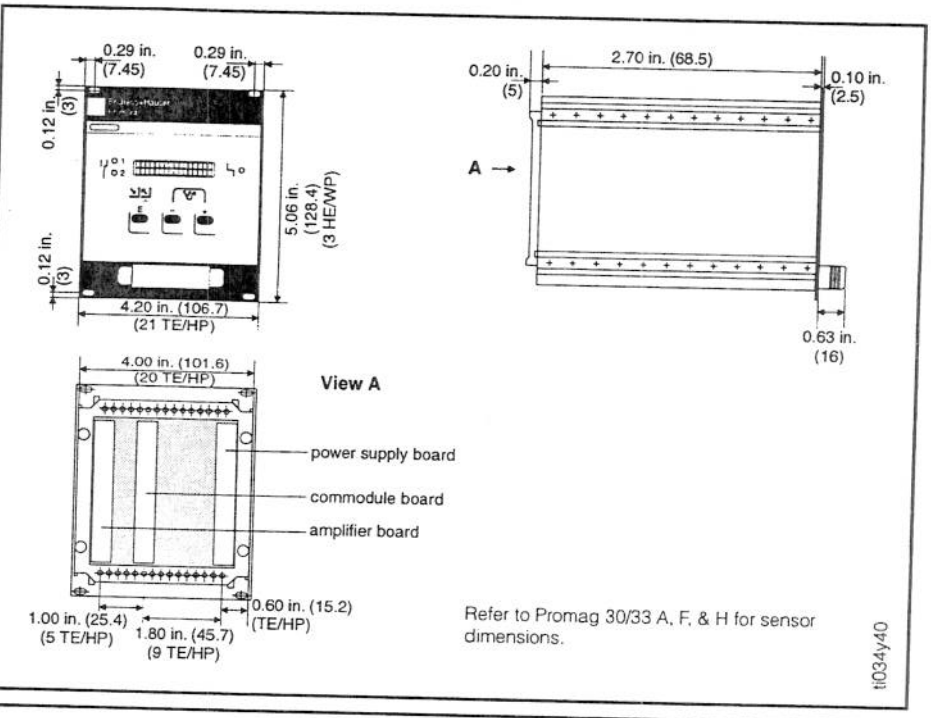
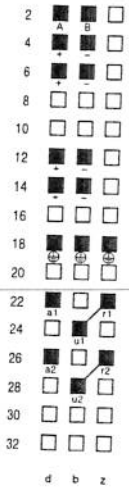


Figure 32
Connecting transmitters with HART protocols to a laptop running Commuwin II, using the Commubox interface adapter.



Commodule board



RS 485 hardware standard: Rackbus protocol
E+H hardware standard: Rackbus protocol

pulse/frequency output (active/passive)
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)

auxiliary input (3 to 30 V DC)

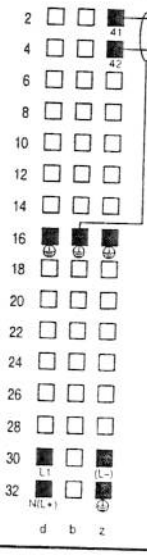
current output 0/4 to 20 mA ($R_{L\ min}$ for HART = 250 Ω)

relay 1 alarm output: available as NC (u1 - r1) and NO contact, maximum 250 V AC/30 V DC, max. 1 A

relay 2 status output: available as NC (u2 - r2) and NO contact, maximum 250 V AC/30 V DC, max. 1 A

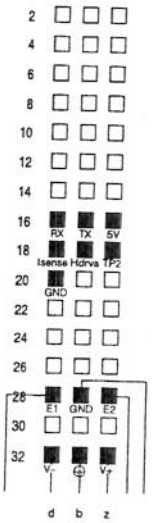
ti034x34

Power supply board



ti034x35

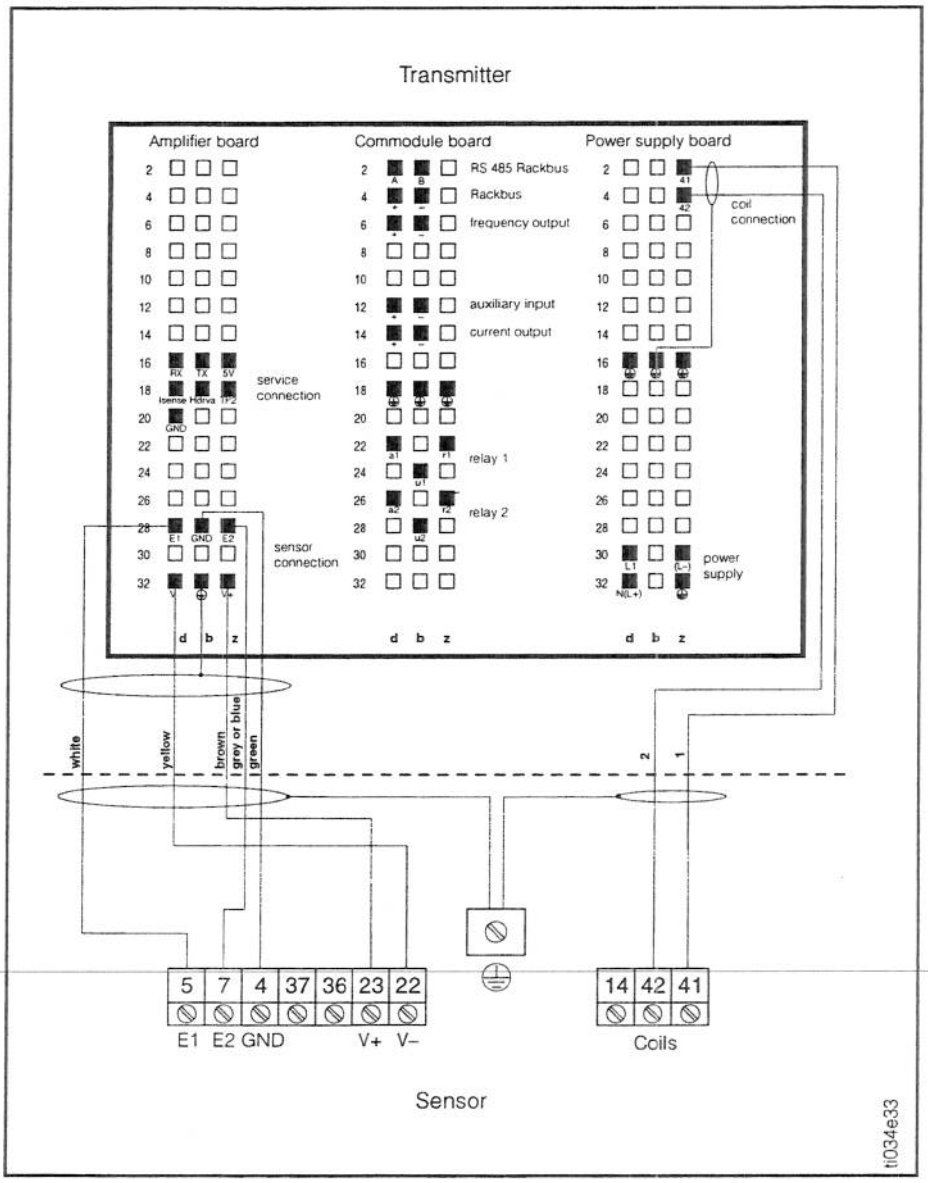
Amplifier board



ti034x36

Promag 39 H and F (FL version)

Wiring diagram transmitter-sensor



Cable Specifications

Promag 30/33 remote version (FS) cable specifications (E + H supplied)

Coil cable: 2 conductor 18 AWG PVC cable with overall shield
Resistance: 0.011 Ω/ ft
Capacitance: core/core, grounded shield 36 pF/ft

Signal cable: 4 conductor 20 AWG PVC cable
Resistance: 0.015 Ω/ ft (EPD L_{max}=33 ft)
Capacitance: core/shield 128 pF/ft

Customer Supplied: See page 10 for cable specifications

Promag 30/33/39 remote version (FL) cable specifications (E + H supplied)

Coil cable: 2 conductor 18 AWG PVC cable with overall shield
Resistance: 0.011 Ω/ ft
Capacitance: core/core, grounded shield 36 pF/ft

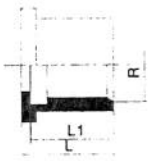
Signal cable: 5 conductor 18 AWG PVC cable with overall shield
Conductor resistance: 0.011 Ω/ ft
Capacitance: core/core 36 pF/ft

Note:
The cable must be resistant to an ambient temperature of max. +176°F if the Promag H is operated at a process temperature of +300°F

Dimensions

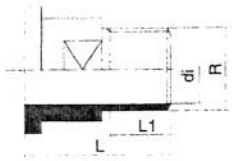
Promag A
Process Connections

Internal thread



Meter size	L	L1	R (NPT)
1/12" - 1/2"	0.79	0.71	1/2"
1"	1.77	0.87	1"

External thread

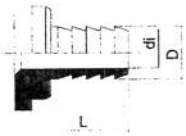


Meter size	L	L1	di	R (NPT)
1/12" - 1/2"	1.65	0.91	0.63	1/2"
1"	1.97	0.66	0.87	1"

PVC bonding sleeve

Meter size	L	D
1/12" - 1/2"	0.75	0.79
1"	2.60	0.98
1"	2.72	1.26

Flexible tubing fitting



Meter size	L	D	di	LW
1/12" - 1/2"	1.18	0.57	0.35	0.51
1/12" - 1/2"	1.18	0.69	0.50	0.63
1/12" - 1/2"	1.18	0.83	0.63	0.75

Weld nipple

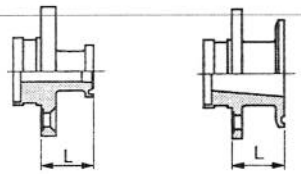
PIPE

Meter size	L	D	s
1/12" - 1/2"	0.79	0.84	0.10
1"	1.18	1.33	0.13

SANITARY TUBING

Meter size	L	D	s
1/12" - 1/2"	0.79	0.71	0.04
1"	1.18	1.06	0.10

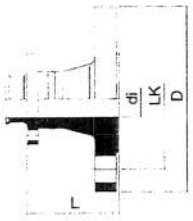
Tri-Clamp
316L
stainless steel



Tri-Clamp	L	For meters
1/2"	0.94 in.	1/12" to 5/16"
3/4"	0.94 in.	1/2"
1"	0.94 in.	1/2" to 1"

Flange
316L stainless steel
ANSI B16.5
dimensions

1/12" - 1/2":
with 1/2" flanges
1":
with 1" flanges

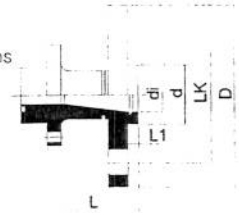


ANSI B16.5 flanges

Meter size	Class 150				Class 300		
	L	D	LK	di	L	D	LK
1/12" - 1/2"	2.46	3.50	2.38	0.62	2.64	3.75	2.62
1"	2.69	4.25	3.12	1.05	2.94	4.88	3.50

Flange
PVDF
ANSI B16.5 dimensions

1/12" - 1/2":
with 1/2" flanges
1":
with 1" flanges



ANSI B16.5 flanges,
Class 150

Meter size	L	L1	D	d	di	LK ANSI
1/12" - 1/2"	2.07	0.24	3.74	1.34	0.64	2.36
1"	2.07	0.28	4.53	1.97	1.07	3.11

Dimensions in inches

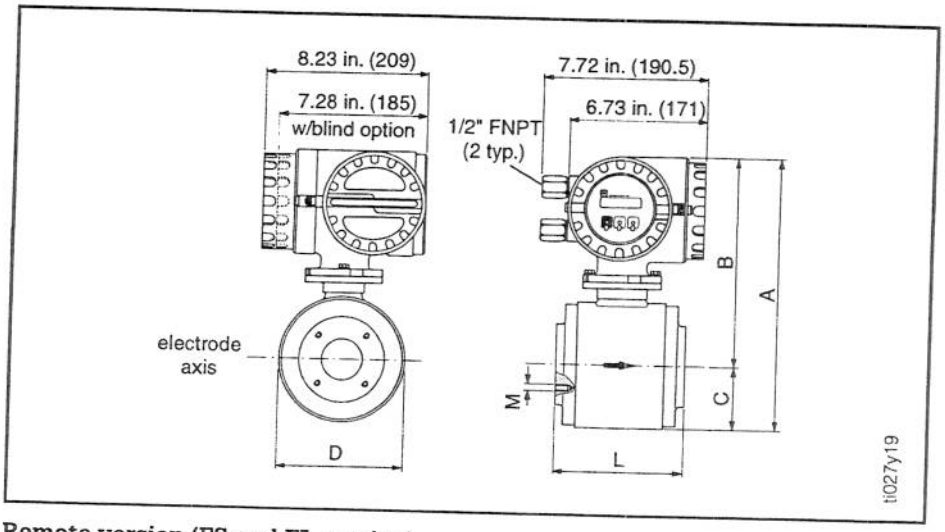
Face-to-face lengths: **2 x L + 5.63 in**
2 x L + 3.74 in for flange version

Dimensions

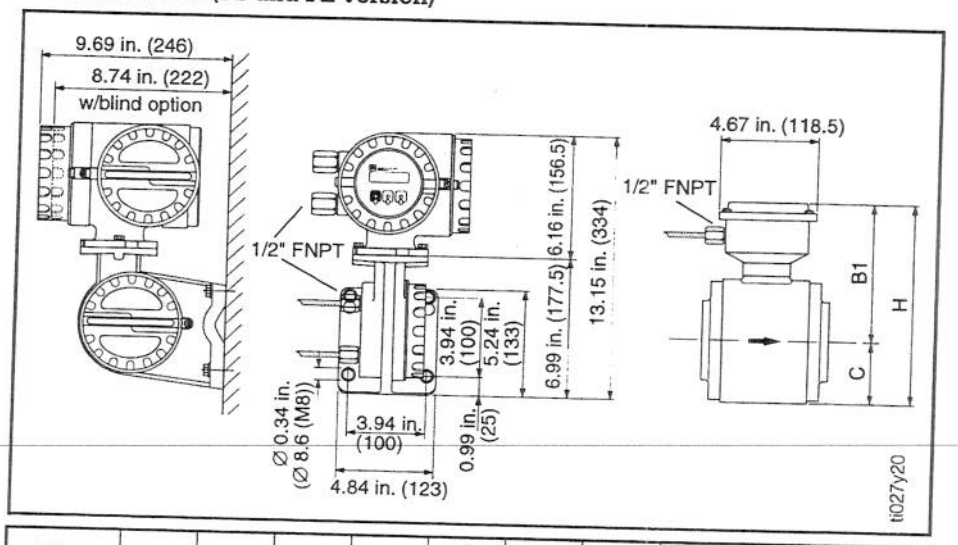
Promag 30/33 H
1" - 4"

When ordering the blind option, use blind option dimensions

Compact version



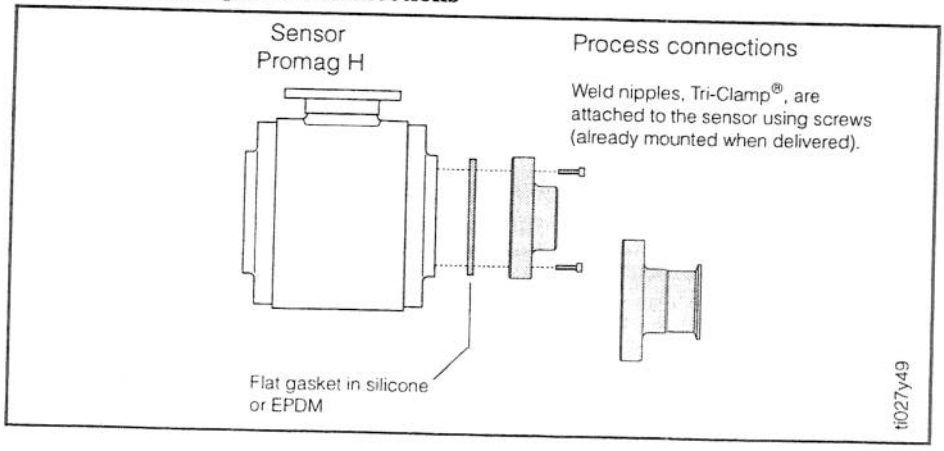
Remote version (FS and FL version)



Size [in.]	L [in.]	A [in.]	B [in.]	B1 [in.]	C [in.]	D [in.]	H [in.]	M [thread]	Weight* [lbs.]
1"	5.50	12.5	10.0	6.24	2.52	5.04	8.76	M6	19.8
1 1/2"	5.50	12.5	10.0	6.24	2.52	5.04	8.76	M6	20.9
2"	5.50	13.5	10.5	6.73	3.01	6.02	9.74	M8	26.5
2 1/2"	5.50	13.5	10.5	6.73	3.01	6.02	9.74	M8	26.5
3"	7.87	15.5	11.5	7.72	4.00	7.99	11.7	M12	48.5
4"	7.87	15.5	11.5	7.72	4.00	7.99	11.7	M12	47.4

*Weights for compact version

Promag H sensor process connections



Note: A weld-in tool is available for installation, see pg. 46.

Size [in.]	L* [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	H [in]	B1 [in]	Weight [lbs]
1/2"	7.87	13.41	10.10	3.31	4.72	3.70	0.44	12.80	9.49	14.3
1"	7.87	13.41	10.10	3.31	4.72	3.70	0.56	12.80	9.49	16.1
1 1/2"	7.87	13.41	10.10	3.31	4.72	3.70	0.69	12.80	9.49	20.7
2"	7.87	13.41	10.10	3.31	4.72	3.70	0.75	12.80	9.49	23.3
3"	7.87	15.37	11.08	4.29	7.09	3.70	0.94	14.76	10.47	30.8
4"	9.84	15.37	11.08	4.29	7.09	3.70	0.94	14.76	10.47	35.2
6"	11.81	18.56	12.66	5.91	10.24	5.51	1.00	17.95	12.05	56.1
8"	13.78	20.73	13.64	7.09	12.76	6.14	1.12	20.12	13.03	77.7
10"	17.72	22.70	14.63	8.07	15.75	6.54	1.19	22.09	14.02	106.7
12"	19.68	24.67	15.61	9.06	18.11	6.54	1.25	24.06	15.00	126.5
14"	21.70	29.10	18.00	11.10	22.20	10.90	1.37	28.40	17.30	234.0
16"	23.60	31.10	19.00	12.10	24.30	10.90	1.44	30.50	18.40	274.0
18"	25.60	33.10	20.00	13.10	26.20	11.50	1.56	32.50	19.40	507.0
20"	25.60	35.10	21.00	14.10	28.20	11.50	1.69	34.50	20.40	375.0
24"	30.70	39.10	23.00	16.10	32.20	15.80	1.87	38.50	22.40	485.0
28"	35.80	47.10	27.00	20.10	40.20	23.20	1.31	46.50	26.40	728.0
30"	38.40	47.10	27.00	20.10	40.20	24.70	1.37	46.50	26.40	926.0
32"	40.90	48.70	27.80	21.00	41.90	25.50	1.50	48.10	27.10	926.0
36"	46.10	54.70	30.80	24.00	47.90	30.90	1.63	54.10	30.20	1213.0
40"	51.20	60.70	33.80	26.90	53.90	33.90	1.63	60.10	33.20	1433.0
42"	53.70	62.70	34.80	27.90	55.80	35.90	1.75	62.10	34.20	2095.0
48"	61.40	70.50	38.70	31.80	63.60	39.10	1.75	69.90	38.10	2315.0
54"	69.10	78.66	42.76	35.91	71.81	49.29	2.13	76.16	40.61	4741.0
56"	71.65	84.57	45.70	38.86	77.72	49.29	—	82.42	43.56	3969.0
60"	76.77	86.46	46.65	39.80	79.61	54.80	2.25	84.31	44.51	5733.0
64"	81.89	90.00	48.43	41.57	83.15	58.35	—	87.85	46.28	5512.5
66"	84.45	92.91	49.88	43.03	86.06	58.35	2.50	90.77	47.74	8158.5
72"	92.13	100.4	53.62	46.77	93.54	64.25	2.63	98.25	41.48	7276.5
78"	102.4	104.3	55.59	48.74	97.48	68.19	2.75	102.2	43.44	9040.5

* Thickness of the flange face includes sealing strip. The face-to-face length is independent of the pressure rating.

Note: The dimensions and weights of FM Class I, Div. 1 sensors can differ from those stated here. Refer to the separate FM documentation EX 006D/24/A2/06.96 available from Endress + Hauser.

Table 2