Flexible System

- Wide choice of materials for process connections and measuring tube linings, compatible to the fluid
- Transmitter housing and display can be rotated to fit the orientation

Operational Security

- ISO 9001 manufacturer
- High electromagnetic compatibility (EMC)
- High operating integrity through self-monitoring with alarm function
- Data protection with EEPROM on power failure (without batteries)
- Empty Pipe Detection (EPD)

Measure Precisely

- Measured error: ±0.5% or ±0.2%
- 1000:1 operable flow range
- Excellent repeatability

Install Anywhere

- Robust, shock-resistant aluminium housing, resistant to acids and caustics
- IP 67 protection for compact and remote versions (optional IP 68 sensor)
- Wide size range DN 2...2000 (1/12...78")
- Flanged version with ISO meter lengths
- Hygienic sensor for food and pharmaceutical applications
- Ex versions for use in Ex Zones 1 and 2

Easy to Operate

- Illuminated, double-spaced display
- Touch control: Operation from outside without opening the housing
- E+H operating matrix – menudriven operation for all instrument parameters
- Interfaces: HART, PROFIBUS-PA, PROFIBUS-DP, Rackbus RS 485

Endress + Hauser
Nothing beats know-how
Measuring System

Fields of Application
With the Promag 33 flowmeter most liquids can be measured provided they have a minimum conductivity of ≥ 5 µS/cm, e.g.
- acids, alkalis, pastes, pulps,
- drinking water, wastewater, sewage sludge,
- milk, beer, wine, mineral water, yoghurt, molasses, etc.

A minimum conductivity of ≥ 20 µS/cm is required for measuring demineralised water.

Ex Versions
Promag 33 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.

Measuring System
The measuring system consists of:
- Promag 33 transmitter
- Promag A, H or F sensor

The Promag 33 measuring system is mechanically and electronically designed for maximum flexibility with the transmitters and sensors being combined in any variation. The wide range of materials and process connections (fittings; flanges DIN, ANSI, JIS; Tri-Clamp, etc.) ensure that the measuring point can adjust to both plant and process conditions.
Function

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 velocity and is fed to the measuring amplifier by a pair of electrodes. 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.

Measuring Principle

The Promag transmitter converts the measured values coming from the sensor into standardised output signals. The following outputs are available for these signals:

- Current output
- Pulse / Frequency output
- Alarm output (Relay 1)
- Status output (Relay 2)

Promag 33 also has the following features:

- Relay 1 and 2 are freely configurable
- Auxiliary input (positive zero return, totalizer reset, batching, dual range mode)
- Empty Pipe Detection (EPD) detects and indicates partially filled or empty measuring tubes.
- The special electrode cleaning circuitry (EEC) ensures accurate flow measurement even with conductive build-up in the measuring tube (e.g. magnetite).

\[
\begin{align*}
U_e &= B \cdot L \cdot v \\
Q &= v \cdot A \\
U_e &= \text{induced voltage} \\
B &= \text{magnetic induction (magnetic field)} \\
L &= \text{distance between measuring electrodes} \\
v &= \text{flow velocity} \\
Q &= \text{volume flow} \\
A &= \text{pipe cross-section}
\end{align*}
\]
Operation

The Promag 33 measuring system is equipped with an illuminated, double-spaced LC display. This ensures that all important variables can be read off and controlled directly at the measuring point:

- Technical units
- Current output functions
- Totalizer functions
- Pulse and frequency output functions
- Relay functions
- Limit values
- Batching functions with integral preset counter

Display parameters

- Creep suppression
- Empty pipe detection (EPD)
- Single and bidirectional measurement
- Auxiliary input

Three operating keys are used for selecting and setting all functions of the instrument. The E+H operating matrix allows quick and easy access to all individual functions.

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

Communication

Depending on which module is fitted, Promag 33 has different interfaces for communication ability with higher level systems:

- HART protocol (SMART technology) is possible on the current output.
- Direct communication to a personal computer and the E+H Rackbus world is possible via the RS 485 interface.

- The PROFIBUS-PA version provides an indirect connection to process control systems via segment couplers.
- Promag 33 is also available as a PROFIBUS-DP version for connecting to a PROFIBUS-DP network.

This communication feature enables operation and configuration of instruments which have no local display.
Diameter Selection

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

A necessary increase in velocity can be achieved through a reduction of the sensor diameter (see page 8). The higher installation expense is normally balanced by the lower sensor cost.

The flow velocity ($v$) is also to be determined by the fluid’s physical properties:
- $v < 2$ m/s: with abrasive fluids, e.g. potter’s clay, lime milk, ore slurry
- $v > 2$ m/s: with fluids causing build up, e.g. wastewater slurry etc.

The table below summarizes the minimum and maximum full scale values for the current output (incl. factory settings).

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>DN [inch]</th>
<th>Minimum full scale at $v = 0.3$ m/s</th>
<th>Factory setting at $v = 2.5$ m/s</th>
<th>Maximum full scale at $v = 10$ m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$\frac{1}{12}$</td>
<td>0.0034</td>
<td>0.0283</td>
<td>0.1131</td>
</tr>
<tr>
<td>4</td>
<td>$\frac{5}{32}$</td>
<td>0.0136</td>
<td>0.1131</td>
<td>0.4524</td>
</tr>
<tr>
<td>8</td>
<td>$\frac{1}{4}$</td>
<td>0.0543</td>
<td>0.4524</td>
<td>1.810</td>
</tr>
<tr>
<td>15</td>
<td>$\frac{1}{2}$</td>
<td>0.1908</td>
<td>1.590</td>
<td>6.362</td>
</tr>
<tr>
<td>25</td>
<td>1&quot;</td>
<td>0.5301</td>
<td>4.418</td>
<td>17.67</td>
</tr>
<tr>
<td>32</td>
<td>$1\frac{1}{4}$</td>
<td>0.8685</td>
<td>7.238</td>
<td>28.95</td>
</tr>
<tr>
<td>40</td>
<td>$1\frac{1}{2}$</td>
<td>1.357</td>
<td>11.31</td>
<td>45.24</td>
</tr>
<tr>
<td>50</td>
<td>2&quot;</td>
<td>2.121</td>
<td>17.67</td>
<td>70.69</td>
</tr>
<tr>
<td>65</td>
<td>$2\frac{1}{2}$</td>
<td>3.584</td>
<td>29.87</td>
<td>119.5</td>
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<tr>
<td>80</td>
<td>3&quot;</td>
<td>5.429</td>
<td>45.24</td>
<td>181.0</td>
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<tr>
<td>100</td>
<td>4&quot;</td>
<td>8.482</td>
<td>70.69</td>
<td>282.7</td>
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<tr>
<td>125</td>
<td>5&quot;</td>
<td>13.25</td>
<td>110.5</td>
<td>441.8</td>
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<tr>
<td>150</td>
<td>6&quot;</td>
<td>19.09</td>
<td>159.0</td>
<td>636.2</td>
</tr>
<tr>
<td>200</td>
<td>8&quot;</td>
<td>33.93</td>
<td>282.7</td>
<td>1130</td>
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<tr>
<td>250</td>
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<td>300</td>
<td>12&quot;</td>
<td>76.34</td>
<td>636.2</td>
<td>2545</td>
</tr>
<tr>
<td>350</td>
<td>14&quot;</td>
<td>103.9</td>
<td>865.9</td>
<td>3464</td>
</tr>
<tr>
<td>400</td>
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<td>450</td>
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<td>500</td>
<td>20&quot;</td>
<td>212.1</td>
<td>1767</td>
<td>7069</td>
</tr>
<tr>
<td>600</td>
<td>24&quot;</td>
<td>305.4</td>
<td>2545</td>
<td>10179</td>
</tr>
<tr>
<td>700</td>
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<td>750</td>
<td>30&quot;</td>
<td>477.1</td>
<td>3976</td>
<td>15904</td>
</tr>
<tr>
<td>800</td>
<td>32&quot;</td>
<td>542.9</td>
<td>4524</td>
<td>18096</td>
</tr>
<tr>
<td>900</td>
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<td>667.1</td>
<td>5726</td>
<td>22902</td>
</tr>
<tr>
<td>1000</td>
<td>40&quot;</td>
<td>848.2</td>
<td>7069</td>
<td>28274</td>
</tr>
<tr>
<td>1050</td>
<td>42&quot;</td>
<td>935.2</td>
<td>7793</td>
<td>31172</td>
</tr>
<tr>
<td>1200</td>
<td>48&quot;</td>
<td>1222</td>
<td>10179</td>
<td>40715</td>
</tr>
<tr>
<td>1350</td>
<td>54&quot;</td>
<td>1546</td>
<td>12852</td>
<td>51530</td>
</tr>
<tr>
<td>1400</td>
<td>56&quot;</td>
<td>1663</td>
<td>13854</td>
<td>55418</td>
</tr>
<tr>
<td>1500</td>
<td>60&quot;</td>
<td>1909</td>
<td>15904</td>
<td>63617</td>
</tr>
<tr>
<td>1600</td>
<td>64&quot;</td>
<td>2172</td>
<td>18096</td>
<td>72382</td>
</tr>
<tr>
<td>1700</td>
<td>66&quot;</td>
<td>2451</td>
<td>20428</td>
<td>81713</td>
</tr>
<tr>
<td>1800</td>
<td>72&quot;</td>
<td>2748</td>
<td>22902</td>
<td>91609</td>
</tr>
<tr>
<td>2000</td>
<td>78&quot;</td>
<td>3393</td>
<td>28274</td>
<td>113097</td>
</tr>
</tbody>
</table>
In order to measure correctly and to prevent damage, please observe the following installation instructions.

**Mounting Position**

*Vertical mounting:* This is the recommended position with the flow upwards. Entrained solid particles sink and fatty components in the stationary fluid rise away from the measuring electrodes. This is the optimal position in empty pipe system and when using Empty Pipe Detection.

*Horizontal mounting:* The axis of the electrodes must be horizontal, thus preventing brief insulation of the electrodes by entrained air bubbles.

**Electrode axis:** The plane in which the electrode axis lies with regard to the transmitter is identical for the Promag A, H and F sensors.

**Inlet and Outlet Sections**

The sensor should be mounted away from fittings such as valves, T-pieces, elbows, etc.

- Inlet section:  ≥ 5 x DN
- Outlet section:  ≥ 2 x DN

The inlet and outlet sections must be observed in order to maintain accuracy.

**Vibration**

The piping before and after the sensor should be securely fastened if there is excessive vibration. Information on shock and vibration resistance is found on page 25. Excessive vibration necessitates separate mounting of the sensor and transmitter.

Mechanical support of the sensor is recommended for free runs of piping over 10 m long.
Correct measurement is only possible when the pipe is full. The following locations should therefore be avoided:

- No installation at the highest point (air accumulation).
- No installation immediately before an open pipe outlet in a downward line.

The alternative installation, however, permits a correct measurement.

For inclines a mounting similar to a drain should be adopted. Added security is offered by Empty Pipe Detection (EPD) in order to detect empty or partly filled pipes.

Note!
Danger of solids accumulation!
Do not mount the sensor at the lowest point of the drain. A cleaning valve should also be installed.

With the installation suggested opposite, partial vacuum is avoided even with a downward pipe > 5 m long (siphon, vent valve downstream of the sensor).

Do not mount the sensors on the suction side of pumps.
This prevents low pressure and prevents possible damage to the lining of the measuring tube.

Pulse dampers should be installed when using reciprocal, diaphragm or peristaltic pumps.
Mounting

The sensor can also be mounted in a pipe with a larger nominal diameter when suitable adapters (reducers and expanders) to DIN 28545 are fitted. The resultant increase in the rate of flow increases the accuracy of measurement with slowly moving fluids.

The adjacent nomogram can be used to determine the pressure loss caused:

1. Determine the ratio of the diameter d/D.
2. From the nomogram read off the pressure loss at the flow velocity and d/D ratio.

Note!
The nomogram applies to fluids with a viscosity similar to that of water.

Remote Version
Two different versions are available for the remote version:

FS version
- The permissible cable length greater than 10 meters is governed by the fluid conductivity (see Figure).
- Permissible cable length of max. 10 meters if the instrument is equipped with an Empty Pipe Detection (EPD) electrode.
- The FS cable is recommended only for distances smaller than 20 m.

FL version
- All fluids with a minimum conductivity of \( \geq 5 \ \mu S/cm \) (demineralised water \( \geq 20 \ \mu S/cm \)) can be measured independent of the cable length.
- Empty Pipe Detection (EPD) is not available with this version.

Please also note the following:
- Fasten the cable gland or lay it in a conduit. When the fluid conductivity is low, cable movements can cause serious changes in capacitance and thereby falsify the measuring signal.
- Do not run the cable in the vicinity of electrical machines or switching elements.
- Ensure potential equalisation between the transmitter and the sensor.
The input and outputs are galvanically separated from the power supply and from each other.

**“HART” version**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Ground connection (protective earth)</td>
</tr>
<tr>
<td>1</td>
<td>L for AC power supply</td>
</tr>
<tr>
<td>2</td>
<td>L for DC power supply</td>
</tr>
<tr>
<td>20</td>
<td>Pulse / Frequency output</td>
</tr>
<tr>
<td>21</td>
<td>active/passive, ( f_{\text{max}} = 10 \text{kHz} )</td>
</tr>
<tr>
<td>22</td>
<td>Alarm output (Relay 1)</td>
</tr>
<tr>
<td>23</td>
<td>can be configured</td>
</tr>
<tr>
<td>24</td>
<td>Status output (Relay 2)</td>
</tr>
<tr>
<td>25</td>
<td>can be configured</td>
</tr>
<tr>
<td>26</td>
<td>Current output</td>
</tr>
<tr>
<td>27</td>
<td>active, 0/4...20 mA, ( R_L &lt; 700 \Omega ) (with HART: ( R_L \geq 250 \Omega ))</td>
</tr>
<tr>
<td>28</td>
<td>Ground connection (screening of signal cable)</td>
</tr>
</tbody>
</table>

**“PROFIBUS-PA” version**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Ground connection (protective earth)</td>
</tr>
<tr>
<td>1</td>
<td>L for AC power supply</td>
</tr>
<tr>
<td>2</td>
<td>L for DC power supply</td>
</tr>
<tr>
<td>20–21</td>
<td>not used</td>
</tr>
<tr>
<td>22</td>
<td>Current output</td>
</tr>
<tr>
<td>23</td>
<td>active, 0/4...20 mA</td>
</tr>
<tr>
<td>24–25</td>
<td>not used</td>
</tr>
<tr>
<td>26</td>
<td>PROFIBUS-PA</td>
</tr>
<tr>
<td>27</td>
<td>EN 50170 Volume 2, IEC 1158-2</td>
</tr>
<tr>
<td>28</td>
<td>Ground connection (screening of signal cable)</td>
</tr>
</tbody>
</table>

**“PROFIBUS-DP” version**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Ground connection (protective earth)</td>
</tr>
<tr>
<td>1</td>
<td>L for AC power supply</td>
</tr>
<tr>
<td>2</td>
<td>L for DC power supply</td>
</tr>
<tr>
<td>20–25</td>
<td>not used</td>
</tr>
<tr>
<td>26</td>
<td>Data B</td>
</tr>
<tr>
<td>27</td>
<td>PROFIBUS-DP (RS 485 interface)</td>
</tr>
<tr>
<td>28</td>
<td>Ground connection (screening of signal cable)</td>
</tr>
</tbody>
</table>
Electrical Connection
Transmitter

Fuse
- Power supply 20...55 V AC / 16...82 V DC:
  2.5 A slow-blow / 250 V; 5.2 x 20 mm
- Power supply 85...260 V AC:
  1 A slow-blow / 250 V; 5.2 x 20 mm

Supply cable
Ground terminal for protective conductor
Ground terminal for signal cable shield
Signal cable

The input and outputs are galvanically separated from the power supply and from each other.

“Rackbus RS 485” version

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Ground connection (protective earth)</td>
</tr>
<tr>
<td>1</td>
<td>L1 for AC power supply</td>
</tr>
<tr>
<td>2</td>
<td>N for AC power supply</td>
</tr>
<tr>
<td>20</td>
<td>L+ for DC power supply</td>
</tr>
<tr>
<td>21</td>
<td>L- for DC power supply</td>
</tr>
<tr>
<td>22</td>
<td>RS 485 interface or Auxiliary input</td>
</tr>
<tr>
<td>23</td>
<td>A or +/–</td>
</tr>
<tr>
<td>24</td>
<td>B or –/+</td>
</tr>
<tr>
<td>25</td>
<td>3..30 V DC</td>
</tr>
<tr>
<td>26</td>
<td>Alarm output (Relay 1) can be configured</td>
</tr>
<tr>
<td>27</td>
<td>max. 60 V AC / 0.5 A AC; max. 30 V DC / 0.1 A DC</td>
</tr>
<tr>
<td>28</td>
<td>Status output (Relay 2) can be configured</td>
</tr>
<tr>
<td>29</td>
<td>max. 60 V AC / 0.5 A AC; max. 30 V DC / 0.1 A DC</td>
</tr>
</tbody>
</table>

“EEEx i” version

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
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<tbody>
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<td>Ground connection PE (protective earth)</td>
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<tr>
<td>1</td>
<td>L1 for AC power supply</td>
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<tr>
<td>2</td>
<td>N for AC power supply</td>
</tr>
<tr>
<td>20 / 21</td>
<td>not used</td>
</tr>
<tr>
<td>22</td>
<td>Current output or Pulse/frequency output</td>
</tr>
<tr>
<td>23</td>
<td>active, 0/4...20 mA, Rl &lt; 350 Ω</td>
</tr>
<tr>
<td>24</td>
<td>(with HART: Rl ≥ 250 Ω)</td>
</tr>
<tr>
<td>25</td>
<td>not used</td>
</tr>
<tr>
<td>26</td>
<td>Pulse/frequency output or Pulse/frequency output</td>
</tr>
<tr>
<td>27</td>
<td>passive, f_{max} = 10 kHz</td>
</tr>
<tr>
<td>28</td>
<td>Can be used as NAMUR contact acc. to DIN 19234</td>
</tr>
</tbody>
</table>

Terminal compartment with:
- a special terminal block for intrinsically safe outputs and
- an IP 40 cover for power supply terminals.
**Remote Version “FS”**

Coil cable: 2 x 0.75 mm² PVC cable with common screen *
- Conductor resistance: ≤ 37 Ω/km
- Capacitance: core/core, screen grounded: ≤ 120 pF/m
- Permanent operating temperature: –20...+70 °C

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 operating temperature: –20...+70 °C

* braided copper screen: ∅ ~ 7 mm

**Remote Version “FL”**

Coil cable: 2 x 0.75 mm² PVC cable with common screen *
- Conductor resistance: ≤ 37 Ω/km
- Capacitance: core/core, screen grounded: ≤ 120 pF/m
- Permanent operating temperature: –20...+70 °C

Signal cable: 5 x 0.5 mm² PVC cable with common screen *
- Conductor resistance: ≤ 37 Ω/km
- Capacitance: core/core, screen grounded: ≤ 120 pF/m
- Permanent operating temperature: –20...+70 °C

* braided copper screen:
  - coil cable ∅ ~ 7 mm; signal cable ∅ ~ 9 mm

**Operation in Areas with Severe Electrical Interference**

The Promag 33 measuring system fulfils all general safety requirements according to EN 61010 and electromagnetic compatibility (EMC) according to EN 50081 Part 1 and 2 / EN 50082 Part 1 and 2 when installed in accordance with the NAMUR recommendations.

Note!
- To comply with the certificate of conformity, the signal and coil cables between the sensor and transmitter of the remote version must always be screened and grounded at both ends. Grounding is made using the ground terminals especially for this purpose on the inside of the connection housings. Keep stripped and twisted cable shield section to the ground terminal as short as possible.
- The cable must be resistant to an ambient temperature of max. +80 °C if the Promag H sensor is operated at a process temperature of +150 °C.
Potential Equalisation

The sensor and the fluid must have roughly the same electrical potential to ensure that measurement is accurate and no galvanic corrosion takes place at the electrode.

Normally the reference electrode in the sensor or the metal pipe ensures that the potentials are equalised.

Reference electrodes:
Promag A: Always with reference electrode
Promag F: Optional, depending on material
Promag H: No reference electrode, as there is always a metallic connection to the fluid.

If the reference electrode is correctly grounded and the fluid flows through metallic, non-lined and grounded piping, then it is sufficient to connect the grounding terminal of the Promag 33 transmitter housing to the potential equalisation line in order to prevent corrosion. The connection with the remote-mounted version is made at the ground terminal of the connection housing.

Caution!
Danger of permanent damage to the instrument! If the fluid cannot be grounded for operational reasons, ground disks are to be used.

Potential Equalisation for Lined Pipes with Cathodic Protection

When the fluid cannot be grounded for operational reasons, the measuring unit must be installed that it is potential-free. Ensure that components of the piping are connected to one another (copper wire, 6 mm²).

All national regulations regarding potential free installation are to be observed (e.g. VDE 0100). Ensure that the mounting material used does not result in a conductive bond with the measuring unit and that the material can withstand the tightening torque used.
Potential Equalisation

Ground disks must always be used with non-conductive piping materials if compensation currents flow through the fluid. They can irreparably damage the reference electrode within a short time due to electrochemical corrosion.

Such conditions occur especially if:
• the piping is insulated with electrically non-conductive materials and
• the piping is made of fibreglass or PVC through which flow highly concentrated acids and alkalis.

Caution!
Danger from damage due to electrochemical corrosion!
• Note the corrosion resistance of the ground disks.
• Note the electrochemical potential series in cases where the ground disks and the measuring electrodes are made of different material.

Equalising Currents in Ungrounded Metal Pipes / Grounding in an Area with Severe Interference

The fluid may be grounded. In order to make the most of the electromagnetic compatibility (EMC) of the Promag 33, it is advisable to provide two flange-to-flange links and to connect them jointly with the transmitter housing to ground potential.

Wall mounting kit Promag A

![Wall mounting kit Promag A diagram]
Dimensions
Promag 33 A

Compact version

Remote version

Weight:
Compact version 5 kg (without process connections)
Promag 33 transmitter 3 kg (5 kg for wall mounted version)
Promag A sensor 2 kg
* with blind version

Can be ordered separately as mounting set:
Internal thread, external thread, PVC adhesive coupling, hose connection, welded nipples

A

Mounting set:
coupling nut on a 1" threaded stub

B

Screw-in process connections
(instead of threaded stub)

Process connections Promag A
(Dimensions: see page 16)

A

DN 2...25

1" threaded stub (ISO 228)

B

DN 2...25

Flange joints
(mounted when delivered)

Tri-Clamp
(mounted when delivered)
### Process Connections Promag A

#### Internal thread
standard thread: ISO 228/DIN 2999

<table>
<thead>
<tr>
<th>DN</th>
<th>L</th>
<th>L1</th>
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<tbody>
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<td>1&quot;</td>
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#### External thread
standard thread: ISO 228/DIN 2999

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#### PVC adhesive coupling

#### Hose connection

#### Welded nipple
DN 2...15

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<td>21.3</td>
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<td>18.1</td>
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#### Welded nipple
DN 25

#### Tri-Clamp
Stainless steel 1.4404/316L

#### Flange
Stainless steel 1.4404/316L
with joint dimensions to DIN 2501/ANSI B16.5/JIS B2210

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#### Flange to DIN 2501, PN 40

#### Flange to ANSI B16.5

Class 150
Class 300

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<th>Class 300</th>
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#### Flange to JIS B2210

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PN 16/Class 150/10K

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<td>27.2</td>
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Face-to-face length to DVGW (200 mm)

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<td>25</td>
<td>52.7</td>
<td>7</td>
<td>27.2</td>
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Face-to-face length to DVGW (200 mm)

All dimensions in [mm]
Dimensions
Promag 33 H

Compact version

Remote version

* with blind version

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<th>L [mm]</th>
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<th>B [mm]</th>
<th>B1 [mm]</th>
<th>C [mm]</th>
<th>K [mm]</th>
<th>H [mm]</th>
<th>M</th>
<th>Weight 2) [kg]</th>
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<td>140</td>
<td>318</td>
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<td>158.5</td>
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<td>128</td>
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<tr>
<td>25</td>
<td>1”</td>
<td>22.6</td>
<td>16</td>
<td>140</td>
<td>318</td>
<td>254.0</td>
<td>158.5</td>
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<td>128</td>
<td>222.5</td>
<td>M 6x4</td>
</tr>
<tr>
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<td>16</td>
<td>140</td>
<td>318</td>
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<td>222.5</td>
<td>M 6x4</td>
</tr>
<tr>
<td>50</td>
<td>2”</td>
<td>48.1</td>
<td>16</td>
<td>140</td>
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<td>266.5</td>
<td>171.0</td>
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<td>153</td>
<td>247.5</td>
<td>M 8x4</td>
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<tr>
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<td>16</td>
<td>140</td>
<td>343</td>
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<td>76.5</td>
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<td>196.0</td>
<td>101.5</td>
<td>203</td>
<td>297.5</td>
<td>M 12x4</td>
</tr>
</tbody>
</table>

1) Internal diameter of tube

Weight:
- Compact version 2) see table above
- Promag 33 transmitter 3 kg (5 kg for wall mounted version)
- Sensor connection housing approx. 1 kg

Process connections Promag H

- Welded nipple
- Tri-Clamp
- ISO 2853
- Flat gasket
- Silicone / EPDM
- DN 11851
- SMS
- ISO 2852

(Process connections Promag H (Dimensions: see page 18)
## Process Connections Promag H

### Welded nipple

- **DIN 11851**
- **Tri-Clamp**
- **SMS 1145**
- **ISO 2852**
- **ISO 2853**

### Specifications

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<thead>
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<th>DN</th>
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<th>G</th>
<th>di (^1)</th>
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<td>42</td>
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<td>100 DIN</td>
<td>168</td>
<td>106</td>
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<td>24</td>
<td>141.5</td>
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</table>

### Length:

- **DN 25... 65** = 2 x L + 136 mm
- **DN 80...100** = 2 x L + 196 mm

\(^1\) Please note the internal diameter (di, DI) when cleaning the piping with a scraper!
### Dimensions

**Promag 33 F**

**DN 15...300**

#### Compact version

![Compact version diagram]

#### Remote version

![Remote version diagram]

* with blind version

<table>
<thead>
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<td>-</td>
<td>336</td>
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1) The length is always identical independently of the chosen pressure rating.

**Weight:**

- Compact version: see table above
- Promag 33 transmitter: 3 kg (5 kg for wall mounted version)
- Sensor connection housing: approx. 1 kg
## Dimensions

### Promag 33 F

#### DN 350...2000

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<td>1143.5</td>
</tr>
<tr>
<td>750</td>
<td>30&quot;</td>
<td>975</td>
<td>1198</td>
<td>686.0</td>
<td>512.0</td>
<td>1024</td>
<td>626</td>
<td>26</td>
<td>34.9</td>
<td>1143.5</td>
</tr>
<tr>
<td>800</td>
<td>32&quot;</td>
<td>1040</td>
<td>1241</td>
<td>707.5</td>
<td>533.5</td>
<td>1067</td>
<td>647</td>
<td>32</td>
<td>38.1</td>
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<tr>
<td>900</td>
<td>36&quot;</td>
<td>1170</td>
<td>1394</td>
<td>784.0</td>
<td>610.0</td>
<td>1220</td>
<td>785</td>
<td>34</td>
<td>41.3</td>
<td>1339.5</td>
</tr>
<tr>
<td>1000</td>
<td>40&quot;</td>
<td>1300</td>
<td>1546</td>
<td>860.0</td>
<td>686.0</td>
<td>1372</td>
<td>862</td>
<td>34</td>
<td>41.3</td>
<td>1491.5</td>
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<tr>
<td>1050</td>
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<td>1365</td>
<td>1598</td>
<td>886.0</td>
<td>712.0</td>
<td>1424</td>
<td>912</td>
<td>36</td>
<td>44.5</td>
<td>1543.5</td>
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<tr>
<td>1200</td>
<td>48&quot;</td>
<td>1560</td>
<td>1796</td>
<td>985.0</td>
<td>811.0</td>
<td>1622</td>
<td>992</td>
<td>38</td>
<td>44.5</td>
<td>1741.5</td>
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<tr>
<td>1350</td>
<td>54&quot;</td>
<td>1755</td>
<td>1998</td>
<td>1036.0</td>
<td>912.0</td>
<td>1824</td>
<td>1252</td>
<td>38</td>
<td>44.5</td>
<td>1943.5</td>
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<tr>
<td>1400</td>
<td>-</td>
<td>1820</td>
<td>2148</td>
<td>1161.0</td>
<td>987.0</td>
<td>1974</td>
<td>1252</td>
<td>38</td>
<td>44.5</td>
<td>2141.5</td>
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<tr>
<td>1500</td>
<td>60&quot;</td>
<td>1950</td>
<td>2196</td>
<td>1185.0</td>
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<td>2022</td>
<td>1392</td>
<td>40</td>
<td>57.2</td>
<td>2514.5</td>
</tr>
<tr>
<td>1600</td>
<td>-</td>
<td>2080</td>
<td>2286</td>
<td>1230.0</td>
<td>1056.0</td>
<td>2112</td>
<td>1482</td>
<td>38</td>
<td>57.2</td>
<td>2730.5</td>
</tr>
<tr>
<td>1650</td>
<td>66&quot;</td>
<td>2145</td>
<td>2360</td>
<td>1267.0</td>
<td>1093.0</td>
<td>2186</td>
<td>1482</td>
<td>38</td>
<td>63.5</td>
<td>2905.5</td>
</tr>
<tr>
<td>1800</td>
<td>72&quot;</td>
<td>2340</td>
<td>2550</td>
<td>1362.0</td>
<td>1188.0</td>
<td>2376</td>
<td>1632</td>
<td>38</td>
<td>66.7</td>
<td>2495.5</td>
</tr>
<tr>
<td>2000</td>
<td>78&quot;</td>
<td>2600</td>
<td>2650</td>
<td>1412.0</td>
<td>1288.0</td>
<td>2476</td>
<td>1732</td>
<td>38</td>
<td>69.9</td>
<td>2595.5</td>
</tr>
</tbody>
</table>

1) Thickness of the flange face includes sealing strip. The length is always identical independently of the chosen pressure rating.

### Weight:

- **Compact version**
  - see table above
- **Promag 33 transmitter**
  - 3 kg (5 kg for wall mounted version)
- **Sensor connection housing**
  - approx. 1 kg
Material Load Curves (p-T-Diagrams)

Promag A

DIN 2413 and 2505
Flange material: Steel 1.4404/1.4435, PVDF, PVC

Promag H

Welded nipple material: Steel 1.4404/316L

Promag F

DIN 2413 and 2505
Flange material: Steel 37.2

ANSI B16.5
Flange material: Steel A105

AWWA C 207, Class D
Flange material: Steel A105

ANSI B16.5
Flange material: Steel 316L

JIS B2210
Flange material: S20C / SUS 316L
## Application

<table>
<thead>
<tr>
<th>Instrument name</th>
<th>Flow measuring system “Promag 33”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument function</td>
<td>Flow measurement of liquids in closed piping. Applications in measurement, control and regulation processes, for e.g. batching and dosing (&gt; 10 s), etc.</td>
</tr>
</tbody>
</table>

## Function and system design

<table>
<thead>
<tr>
<th>Measuring principle</th>
<th>Electromagnetic flow measurement according to Faraday’s law (generation of a voltage by induction in a magnetic field).</th>
</tr>
</thead>
</table>
| Measuring system    | Instrument family “Promag 33” consisting of:  
- Transmitter: Promag 33 (with electronics versions HART, PROFIBUS-PA, PROFIBUS-DP, Rackbus RS 485 or EEx i)  
- Sensor: Promag A (DN 2, 4, 8, 15, 25)  
  Promag H (DN 25, 40, 50, 65, 80, 100)  
  Promag F (DN 15...2000)  
  Two versions are available:  
  - Compact version  
  - Remote version (FS or FL version) |

## Input variables

<table>
<thead>
<tr>
<th>Measuring variable</th>
<th>Flow velocity (proportional to induced voltage, measured by two electrodes in the measuring tube)</th>
</tr>
</thead>
</table>
| Measuring range   | Measuring range of electronics within $v = 0...12.5 \text{ m/s}$  
  The full scale value for the current output can be selected within the following limits (see also page 5):  
  - Minimum full scale value at $v = 0.3 \text{ m/s}$  
  - Maximum full scale value at $v = 10 \text{ m/s}$ |
| Operable flow range | Over 1000 : 1  
  When the flow is pulsating, the amplifier is not overloaded above its set full scale value even with peak velocities of 12.5 m/s.  
  Flow is measured between 0.01...>10 m/s at the stated accuracy. |

## Auxiliary input

| Variable          | The auxiliary input is only available with a “RS 485” communications module.  
  $U = 3...30 \text{ V DC, } R_i = 1.8 \text{ k} \Omega$, galvanically isolated  
  Configurable for: Positive zero return, totalizer reset, starting a batch cycle or dual range mode. |

## Output variables

| Output signal |  
  - Current output:  
    active, 0/4...20 mA, galvanically isolated, $R_i$ (see page 23),  
    time constant selectable (0.01...100 s),  
    full scale value freely selectable, temperature coefficient: typical 0.005% o.r./°C; resolution: 10 µA  
  - Pulse / frequency output:  
    active/passive selectable, galvanically isolated  
    active: 24 V DC, 25 mA (max. 250 mA during 20 ms), $R_i > 100 \Omega$  
    passive: Open Collector, 30 V DC, 250 mA  
    Frequency output:  
    full scale frequency 2...10000 Hz, pulse/pause ratio 1:1, pulse width max. 2 s  
    Pulse output:  
    pulse value and pulse polarity selectable,  
    pulse width adjustable (0.05...2 s)  
    above a frequency of 1 / (2 x pulse width) the pulse/pause ratio is 1:1 |

(continued on next page)
## Output variables (continued)

### Output signal (continued)
- **Alarm output (Relay 1):**
  Either NC or NO via a jumper available (factory setting: NO contact)
  max. 60 V AC / 30 V DC; max. 0.5 A AC / 0.1 A DC, galvanically isolated.
  Configurable for: error message (failure), empty pipe detection (EPD),
  failure + EPD, full scale switching, batch precontact,
  direction of flow, limit value 1 and overflow ($v > 12.5 \text{ m/s}$)
- **Status output (Relay 2):**
  Either NC or NO via a jumper available (factory setting: NC contact)
  max. 60 V AC / 30 V DC; max. 0.5 A AC / 0.1 A DC, galvanically isolated.
  Configurable for: empty pipe detection (EPD), full scale switching,
  batch contact, direction of flow, limit value 2 and overflow
  ($v > 12.5 \text{ m/s}$)

### Signal on alarm
- Current output → failsafe mode selectable
- Pulse/frequency output → failsafe mode selectable
- Relay 1 output → de-energised on failure or power supply failure
- Relay 2 output → de-energised on power supply failure

### Load (current output)
- $R_L < 700 \ \Omega$ (HART current output and Rackbus RS 485 version)
- $R_L < 350 \ \Omega$ (PROFIBUS-PA and EEx i version)
- $R_L \geq 250 \ \Omega$ (with HART)

### Creep suppression
- Switching points selectable
- Max. creepage depending on the nominal diameter at $v = 1 \text{ m/s}$
- Hysteresis: 50% of set creepage

### Accuracy

#### Reference conditions
According to DIN 19200 and VDI/VDE 2641:
- Fluid temperature: $+28 ^\circ\text{C} \pm 2 \text{ K}$
- Ambient temperature: $+22 ^\circ\text{C} \pm 2 \text{ K}$
- Warm up period: 30 minutes

**Mounting:**
- Inlet section $> 10 \times \text{DN}$
- Outlet section $> 5 \times \text{DN}$
- Transmitter and sensor are grounded.
- The sensor is build-in centered into the pipining.

#### Measured error
- **Pulse output:** $\pm 0.5\% \text{ o.r.} \pm 0.01\% \text{ o.f.s.}$ (full scale value = 10 m/s)
- **Current output:** additionally $\pm 5 \mu \text{A}$ (typical)
  - $\text{o.r.} = \text{of reading}$
  - $\text{o.f.s.} = \text{of max. full scale value}$

![Measured error graph]

**Option:**
- Promag 33 A and F: $\pm 0.2\% \text{ o.r.} \pm 0.005\%$ of $Q_k$
  - $Q_k =$ desired reference flow quantity for calibration ($v = 2...10 \text{ m/s}$).
  - $Q_k$ has to be noted for ordering.

Deviations in power supply voltage have no influence on the specified ranges.

#### Repeatability
- $\pm 0.1\% \text{ o.r.} \pm 0.005\% \text{ o.f.s.}$
  - $\text{o.r.} = \text{of reading}$
  - $\text{o.f.s.} = \text{of max. full scale value}$ (see table on page 5)
## Technical Data

### Operating conditions

#### Installation conditions

**Installation instructions**

- Orientation: vertical or horizontal
- Restrictions and other recommendations → see page 6 ff.

**Inlet and outlet sections**

- Inlet section: ≥ 5 x DN
- Outlet section: ≥ 2 x DN

#### Connection cable length

**Remote FS version:**

- 0...10 m → min. conductivity ≥ 5 µS/cm (for liquids in general)
- 0...10 m → min. conductivity ≥ 20 µS/cm (for demineralised water)
- 10...200 m → min. conductivity = f (L_{max})

**Remote FL version:**

- 0...200 m → min. conductivity ≥ 5 µS/cm (for liquids in general)
- 0...200 m → min. conductivity ≥ 20 µS/cm (for demineralised water)

**Instrument equipped with empty pipe detection (EPD):**

- max. cable length = 10 m

### Ambient conditions

**Ambient temperature**

- −25...+60 °C (Transmitter and sensor)
- An all-weather cover should be used to protect the housing from direct sunlight when mounting in the open. This is especially important in warmer climates and with high ambient temperatures.
- Due to the danger of the transmitter electronics overheating, the transmitter and sensor are to be mounted separately with high ambient and fluid temperatures (see Figure).

### Storage temperature

- −10...+50 °C (preferably at +20 °C)

### CIP cleanable

- Promag A, H, F → Yes (observe maximum temperature)
### Operating conditions (continued)

#### Ambient conditions

<table>
<thead>
<tr>
<th>SIP cleanable</th>
<th>Promag A</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Promag H</td>
<td>Yes (observe maximum temperature)</td>
</tr>
<tr>
<td></td>
<td>Promag F</td>
<td>No</td>
</tr>
</tbody>
</table>

**Degree of protection (EN 60529)**

- IP 67 (NEMA 4X)
- Option: IP 68 (NEMA 6P) for sensor A and F

**Shock and vibration resistance**

- Acceleration up to 2 g / 2 h per day; 10...100 Hz

**Electromagnetic compatibility (EMC)**

- According to EN 50081 Part 1 and 2 (interference emission) / EN 50082 Part 1 and 2 (interference immunity) as well as to NAMUR recommendations

#### Process conditions

**Fluid temperature**

- The fluid temperature range depends on the sensor lining:
  - **Promag A**
    - –20...+130 °C PFA
  - **Promag H**
    - –20...+130 °C PFA with EPDM gasket
    - –20...+150 °C PFA with Silicone gasket
  - **Promag F**
    - –40...+130 °C PTFE (Teflon), DN 15...600
    - –20...+120 °C Soft rubber (EPDM), DN 25...2000
    - 0...+ 80 °C Hard rubber, DN 65...2000

**Nominal pressure**

<table>
<thead>
<tr>
<th>Promag A</th>
<th>PN 16 for Tri-Clamp, PVC couplings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PN 40 for all other connections</td>
</tr>
<tr>
<td>Promag H</td>
<td>PN 16</td>
</tr>
<tr>
<td>Promag F</td>
<td>DIN PN 6 (DN 1200...2000)</td>
</tr>
<tr>
<td></td>
<td>PN 10 (DN 200...1000)</td>
</tr>
<tr>
<td></td>
<td>PN 16 (DN 65...150)</td>
</tr>
<tr>
<td></td>
<td>PN 40 (DN 15...50)</td>
</tr>
<tr>
<td></td>
<td>PN 10 (DN 1200...2000, optional)</td>
</tr>
<tr>
<td></td>
<td>PN 16/25 (DN 200...1000, optional)</td>
</tr>
<tr>
<td></td>
<td>PN 40 (DN 65...150, optional)</td>
</tr>
<tr>
<td>ANSI</td>
<td>Class 150 ((\frac{1}{2})...24&quot;)</td>
</tr>
<tr>
<td></td>
<td>Class 300 ((\frac{1}{2})...6&quot;, optional)</td>
</tr>
<tr>
<td>AWWA</td>
<td>Class D (28...48&quot;)</td>
</tr>
<tr>
<td>JIS</td>
<td>10K (DN 50...300)</td>
</tr>
<tr>
<td></td>
<td>20K (DN 15...40)</td>
</tr>
<tr>
<td></td>
<td>20K (DN 50...300, optional)</td>
</tr>
</tbody>
</table>

**Conductivity**

- Minimum conductivity:
  - ≥ 5 µS/cm → for liquids in general
  - ≥ 20 µS/cm → for demineralised water

- With the remote “FS” version the conductivity required also depends on the length of the cable → see page 24 “Connection cable length”

**Pressure loss**

- No pressure loss if sensor and piping have the same nominal diameter.
- Pressure loss specifications when using adapters e.g. reducers or expanders → see page 8
## Mechanical construction

<table>
<thead>
<tr>
<th>Design / Dimensions</th>
<th>Dimensions</th>
<th>see pages 15–20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>See pages 15–20</td>
<td></td>
</tr>
</tbody>
</table>

### Materials

**Transmitter housing:**
Powder-coated die-cast aluminium

**Sensor housing:**
- Promag A: 1.4435 incl. threaded stub
- Promag H: 1.4301
- Promag F: DN 15...300: Powder-coated die-cast aluminium
  - DN 350...2000: Coated steel

**Process connections:**

<table>
<thead>
<tr>
<th>Promag A</th>
<th>DIN → Stainless steel 1.4404, PVDF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANSI → 316L, PVDF</td>
</tr>
<tr>
<td></td>
<td>JIS → 316L, PVDF</td>
</tr>
<tr>
<td></td>
<td>Threaded stub: 1.4435, PVC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Promag H</th>
<th>1.4404 / 316L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promag F</td>
<td>DIN → Stainless steel 1.4571, St. 37-2</td>
</tr>
<tr>
<td></td>
<td>ANSI → A 105, 316L</td>
</tr>
<tr>
<td></td>
<td>AWWA → A 105, A 36</td>
</tr>
<tr>
<td></td>
<td>JIS → S20C, SUS 316L</td>
</tr>
</tbody>
</table>

**Electrodes:**
- Promag A: 1.4435; Platinum/Rhodium 80/20; Titanium; Hastelloy C-22; Tantalum
- Promag H: 1.4435
- Promag F: 1.4435; Platinum/Rhodium 80/20; Hastelloy C-22; Tantalum

**Gasket material:**
- Promag A: Viton, Kalrez (optional), Silicone (aseptic version)
- Promag H: EPDM, Silicone
- Promag F: no gaskets (lining = 'gasket')

### Electrodes fitted

- **Promag A:** Measuring, reference and empty pipe detection electrodes.
  - As standard with: 1.4435, Hastelloy C-22, Tantalum
  - Option with: Platinum/Rhodium
- **Promag H:** Measuring and empty pipe detection electrodes
- **Promag F:** Measuring, reference and empty pipe detection electrodes.
  - As standard with: 1.4435, Hastelloy C-22, Tantalum

### Process connections

- **Promag A:** Internal and external thread, PVC adhesive coupling, hose connection, welded nipple, aseptic welded nipples for pipelines according to DIN 11850, Tri-Clamp, flange connection (DIN, ANSI, JIS).
- **Promag H:** Welded nipples for OD tube, SMS, JIS, ISO and DIN 11850 tubes, DIN 11851 thread, SMS thread, ISO 2853 thread, Tri-Clamp, ISO 2852 connection.
- **Promag F:** Flange connection (DIN, ANSI, JIS)

### Electrical connection

- Wiring diagrams: see page 9 ff.
- Cable specifications: see page 12
- Galvanic isolation:
  - All circuits for inputs, outputs, power supply and sensors are galvanically isolated from one another.

### Cable entries

**Power supply and signal cable (outputs):**
- Cable glands PG 13.5 (5...15 mm) or threads for cable glands $\frac{1}{2}''$ NPT, M20 x 1.5 (8...15 mm), G $\frac{1}{2}''$

**Coil current cable and signal cable (remote version)**

<table>
<thead>
<tr>
<th>Promag A</th>
<th>Cable glands PG 11 (5...12 mm) or threads for cable glands $\frac{1}{2}''$ NPT, M20 x 1.5 (8...15 mm), G $\frac{1}{2}''$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promag H</td>
<td>Cable glands PG 13.5 (5...15 mm) or threads for cable glands $\frac{1}{2}''$ NPT, M20 x 1.5 (8...15 mm), G $\frac{1}{2}''$</td>
</tr>
<tr>
<td>Promag F</td>
<td>Cable glands PG 13.5 (5...15 mm) or threads for cable glands $\frac{1}{2}''$ NPT, M20 x 1.5 (8...15 mm), G $\frac{1}{2}''$</td>
</tr>
</tbody>
</table>
## User interface

### Operation
- On-site operation with three optical keypads (E, –, +)
- E+H operating matrix for all instrument functions

### Display
- LC display: illuminated, double-spaced with 16 characters each
- Damping of flow display can be adjusted: 0...99 s

### Communication
- SMART protocol (HART protocol via current output)
- PROFIBUS-PA / PROFIBUS-DP
- Rackbus RS 485 interface (Rackbus protocol)

## Power supply

### Supply voltage / Frequency
- 85...260 V AC, 45...65 Hz
- 20... 55 V AC, 45...65 Hz
- 16... 62 V DC

### Power consumption
- AC: <15 VA (incl. sensor)
- DC: <15 W (incl. sensor)

Current at make (Promag 33 X / 24 V DC):
- max. 13.5 A (< 100 µs)
- max. 6 A (< 5 ms)

### Power supply failure
- Bridges minimum 1 power cycle (22 ms)
- EEPROM saves measuring system data on power failure (no batteries required).
- DAT = replaceable data memory in which basic data of the sensor are stored: nominal diameter, SAPS (actual values), serial number, calibration factor, zero point, status EPD (yes/no), EPD calibration values.

## Certificates and approvals

### Ex approvals
Information on Ex versions (e.g. ATEX/CENELEC, FM, CSA) can be supplied by your E+H sales center on request. All explosion protection data are given in separate documentation available on request.

### Sanitary version
- Sensor Promag A: 3A approval
- Sensor Promag H (hygienic version): 3A approval and EHEDG tested

### CE mark
By attaching the CE mark, Endress+Hauser confirms that the Promag 33 measurement system has been successfully tested and fulfills all legal requirements of the relevant CE directives.

## Order information

### Accessories
- Post mounting set for transmitter (remote version): Order No. 50076905
- Wall mounting kit for Promag A sensor: Order No. 50064550

### Supplementary documentation
- System Information Promag (SI 010D/06/en)
- Operating Manual Promag 33 (BA 009D/06/en)
- Supplementary Ex documentation: ATEX/CENELEC, FM, CSA

## Other standards and guidelines

- EN 60529 Degree of protection by housing (IP code)
- EN 61010 Protection Measures for Electronic Equipment for Measurement, Control, Regulation and Laboratory Procedures
- EN 50081 Part 1 and 2 (interference emission)
- EN 50082 Part 1 and 2 (interference immunity)
- NAMUR Association of Standards for Control and Regulation in the Chemical Industry