RVG and RVG-ST
Rotary Gas Meters

Applications

**Media:** Natural gas, town gas, inert gases

**Industry:** Gas supply, stove manufacturers, chemical industry.

**Tasks:** Measurement, control and automatic regulation.

Brief information

**RVG:** Flange connection G16 – G400
**RVG-ST:** Standard thread connection G10 – G25

**Operating principle:** Elster-Instromet RVG and RVG-ST rotary gas meters are volume-measuring devices for gaseous media and operate according to the positive displacement principle. They register the gas volume under operating conditions. In order to correct the measured volume to standard conditions, electronic volume correctors with various characteristics are available.

The actual measuring cell consists of two 8 shaped impellers, which build together with the housing 4 chambers per revolution, which are periodically filled and emptied.

The number of revolutions is proportional to the passed volume. The rotation is transferred to a mechanical index, which indicates this volume.

General: Rotary meters are characterized by high measuring range and compact dimensions.

Due to their measuring principle they do not require any straight inlet or outlet pipe section. Rotary meters have to be lubricated with oil. For easy access and control of the appropriate oil level the oil chambers on the front and the backside are connected to allow maintenance to be done from the front side only.

The double direction index allows adapting the meter to any flow direction.

The RVG is available with the latest technology of the Absolute-ENCODER S1D, which enables the most reliable readout of a mechanical index.

The RVG-ST is the smallest meter line from G10 to G25. It has a threaded connection as standard. Optionally it is also available as flange version.

The index of the RVG-ST is located in the gas area, while the RVG uses index variants outside the gas area in atmospheric air driven by a magnetic coupler.

Main features

- Meter sizes: G10 – G400
- For flow rates
  0.6 m³/h to 650 m³/h
- Nominal widths DN 25 – DN 150
- Pressure ratings
  PN 10/16 and ANSI 150
- Cast iron housing (GGG 40) or aluminium housing
- High-temperature resistance up to 4 bar for GGG 40
- Optional: double direction index S1D for universal installation and flow direction
RVG: Rotary Gas Meters / flange connection

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**Technical data RVG**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>Gas temperature</td>
<td>-20 to +60 °C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20 to +70 °C</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>Max. 20 bar</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP67 (suitable for outdoor installation)</td>
</tr>
<tr>
<td>Housing</td>
<td>Aluminium or cast iron GGG-40; pistons made of aluminium</td>
</tr>
<tr>
<td>Metrological approval</td>
<td>PTB</td>
</tr>
<tr>
<td>ATEX approval</td>
<td>Ex-zone 1</td>
</tr>
<tr>
<td>Media</td>
<td>Natural gas, town gas, inert gases, further gases on request</td>
</tr>
<tr>
<td>Max. error</td>
<td>± 1 % for ( Q_t ) (=) ( Q_{\text{max}} ) for measuring range (\leq 1.20)</td>
</tr>
<tr>
<td></td>
<td>± 2 % for ( Q_{\text{min}} ) (=) ( Q_t ) for measuring range (&gt; 1.30)</td>
</tr>
<tr>
<td>Reproducibility</td>
<td>&lt; 0.1%</td>
</tr>
<tr>
<td>Applicable standards</td>
<td>EN 12480, DIN EN 13463-1 and -5, EN 50020:2002</td>
</tr>
<tr>
<td>Index variants</td>
<td>S1 (standard), Double direction index S1D, Absolute-ENCODER S1D (option)</td>
</tr>
<tr>
<td>Outputs</td>
<td>Retrofitable LF-Pulser IN-Sxx (Reed switch)</td>
</tr>
<tr>
<td></td>
<td>Retrofitable LF-Pulser IN-W11 (Wiegand sensor, option)</td>
</tr>
<tr>
<td></td>
<td>HF-pulser A1K (option)</td>
</tr>
<tr>
<td>Pressure/temperature tapping</td>
<td>2 pressure tappings ¼&quot; NPT, 2 thermowells applicable</td>
</tr>
</tbody>
</table>

**Measuring ranges: according EEC type approval D 95 7.131.06**

<table>
<thead>
<tr>
<th>Size</th>
<th>Measuring chamber ([\text{dm}^3])</th>
<th>Start-up flow rate ([\text{m}^3/\text{h}])</th>
<th>(Q_{\text{min}}) ([\text{m}^3/\text{h}]) National 1:160</th>
<th>(Q_{\text{min}}) ([\text{m}^3/\text{h}]) National 1:100</th>
<th>(Q_{\text{min}}) ([\text{m}^3/\text{h}]) National 1:6.5</th>
<th>(Q_{\text{max}}) ([\text{m}^3/\text{h}]) EU-Norm 1:20</th>
<th>(Q_{\text{max}}) ([\text{m}^3/\text{h}]) Was</th>
<th>2xFN ([\text{imp}/\text{m}^3])</th>
<th>HF * ([\text{imp}/\text{m}^3])</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 16 DN 50</td>
<td>0.56</td>
<td>0.03</td>
<td>1.3</td>
<td>2.0</td>
<td>2.0</td>
<td>1.0</td>
<td>25</td>
<td>10</td>
<td>~14025</td>
<td></td>
</tr>
<tr>
<td>G 25 DN 50</td>
<td>0.56</td>
<td>0.03</td>
<td>0.6</td>
<td>1.0</td>
<td>1.0</td>
<td>0.6</td>
<td>25</td>
<td>10</td>
<td>~14025</td>
<td></td>
</tr>
<tr>
<td>G 40 DN 50</td>
<td>0.56</td>
<td>0.03</td>
<td>0.6</td>
<td>1.0</td>
<td>1.0</td>
<td>0.6</td>
<td>25</td>
<td>10</td>
<td>~14025</td>
<td></td>
</tr>
<tr>
<td>G 65 DN 50</td>
<td>0.56</td>
<td>0.03</td>
<td>0.6</td>
<td>1.0</td>
<td>1.0</td>
<td>0.6</td>
<td>25</td>
<td>10</td>
<td>~14025</td>
<td></td>
</tr>
<tr>
<td>G 100 DN 80</td>
<td>1.07</td>
<td>0.05</td>
<td>1.0</td>
<td>1.6</td>
<td>1.6</td>
<td>1.0</td>
<td>10</td>
<td>10</td>
<td>~7528</td>
<td></td>
</tr>
<tr>
<td>G 160 DN 80</td>
<td>2.01</td>
<td>0.1</td>
<td>1.6</td>
<td>2.5</td>
<td>2.5</td>
<td>1.6</td>
<td>10</td>
<td>10</td>
<td>~3882</td>
<td></td>
</tr>
<tr>
<td>G 250 DN 100</td>
<td>2.54</td>
<td>0.3</td>
<td>2.5</td>
<td>4.0</td>
<td>4.0</td>
<td>2.5</td>
<td>20</td>
<td>20</td>
<td>~3178</td>
<td></td>
</tr>
<tr>
<td>G 400 DN 100</td>
<td>3.65</td>
<td>0.4</td>
<td>4.0</td>
<td>6.5</td>
<td>6.5</td>
<td>4.0</td>
<td>65</td>
<td>65</td>
<td>~2191</td>
<td></td>
</tr>
<tr>
<td>G 400 DN 150</td>
<td>3.65</td>
<td>0.4</td>
<td>4.0</td>
<td>6.5</td>
<td>6.5</td>
<td>4.0</td>
<td>65</td>
<td>65</td>
<td>~2191</td>
<td></td>
</tr>
</tbody>
</table>

* staled HF pulse values nominal, Specific values can deviate

**Double direction index S1D (option)**

- RVG with S1D and IN S11
- Flow direction according to arrow on cover plate here left → right
- Upper index covered, lower free
- When flow direction bottom ↑ top cover is turned round, upper index is free, lower index covered pr-offtake always at inlet
- Horizontal flow: Reading from top
- Vertical flow: Reading from the front

**Absolute-ENCODER S1D**

- Electronically readable mechanical double index
- PTB and ATEX approval

For detailed information please see data sheet "Absolute-ENCODER S1"
LF pulser E1 and PCM

Elster-Instromet RVG rotary meters are commonly equipped with 2 low-frequency (LF) pulse generators and an additional monitoring reed switch (PCM) for detection of line break or interferences caused by magnetic fields. These pulse generators are attachable and can be retrofitted or changed without opening totalizer.

**Installation**
- Both guides of the IN-S1x are inserted into the guiding grooves of the totalizer head.
- Push the unit over the safety clip of the totalizer head until the IN S1x locks acoustically.

**Removal**
- Lift the lower clip of IN-S1x by means of a screwdriver and, by pulling slightly, remove from the guide of the totalizer head.

**IN-S10 (standard)**
- Wiring colours:
  1. E1: white-brown
  2. E1: green-yellow
  PCM: grey-pink
  PCM monitoring against manipulation

**IN-S11 (option)**
- View on soldering side of plug socket including 1 each 6-pin female plug socket PG 9 DIN 45322

**IN-S12 (option)**
- View on soldering side of plug socket including 2 each 6-pin female plug sockets PG 9 DIN 45322

The PCM control contact is a special Reed switch. In the control state, this switch is closed with a protection resistor $R_i = 100\,\Omega$ in series. When an external magnetic field is brought into contact with the IN-S1x pulser (tampering to suppress the pulses originating from the gas flow) the Reed switch is opened. If the switch is permanently monitored (e.g. by Elster-Instromet volume conversion devices), it is possible to recognize the exact time of line break or tampering.

LF pulser IN-W11

As an option, it is possible to fit Elster-Instromet RVGs with the Wiegand sensor module IN-W11 instead of the LF pulser module IN-S1x. The IN-W11 is a low-frequency pulser with a definite pulse width > 50 ms, which is highly reliable and ensures there is no mechanical wear and tear.

HF pulser A1K

The indicated pin assignments show:
- The view on the pin contacts of the built-in flange connector or
- The view on the soldered connection ends of the adapter socket

The apertured disk with 8 apertures is mounted onto an inductive proximity switch with a measuring transducer and a nominal voltage of $U_n = 8\,\text{V DC}$. Current consumption:
- Active area free: $I > 2.1\,\text{mA}$
- Active area covered: $I \leq 1.2\,\text{mA}$
RVG: Rotary Gas Meters / flange connection

Thermowell

Prepared for two thermowells type EBL 67 (for temperature sensors up to Ø 6mm).

Pressure loss diagram

Example

Example to determine the pressure loss under operating conditions

Given:
- Load 400 m³/h
- Type G 250, DN 100
- Operating pressure 10 bar
- Gas: natural gas or air

From the diagram:
\[ \Delta p_1 = 3.35 \text{ mbar (natural gas at 1 bar abs.)} \]
\[ \rho_b = 0.83 \cdot \frac{1}{1} = 9.13 \text{ kg/m}^3 \]
\[ \Delta p_b = 3.35 \cdot 9.13 = 30.6 \text{ mbar for natural gas} \]

Conversion for any gas (here air):
\[ \Delta p_{air} = 30.6 \cdot \frac{1.29}{0.83} = 47.56 \text{ mbar} \]

Pressure loss under operating conditions:
\[ \Delta p_b = \Delta p_1 \cdot \rho_b \]

Density under operating conditions:
\[ \rho_b = \rho_n \cdot \rho_{atm} \]

Pressure loss for any gas G:
\[ \Delta p_G = \Delta p_{ng} \cdot \frac{\rho_G}{\rho_{ng}} \]

Densities \( \rho_n \) in standard condition:

<table>
<thead>
<tr>
<th>Gas</th>
<th>Density in standard condition ( \rho_n ) in kg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>1.29</td>
</tr>
<tr>
<td>Town gas</td>
<td>0.64</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0.83</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>1.25</td>
</tr>
<tr>
<td>Methane</td>
<td>0.72</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>1.98</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>0.09</td>
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</table>
Flow direction

left → right

vertical: top → bottom

Dimensions and weights

<table>
<thead>
<tr>
<th>Size</th>
<th>DN *</th>
<th>DN **</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>H</th>
<th>Dk</th>
<th>DL</th>
<th>E</th>
<th>K</th>
<th>L</th>
<th>F</th>
<th>Weight</th>
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<tr>
<td>G 16</td>
<td>50</td>
<td>40</td>
<td>335</td>
<td>115</td>
<td>220</td>
<td>222</td>
<td>125</td>
<td>4 x M16</td>
<td>180</td>
<td>240</td>
<td>141</td>
<td>171</td>
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</tr>
<tr>
<td>G 25</td>
<td>50</td>
<td>40</td>
<td>335</td>
<td>115</td>
<td>220</td>
<td>222</td>
<td>125</td>
<td>4 x M16</td>
<td>180</td>
<td>240</td>
<td>141</td>
<td>171</td>
<td>12</td>
</tr>
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<td>40</td>
<td>335</td>
<td>115</td>
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<td>4 x M16</td>
<td>180</td>
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<td>141</td>
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<td>G 65</td>
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<td>115</td>
<td>220</td>
<td>222</td>
<td>125</td>
<td>4 x M16</td>
<td>180</td>
<td>240</td>
<td>141</td>
<td>171</td>
<td>12</td>
</tr>
<tr>
<td>G 100</td>
<td>80</td>
<td>-</td>
<td>435</td>
<td>165</td>
<td>272</td>
<td>222</td>
<td>160</td>
<td>8 x M16</td>
<td>180</td>
<td>290</td>
<td>141</td>
<td>171</td>
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</tr>
<tr>
<td>G 160</td>
<td>80</td>
<td>100</td>
<td>469</td>
<td>189</td>
<td>280</td>
<td>278</td>
<td>160</td>
<td>8 x M16</td>
<td>220</td>
<td>298</td>
<td>168</td>
<td>241</td>
<td>33</td>
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<td>100</td>
<td>80</td>
<td>529</td>
<td>219</td>
<td>310</td>
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<td>180</td>
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<td>220</td>
<td>328</td>
<td>168</td>
<td>241</td>
<td>39</td>
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<td>G 400</td>
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<td>-</td>
<td>660</td>
<td>290</td>
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<td>220</td>
<td>421</td>
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<td>100</td>
<td>660</td>
<td>290</td>
<td>370</td>
<td>308</td>
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<td>8 x M20</td>
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<td>421</td>
<td>168</td>
<td>260</td>
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</table>

* Standard ** Special model *** Special dimensions in parentheses at GGG-40

Standard: Flange PN 10/16 according to DIN 2633; optional: ANSI 150 according to ASME B16.5

GGG-40

<table>
<thead>
<tr>
<th>Size</th>
<th>DN *</th>
<th>DN **</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>H</th>
<th>Dk</th>
<th>DL</th>
<th>E</th>
<th>K</th>
<th>L</th>
<th>F ***</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 16</td>
<td>50</td>
<td>40</td>
<td>335</td>
<td>115</td>
<td>220</td>
<td>222</td>
<td>125</td>
<td>4 x M16</td>
<td>180</td>
<td>240</td>
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<td>150</td>
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<td>G 25</td>
<td>50</td>
<td>40</td>
<td>335</td>
<td>115</td>
<td>220</td>
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<td>4 x M16</td>
<td>180</td>
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<td>G 40</td>
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</tr>
<tr>
<td>G 65</td>
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<td>335</td>
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<td>220</td>
<td>222</td>
<td>125</td>
<td>4 x M16</td>
<td>180</td>
<td>240</td>
<td>141</td>
<td>150</td>
<td>23</td>
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<tr>
<td>G 100</td>
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<td>-</td>
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<td>222</td>
<td>160</td>
<td>8 x M16</td>
<td>180</td>
<td>290</td>
<td>141</td>
<td>240(230)</td>
<td>34</td>
</tr>
<tr>
<td>G 160</td>
<td>80</td>
<td>100</td>
<td>469</td>
<td>189</td>
<td>280</td>
<td>278</td>
<td>160</td>
<td>8 x M16</td>
<td>220</td>
<td>298</td>
<td>172</td>
<td>241</td>
<td>64</td>
</tr>
<tr>
<td>G 250</td>
<td>100</td>
<td>80</td>
<td>529</td>
<td>219</td>
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<td>278</td>
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<td>8 x M16</td>
<td>220</td>
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<td>172</td>
<td>241</td>
<td>72</td>
</tr>
</tbody>
</table>

* Standard ** Special model *** Special dimensions in parentheses at GGG-40

Minimum wall clearance: M or N in mm

<table>
<thead>
<tr>
<th>Size</th>
<th>M</th>
<th>N</th>
<th>N with HF pulser</th>
</tr>
</thead>
<tbody>
<tr>
<td>G16 - G65</td>
<td>120</td>
<td>190</td>
<td>250</td>
</tr>
<tr>
<td>G100</td>
<td>170</td>
<td>240</td>
<td>300</td>
</tr>
<tr>
<td>G160</td>
<td>200</td>
<td>245</td>
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</tr>
<tr>
<td>G250</td>
<td>250</td>
<td>285</td>
<td>340</td>
</tr>
<tr>
<td>G400</td>
<td>305</td>
<td>350</td>
<td>435</td>
</tr>
</tbody>
</table>
**RVG-ST**

Rotary gas meter G 10 - G 25

**Main features RVG-ST**
- Meter sizes G10 – G25
- Flow rates from 0.8 – 40 m³/h
- Nominal widths
  - DN 25, DN 32, DN 40, DN 50
- Line pressure maximum 20 bar
- Aluminium housing

**Dimensions**

**Thread versions**

**Flanged versions**

Ultimate system:
- RVG-ST + EK210 + MR 25 G6
  - Smallest space required
  - Highest measuring accuracy
  - Highest outlet pressure control
## Technical data RVG-ST

<table>
<thead>
<tr>
<th>Size</th>
<th>G10</th>
<th>G16</th>
<th>G25</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Q_{\text{min}} ) (m(^3)/h)</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>(Q_{\text{max}} ) (m(^3)/h)</td>
<td>16</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>Rangeability</td>
<td>1 : 20</td>
<td>1 : 20 to 1 : 30</td>
<td>1 : 20 to 1 : 50</td>
</tr>
</tbody>
</table>

- Flow range: 0.8 – 40 m\(^3\)/h
- Start-up flow rate: 0.03 m\(^3\)/h (0.5 l/min)
- Gas temperature: -20 °C to +60 °C
- Ambient temperature: -20 °C to +70 °C
- Line pressure (gauge): Maximum 20 bar
- Protection class: IP67 (suitable for outdoor installation)
- Housing: Aluminium; pistons made of aluminium
- Metrological approval: PTB
- ATEX approval: Ex-Zone 1
- Media: Natural gas, inert gases

**Max error:**
- \(\pm 1\% \) for \(Q_{\text{t}} - Q_{\text{max}}\) when measuring \(Q_{\text{t}} \leq 1:20\)
- \(\pm 2\% \) for \(Q_{\text{t}} - Q_{\text{min}}\) when measuring \(Q_{\text{t}} \leq 1:20\)

\[ Q_{\text{t}} = 0.2 \times Q_{\text{max}} \text{ for measuring range } \leq 1:20 \]
\[ Q_{\text{t}} = 0.15 \times Q_{\text{max}} \text{ for measuring range } > 1:30 \]
\[ Q_{\text{t}} = 0.1 \times Q_{\text{max}} \text{ for measuring range } = 1:50 \]
\[ Q_{\text{t}} = 0.05 \times Q_{\text{max}} \text{ for measuring range } > 1:50 \]

- Applied standards: EN 12480, DIN EN 13463-1 and -5, EN 50020-2002
- Index: 8-digit roller index, reading from the front
- Outputs: LF Reed contact E1
  - Standard: 1 contact (pulse value = 10 pulses/m³) + PCM*
  - Option: 2 contacts (pulse value = 10 pulses/m³) + PCM*
  - HF pulser (option)
  - 1 HF pulser (pulse value = 2500 pulses/m³) according to DIN EN 50227 (Namur)
    - Equipment: 1 HF-pulser + 1 LF-reed contact + PCM*

- Pressure/temperature tapping: 2 pressure tappings ¼” NPT, 2 thermowells applicable
- Pipe connection: - Pipe thread ISO 228, G 1½ (internal thread), adaptable to pipes DN 25 (1”), DN 32 (1¼”), DN 40 (1½”), DN 50 (2”)
  - Flanged connection DN 25, DN 32, DN 40, DN 50 according to DIN 2633 and ASME B16.5
- Mounting: Horizontal or vertical
- Flow direction: Left → right, right → left, top → bottom, bottom → top
  - must be specified in the order
- Weight (kg): 4.5

* PCM: supervision contact against tampering

### LF pulser E1

**View on plug socket**

- Standard: LF-pulser E1 (Reed-contact) and PCM supervision contact against tampering
- Option: HF - LF pin assignment

**View on soldering side of plug socket**
Connecting sets

Optional available are connecting sets consist of:
3 x gasket
1 x sieve
2 x adapter piece
2 x union nut
for 1" pipes with outside thread No. 730 176 52
for 1¼" pipes with outside thread No. 730 176 53
for 1½" pipes with outside thread No. 730 176 54
for 2" pipes with outside thread No. 730 181 60

Pressure loss diagram

Your contacts

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