Compact Magneto-Inductive Flowmeter

- Flow Ranges: 0.18...7.8 GPH to 9...180 GPM
- Accuracy: ±2 % of Full Scale
- $P_{\text{max}}$: 145 psi; $t_{\text{max}}$: 176 °F
- Connection: G½...G 2¾ Male with Optional NPT, Socket, and Hose Connections
- Materials: PPS Body with Stainless Steel Electrodes; PVDF Body with Hastelloy® or Tantalum Electrodes
- Electronic Packages: Frequency or Current Outputs, Adjustable Switches, and Integral Totalizers or Batch Controllers
- Highlights:
  - No Moving Parts in the Flow Body
  - Low Pressure Loss
  - Universal Mounting
  - High Quality at a Low Price
Compact Magneto-Inductive Flowmeter Model MIK

Description

The KOBOLD MIK flow meter is used for measuring and monitoring small to medium-sized flows of conductive liquids in pipes. The sensor operates according to the electromagnetic measurement principle. According to Faraday’s Law of magnetic induction, a voltage is induced in a conductor moving through a magnetic field. The electrically conductive media acts as the conductor. The voltage induced in the media is proportional to the flow velocity and is therefore a value for the volumetric flow. The media must have a minimum conductivity of 30 μS/cm (200 μS/cm for U0 & U1 ranges) for proper operation. The induced voltage is picked up by two sensing electrodes which are in contact with the media and sent to the measuring amplifier. The flow rate will be calculated based on the cross sectional area of the pipe.

The measurement is not dependent on the process liquid and its material properties such as density, viscosity, and temperature. The device may be equipped with a switch, frequency, or analog output. Moreover, there is a compact electronic option, which contains a switch and an analog output. The sensor series is completed by an optional batching or totalizer electronic option. The totalizer electronic option displays the current flow rate on the first line of the display and shows the partial or grand total volume on the second. A batching electronic controls simple filling duties and also measures the flow rate, grand total volume, and filling volume. The analog output and two relay outputs can be utilized for the further processing.

Technical Data

Range: See Table
Accuracy: ±2.0% of f. s.
Repeat Accuracy: ±1.0% of f. s.
Measurement Process: Electromagnetic
Electrical Conductivity: Min. 30 μS/cm (MIK-..U0.. & MIK-..U1..), Min. 200 μS/cm
Mounting Position: Universal, Flow in Direction of the Arrow
Inlet/Outlet Straight Run: 3 x PD / 2 x PD (Pipe Diameters)
Media Temperature: -4...176 °F (max. 140 °F with PVC-connection Set)
Ambient Temperature: 14...140 °F
Max. Pressure: 145 psi
Max. Pressure Loss: Max. 3.7 psi at f.s.
Max. Media Viscosity: Max. 20 cSt for ranges: U0...U8
Max. 70 cSt for ranges: UA...UH

Wetted Parts

Sensor Housing: PPS or PVDF, Fiberglass-reinforced
Native Connection: G 1/2 to G 2-3/4
Optional Connection Set: NPT, PVC-glue Connections, Hose Barb, or Butt Weld Connections
Electrodes: 316L Stainless Steel, Hastelloy C4, or Tantalum
Seal: NBR, FKM, or FFKM
Response Time t90: ca. 1 s
Protection: IP 65

Connection/Ranges

<table>
<thead>
<tr>
<th>Native Connection</th>
<th>Inside Diameter</th>
<th>Flow Velocity at f.s.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G ½ male</td>
<td>5 mm</td>
<td>approx. 0.45 m/s</td>
<td>0.18...7.8 gph</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 0.9 m/s</td>
<td>0.78...15.6 gph</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 2.7 m/s</td>
<td>2.4...48.0 gph</td>
</tr>
<tr>
<td>G ¾ male</td>
<td>10 mm</td>
<td>approx. 2.2 m/s</td>
<td>0.13...2.6 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 3.5 m/s</td>
<td>0.2...4.0 gpm</td>
</tr>
<tr>
<td>G 1 male</td>
<td>15 mm</td>
<td>approx. 3.0 m/s</td>
<td>0.4...8.0 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 4.7 m/s</td>
<td>0.65...13 gpm</td>
</tr>
<tr>
<td>G 1 ½ male</td>
<td>20 mm</td>
<td>approx. 3.3 m/s</td>
<td>0.8...16 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 5.3 m/s</td>
<td>1.3...26 gpm</td>
</tr>
<tr>
<td>G 2 male</td>
<td>32 mm</td>
<td>approx. 3.3 m/s</td>
<td>2.0...40 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 5.9 m/s</td>
<td>4.0...75 gpm</td>
</tr>
<tr>
<td>G 2 ¾ male</td>
<td>54 mm</td>
<td>approx. 3.6 m/s</td>
<td>6.5...130 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>approx. 5.1 m/s</td>
<td>9.0...180 gpm</td>
</tr>
</tbody>
</table>

Media

- Conductive Liquids
- Acids and Caustic Solutions
- Drinking, Cooling, and Waste Water
- Ground Water, Raw Water
- Aggressive or Salty Solutions
- Unsuitable for Oils & Other Low or Non-Conductive Medias

Areas of Application

Flow Monitoring, Flow Measuring, Batching and Totalizing for:
- Machine Building
- Chemical Industry
- Paper Industry
- Automobile Industry
- Cement Industry
- Laboratories

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Compact Magneto-Inductive Flowmeter Model MIK

MIK-...F300, MIK-...F390
Pulse Output: PNP, Open Collector, max. 200 mA
500 Hz at f. s. (...F300)
50...1000 Hz at f. s. (...F390)
Factory Set as per Customer Request
Power Supply: 24 V\textsubscript{DC} ±20%
Power Consumption: 60 mA
Electrical Connection: Plug M 12 x 1

MIK-...S300, MIK-...S30D
Display: Duo-LED for Switch Status
Switching Output: Relay SPDT, Max. 1A/30V\textsubscript{DC} or Active 24 V\textsubscript{DC}, N/C / N/O
Switch Point: 10 ...100% of f. s. in 10%-Steps
User Configured via Rotary Switch
Power Supply: 24 V\textsubscript{DC} ±20%
Power Consumption: 80 mA
Electrical Connection: Plug M 12 x 1, 5-pin

MIK-...L343
Output: 4-20 mA, 3-wire
Max. Load: 500 Ω
Power Supply: 24 V\textsubscript{DC} ±20%
Power Consumption: 80 mA
Electrical Connection: Plug M 12 x 1

MIK-...L443 (Optional Use with AUF-3000)
Output: 4-20 mA, 3-wire
Max. Load: 500 Ω
Power Supply: 24 V\textsubscript{DC} ±20%
Power Consumption: 80 mA
Electrical Connection: Plug DIN 43650

MIK-...Ex4R (Totalizing Electronic)
Display: LCD, 2 x 8 Digit, Illuminated
Rate, Total, and Grand Total
Unit Selectable
Quantity Meter: 8-digit
Analog Output: 4-20 mA Adjustable
Load: Max. 500 Ω
Switching Output: 2 Relays, Max. 30V/2 A
Settings: Via 4 buttons
Functions: Reset, MIN/MAX Memory, Flow Switch, Monitoring for Total and Grand Total, Language
Power Supply: 24 V\textsubscript{DC} ±20%, 3-wire
Power Consumption: Approx. 150 mA
Electrical Connections: Cable Connection or M12 Plug

MIK-...Gx4R (Batching Electronic)
Display: LCD, 2 x 8 Digit, Illuminated
Batching, Total, and Grand Total
Unit Selectable
Quantity Meter: 8-digit
Batch: 5-digit
Analog Output: 4-20 mA Adjustable
Load: Max. 500 Ω
Switching Output: 2 relays, Max. 30V/2 A
Settings: Via 4 Buttons
Functions: Batching (Relay S2), Start, Stop, Reset, Fine Batching, Correction Amount, Flow Switch, Total Quantity, Language
Power Supply: 24 V\textsubscript{DC} ±20%, 3-wire
Power Consumption: Approx. 150 mA
Electrical Connection: Cable Connection or M12 Plug

MIK-...C3xx (Compact Electronics)
Display: 3-digit LED
Analog Output: 4...20 mA Adjustable
(only MIK-...C34P)
Max. Load: 500 Ω
Switching Output: 1(2) Semiconductor PNP or NPN,
Set at Factory
Contact Function: N/C / N/O-Frequency
Programmable
Settings: Via 2 Buttons
Power Supply: 24 V\textsubscript{DC} ±20%, 3-wire
Power Consumption: 120 mA
Electrical Connection: Plug M 12 x 1

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Compact Magneto-Inductive Flowmeter Model MIK

Electrical Connections

MIK-...S300

Output N/O

+Vs

GND

MIK-...S30D

Output N/O

+Vs

GND

MIK-...L343, MIK-...F3x0

n.c.

GND

Signal out

MIK-...C30x

Signal out

+Vs

GND

Switch out 1

GND

Switch out 2

+Vs

MIK-...E14R, MIK-...G14R Cable Connection

<table>
<thead>
<tr>
<th>Wire Number</th>
<th>MIK-...E14R Totalizing Electronics</th>
<th>MIK-...G14R Batching Electronics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24 VDC</td>
<td>+24 VDC</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>4-20 mA</td>
<td>4-20 mA</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>n.c.</td>
<td>Control 1*</td>
</tr>
<tr>
<td>6</td>
<td>Reset part quantity</td>
<td>Control 2*</td>
</tr>
<tr>
<td>7</td>
<td>Relay S1</td>
<td>Relay S1</td>
</tr>
<tr>
<td>8</td>
<td>Relay S1</td>
<td>Relay S1</td>
</tr>
<tr>
<td>9</td>
<td>Relay S2</td>
<td>Relay S2</td>
</tr>
<tr>
<td>10</td>
<td>Relay S2</td>
<td>Relay S2</td>
</tr>
</tbody>
</table>

Control 1 <-> GND: Start-Batching
Control 2 <-> GND: Stop-Batching
Control 1 <-> Control 2: Reset-Batching

Plug Connection

+24 VDC

0 (4) - 20 mA Out

max. 500 Ω

Reset/Ctr 2*

d.c./Ctr 1*

GND

30 VAC/DC / 2 A

S 2

S 1

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Compact Magneto-Inductive Flowmeter Model MIK

Order Details (Example: MIK-5NA U5 A F300)

<table>
<thead>
<tr>
<th>Model</th>
<th>Measuring Range, Native Process Connection</th>
<th>Optional Fitting Set</th>
<th>Output/Electronics</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIK-5NA.</td>
<td>..U0.. = 0.18…7.8 GPH, G ½ ..U1.. = 0.78…15.6 GPH, G ½ ..U2.. = 2.4…48.0 GPH, G ½</td>
<td>..A.. = without 1) ..N.. = PVC, 1/4' NPT female ..R.. = PVC, 1/2' hose barb</td>
<td>Frequency Output ..F300 = M12-plug, 500 Hz ..F390 = M12-plug, 50...1000 Hz 2)</td>
</tr>
<tr>
<td>MIK-5VA.</td>
<td>..U4.. = 0.13…2.6 GPM, G ¾ ..U5.. = 0.2…4.0 GPM, G ¾</td>
<td>..A.. = without 1) ..M.. = PVC, 3/8' PVC glue socket ..N.. = PVC, 3/8' NPT female ..R.. = PVC, 3/4' hose barb ..R.. = Polypropylene, 3/8' NPT female</td>
<td>Switching Output ..S300 = relay, M12-plug ..S30D = active 24 VDC, M12-plug</td>
</tr>
<tr>
<td>MIK-6FC.</td>
<td>..U7.. = 0.4…8.0 GPM, G 1 ½ ..U8.. = 0.65…13 GPM, G 1 ½</td>
<td>..A.. = without 1) ..H.. = PVDF, 1/2' NPT female ..M.. = PVC, 1/2' glue socket ..N.. = PVC, 1/2' NPT female ..P.. = PVC, 1' hose barb ..R.. = Polypropylene, 1/2' NPT female ..V.. = PVDF, butt weld 20mm O.D. tube ..W.. = 316L SS, 1/2' NPT female ..X.. = Brass, 1/2' NPT female</td>
<td>Analog Output ..L343 = M12-plug, 4 - 20 mA ..L443 = DIN-plug, 4 - 20 mA</td>
</tr>
<tr>
<td>MIK-6FT.</td>
<td>..UA.. = 0.8…16 GPM, G 1 ½ ..UB.. = 1.3…26 GPM, G 1 ½</td>
<td>..A.. = without 1) ..H.. = PVDF, 1' NPT female ..M.. = PVC, 1' glue socket ..N.. = PVC, 1' NPT female ..R.. = Polypropylene, 1' NPT female ..V.. = PVDF, butt weld 32mm O.D. tube</td>
<td>Compact Electronic ..C30R = Open Coll. PNP (2x) ..C30M = Open Coll. NPN (2x) ..C34P = 4 - 20 mA, Open Coll. PNP ..C34N = 4 - 20 mA, Open Coll. NPN</td>
</tr>
<tr>
<td>MIK-6FS.</td>
<td>..UD.. = 2.0…40 GPM, G 2 ..UE.. = 4.0…75 GPM, G 2 ¹)</td>
<td>..A.. = without 1) ..H.. = PVDF, 1-1/4' NPT female ..M.. = PVC, 1-1/4' glue socket ..N.. = PVC, 1-1/4' NPT female ..R.. = Polypropylene, 1-1/4' NPT female</td>
<td>Totalizing Electronic ..E14R = LCD, 4-20 mA, relay (2x), 5' cable ..E34R = LCD, 4-20 mA, relay (2x), M12 plug (2x)</td>
</tr>
<tr>
<td>MIK-6FU.</td>
<td>..UG.. = 6.5…130 GPM, G 2 ¾ ..UH.. = 9.0…180 GPM, G 2 ¾</td>
<td>..A.. = without 1) ..H.. = PVDF, 2' NPT female ..M.. = PVC, 2' glue socket ..N.. = PVC, 2' NPT female ..R.. = Polypropylene, 2' NPT female</td>
<td>Batching Electronic ..G14R = LCD, 4-20 mA, relay (2x), 5' cable ..G34R = LCD, 4-20 mA, relay (2x), M12 plug (2x)</td>
</tr>
<tr>
<td>MIK-6FS.</td>
<td>..UA/UB (1 ½&quot;)</td>
<td>..A.. = without 1) ..H.. = PVDF, 2&quot; NPT female ..M.. = PVC, 2&quot; glue socket ..N.. = PVC, 2&quot; NPT female ..R.. = Polypropylene, 2&quot; NPT female</td>
<td></td>
</tr>
<tr>
<td>MIK-6FS.</td>
<td>..UD/UE (2&quot;)</td>
<td>..A.. = without 1) ..H.. = PVDF, 2½&quot; NPT female ..M.. = PVC, 2½&quot; glue socket ..N.. = PVC, 2½&quot; NPT female ..R.. = Polypropylene, 2½&quot; NPT female</td>
<td></td>
</tr>
</tbody>
</table>

Accessories: P/N 807.037 = 4-pin Micro-DC connector with 6-foot cable for output types F300, F390, L343, & S30D P/N 807.007 = 5-pin Micro-DC connector with 6-foot cable for output types C3xx, S300, E34R, & G34R P/N 807.087 = 8-pin Micro-DC connector with 6-foot cable for output types E34R & G34R

1) incl. frontal gaskets (2 pc. O-rings) 2) Please specify frequency at full scale in clear text while ordering 3) Please clearly specify flow direction when ordering

Sensor Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>PPS</th>
<th>PVDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIK-...U0/U1/U2 (1½&quot;)</td>
<td>approx. 0.40 lb</td>
<td>approx. 0.43 lb</td>
</tr>
<tr>
<td>MIK-...U4/U5 (1¼&quot;)</td>
<td>approx. 0.42 lb</td>
<td>approx. 0.50 lb</td>
</tr>
<tr>
<td>MIK-...U7/U8 (1&quot;)</td>
<td>approx. 0.60 lb</td>
<td>approx. 0.72 lb</td>
</tr>
<tr>
<td>MIK-...UA/UB (1 ½&quot;)</td>
<td>approx. 0.90 lb</td>
<td>approx. 1.10 lb</td>
</tr>
<tr>
<td>MIK-...UD/UE (2&quot;)</td>
<td>approx. 1.24 lb</td>
<td>approx. 1.35 lb</td>
</tr>
<tr>
<td>MIK-...UG/UH (2 ¾&quot;)</td>
<td>approx. 2.65 lb</td>
<td>approx. 3.02 lb</td>
</tr>
</tbody>
</table>

Electronics Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIK-...F3x0</td>
<td>approx. 0.18 lb</td>
</tr>
<tr>
<td>MIK-...S30x</td>
<td>approx. 0.67 lb</td>
</tr>
<tr>
<td>MIK-...Lxx3</td>
<td>approx. 0.56 lb</td>
</tr>
<tr>
<td>MIK-...C3xx</td>
<td>approx. 0.56 lb</td>
</tr>
<tr>
<td>MIK-...Exxx</td>
<td>approx. 0.56 lb</td>
</tr>
<tr>
<td>MIK-...Gxxx</td>
<td>approx. 0.56 lb</td>
</tr>
</tbody>
</table>

Total Weight = Sensor Weight + Electronics Weight
## Compact Magneto-Inductive Flowmeter Model MIK

### Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>G</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
<th>H1</th>
<th>H2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIK-xxxU0A</td>
<td>G ½</td>
<td>118</td>
<td>90</td>
<td>14</td>
<td>46</td>
<td>58</td>
<td>36</td>
<td>43</td>
<td>28</td>
</tr>
<tr>
<td>MIK-xxxU1A</td>
<td>G 122</td>
<td>90</td>
<td>16</td>
<td>46</td>
<td>58</td>
<td>36</td>
<td>43</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxU2A</td>
<td>G 126</td>
<td>90</td>
<td>18</td>
<td>46</td>
<td>58</td>
<td>36</td>
<td>43</td>
<td>29,5</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxU4A</td>
<td>G 134</td>
<td>90</td>
<td>22</td>
<td>68</td>
<td>80</td>
<td>36</td>
<td>66</td>
<td>31,5</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxU5A</td>
<td>G 138</td>
<td>90</td>
<td>24</td>
<td>68</td>
<td>80</td>
<td>36</td>
<td>72</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxU7A</td>
<td>G 126</td>
<td>90</td>
<td>18</td>
<td>46</td>
<td>58</td>
<td>36</td>
<td>43</td>
<td>29,5</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxU8A</td>
<td>G 134</td>
<td>90</td>
<td>22</td>
<td>68</td>
<td>80</td>
<td>36</td>
<td>66</td>
<td>31,5</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxUAA</td>
<td>G 138</td>
<td>90</td>
<td>24</td>
<td>68</td>
<td>80</td>
<td>36</td>
<td>72</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxUBA</td>
<td>G 126</td>
<td>90</td>
<td>18</td>
<td>46</td>
<td>58</td>
<td>36</td>
<td>43</td>
<td>29,5</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxUDA</td>
<td>G 134</td>
<td>90</td>
<td>22</td>
<td>68</td>
<td>80</td>
<td>36</td>
<td>66</td>
<td>31,5</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxUEA</td>
<td>G 138</td>
<td>90</td>
<td>24</td>
<td>68</td>
<td>80</td>
<td>36</td>
<td>72</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxUGA</td>
<td>G 2 202</td>
<td>150</td>
<td>26</td>
<td>96</td>
<td>110</td>
<td>75</td>
<td>104</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>MIK-xxxUHA</td>
<td>G 2 202</td>
<td>150</td>
<td>26</td>
<td>96</td>
<td>110</td>
<td>75</td>
<td>104</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

- **MIK-...F3x0, MIK-...S30x, MIK-...L343**
- **MIK-...L443**
- **MIK-...C3xx**
- **MIK-...Ex4R, MIK-...Gx4R**
Compact Magneto-Inductive Flowmeter Model MIK


Reference table 7.1...table 7.5

Dimensions Fitting Set ..N.. PVC-NPT Connection

<table>
<thead>
<tr>
<th>G</th>
<th>L1</th>
<th>L2</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 1/2</td>
<td>Refer to figure 7.2</td>
<td>1/4&quot; nom.</td>
<td></td>
</tr>
<tr>
<td>G 3/4</td>
<td>0.68&quot;</td>
<td>0.52&quot;</td>
<td>3/8&quot; nom.</td>
</tr>
<tr>
<td>G 1</td>
<td>0.76&quot;</td>
<td>0.68&quot;</td>
<td>1/2&quot; nom.</td>
</tr>
<tr>
<td>G 1 1/2</td>
<td>0.98&quot;</td>
<td>0.87&quot;</td>
<td>1&quot; nom.</td>
</tr>
<tr>
<td>G 2</td>
<td>1.33&quot;</td>
<td>0.98&quot;</td>
<td>1-1/4&quot; nom.</td>
</tr>
<tr>
<td>G 2 1/4</td>
<td>1.61&quot;</td>
<td>0.98&quot;</td>
<td>2&quot; nom.</td>
</tr>
</tbody>
</table>

Dimensions Fitting Set ..M.. PVC-IPS Glue Connection

<table>
<thead>
<tr>
<th>G</th>
<th>L1</th>
<th>L2</th>
<th>D</th>
</tr>
</thead>
<tbody>
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Dimensions Fitting Set ..V.. Butt Weld

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Dimensions Fitting Set ..H.. PVDF-NPT Connection

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Dimensions Fitting Set ..H.. PP-NPT Connection

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Dimensions Fitting Set ..R.. SS/Brass-NPT Connection

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Dimensions Fitting Set ..N.. PVC-1/4" NPT Connection

Reference table 7.1 G ½ only

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Dimensions Fitting Set ..W, X.. SS/Brass-NPT Connection

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Dimensions Fitting Set ..P.. PVC-Hose Connection

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No responsibility taken for errors; subject to change without prior notice.