Accurate flow measurement is of primary importance in achieving an efficient process system. Autoclave Engineers offers a complete line of needle, gauge and instrument manifold valves designed to provide accurate, safe and dependable flow measurement. Manufactured for Autoclave Engineers, the design of these valves reflects extensive engineering and manufacturing experience, resulting in attainment of the highest standards for valve quality and reliability.

AE Series 5000 needle, gauge and instrument manifold valves have been engineered to provide versatility in meeting specific process requirements. Several standard bonnet assemblies offer different stem, seal and material selections. Bonnets are installed in hard seat, soft seat and roddable valve models of varied body designs to accommodate the process control, flow measurement and mounting requirements of specific applications. Most valves are rated for pressure service to 6,000 psi (414 bar) with certain models rated to 10,000 psi (690 bar).

**Features:**

- One piece bar stock construction with full material traceability.
- Back seating of stems in a fully open position prevents stem backout.
- Permanent locking of valve bonnet prevents accidental removal while operating valve.
- Stem seal isolates the lubricated stem threads from the process.
- Stainless steel models of needle, gauge and instrument manifold valves, equipped with needle stems, meet NACE MR-01-75.
- Optional high temperature packing for compatibility to 1000°F (538°C) on certain models.
- All valves are designed in accordance with ASME/ANSI B16.34-1988 and ASME Section VIII, Div. 1.
Needle/Gauge Valve - General Information

Needle Valves
Autoclave needle valves are engineered to provide a reliable method for isolating instrumentation from the process and for throttling or shut-off requirements. AE Series 5000 Valves are bubble tight in both the seated and back seated positions. Both hard and soft seated models are available. These needle valves will accept a variety of pipe sizes from 1/4” to 1” and are rated for either 6,000 psi (414 bar) or 10,000 psi (690 bar).

Gauge Valves
Gauge valves are primarily used to isolate the process from instrumentation such as gauges or transducers. These valves are typically used in conjunction with block and bleed valves. AE Series 5000 gauge valves are available with an extended length between the inlet and the bonnet centerline to ensure the valve extends far enough from the process connection to clear the pipeline insulation or to distance a socket weld end from the bonnet. Autoclave gauge valves accept a variety of bonnet styles, threaded pipe sizes and socket welds and are rated for service to 6,000 psi (414 bar).

Instrument Manifold Valves
Autoclave instrument manifold valves provide a safe, economical and convenient method of isolating, blocking, bleeding and calibrating instruments, meters and pressure transmitters. These valves are available in numerous body, bonnet and seal configurations with FNPT, tube fittings and/or instrument flange connections.

AE Series 5000 instrument manifold valves operate to pressures of 6,000 psi (414 bar) and offer excellent flexibility with different body patterns and hard seat models utilizing either a vee, ball or non-rotating stem. Valve models include 2, 3 and 5 bonnet remote line mounting; 2, 3 and 5 bonnet direct mounting single flange; and 2 and 3 bonnet direct mounting, dual flange. Vee, ball and non-rotating tips are available in hard seat models; soft seats use only vee tip stems.

Customer Support
Autoclave Engineers is prepared to assist you in every phase of the design/application cycle. Our technical sales specialists will work with your design team to ensure the correct valve configuration is selected, and/or to custom engineer a special valve for your individual requirements. Our worldwide sales and service organization is available to conduct any on-site review/analysis of your application requirements or to provide timely installation and repair services. Whatever your need, Autoclave’s engineering experience and customer oriented focus will help you find a solution.

Pressure vs. Temperature
Ratings for body, seat and packing materials

Note: Soft seats are bubble-tight at pressure vs. temperature ratings shown above. Metal seat meets ANSI B16.104 Class V.

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**Needle/Gauge Valve - Needle Valves**

**Hard Seated Needle Valve - Model 6N2H**

Model 6N2H hard seated needle valve is designed for applications requiring throttling or shut-off. The wide selection of inlet and outlet configurations makes this valve extremely versatile.

**Features**
- Pressures up to 6,000 psi (414 bar)
- 1/8" bore for 1/4" NPT valves
- 3/16" bore for 3/8" NPT and larger valves
- Optional Arlon soft seat available

**Ordering Procedure**

Typical ordering number: 6N2HSM22TB-2

<table>
<thead>
<tr>
<th>Model</th>
<th>Connections</th>
<th>Bonnet Assembly</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>6N2H</td>
<td>S</td>
<td>M22T</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>M - Material</td>
<td></td>
<td>Grafoil packing</td>
</tr>
<tr>
<td></td>
<td>S - 316SS</td>
<td></td>
<td>Clean for</td>
</tr>
<tr>
<td></td>
<td>C - Carbon steel</td>
<td></td>
<td>chlorine service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clean for</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>oxygen service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arlon soft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>seat material</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(&quot;B&quot; and &quot;DN&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>bonnets only)</td>
</tr>
</tbody>
</table>

**Special Purpose Heavy Duty/Isolation Valve - Model 6N3H**

Model 6N3H special purpose, heavy duty, isolation valve is designed for rugged service applications where a large bore is required for viscous fluids or solids entrainment. Large 1" NPT, M x F or F x F body connections and type "G" high pressure bonnet assure reliable performance and versatility.

**Features**
- Pressures up to 6,000 psi (414 bar)
- Globe flow pattern with large bore suitable for high temperature applications up to 1,000°F (538°C)
- Rugged type "G" bonnet assembly with self-centering ball stem on hard seat provides positive shut-off and dependable performance
- 5/16" bore

**Ordering Procedure**

Typical ordering number: 6N3HSM88TG-G

<table>
<thead>
<tr>
<th>Model</th>
<th>Connections</th>
<th>Bonnet Assembly</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>6N3H</td>
<td>S</td>
<td>M88T</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>M - Material</td>
<td></td>
<td>Grafoil packing</td>
</tr>
<tr>
<td></td>
<td>S - 316SS</td>
<td></td>
<td>Clean for</td>
</tr>
<tr>
<td></td>
<td>C - Carbon steel</td>
<td></td>
<td>chlorine service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clean for</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>oxygen service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Arlon soft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>seat material</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(&quot;B&quot; and &quot;DN&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>bonnets only)</td>
</tr>
</tbody>
</table>
Needle/Gauge Valve - Needle Valves

Self-Aligning Metal Seated-Model 10N2

Model 10N2 self-aligning, metal seat, needle valve is designed with a globe flow pattern, suitable for high temperature applications. This high pressure valve combines operating advantages and rugged construction for dependable, leak-free performance under widely varying pressure and temperature conditions.

Features
• Pressures to 10,000 psi (690 bar)
• Self-centering ball stem provides positive shut-off on “C” type bonnet assembly
• Needle stem also available
• Available in 7/8” square stock with “F” type bonnet in 1/4” NPT female connections
• 1/8” bore for 1/4” NPT valves
• 3/16” bore for 3/8” NPT and larger valves

Ordering Procedure

Typical ordering number: 10N2SM44TCN-2

10N2

Material
S = 316SS
C = Carbon steel

Connections
M44T - 1/2” MNPT x 1/2” FNPT
F44T - 1/2” FNPT x 1/2” FNPT
M64T - 3/4” MNPT x 3/4” FNPT
M66T - 3/4” MSW x 3/4” FNPT
M66S - 3/4” MSW x 3/4” FNPT

Bonnet Assembly
CN - Needle stem/ Teflon packing
C - Ball stem/ Teflon packing
A - Needle stem/ Viton O-ring
F - Miniature ball stem/ Teflon packing (on 1/4” valves only)

Options
G - Grafoil packing
C - Clean for chlorine service
2 - Clean for oxygen service

Soft Seated Roddable Hand Valve-Model 6N1S

Model 6N1S soft seated needle valve is an all purpose valve for gauge or isolation service. The straight through flow design allows for higher flow capacity. The wide selection of inlet and outlet configurations makes this valve extremely versatile.

Features
• Pressures to 6,000 psi (414 bar)
• A replaceable, roddable Arlon soft seat
• 3/16” bore

Ordering Procedure

Typical ordering number: 6N1SSM44TCN-G

6N1S

Material
S = 316SS
C = Carbon steel

Connections
M44T - 1/2” MNPT x 1/2” FNPT
F44T - 1/2” FNPT x 1/2” FNPT
M64T - 3/4” MNPT x 1/2” FNPT

Bonnet Assembly
A - Needle stem/ Viton O-ring
CN - Needle stem/ Teflon packing

Options
G - Grafoil packing

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Panel Mount Needle Valve-Model 6N2H

Features
- Pressures to 6,000 psi (414 bar)
- Optional Delrin soft seat available
- Viton o-ring or Teflon packing available

Ordering Procedure
Typical ordering number: 6N2H-SF22TBPM-D

Panel Mount Needle Valve-Model 10N2

Features
- Pressures to 10,000 psi (690 bar)

Ordering Procedure
Typical ordering number: 10N2-SF22TFNPM-G

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Needle/Gauge Valve - Needle Valves

90° Angle Needle Valve - Model 6N2A

Features
- Pressures to 6,000 psi (414 bar)

Ordering Procedure

Typical ordering number: 6N2A-ASM44TDN-G

- **6N2A**
  - Model
  - 6N2A

- **S**
  - Material
  - S - 316SS
  - C - Carbon steel

- **M44T**
  - Connections
  - Inlet/Outlet
  - M44T - 1/2" FNPT x 1/2" MNPT

- **CN**
  - Bonnet Assembly
  - B - Needle stem/Viton O-ring
  - D - Ball stem/Teflon packing
  - DN - Needle stem/Teflon packing

- **G**
  - Options
  - G - Grafoil packing
  - C - Clean for chlorine service
  - Z - Clean for oxygen service

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**Gauge Valve with Multiple Outlet-Model 6G11**

Model 6G11 gauge valve provides the strength necessary for direct instrument mounting in any position. The extra valve connections provide an easy method for obtaining process samples, checking and calibrating the instrument.

**Features**
- Pressures to 6,000 psi (414 bar)
- Self-centering ball seat provides positive shut-off
- Optional extended inlet available for insulation clearance - add 2.50” (63.5)
- 3/16” bore

**Ordering Procedure**

Typical ordering number: **6G11SM44TA-2**

<table>
<thead>
<tr>
<th>Model 6G11</th>
<th>Material S - 316SS</th>
<th>Connections Inlet/Outlet M44T - 1/2” MNPT x 1/2” FNPT</th>
<th>Bonnet Assembly A - Needle stem/ Viton O-ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td></td>
<td></td>
<td>Options G - Grafoil packing</td>
</tr>
<tr>
<td>M44T</td>
<td></td>
<td></td>
<td>C - Clean for chlorine service</td>
</tr>
<tr>
<td>M44S</td>
<td></td>
<td></td>
<td>2 - Clean for oxygen service</td>
</tr>
</tbody>
</table>

**Soft Seat with Multiple Outlet-Model 6G6S**

Model 6G6S soft-seated gauge valve offers multiple ports which allows for choice of gauge or handle orientation. This valve version is a roddable design utilizing a replaceable soft seat for positive shut-off capability.

**Features**
- Pressures to 6,000 psi (414 bar)
- Optional extended inlet available for insulation clearance - add 2.50” (63.5)
- Replaceable roddable Arlon soft seat
- 3/16” bore

**Ordering Procedure**

Typical ordering number: **6G6SSM64TCN-2**

<table>
<thead>
<tr>
<th>Model 6G6S</th>
<th>Material S - 316SS</th>
<th>Connections Inlet/Outlet M44T - 1/2” MNPT x 1/2” FNPT</th>
<th>Bonnet Assembly A - Needle stem/ Viton O-ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td></td>
<td></td>
<td>Options G - Grafoil packing</td>
</tr>
<tr>
<td>M44T</td>
<td></td>
<td></td>
<td>C - Clean for chlorine service</td>
</tr>
<tr>
<td>M44S</td>
<td></td>
<td></td>
<td>2 - Clean for oxygen service</td>
</tr>
<tr>
<td>M64S</td>
<td></td>
<td></td>
<td>C - Ball stem/ Teflon packing</td>
</tr>
<tr>
<td>M64L</td>
<td></td>
<td></td>
<td>2 - Clean for oxygen service</td>
</tr>
</tbody>
</table>

---

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Needle/Gauge Valve - Gauge Valves

Gauge Valve OS&Y Construction-Model 6G9H

Model 6G9H gauge valve is designed as a primary block valve. The OS&Y bonnet design is suitable for high temperature applications. Multiple outlet connections allow for flexibility during installation. This valve has a 5/16” orifice for high C.V. capability. It is ideally suited for severe service application.

Features
- Pressures to 6,000 psi (414 bar)
- Extreme service design
- Inlet is schedule 160 or heavier
- Optional extended inlet available for insulation clearance – add 3.00” (76.2)
- Back seated stem design
- 5/16” bore

Ordering Procedure

Typical ordering number: 6G9HSM64TE-G

Instrument Block Valve with Integral Bleed-Model 6GIB

Model 6GIB instrument valve is a ruggedly constructed direct mounting instrument block valve. Featuring the larger configuration Type “C” bonnet, model 6GIB is a durable block and integral bleed valve providing safe instrument depressurization. A small drain tube allows venting of process.

Features
- Pressures to 6,000 psi (414 bar)
- Available with needle or self-aligning ball stem
- 3/16” bore

Ordering Procedure

Typical ordering number: 6GIBSM64TC-G

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**Needle/Gauge Valve - Gauge Valves**


Models 6G2R and 6G2D gauge valves are roddable designs with a large 3/8” bore and multiple ports. They can be supplied with hard or soft seats and the bonnets are equipped with an injection nipple for on-line emergency venting or sealing in the event of packing failure or lubrication injection.

**Features**
- Pressures to 6,000 psi (414 bar)
- Both bonnet assemblies offered for these valves have a tapered self-aligning, non-rotating plug
- Optional high temperature model “K” bonnet, to 1,000°F (538°C)
- An optional, replaceable, roddable Arlon soft seat which has been used in steam applications up to 550°F (288°C)

**Ordering Procedure**

Typical ordering number: **6G2RSM84TK-2**

<table>
<thead>
<tr>
<th>Model</th>
<th>Material</th>
<th>Connections</th>
<th>Bonnet Assembly</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>6G2R</td>
<td>S - 316SS</td>
<td>M44T, M84T</td>
<td>H - Threaded</td>
<td>A - Arlon 1000 soft seat material “H” bonnet only)</td>
</tr>
<tr>
<td>6G2L (for long body option)</td>
<td>C - Carbon steel</td>
<td>M64T, M64S</td>
<td>self-aligning non-rotating plug</td>
<td>C - Clean for chlorine service</td>
</tr>
<tr>
<td>6G2D</td>
<td></td>
<td>M84T</td>
<td>K - Threaded</td>
<td>2 - Clean for oxygen service</td>
</tr>
<tr>
<td>Double block valve</td>
<td></td>
<td></td>
<td>self-aligning non-rotating plug and non-rotating stem with Grafoil packing</td>
<td></td>
</tr>
</tbody>
</table>

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Needle/Gauge Valve - Gauge Valves

**Orifice Valve OS&Y Construction-Models 6G80**

Models 6G80 orifice valve utilizes the OS&Y style bonnet and offers two outlet ports at 90° to the inlet. The valve is primarily designed for side-by-side installation on orifice flanges.

**Features**
- Pressures to 6,000 psi (414 bar)
- Inlet is schedule 160 or heavier
- Large C.V. roddable seats
- Manufactured to fit standard orifice flanges @ 2.13” (54.1) centers
- Back seated stem design
- Available with non-rotating ball stem
- 5/16” bore

**Ordering Procedure**

Typical ordering number: 6G80SM64TE-G

**Instrument Block and Bleed Valve with Integral Vent-Model 6GIV**

Features
- Pressures to 6,000 psi (414 bar)

**Ordering Procedure**

Typical ordering number: 6GIVSM44TDN-G
Needle/Gauge Valve - Gauge Valves

Replaceable Seat non-Rotating Stem Root/Gauge Valve-Model 6G4R

Features
• Pressures to 6,000 psi (414 bar)
• Replaceable hard or soft seat available
• Complete roddability through a 3/8” diameter orifice
• Available with Teflon or Grafoil packing

Ordering Procedure

Typical ordering number: 6G4RSM84TK-L

6G4R
Model
6G4R
6G4L (for long body option)

S
Material
S - 316SS
C - Carbon steel

M84T
Connections
Inlet/Outlet
M44T - 1/2” MNPT x 1/2” FNPT
M64T - 3/4” MNPT x 1/2” FNPT
M84T - 1” MNPT x 1/2” FNPT
M44S - 1/2” MSW x 1/2” FNPT
M64S - 3/4” MSW x 1/2” FNPT
M84S - 1” MSW x 1/2” FNPT

P
Bonnet Assembly
K - Threaded bonnet/non-rotating stem/self aligning non-rotating hardened plug/replaceable seat/Teflon packing

L
Options
G - Grafoil packing
A - Arlon seat
I - 316 SS seat
L - Lockplate
C - Clean for chlorine service
2 - Clean for oxygen service

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Needle/Gauge Valve - Bonnets

**Type “C” Bonnet Assembly**  
Optional needle stem available (“CN”)  
(Interchangeable with “A” bonnet)

- Handle (C12L14 or 303 SS)
- Dust cover (aluminum)
- Packing adjuster (carbon steel or SS)
- Lock nut (carbon steel or SS)
- Screwed bonnet (carbon steel or 316 SS)
- Packing (Teflon or Grafoil)
- Stem (303 or 316 SS)
- 316 SS ball

**Type “D” Bonnet Assembly**  
Optional needle stem available (“DN”)  
(Interchangeable with “B” bonnet)

- Handle (C12L14 or 303 SS)
- Dust cover (aluminum)
- Packing adjuster (carbon steel or SS)
- Lock-nut (carbon steel or SS)
- Screwed bonnet (carbon steel or 316 SS)
- Packing (Teflon or Grafoil)
- Stem (303 or 316 SS)
- 316 SS ball

**Type “E” Bonnet Assembly**

- Handle (C12L14 or 303 SS)
- Dust cover (plastic)
- Yoke head (C12L14 or 303 SS)
- Yoke stud (stress proof or 316 SS)
- Packing washer (C12L14 or 303 SS)
- Packing follower (316 SS)
- Packing (Teflon)
- Packing guide (316 SS)
- Bolted bonnet (C1018 or 316 SS)
- Gasket (Flexitalic)
- Stem (303 or 316 SS)
- 316 SS ball

**Type “G” Bonnet Assembly**

- Handle (C12L14 or 303 SS)
- Dust cover (aluminum)
- Packing adjuster (carbon steel or SS)
- Lock-nut (carbon steel or SS)
- Screwed bonnet (carbon steel or 316 SS)
- Packing (Teflon or Grafoil)
- Stem (303 or 316 SS)
- 316 SS ball

**Type “H” Bonnet Assembly**

- Handle (303 SS)
- Dust cover (aluminum)
- Packing adjuster (416 SS)
- Lock-nut (303 SS)
- Screwed bonnet (316 SS)
- Injection nipple
- Packing (Teflon)
- Stem (316 SS)
- Plug (416 SS)
- Seat (316 SS or Arlon)

**Type “K” Bonnet Assembly**  
(For high temperature and severe service applications)

- Handle (4140)
- Injection Nipple
- Packing adjuster (416 SS)
- Screwed bonnet (316 SS)
- Packing (Grafoil)
- Lock nut (SS)
- Stem (316 SS)
- Plug (416 SS)
- Seat (316 SS)

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Bonnet Assemblies

Autoclave Engineers needle, gauge and instrument manifold valves utilize several different bonnet styles to increase operational flexibility and process compatibility. These bonnets offer both adjustable and non-adjustable packing as well as designs incorporating ball or needle stems, non-rotating stems and a non-rotating plug. Standard materials for bonnet, stem and handle construction are offered in either carbon steel or stainless steel with monel available as an option. Handles are pinned to the stem and are designed to sheer the pin to prevent over torquing. Standard seal materials are Viton O-rings or Teflon packing with Grafoil packing available as an option.

Features
- Stem back seat the bonnet for a metal-to-metal seal isolating the packing from the process.
- All stem packing is located below the stem threads thereby isolating stem threads from process fluids.
- All bonnets include color-coded dust covers to prevent abrasive materials from entering the stem threads. The color coding identifies the packing materials.
- All threaded bonnets include a lock pin to prevent accidental removal of the bonnet.
- Lockplates also available as an option and are standard on the “H” and “K” bonnets.

Seal Temperature Limits

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Minimum Temperature</th>
<th>Maximum Temperature</th>
<th>Cover Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viton</td>
<td>O-ring</td>
<td>-20°F (-29°C)</td>
<td>400°F (204°C)</td>
<td>orange</td>
</tr>
<tr>
<td>Teflon</td>
<td>Packing</td>
<td>-100°F (-73°C)</td>
<td>500°F (260°C)</td>
<td>red</td>
</tr>
<tr>
<td>Grafoil</td>
<td>Packing</td>
<td>-40°F (-40°C)</td>
<td>1000°F (538°C)</td>
<td>silver</td>
</tr>
</tbody>
</table>

For NACE requirements-needle stem required

Type “A” Bonnet Assembly
(Interchangeable with “C” bonnet)

- Handle (C12L14 or 303 SS)
- Dust cover (plastic)
- Screwed bonnet (carbon steel or 316 SS)
- Back-up ring (Teflon)
- “O” ring (Viton)
- Stem (303 or 316 SS)
- Seat (Arlon)
- Lock Pin

Type “B” Bonnet Assembly
(Interchangeable with “D” bonnet)

- Handle (C12L14 or 303 SS)
- Dust cover (plastic)
- Screwed bonnet (carbon steel or 316 SS)
- Back-up ring (Teflon)
- “O” ring (Viton)
- Stem (303 or 316 SS)
- Hard Seat

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Needle/Gauge Valve - Accessories

Gauge Siphon-Model 6GS

Features
• Pressures to 6,000 psi (414 bar)

Ordering Procedure

Typical ordering number: 6GSSM44T

Bleed Valve with Integral Vent-Model 6BV

Features
• Pressures to 6,000 psi (414 bar)

Ordering Procedure

Typical ordering number: 6BVSM4T

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