For over 60 years, TechnipFMC's INVALCO product group has been manufacturing instrumentation and controls for the process and petroleum industries worldwide. Products groups include liquid/gas; turbine, positive displacement, gear and insertion meters with associated electronics; diaphragm-operated control valves; level controls; water-in-oil and oil-in-water analyzers.

**Flow Measurement**
INVALCO has been a pioneer in the use of tungsten carbide, a bearing material for the stringent demands of the petroleum industry. We offer a full line of industrial and sanitary turbine meters to suit your measurement needs. Whether measuring anhydrous ammonia or deionized water, natural gas or compressed air, we have you covered.

**Totalizers, Flow Computers and Transmitters**
INVALCO offers a wide variety of readout equipment. Our flow totalizers and rate indicators are inexpensive and easy to use for a broad range of applications.

**Analytical Instruments**
INVALCO analytical instruments offer accurate, reliable readings to detect concentrations of water and emulsified water in a crude oil stream.

**Valves**
INVALCO valves are the industry standard when rugged and reliable dump/control, fuel control, back pressure and pressure relief valves are required. If dumping large volumes of fluid quickly at low- or high-pressures or to control blending is needed, our valves meet the application. Most valves are NACE adaptable, making them easily modified for sour service. Manufactured with hammer union construction guarantees reliability and reduces downtime for repairs.

**Micro Valve®**
Since introduction in 1956, INVALCO's Micro Valve has been the best valve to solve liquid, air, and gas service design problems. Other miniature valves leak when flow is redirected from one port to another. With Micro Valve, flow is instantly redirected so there is no leakage.

**Level Controls**
Designed with the end user in mind, INVALCO’s level controls are trusted to be dependable, easy to work with, and easy to maintain. The level controls range from simple point-type to continuous electronic level transmitters for industrial and sanitary applications.

**Pressure Switches and Other Controls**
The consistency of INVALCO’s mechanical design provides years of reliable and accurate service. Innovations in our electronics design refinements and manufacturing advances keep these products on the leading edge of technology.

**Controls and Miscellaneous**
Experience, service, and performance are what you can expect from INVALCO – the company that has a proven record for quality and dependability.
Flow Measurement

**WH Series Turbine Meters**

The WH Oilfield Series Meter utilizes a rugged, durable three-piece rotor/stator design. The double-sleeve tungsten carbide bearing and flow-through design provide excellent performance and unsurpassed mean-time-between-failure (MTBF) characteristics. For additional information, see SSIN038.

<table>
<thead>
<tr>
<th>Flow Range</th>
<th>GPM</th>
<th>ACFM</th>
<th>ACFH</th>
<th>AM H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes (in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1” - L</td>
<td>6.5</td>
<td>24.6</td>
<td>65</td>
<td>246</td>
</tr>
<tr>
<td>1 ¼” - L</td>
<td>17.5</td>
<td>66.2</td>
<td>175</td>
<td>662</td>
</tr>
<tr>
<td>2” - L</td>
<td>40</td>
<td>151.2</td>
<td>400</td>
<td>1512</td>
</tr>
</tbody>
</table>

**Features and Benefits**

- Rotor supports: heavy-duty upstream and downstream flow straightening for increased accuracy and durability
- Helical cast rotor: cast from a highly wear-resistant stainless steel for durability and long service life
- Journal bearings and thrust balls: tungsten carbide bearing surfaces are extremely durable and reliable
- All stainless steel construction: all wetted parts are highly corrosion-resistant stainless steel ensuring years of corrosion-free service
- Available in 1” and 2” wafer-style, 1” and 1 ½” NPT, and 2” f x f NPT

**GT Gas Series Turbine Meters**

The Cartridge Style Gas Turbine Meter is a unique one-piece cartridge design which has been adapted to include a gas rotor and bearing assembly. Each meter has three separate rotor designs which overlap adjacent meter ranges and will conform to more pipe sizes without reduction or expansion requirements. Covering flow rates from 0.5 to 200 ACFM, these meters will work within pressures from vacuum to 2000 psi. Replacement cartridges are fully-calibrated and are ready for installation with no special tools required. The Tungsten carbide v-cup bearing design provides excellent performance and unequalled service life in non-lubricating and solids containment gases. For additional information, see SSIN024.

<table>
<thead>
<tr>
<th>Linear Gas Flow Range (Nominal)</th>
<th>ACFM</th>
<th>ACFH</th>
<th>AM H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (in)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>¾” - L</td>
<td>0.13</td>
<td>8</td>
<td>.22</td>
</tr>
<tr>
<td>¾” - M</td>
<td>0.5</td>
<td>30</td>
<td>.85</td>
</tr>
<tr>
<td>¾” - H</td>
<td>0.75</td>
<td>45</td>
<td>1.25</td>
</tr>
<tr>
<td>1” - L</td>
<td>0.5</td>
<td>30</td>
<td>.85</td>
</tr>
<tr>
<td>1” - M</td>
<td>0.65</td>
<td>40</td>
<td>1.1</td>
</tr>
<tr>
<td>1” - H</td>
<td>1.1</td>
<td>65</td>
<td>1.8</td>
</tr>
<tr>
<td>1 ¼” - L</td>
<td>0.6</td>
<td>36</td>
<td>2</td>
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<td>1 ¼” - M</td>
<td>1.65</td>
<td>100</td>
<td>2.8</td>
</tr>
<tr>
<td>1 ¼” - H</td>
<td>3.0</td>
<td>175</td>
<td>5.0</td>
</tr>
<tr>
<td>2” - L</td>
<td>3.0</td>
<td>175</td>
<td>5.0</td>
</tr>
<tr>
<td>2” - M</td>
<td>4.5</td>
<td>4.5</td>
<td>7.7</td>
</tr>
<tr>
<td>2” - H</td>
<td>8.5</td>
<td>8.5</td>
<td>14.0</td>
</tr>
<tr>
<td>2” - XH</td>
<td>20</td>
<td>20</td>
<td>33</td>
</tr>
</tbody>
</table>


**Features and Benefits**

- Three rotors, one body: suits more applications without reduction or expansion fittings
- One piece cartridge internals: with integral flow straighteners for ease of maintenance
- Tungsten carbide bearing system: for long service life
- Stainless steel/tungsten carbide construction: for corrosion-free service
Totalizers, Flow Computers and Transmitters

Series 4200 Meter Mounted Rate Totalizers

Model 4200 is a meter-mount or wall-mounted, programmable, battery operated, intrinsically-safe, rate/totalizer suitable for use in NEMA 4X weatherproof areas. As an option, Model 4200 can be loop powered and supply a 4-20 mA output, or be powered from a 8-35 Vdc supply. For additional information, see SSIN036.

Features and Benefits

- Intrinsically safe to Class I, Div. 1, Groups A,B, C, and D CUL/UL
- Displays rate, and accumulated total
- Battery, loop, or DC powered
- Weatherproof and corrosion resistant
- Wall, panel, or flowmeter mounting
- Fully programmable
- 4-20 mA output option
- Password protection
- K-Factor linearization

Series 4300 Meter Mounted Rate Totalizers

Featuring 5 digits of rate and 8 digits of total, the INVALCO 4300 is a battery or loop-powered indicator capable of accepting magnetic pickup, DC pulse or switch closure inputs from pulse producing flowmeters. The unit can be ordered with an optional 4-20mA output (Models 4300-3I and 4300-3O). The 4300 uses the 4-20mA loop to provide power when this output is used. For additional information, see SSIN037.

Features and Benefits

- Accepts inputs from: magnetic pickups, contact closures, DC pulses (optically isolated) from pulse producing flowmeters
- Displays rate and total simultaneously
- 5 digit rate display, 8 digit totalizer display
- 4-20 mA analog output option (8 updates/sec)
- Powered from internal battery, external DC supply or 4-20 mA output loop
- 20 pt. linearization
- Isolated scaled pulse output
- Nonvolatile flash memory of setup data
- Extended battery life
- RS 485 Modbus option
**PA-6 Preamplifier**

PA-6 Preamplifier is designed to be used with the Smith Meter® Turbine Meters and D Transmitters (on PD Meters) to convert the low voltage sinusoidal signal to a square wave pulse form that can be used to increase the transmission distance of the pulse or convert the pulse form for instruments that require a highspeed, edge-triggered input. The preamplifier has also been designed with a jumper-selectable gain that can be used to either increase or decrease the sensitivity of the unit to fit the needs of the application. For additional information, see SS02012.

**Features and Benefits**
- Explosion-proof mounting on the turbine meter
- 8–29 VDC input power
- Low susceptibility to EMI/RFI interference
- Pulse output multiplication (0.5, 1, or 2 times)
- Jumper-selectable gain (1, 25, 50)
- Simple installation
- Allows greater distance between meter and flow computer

**PA-11 Preamplifier**

Model PA-11 can be used with Smith Meter® Turbine Meters or can be field mounted. It is used to convert a low voltage sinusoidal signal to a square wave pulse form that can be used to increase the transmission distance of the pulse or convert the pulse form for instruments that require a high speed, edged-triggered input. The preamplifier has also been designed with a jumper-selectable gain that can be used to either increase or decrease the sensitivity of the unit to fit the needs of the application. The preamplifier has the capacity to operate with either two or three wires. On the two-wire system, the output signal and power are carried on the same two wires. For additional information, see SS02019.

**Features and Benefits**
- Two-wire connection from preamplifier to receiver
- Low susceptibility to EMI/RFI interference
- Jumper selectable gain (1, 25, 50)
- Explosion-proof mounting on turbine meters
Model WCM 7300M Temperature Compensated Water Cut Monitor

Model WCM 7300ME Temperature Compensated Water Cut Monitor with Insertion Probe

Model WCM 7300M is designed to provide the highest possible sensitivity, resolution, and accuracy for water content determination in crude oil, other hydrocarbons, or other low dielectric liquids from a maximum of 25% to levels below 1000 parts per million (ppm). In oil and natural gas (condensate) production, water cut and S&W measurements are significantly improved with the WCM 7300M technology. Enhanced digital signal processing and full product temperature compensation are two of the technological advancements utilized by this device. Probe sizes from 2” through 12” are available. 4-20 mA and 0-5 volt outputs are available for remote readout. Water cut, process temperature or probe electrical value can be selected for viewing without removing conduit cover by use of a supplied magnet to operate an internal reed switch. For additional information, see SSIN016 and SSIN017.

Features and Benefits

- Approvals: UL/CUL explosion-proof certificate for Class I, Div. 1, Groups C and D or Class II, Groups E, F, and G hazardous locations
- Enhanced digital signal precession
- Full product temperature compensation
- Probe sizes from 2” through 12” are available
- WCM 7300M will provide a 0-5 Vdc output for use with Model 4728 S&W Monitor where remote monitoring is desirable
- NACE adaptable: can be modified for use in sour service

Applications

- LACT (Lease Automatic Custody Transfer) Units
  - Detect and provide relay contact closure that can be used to reroute oil that has excess water cut
- Pipeline Loading
  - Monitor transfer of petroleum/condensate products from loading facilities
- Dehydration Equipment
  - Determine and enhance equipment efficiencies, by monitoring the product and indicating water content
- Fuel Oil Monitoring
  - Determine contamination of fuel oil by condensation, or other external factors, before entry to engine
- Storage and Treating Facilities
  - Monitoring and early detection of undesirable conditions as well as interface detection during dewatering of storage tanks
Models 4528, 4528EZ, and 4728 Monitors
CX-645 Probe Water Cut Monitors

Model 4728 Water Cut Monitor, in conjunction with a Model 4528 Detector and a Model CX-645 Capacitance Probe is a continuous on-line monitor or percent water in a flowing crude oil emulsion stream. This unit displays percent of water in various ranges from 0-5% up to and including 0-20% on a digital LCD indicator. In addition, Model 4728 provides a 4-20 mA analog output proportional to input range, and a field-adjusted, time-delayed, limit relay for valve control or alarming. For additional information, see SSIN015.

Features and Benefits

- Real-time display and retransmission of water cut monitor: allows quick response to upset conditions for downstream controls
- Adjustable delay of relay closure: prevents nuisance alarms and “actuator overload”
- Direct analog output from Model 4528 Detector: 4-20 mA signal is available from the probe without the need to include Model 4728 monitor
- Nace adaptable: can be modified for use in NACE
- Approvals: UL/CUL explosion-proof certificate for Class I, Div. 1, Groups C and D or Class II, Groups E, F, and G hazardous locations

Applications

- **LACT (Lease Automatic Custody Transfer) Units**
  Detect and provide relay contact closure that can be used to reroute oil that has excess water cut
- **Pipeline Loading**
  Monitor transfer of petroleum/condensate products from loading facilities
- **Dehydration Equipment**
  Determine and enhance equipment efficiencies by monitoring the product and indicating water content
- **Fuel Oil Monitoring**
  Determine contamination of fuel oil by condensation, or other external factors, before entry to engine
- **Storage and Treating Facilities**
  Monitoring and early detection of undesirable conditions as well as interface detection during dewatering of storage tanks
Valves

Series 415 and 416 Vessel Dump Control Valves

Series 415 is ideal for low pressure separators or any application that needs to dump large volumes or fluid quickly. Series 416 is ideal for high pressure separators or any application that requires moving large volumes of fluid quickly. For additional information, see SSIN045.

Features and Benefits

- Quick-opening trim: better flow characteristics
- Ductile or steel bodies: meets low or high pressure demands
- Threaded or grooved bodies: meets more application demands
- Throttling or quick opening trim: covers all operating conditions
- Nace adaptable (RNCE available): can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
<th>Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>415/416</td>
<td>Ductile or Steel</td>
<td>Steel</td>
<td>FNPT/Grooved</td>
<td>Yes</td>
<td>Quick</td>
</tr>
</tbody>
</table>

Series 418 and 420 High Pressure Dump/Control Valves

Series 418 and Series 420 are ideal for high pressure separators, dehydrators, or any application where it is necessary to control the fluid output. For additional information, see SSIN046.

Features and Benefits

- Ductile or steel bodies: meets low or high pressure demands
- Hammer union construction: reduced downtime for repair
- Wide range of trim sizes: meets all operating conditions
- Globe or angle body: ease of piping
- Nace adaptable (RNCE available): can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
<th>Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>418/420</td>
<td>Ductile or Steel</td>
<td>Steel, Union</td>
<td>Threaded</td>
<td>Yes</td>
<td>Wide range</td>
</tr>
</tbody>
</table>
**Series 423 and 424 Non-Freeze Dump/Control Valve**

Series 423 and Series 424 Valves are perfect for use as a liquid dump valve on high pressure separators. The trim and seat are totally immersed in the fluid to prevent freeze-ups. For additional information, see SSIN061 and SSIN048.

**Features and Benefits**
- Non-freese construction: prevents freeze-up at the plug and seat
- Hammer union construction: reduced dowtime for repair
- Replaceable trim (RNCE available): reduces cost

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
<th>Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>423/424</td>
<td>Low Temp. Carbon Steel</td>
<td>Steel, Union</td>
<td>MNPT/FNPT</td>
<td>No</td>
<td>Replaceable</td>
</tr>
</tbody>
</table>

**Series 434 Flanged Dump/Control Valve**

Series 434 Valve can be used in any application that requires a steel-bodied flanged valve. This could include high or low pressure separators, treaters, dehydrators, or any other pressure vessel. Series 434 is perfect for use on offshore vessels. For additional information, see SSIN049.

**Features and Benefits**
- Hammer union construction: reduced downtime for repair
- Quick change trim: reduced cost for repair
- Steel bodies: meets all application requirements
- Nace adaptable: can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
<th>Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>434</td>
<td>Steel</td>
<td>Carbon Steel, Union</td>
<td>Flanged</td>
<td>Yes</td>
<td>Quick</td>
</tr>
</tbody>
</table>

**Series 436 and 438 Flanged Dump/Control Valves**

Series 436 and 438 Valves can be used in a variety of applications that require a steel bodied valve. This could include high or low pressure separators, treaters, dehydrators, or any other pressure vessel.

**Features and Benefits**
- Meets ANSI flanged dimensions: perfect for offshore applications.
- Proven closed yoke design: reduces the chance of debris entering the valve.
- NACE adaptable: can be modified for use in sour service.

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>436/438</td>
<td>Steel</td>
<td>Steel</td>
<td>Flanged</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Series 442 and 443 Diatroller Treater Valve

Series 442 and 443 is a combination liquid level controller and liquid valve. Closed, the force of the weighted rod on top exceeds the liquid pressure under the valve diaphragm. As the liquid level rises in the vessel, the increased head pressure raises the diaphragm, opening the valve. Gas from the top of pressure vessels is piped to the valve diaphragm’s top side to equalize pressure. For additional information, see SSIN050.

Features and Benefits
- Quick change trim: can be changed without taking valve out of the line - reduced downtime
- Replaceable seat: reduced overall cost
- Weights can be added: meets all application demands
- Soft plug: assures tight shut-off

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
<th>Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td>442/443</td>
<td>Cast Iron, A-126</td>
<td>Cast Iron, A-126</td>
<td>Threaded or Flanged</td>
<td>No</td>
<td>Quick</td>
</tr>
</tbody>
</table>

Series 455 Double Port Dump/Control Valve

Series 455 Valve can be used in any low to moderate pressure application that requires discharge of large amounts of fluid quickly. This could be large treaters, separators, free water knockouts, etc. For additional information, see SSIN051.

Features and Benefits
- Ductile iron body: meets most application needs
- Soft plug: assures tight shut-off
- Double port construction: assures maximum discharge rates
- Nace adaptable (RNCE available): can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>455</td>
<td>Ductile Iron</td>
<td>Ductile Iron</td>
<td>150 lb. raised face</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Series 465 Single Port/Fuel Control Valve

Series 465 Globe Valve is commonly used as a fuel valve. Suitable applications include thermostat service or fuel shut-off for oil, gas, water, glycol, and distillate service. For additional information, see SSIN052.

Features and Benefits
- Carbon steel body: meets all application requirements
- Soft plug: assures tight shut off
- Small size: assures precise modulation of fluid

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
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<tr>
<td>465</td>
<td>Carbon Steel</td>
<td>416 Stainless</td>
<td>FNPT</td>
<td>Yes</td>
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</table>

Series 468 Single Port/Fuel Control Valve

Series 468 Globe Valve is perfect for use as a fuel regulating valve for precise burner controls. Suitable applications include thermostat service, fuel shut-off, for oil, gas, glycol, and distillate service. For additional information, see SSIN053.

Features and Benefits
- Adjustable spring: meets various application demands
- Soft plug: assures tight shut off
- Nace adaptable: can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
<th>End Connections</th>
<th>NACE Adaptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>468</td>
<td>Ductile Iron</td>
<td>Ductile Iron</td>
<td>FNPT</td>
<td>Yes</td>
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</tbody>
</table>

Series 470 Single Port/Fuel Control Valve

Series 470 Globe Valve is perfect for use when precise burner control is required. Suitable applications include thermostat service or fuel shut-off for oil, gas, glycol, and distillate service. For additional information, see SSIN054.

Features and Benefits
- Soft plug: assures tight shut off
- Adjustable spring: meets various application demands
- Steel body: meets most application requirements
- Nace adaptable: can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
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<tr>
<td>470</td>
<td>Carbon Steel</td>
<td>18-8 Stainless</td>
<td>FNPT</td>
<td>Yes</td>
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</tbody>
</table>
Series 476 3-Way Control Valve

Series 476 3-Way 2” Control Valve is perfect for use in diverting, blending, manifolding, and volume metering service. Its primary use is in LACT service, but it can be used in other blending applications.

Features and Benefits
- Replaceable seats: reduced cost
- Grooved or threaded bodies: meets most applications
- Direct or reverse acting: more flexibility in applications
- Two or three position inner valve: allows for positive shut-off when metering fluids
- Nace adaptable: can be used in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
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<th>NACE Adaptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>476</td>
<td>Ductile Iron</td>
<td>Carbon Steel</td>
<td>Grooved or NPT</td>
<td>Yes</td>
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</table>

Series 504/507/510 Back Pressure Valves

Series 504/507/510 Valves are perfect for maintaining back pressure on vent lines from separators, treaters, dehydrators, compressor stations, gas gathering systems, etc. For additional information, see SSIN055, SSIN056, and SSIN057.

Features and Benefits
- Ductile iron body: meets most application needs
- Soft plug: assures tight shutoff
- Double-port construction: assures maximum discharge rates
- External sensor line: for ease of service
- Internal sensor line: reduces the chance of blockage
- Nace adaptable: can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
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</tr>
</thead>
<tbody>
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<tr>
<td>507</td>
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<td>Grooved or FNPT</td>
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<tr>
<td>510</td>
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<td>Ductile</td>
<td>Flanged</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Series 524 Lever Operated Dump Valve

Series 524 Valve can be used as oil or water dump valves on separators, treaters, free water knockouts, or similar vessels that require a lever-operated valve. For additional information, see SSIN058.

Features and Benefits
- Double-port design: allows for maximum fluid discharge
- Soft plug: assures tight shut off
- Angle and globe bodies: meets most application demands: Nace Adaptable (RNCE available)
- Nace adaptable (RNCE available): can be modified for use in sour service

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
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<th>NACE Adaptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>524</td>
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<td>Ductile</td>
<td>Flanged</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Series 550 Socket Weld Log Nose Choke

Typically used in indirect heaters, but can be used in any application requiring a long nose choke design. Long Nose Chokes are primarily used to expand high-pressure gas inside the flow coil of indirect heaters. The “long nose” name is derived from the fact the outlet section of the angle-type body is extended permitting the choke orifice area to be immersed within the indirect heater bath. The heat generated in this manner minimizes the formation of hydrates, which occurs as high-pressure gas expands.

<table>
<thead>
<tr>
<th>Model</th>
<th>Body Material</th>
<th>Body Cover</th>
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<tr>
<td>550</td>
<td>Forged Steel</td>
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<td>Socket Weld</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Quick, Sure Response with Design Adaptability
With a unique, over-center snap-action you get a quick, sure response. There are no sliding seals, packing, or tight-fitting moving parts to leak, wear out, or stick. Therefore, no lubricants are required. All models have been tested through several million cycles without maintenance, thus guaranteeing your system’s performance. Micro Valves will withstand abrasive-bearing fluids. With all ports having some connection, external contaminants cannot enter the units. Dirt and grit will not prevent tight seating and will not cause the valve to stick.

Dependable Performance
The valve offers sure response, with no “neutral” position, and no varying time lag between position. Micro Valves maintain either position without holding force, and cannot be vibrated or jarred out of position. Valve action is full-speed regardless of operator speed or force applied. Trip-point position repeats accurately and is essentially independent of the speed of the external device. Light operating forces are required and not affected by operating pressure or flow rate. Shut-off is bubble-tight up to related pressures.

Features and Benefits
- Flow is instantly redirected, so there is no leakage
- Unique over-center snap action provides quick, sure response
- No sliding seals, packing or tight-fitting moving parts to leak or wear out
- Requires no lubrication; no need to introduce a system lubricator
- Suitable for vacuum service

Applications
- Pressure switches
- Level controls
- Air switch to operate pneumatic tool
- Pilot operation of main valves
- Limit switches on cylinder actuated devices
- Diverting valve used to introduce additive to two independent flow systems
- Vial or container filling or sampling with instant and dripless shut off
- Machine shop and assembly area for parts “blow off”

For additional information, see SSIN064.
### Gas Operating Range

<table>
<thead>
<tr>
<th>Series 316 Micro Valve</th>
<th>Series 38 Micro Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Flow</td>
<td>Gas Flow</td>
</tr>
<tr>
<td><strong>ΔP (psig)</strong></td>
<td><em><em>Q (SCFH</em>)</em>*</td>
</tr>
<tr>
<td>1/16&quot; Orifice</td>
<td>1/32&quot; Orifice</td>
</tr>
<tr>
<td>1</td>
<td>23.6</td>
</tr>
<tr>
<td>2</td>
<td>33.1</td>
</tr>
<tr>
<td>3</td>
<td>40.6</td>
</tr>
<tr>
<td>4</td>
<td>46.7</td>
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<tr>
<td>5</td>
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<td>7</td>
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<tr>
<td>9</td>
<td>69.1</td>
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<td>10</td>
<td>75.0</td>
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<td>20</td>
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<tr>
<td>30</td>
<td>143.0</td>
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<tr>
<td>40</td>
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<tr>
<td>70</td>
<td>270.0</td>
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<tr>
<td>80</td>
<td>305.0</td>
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<tr>
<td>90</td>
<td>337.2</td>
</tr>
<tr>
<td>100</td>
<td>369.4</td>
</tr>
</tbody>
</table>

Note: The above flow rates are for air. To find the flow rate of other gases, divide the flow rate by the square root of the gas’s specific gravity.

*Standard cubic feet per hour.

### Liquid Operating Range

<table>
<thead>
<tr>
<th>Series 316 Micro Valve</th>
<th>Series 38 Micro Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Flow</td>
<td>Liquid Flow</td>
</tr>
<tr>
<td><strong>ΔP (psig)</strong></td>
<td><em><em>Q (SCFH</em>)</em>*</td>
</tr>
<tr>
<td>1/16&quot; Orifice</td>
<td>1/32&quot; Orifice</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
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<td>130</td>
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<td>140</td>
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<tr>
<td>150</td>
<td>0.88</td>
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<tr>
<td>160</td>
<td>0.88</td>
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<tr>
<td>170</td>
<td>0.88</td>
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<tr>
<td>180</td>
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<tr>
<td>190</td>
<td>0.88</td>
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<tr>
<td>200</td>
<td>0.88</td>
</tr>
<tr>
<td>210</td>
<td>0.88</td>
</tr>
<tr>
<td>220</td>
<td>0.88</td>
</tr>
<tr>
<td>230</td>
<td>0.88</td>
</tr>
<tr>
<td>240</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Note: The above flow rates are for water. To find the flow rate of other fluids, divide the flow rate by the square root of the fluid’s specific gravity.
Level Controls

CT Flex Tube® Displacer Type Level Control

General Purpose Enclosure
An industry standard for over 50 years, the CT Series Flex Tube simplicity, reliability, ease of maintenance, and rugged construction have made it popular where downtime for repairs could be critical to processes or minimum maintenance is desirable. This enclosure is suitable for many exposed applications. All exhaust gas is vented inside the enclosure and then to the atmosphere through a screened vent connection. For additional information, see SSIN006.

Waterproof Enclosure
The weatherproof pilot enclosure provides a weathertight pilot enclosure to completely protect the control from the elements and even house cleaning operations. In addition, it allows hazardous exhaust gases to be vented through piping to a safe release area. For additional information, see SSIN006.

Model CMAQ/CMAF Level Controls

These snap-action, float-operated level controls are equipped with a three-way Micro Valve unit and are actuated by two adjustable arms. Adjustable pusher arms allow control range to be adjusted easily and accurately to desired range. For additional information, see SSIN007.

Features and Benefits
- Adjustable span to desired level detection point
- No external power is required
- Standard gear stem assembly is 303 stainless steel
- Standard 14” long float rod

Model CADM-201/CADMEX-201 Level Controls

These diaphragm-operated liquid level controls are available with either a pneumatic or electrical control switch. Model CADMEX-201 is supplied with an explosion-proof SPDT Micro Switch. This switch is UL and CSA approved. Model CADM-201 is supplied with the popular snap-action, three-way Micro Valve, ideally suited for diaphragm motor valve control. The 2” process connections are recommended where high paraffin or sediment content is present in the measured material. The most outstanding feature of these controls is the absence of troublesome small orifice and chambers usually found in similar types of floatless level controls. For additional information, see SSIN011.
Model CQ-401 Float Type, Continuous Drain

Model CQ-401 offers dual purpose action to automatically discharge vapor or liquid from a tank. The continuous drain valve is widely used in the bottom of fuel gas scrubbers to provide continuous drainage of the accumulated liquids and thus prevent transfer of the liquid to the burner section. For additional information, see SSIN010.

Model IMS 780 Liquid Interface Measurement System

The superior design of the Interface Measurement System offers reliable, precise control of gas/liquid or liquid/liquid interface levels. Carefully matched electronic assemblies with probe components combine to provide a measurement system for the most demanding applications. A wide variety of standard features and ease of installation give the Interface Measurement System (IMS) 780 the flexibility necessary for optimum performance. The (IMS) has been carefully designed for dedicated interface control and surpasses all other multi-purpose devices. For additional information, see SSIN005.

Features and Benefits
- Excellent sensitivity and repeatability means precision control even with difficult applications
- Non-fouling probe for continuous, reliable use
- Convenient operator interface provides visual status indication and greatly reduced set-up time
- Individually adjustable dual outputs with time delay allows the flexibility needed to change and customize control of your system
- Approved for use in hazardous locations, cUL and UL approved. Class I, Groups C and D
- 110/220 VAC or 24 VDC 6 watts
- Probe length variations available – consult factory

Model CMAS-203/CMEASX-203 Level Control

Model CMAS-203 utilizes a stainless steel float and a pneumatic output for control of liquid level. An override feature permits adjustment of set points without disturbing process level. For additional information, see SSIN009.

Features and Benefits
- Adjustable span to desired level detection point
- Proven Micro Valve unit provides long life and ease of maintenance
- Operation override allows for the adjustment of set points without disturbing process level
- Steel body provides long life, reducing cost of ownership
- NACE adaptable option for use in harsh, corrosive service
- Dual seal available
Model CMEAQX and CMEAFX Level Controls – Float Operated

Model CMEAQX and CMEAFX Float Controls provide electrical contact switch closure for alarm or control functions. An explosion-proof Micro Switch is actuated by two adjustable yoke-type pusher arms permitting the control range to be easily and accurately adjusted.

With the liquid level below the float the Micro Switch will be in the low level position and will remain there until the float resets to the preset high level. The Micro Switch will reverse positions until the float drops to the preset low level position of liquid level. An override feature permits adjustment of set points without disturbing process level. For additional information, see SSIN008.

Features and Benefits

- Adjustable span allows for pump up and pump down control; easy-to-set desired level detection point
- Proven design provides long life and ease of maintenance
- Optional steel and ductile iron models are NACE adaptable for use in harsh, corrosive service
- Standard gear stem assembly is 303 stainless steel; 316 stainless steel optional (consult factory)
Pressure Switches and Other Controls

Model CDM 3801B Diaphragm Operated Pressure Switch

Model CDM is a diaphragm-operated Pressure Switch for pneumatic or hydraulic control. The unit is equipped with one or two snap-acting three-way Micro Valves to provide on/off output to one or more controlled circuits. Since the Micro Valves are completely isolated from the diaphragm, and also isolated from each other, various control output pressures and media may be used in the same CDM pilot. For additional information, see SSIN014.

Model CADM/CADMEX Series Pneumatic and Electric Pressure Switches

Model CADMEX is furnished with an explosion-proof Micro Switch providing dependable operation for systems requiring electrical control. The standard Micro Switch has SPDT contacts and UL and CSA hazardous area approval. An optional switch arrangement is available with DPDT contacts and spring-loaded design. The DPDT Micro Switch does not have the adjustable differential capability of the SPDT and, therefore, is actuated and released at approximately the same pressure. The CADMEX is offered with a choice of four spring ranges providing a wide range of flexibility in application. For additional information, see SSIN013.

Model CDM 3801B Diaphragm Operated Pilot Valve

Model CDM is a diaphragm operated pilot valve for pneumatic or hydraulic control. The unit may be equipped with one, two, or three snap-acting three-way Micro Valves to provide on/off output to one or more controlled circuits at pressures up to 100 psi. Two Micro Valve sizes and four spring ranges provide extreme flexibility in application to simple or complex control systems. Since Micro Valves are completely isolated from the diaphragm, and also isolated from each other, various control output pressures and media may be used in the same CDM pilot.
Controls and Miscellaneous

- **Model CM7 Pilot Guard**

  The CM7 Pilot Guard is designed to provide positive shut off of the gas supply to both the pilot, and main burner in the event of a pilot flame out. It has a unique field adjustable sensitivity control that allows the operator to obtain a quick response of the CM7 to a pilot outage. Gas shutoff down to 20 seconds or less, regardless of the heat characteristics of the pilot flame. Adjustment of the sensitivity circuit is made using a supplied screwdriver. The CM7 requires no external power source. It is unaffected by power outages and can be used in areas where no electrical power is available. It is designed to be used with the RHSB pilot burner. For additional information, see SSIN004.

- **Features and Benefits**
  - Detects pilot flame outage quickly
  - Requires no external power source
  - Controls both burner and pilot gas
  - Ensures that the burner port is closed during pilot ignition
  - Latchable reset for one-man pilot ignition
  - Uses proven thermocouple technology for long service life
  - Available with 15' thermocouple leads
  - Easily serviced; requires no special tools
  - Constructed of anodized aluminum to withstand harsh conditions
  - Main burner port vents through pilot port flame out
  - Manufactured with stainless steel internal valve parts for a long, trouble-free life
  - Seals constructed of Fluoroelastomer for long life and resistance to most chemicals

- **Vent Line Flash Arrestor**

  Line Flash Arrestors for use on tank or similar low pressure, vertical, vent lines to reduce chances for combustion within the line from an external source. All steel construction except 4" thick aluminum element. **Caution:** Excessive pressure drop caused by high flow rates or differential pressure across element may be dangerous. Pressure drop across flash arrestors not to exceed 1 psi. Not for use on vent lines where this might occur. For additional information, see SSIN003.
Model 80/80S Gas Scrubber Valves

Model 80S Gas Scrubber Valve is used in fuel gas scrubbers, and air eliminators. Installs through 2” pipe coupling or can be wholly contained by mounting by 1” nipple welded through cover. Model 80S is a direct replacement for the IC-125 or Model 80 Scrubber Valve. For additional information, see SSIN001 and SSIN002.