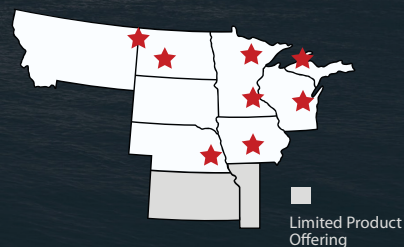




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## INSTRUMENTATION, HEAT TRACE, AND CONTROL VALVES

### SIEMENS

*Includes Milltronics, Controlotron, Moore, & Danfoss*

- Gauge, differential, & absolute pressure transmitters
- Temperature sensors and transmitters
- Magnetic, vortex, clamp-on, & coriolis flowmeters
- Ultrasonic, radar, capacitance, & guided wave level
- Valve positioners and damper actuators
- Motion sensing & speed switch process protection
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- Wireless solutions

### METTLER TOLEDO

INGOLD and THORNTON

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- Electric & steam heat tracing cables, systems, & accessories
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- Cata-Dyne: Catalytic heaters for hazardous areas
- Norseman: hazardous area electric heat
- Ruffneck: Electric heat & steam for hazardous areas



**Eurotherm.**  
by Schneider Electric

Signal conditioners, temperature transmitters, digital displays



Moisture, oxygen, and hydrogen sulfide analyzers (H<sub>2</sub>S) for natural gas pipelines and many other industries



Liquid and gas analyzers for H<sub>2</sub>S, CO<sub>2</sub>, total sulfur, hydrocarbons, & oil



**BELLOFRAM**

Pressure regulators and I/Ps



Custom engineered emissions monitoring for compliance & process improvement



Hi-Flow valves, transmitters, gauges, & switches



Globe body & segmented ball control valves, E body & D body parts, controllers & positioners



SD, ND, and MN only  
Thermal mass flowmeters, flow & level switches, vortab flow conditioners



Calibration gas, precision, mixtures, cylinders, regulators



Advanced thermal detection technology to scan internal body temperatures



Turbine, oval gear, impeller flow meters, magnetic flow meters, BTU calculators and displays



Electronic level indication & visual gauge sight glass equipment, accurate & reliable measurement of the boiler steam, drum water level, feedwater heater, level/alarming, drain-pot level/alarming, and other applications for water detection



Fiber optic sensing for strain and leak detection, sonar sludge level monitoring, blocked chute protection, & wireless communication, guided wave radar for interface & high level measurements



Explosion proof & general purpose electric fail-safe valve actuation



Heated enclosures, shelters, & safety showers



Flow & energy computers, process indicators & sensors, batch controllers, counters, timers, totalizers, HMI's, & flat panel monitors



Electromagnetic flowmeters, propeller meters, and V-cone flowmeters



Conventional & pilot operated safety relief valves for gas service, featuring "auto seat technology"



High performance & resilient Seated butterfly valves; ball valves



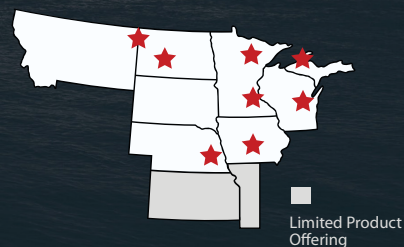
- Intrinsic safety isolators & barriers
- Signal conditioners & surge suppressors
- Ruggedized HMI's for class 1 div 1 environments



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Offering

## INSTRUMENTATION, HEAT TRACE, & CONTROL VALVES CONTINUED



Remote alarm monitoring &  
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Gas chlorinators, sulphonators,  
ammoniators, & gas cylinder scales



Industrial grade, gas detection systems



Submersible level detectors, lift station  
retro-fits, & level controls



Industrial weighing solutions for solids  
and liquids including checkweighers,  
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Liquid leak detection systems, wired  
& wireless web-based monitoring  
solutions, & raised floor airflow  
management



Flow, level, pressure & temperature  
displays, indicators, totalizers,  
transmitter, & batch controllers



Low level radiation systems for level,  
density, & flow



Pressure & temperature switches,  
transmitters, sensors, and controls for  
safety, alarm and shutdown; wireless  
gas detection



RTD's, thermocouples, wells, &  
temperature transmitters



Inline process refractometers  
concentration measurement



Tower packing, trays, & mist eliminators



Globe & eccentric ball control valves

Omaha, NE  
Phone: 800.776.6184  
Fax: 952.935.7772

### Additional Sales Offices

Bismarck, ND  
800.776.6184

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800.776.6184

Hibbing, MN  
218.262.3421

Ishpeming, MI  
906.485.6361

Minneapolis  
952.938.6504

## CONVERSIONS, FORMULAS, & ENGINEERING DATA

### Pressure Conversions

1 PSI = 27.71 inches water  
1 PSI = 2.0418 in. Hg @ 60F  
1 PSI = 51.81 mm Hg @ 60F  
1 PSI = .0689 bar  
1 PSI = 6.895 kPa  
1 inch water = 1.8718 mm Hg  
1 inch water = .2489 kPa

### Volume Conversions

1 Gallon = .1337 cubic feet  
1 Gallon = 231 cubic inches  
1 Gallon = .003785 cubic meters  
1 Gallon = 3.785 liters  
1 Barrel (oil) = 42 gallons  
1 Bushel = 1.2445 cubic feet

### Volumetric Flow

1 GPM = .227 cubic meters/hour  
1 GPM = 3.785 liters per minute

### Water Density

At 60 degrees F = 62.371 lbs/ft.  
At 60 degrees F = 8.3378 lbs./gal.

### Flow Velocity of Water

$V(\text{ft./second}) = .4086 * Q/D * D$   
Q is flow in GPM  
D is pipe ID in inches

### Flow Velocity of Gas

$V = 3.056 * Q/D * D$   
V is flow velocity in SFPS  
Q is flow in SCFM  
D is pipe ID in inches

### Volumetric Gas Flow

$\text{SCFM} = \text{ACFM} * (\text{pf} * 520) / (14.7 * \text{Tf})$   
Pf = Pressure at flow conditions PSIA  
Tf = Temp. at flow conditions Deg. R

### Volumetric to Mass Flow of Water

33F water, 8.325 lb./gallon density  
 $Q(\text{GPM}) = Q(\text{lbs./hour}) * .002$

### Distance

1 inch = 2.54 centimeters  
1 foot = .3048 meters

### Pressure

$\text{PSI (absolute)} = \text{PSI (gauge)} + 14.696$

### Steam Data

Gage Press.	Temp Spec.	Volume
PSIG	Deg. F	Cubic ft/minute
0.0	212	26.8
25.3	267.25	10.5
50.3	297.97	6.66
100	337.90	3.88
150	365.99	2.75
200.3	377.89	2.13
250.3	406.13	1.74