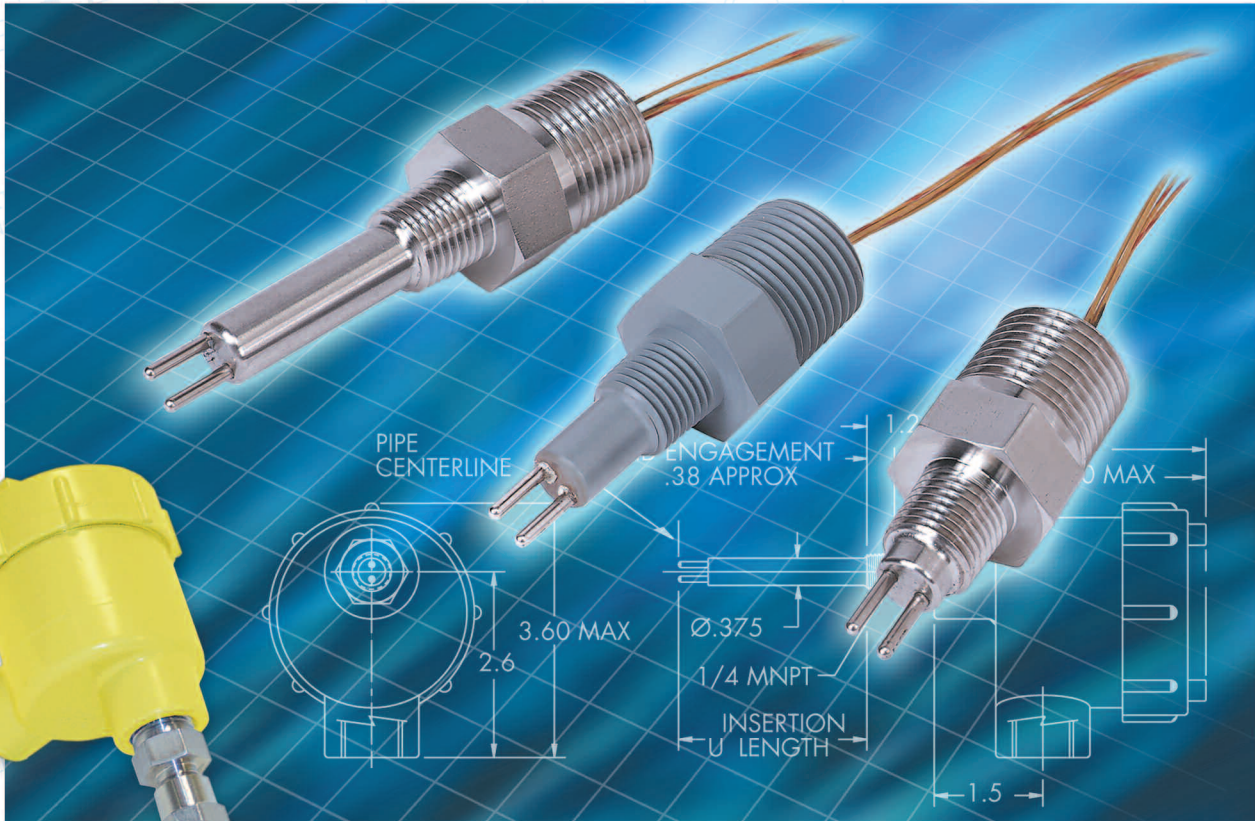


FCI M180 Series: Custom Engineered Flow and Level Sensors for OEM Applications

*Flow Measurement
Flow Switches
Level Switches
Level Interface Switches*



Industrial Machinery
Chemical Injection Controls
Pump Protection
Gas Fuel Flow
Lubricant Level

Equipment Controls and Safety
Lubricant Circulation Status
Fill Control
Over/Under Flow
Coolant Flow/Level

FCI[®]

The M180 Series for OEM Applications

*Improve machinery and equipment controls and protection circuitry with long-lasting,
electronic flow and level sensors*

Manufacturers of industrial/commercial equipment and machinery, and control system designers have diverse and technical requirements for flow and level sensing products. Fluid Components International (FCI) is a world leading manufacturer of built-to-specification and semi-custom flow and level sensors with designs that meet specifications and exceed quality expectations.

Instrument Capabilities

- > Air, gases, liquids
- > High accuracy, fast response
- > Non-clogging, sealed sensor
- > No moving parts design
- > Small size, low cost design
- > Ultra low flow sensitivity
- > Wide flow range
- > Line/pipe sizes from 1/4 inch to 60 inch [6 mm to 1524 mm]

FCI works closely with the manufacturer's engineering and procurement team to produce products that meet performance specifications while conquering constraints and conditions on size, installation, mounting, powering and more. FCI's engineering capabilities, ISO certified manufacturing facilities and world-class flow laboratory ensure optimal designs that result in the highest quality and lowest cost solution for OEM customers.

The products shown here are just a few examples of what FCI can do. For OEM flow and level sensors, please contact FCI with concept requirements or specifications to learn how a flow or level solution can be exclusively engineered for you. For convenience, this brochure provides a product definition and application work sheet.

Applications

- > Fuel/air feed lines
- > Compressor controls
- > Dispensing and additives monitoring
- > Oil and lubricant circulation
- > Pump protection circuits
- > Cooling system controls
- > Over/under flow limit switches
- > Level and interface control switches
- > Analyzer flow verification

Manufacturers of industrial machinery and equipment can improve their products and reduce costs with FCI's new M180 Series of OEM flow sensors. In equipment or machinery requiring flow or level/interface monitoring, the M180 Series flow sensors will perform more reliably, last longer and cost less than other flow sensing techniques.

Built to Specification

- > Off the Shelf
- > Semi Custom
- > Custom



FCI designs and manufactures flow and level sensors to an array of specifications on size, sensor length and materials, housing style and materials, electronic outputs, powering, electrical connector type, installation and mounting, and more.

Whether adding flow sensing to the equipment or replacing antiquated, un-reliable mechanical sensors, the M180 Series provides precision electronic flow and level sensing solutions in robust, industrial-grade packaging. M180 Series sensors can be utilized in flow switch, high/low flow alarms, flow rate metering, totalized flows applications, level switching, level alarms and more. They are equally well suited in air, gases and liquid flow and level applications. Designs are available for line sizes as small as 1/4 inch tube to as large as 60 inch pipe [6 mm to 1524 mm]. FCI integrates its proven thermal-dispersion sensor technology with small-size, microprocessor electronics and precision calibration to achieve superior accuracy, fast response and virtually maintenance free operation.

The sensors directly measure mass flow and can be specified for use over a wide flow and turn-down range and process media conditions. Unlike mechanical devices, orifice plates or turbine technologies, M180 Series is minimally invasive in the line so is not subject to wear or clogging and pressure drop is negligible. The sensing element contains two, precision platinum RTD's mounted in miniature thermowells



that are fully sealed from contamination by the process media. The small sensors assure fast-response and greater repeatability under actual process conditions. The M180 Series brings unmatched reliability and long-life to OEM installations with MTBF calculations exceeding 60,000 hours.

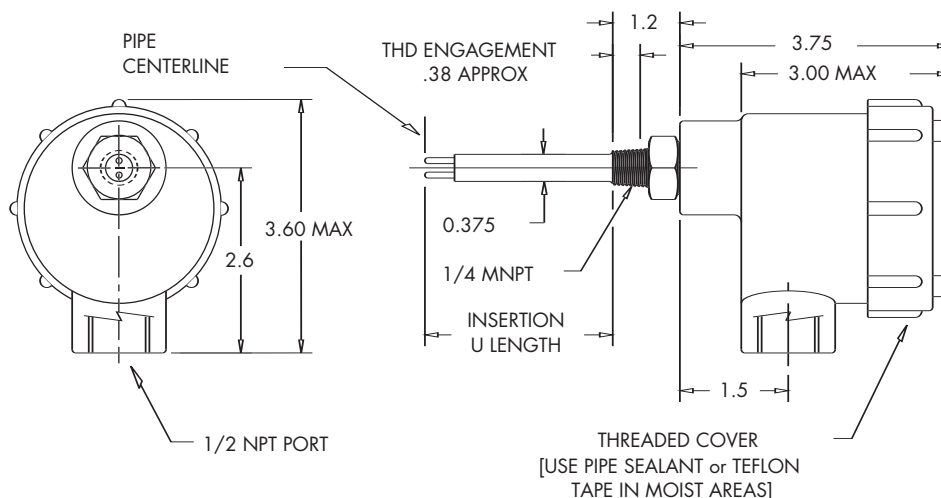
The FCI M180 Series has over 30 base configurations to develop semi or fully customized final designs to meet exact application specifications and requirements. FCI can create M180 Series sensors in a specific size, material, media compatibility, calibration and output signal in any combination. Sensors comply with various industry standards including UL, CE, FM, ATEX, CSA and more.

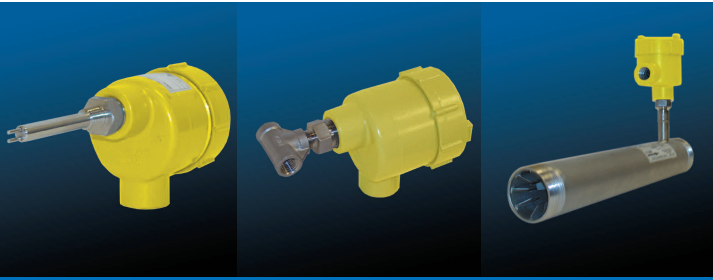


Typical placement in the field

- > Boiler systems
- > Air and gas compressors
- > Burners and industrial furnaces
- > Chillers and cooling systems
- > Blowers and dryers
- > Co-gen power generators
- > Gas analyzers
- > Oil reservoirs
- > Hydraulic systems

Each OEM solution comes with a customer unique drawing and part number





Flow Meters

Gas Meter

Features a scalable 4 to 20mA of flow or temperature, 0 to 10 Vdc for flow or temperature, and a 0 to 1000 Hz pulse output. Independent signals can also be configured for alarms and/or totalizing. Typical applications include compressed air, low pressure aeration and HVAC applications, nitrogen/carbon dioxide blanketing, and natural gas fuel flow. Standard input power is 9 to 36 Vdc. Wetted parts are 300 series stainless steel.

Gas Meter with Compression Fitting

Features the same output signals offered in the gas meter (listed above) with an adjustable insertion length using a removable compression fitting. Ideal for air applications, particularly compressed air and HVAC duct installations. Standard input power is 9 to 36 Vdc. Wetted parts are 300 series stainless steel with a teflon or stainless steel compression fitting ferrule.

Gas Meter with Pigtail Connection

Features a pigtail cable connected insertion probe for up to 2 inch [51 mm] pipe sizes. Useable in flow media temperatures up to 248°F [120°C]. Wetted parts are 300 series stainless steel. Ideally suited for applications which require remote mounting of electronics, such as away from high temperature conditions or excessive vibration, or where mounting space is limited.

Gas Meter for 5 to 9 VDC Battery Powering

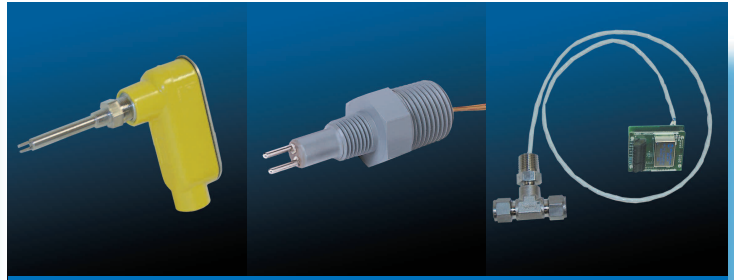
Features sensor and circuit board for use as a portable assembly powered by a 5 to 9 Vdc lithium battery. 12 Vdc battery powered units are also available. Wetted parts are 300 series stainless steel.

Ultra Low Flow Gas Meter

Air and gas monitoring down to 0.4 SCFM [0.01 NCMH] in tube lines as small as 1/4 inch [6 mm]. Wetted parts are 300 series stainless steel.

Gas Meter with VORTAB Flow Conditioner

Same features as gas meter and includes an integral flow conditioner for installations with limited straight run of piping. Ideal for skid mounted packages where straight run and space are limited. Typical applications include fuel gas flow measurement, compressor leak detection and compressor fuel gas consumption. Wetted parts are 300 series stainless steel.



Flow Switches

Flow Switch, 2-Wire Loop Powered, Explosion Proof

Ideal for applications with installation constraints such as tight compartments. Typical flow applications include lube oil monitoring, cooling water detection, air flow and/or leak detection and analyzer sample flow verification. The flow switch uses a two-wire control circuit in an explosion proof enclosure. Wetted parts are 300 series stainless steel.

Flow Switch, Insertion Type with Pigtail

Features a pigtail connection and remote 4-wire control board that is ideal for small/confined vessels and difficult to access locations. Typical flow applications include lube oil monitoring, cooling water detection, air flow and/or leak detection and analyzer sample flow verification. Wetted parts are 300 series stainless steel. CPVC with 300 series stainless steel or Hastelloy C-22 sensors are also available.

Flow and Temperature Switch

Features flow monitoring with an additional output parameter for temperature. The transmitter can be configured to provide a solid state output with changes in flow and temperature. Ideal for semiconductor flow applications monitoring air flow to cool their process by providing a signal when there is significant deviation in the flow rate or air temperature. Relay contacts are available. Wetted parts are 300 series stainless steel.

Flow Switch with 2-Wire Loop Powered

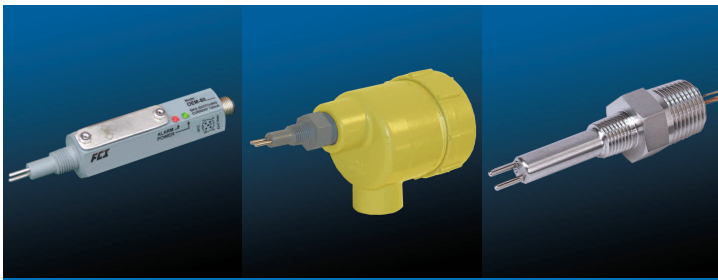
Features a 1/4 inch insertion sensor that is ideal for applications monitoring flow to analyzers. The 2-wire loop powered small circuit board design enables convenient mounting in customer's control system enclosure. Wetted parts are 300 series stainless steel.

Integral Type Flow Switch

Features the combination of small size, low cost and no moving parts with 24 Vdc input power to provide the perfect solution for chlorinated water and other corrosive medias as well as other aqueous or hydrocarbon fluids. Wetted parts are CPVC with Hastelloy C-22 sensors. 316L stainless steel body, pigtail or M12 connectors are also available.

High Temperature Flow Switch

Features pigtail connections from a small sensor to remote electronics for applications with process temperatures up to 450°F [232°C]. Typical flow applications include monitoring heating oil and coolant fluids in wafer machines, plasma cutters, welding machines and industrial lasers. Wetted parts are 300 series stainless steel.



Level/Interface Monitors

Level/Interface, 2-Wire Loop Powered, Explosion Proof

Ideal for applications with installation constraints. Typical level applications include engine oil level monitoring, small container filling, low level alarm and dry to wet indication. The NuTec style level switch uses a two-wire control circuit in a NEMA Type 4X and explosion proof enclosure. Wetted parts are 300 series stainless steel.

Level/Interface, Insertion Type with Pigtail

Features a pigtail connection and remote 4-wire control board that is ideal for small/ confined vessels and difficult to access locations. Wetted parts are 300 series stainless steel. CPVC with 300 series stainless steel or Hastelloy C-22 sensors are also available.

Level and Temperature Switch

Features level point detection with an additional output parameter for temperature. The transmitter can be configured to provide a solid state output with changes in level/interface and temperature. Wetted parts are 300 series stainless steel.

Level/Interface Switch, 2-Wire Loop Powered

Features 2-wire loop powered small circuit board design that enables convenient mounting in customer's control system enclosure. Wetted parts are 300 series stainless steel.

Integral Type Level/Interface Switch with connector output

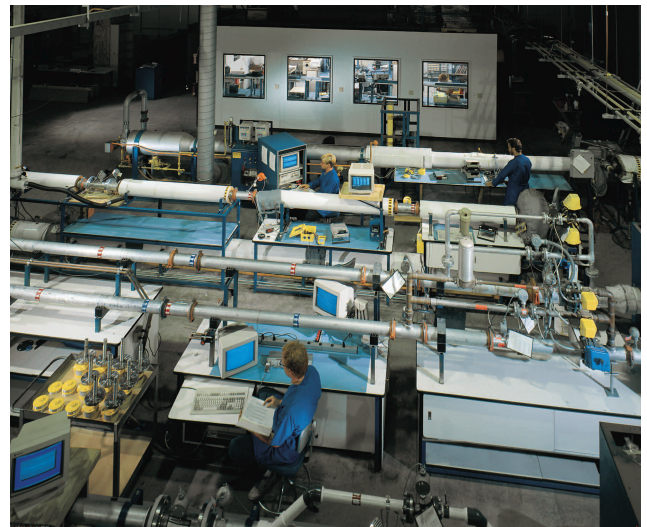
Features the combination of small size, low cost and no moving parts with 24 Vdc input power to provide the perfect solution for chlorinated water and other corrosive medias as well as other aqueous or hydrocarbon fluids. Wetted parts are CPVC with Hastelloy C-22 sensors. 304 stainless steel, pigtail or M12 connectors are also available.

High Temperature Level/Interface Switch

Features pigtail connections from a small sensor to remote electronics for applications with process temperatures up to 450°F [232°C]. Typical level applications include heating oil and coolant fluid reservoirs. Wetted parts are 300 series stainless steel.

Wet/Dry Switch

Features the combination of small size, low cost and no moving parts with 24 Vdc input power to provide the perfect solution for chlorinated water and other corrosive medias as well as other aqueous or hydrocarbon fluids. Wetted parts are CPVC with Hastelloy C-22 sensors and body is 316L stainless steel. Pigtail or M12 connectors are available.



Test and Calibration Laboratory

Fluid Components International maintains an extensive, instrument test and calibration laboratory at its headquarters in San Marcos, California. Utilizing the latest in advanced, computerized data acquisition systems and calibration test equipment, this facility permits comprehensive product development, testing, and calibration. Any FCI product can be calibrated in accordance with customer specifications. Laboratory standards are maintained with NIST (National Institute of Standards and Technology) traceable Cavitating Venturis (CVs) and precisely calibrated, pressure and temperature corrected turbine flowmeters.

Combustible and non-combustible gas calibration flow stands allow for the calibration of FCI products in a wide range of gases and gas mixtures in flow stand line sizes as small as 1/8 inch to 30 inches [3 to 760 mm] in diameter. A variety of flow profiles from laminar to turbulent conditions are generated to duplicate actual field conditions. Flow rates from 0 to 20,000+ SCFM [0 to 34,000 NCMH], velocities from 0 to 800 SFPS [0 to 240 NMPS], pressures from vacuum to 3000 psig [200 bar(g)], and temperatures from -100° to +900°F [-70° to +480°C] are available.

- › NIST tractability
- › Automated data acquisition
- › ISO 9001 certified
- › Flow, level and temperature calibrations

Faxable Product Definition & Application Data Sheet

Product Type

- Flow switch Flow transmitter
 Temperature switch Temperature transmitter
 Level/interface switch

Application Description

Describe type of application (e.g. boiler feed, chiller, etc.)

Media

Gas or liquid name

Process Conditions

	Nominal	Minimum	Maximum	Units
Flow rate:	_____	_____	_____	_____
Temperature:	_____	_____	_____	_____
Pressure:	_____	_____	_____	_____

Required Accuracy

Input power: 24 Vdc 115 Vac 230 Vac

Other _____

Signal Output: 4-20 mA (600Ω max) 0-5 V (2500Ω min)

1-5 V (2500Ω min) 0-10 V (5000Ω min)

Solid state relay 0-1000 Hz pulse

Other _____

Required Dimensions

Pipe/duct size (inside dimensions and units): _____

Pipe/duct material: _____

Approximate Annual Usage: _____ (units)

Installation Configuration Sketch:

*Please complete and fax this sheet to
1-760-736-6250 to have FCI evaluate
your application and recommend a
product solution.*

Sent by:

Name

Company

Address

City/State

Zip

Country

Fax

E-mail

Telephone

24 Hour Customer Service Access Available

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FCI is ISO 9001 certified /conformance to AS9100