

# FLOW MONITORS SELECTION GUIDE

Housing	Style	Technology	Advantage	Page
	FCMI Magnetic Inductive	Magnetic Inductive	<ul style="list-style-type: none"> <li>■ Meter for electrically conductive fluids</li> <li>■ ±2% of reading accuracy</li> <li>■ 0-9.9 GPM or 0-20 GPM models</li> </ul>	C3
	FTCI Digital Read Out	Calorimetric	<ul style="list-style-type: none"> <li>■ Displays flow and temperature</li> <li>■ Linearized, output for water, water/glycol mixtures, Galden® HT, ZT</li> <li>■ Set points for flow &amp; temperature</li> <li>■ Outputs: 2 analogs, 4 setpoints, 2 setpoints, 1 analog, 1 setpoint</li> </ul>	C7
	FCI Inline	Calorimetric	<ul style="list-style-type: none"> <li>■ Intrinsically safe models (ATEX approved)</li> <li>■ Faster response time than probes</li> <li>■ Remote mounting options</li> <li>■ Low flow rates detection down to 1 ml/min</li> </ul>	C11
	FCS Probe	Calorimetric	<ul style="list-style-type: none"> <li>■ Probe lengths vary for larger pipes</li> <li>■ Remote mounting options (requires remote amplifier)</li> <li>■ Intrinsically safe models (ATEX approval)</li> <li>■ Chemically resistant models available</li> </ul>	C21
	FCS.../A Airflow	Calorimetric	<ul style="list-style-type: none"> <li>■ Can monitor air and other inert gases</li> <li>■ Probes and inlines available</li> </ul>	C41
<b>Remote Amplifiers</b>			<ul style="list-style-type: none"> <li>■ Signal processors for remote probes</li> </ul>	C51
<b>Flow Conversion Chart</b>			<ul style="list-style-type: none"> <li>■ Allows flow rate conversions from linear flow to volumetric flow and vice versa for liquids and gases</li> </ul>	C53

# FLOW MONITORS

## PRODUCT OVERVIEW

### WHAT ARE TURCK FLOW MONITORS?

TURCK flow monitors are solid-state devices that operate on the calorimetric or magnetic inductive principle. The monitors do not include any moving parts that may break or become lodged in the pipeline, as is often the case with mechanical devices that come in contact with the media being sensed.

### WHY CHOOSE TURCK FLOW MONITORS?

- Choice of monitor to suit specific application needs: Inline models, self-contained devices or remote probe styles (with a separate signal processor).
- Rugged design; most monitors are rated for IP67 protection.
- All wetted parts are made of stainless steel, titanium, Hastelloy or PVDF.
- Select models designed to withstand caustic materials.
- Pressure ratings of up to 1450 psi on select models.
- Calometric flow monitors have a temperature gradient of 4°C/sec, which allows them to respond rapidly to changes in flow.

### WHERE CAN I USE TURCK FLOW MONITORS?

Any application that requires monitoring water, oil, inert gases and air flow. In applications with a larger pipe or long standoff, probes are available in 20 millimeter increments with a maximum length of 220 millimeters.

- Pump run dry protection
- Dosing monitoring/verification
- Industrial ventilation
- Filtration systems
- Lubrication monitoring
- Cooling systems
  - » Welders
  - » Power transformers
  - » Laser systems
  - » Molding
  - » Casting



FTCI: flow and temperature with digital display



Inline flow sensor



Probe style flow sensor

# FCMI MAGNETIC INDUCTIVE FLOW MONITOR

## PRODUCT OVERVIEW

### WHAT IS THE FCMI FLOW MONITOR?

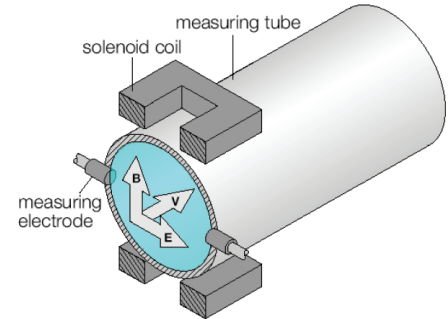
The FCMI magnetic inductive flow monitor was designed for measuring electrically conductive liquids using Faraday's inductive measuring principle. Electrons in the fluid are driven to the pipe wall when passing through the magnetic field created in the measuring pipe. This causes a potential difference that is detected by two laterally mounted electrodes. Based on the known magnetic field and the electrode spacing, the measured potential difference at the electrodes is proportional to the flow speed and therefore the flow rate.

### WHY CHOOSE THE FCMI FLOW MONITOR?

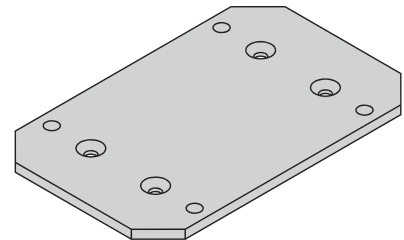
- The FCMI is completely wear-free, because it has no moving parts. In contrast to monitors that employ other measuring principles, FCMI monitors do not require a reduction of the pipe diameter and do not obstruct the flow of the medium.
- Easy-to-use push buttons for programming the monitor are password protected to prevent inadvertently altering flow settings.
- Measuring accuracy: 2% of the measured value
- Available with 1 switching output and linear 4-20 mA analog output

### WHERE CAN I USE FCMI FLOW MONITORS?

- Ideal for applications with low to medium flow rates up to 20 gpm in a 3/4" pipe.
- Electrically conductive fluids, i.e. water/water based fluids:
  - » Minimum conductivity: 10  $\mu\text{S}/\text{cm}$   
For example: water = 15  $\mu\text{S}/\text{cm}$



FCMI monitors utilize Faraday's magnetic inductive principle

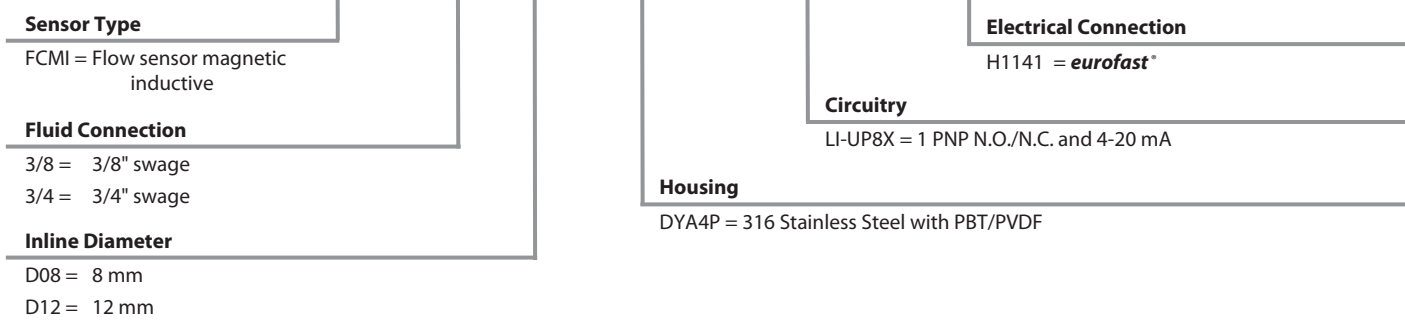


FCMI monitors may be secured using the four M4 threaded holes located on the bottom of the housing. An optional mounting plate (pictured above) may be used for applications that use flexible tubing. Compression fittings and NPT adapters are also available.

# Flow Monitors

## Digital Read Out Flow Sensor - Magnetic Inductive Part Number Key

FCMI - 3/8 D08 DYA4P - LI-UP8X - H1141



FLOW



# TURCK

## Flow Monitors

### FCMI Flow Monitors

- Magnetic Inductive flow meters
- IP65
- Flow rates up to 20 GPM
- Great for water metering applications



Part Number	Flow Rate (GPM)	Measuring Tolerance	Fluid Connection (swage)	In-line Diameter (mm)	Media Temperature (°C)	Output 1: Flow	Output 2: Flow	Conductive Fluids > 10 micro-Siemens/cm	Adapter Color Code
FCMI-3/8D08DYA4P-LI-UP8X-H1141	0-20	<1.33 gpm = +/- .027 gpm >1.33 gpm = +/- 2% measured value	3/8"	8	5 to 60	4-20 mA Analog	PNP NO/NC	•	
FCMI-3/4D12DYA4P-LI-UP8X-H1141	0-9.9	<2.0 gpm = +/- .1 gpm >2.0gpm = +/- 2% measured value	3/4"	12	5 to 60	4-20 mA Analog	PNP NO/NC	•	

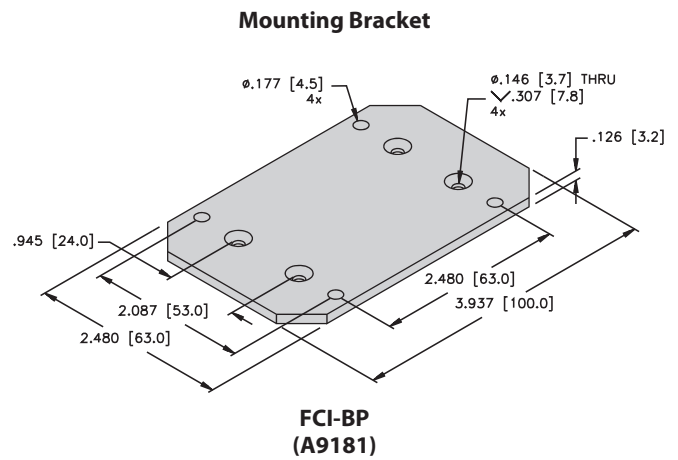
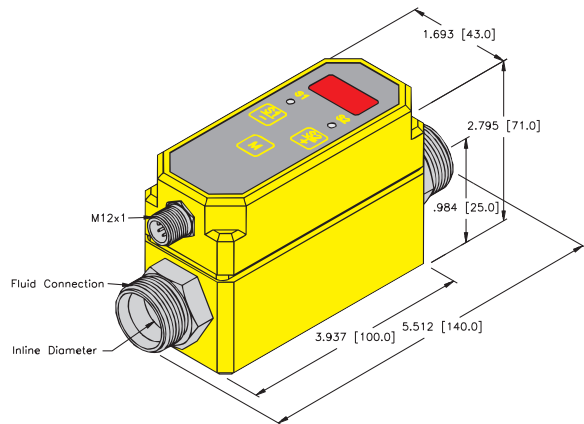
Specifications:	
Electrical	
Operating Voltage	21.6-26.4 VDC
Current Consumption	<100 mA
Switching Current PNP outputs	200 mA
Analog Load	200-500 Ω
Environmental	
Protection	IP65
Pressure Rating	145 PSI
Ambient Temperature	0 to 60 °C
Materials	
Housing	PBT
Wetted Parts:	
Tubing	316 TI Stainless Steel
O-ring	PVDF
Operational	
Response time	.5 seconds
Switch On/Off Delay	0-50 seconds
Time Delay before Availability	6-10 seconds

### Parameter Ranges for Available Models

Size	Detection Range Flow	Adjustment Range SP1	Hysteresis Flow Switch Points	Analog Start Point Range	Analog End Point Range
3/8"	0.0 to 9.99 gpm 0.0 to 37.8 l/min	0.5 to 9.95 gpm 1.8 to 37.8 l/min	0.05 to 1.5 gpm 0.2 to 5.6 l/min	0.0 to 2.5 gpm 0.0 to 9.4 l/min	2.5 to 9.99 gpm 9.4 to 37.8 l/min
3/4"	0.0 to 20 gpm 0.0 to 75.7 l/min	1.0 to 20 gpm 3.7 to 75.7 l/min	0.1 to 2 gpm 0.4 to 7.5 gpm	0.0 to 15 gpm 0.0 to 56.8 l/min	5.0 to 20 gpm 18.9 to 75.7 l/min

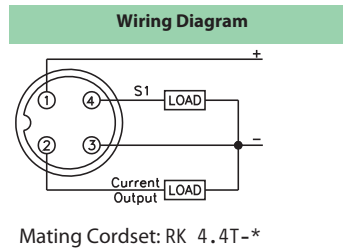
# Flow Monitors

## Drawings



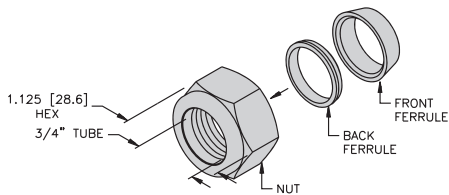
FLOW

## Wiring Diagram

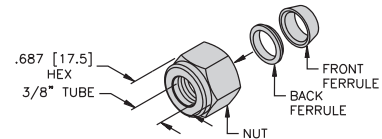


## Adapter Options

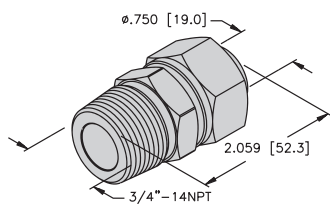
### FSV-SS 3/4 KIT (2 sets) (A9185)



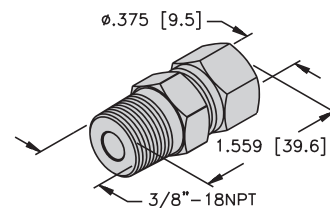
### FSV-SS 3/8 KIT (2 sets) (A9183)



### FSV-SS 3/4 TS-NPT (A9306)



### FSV-SS 3/8 TS-NPT (A9307)



# FTCI DIGITAL READ OUT FLOW MONITOR

## PRODUCT OVERVIEW

### WHAT IS THE FTCI FLOW MONITOR?

The FTCI inline flow monitor is a self-contained, solid-state, fully programmable sensor that monitors both flow and temperature. The monitor operates using the calorimetric flow principle, which detects the transfer of heat in thermally conductive fluids. The temperature detecting elements are platinum RTDs. One of the elements (R1) detects the temperature of the fluid in the pipe and the resistor (R2) is connected to a heater. The heating element heats R2 to a temperature that is slightly above the temperature of the surrounding fluid. When there is no fluid flow, the difference between R1 and R2 remains constant. As the fluid moves through the sensor, heat is conducted away from the heated element causing the temperature of R2 to decrease. This heat loss causes the differential resistance input to the amplifier where the various outputs are generated.

### WHY CHOOSE THE FTCI FLOW MONITOR?

- Rugged design implements stainless steel wetted parts and mounts directly into the pipeline.
- Highly visible three-digit display that can alternate between flow rate and media temperature.
- High repeatability; able to monitor changes in flow as low as 0.2 gallons per minute (gpm) or as fast as 12 gpm.
- Easy-to-use push buttons for programming the monitor are password protected to prevent inadvertently altering flow settings.
  - » Two outputs to monitor flow rate, or one output for flow rate and one output for temperature.
  - » Programmable on and off time delay functions.
  - » User defined hysteresis for both the flow and temperature set points.
- Programmed to perform in many different media.
  - » Water
  - » Deionized water
  - » Ethylene glycol (0-70%)
  - » If the fluid is a glycol/water mix, the percentage of glycol can be programmed so that the monitor can adjust to each unique application without the need for factory calibration.
- Can be programmed for liters per minute or gallons per minute, as well as °F or °C.
- An adjustable filter to smooth out a variety of erratic flow conditions.
- Pressure resistance of 145 psi.

### WHERE CAN I USE THE FTCI FLOW MONITORS?

- Weld tip protection
- Transformer cooling
- Process chamber cooling
- Hot roller coolant
- Cooling water monitor



FTCI monitors are available with different fluid connections and accessories. It is manufactured with a standard *euromast*® M12 connector.

# Flow Monitors

## Digital Read Out Flow Monitor Part Number Key



<p><b>Sensor Type</b></p> <p>FTCI = Inline Flow and Temperature Sensor</p> <p><b>Fluid Connection</b></p> <p>3/8 = 3/8" swage 1/2 = 1/2" swage 3/4 = 3/4" swage</p> <p><b>Inline Diameter</b></p> <p>D10 = 10 mm D15 = 15 mm</p>	<p><b>Electrical Connection</b></p> <p>H1141 = <i>eurofast</i><sup>®</sup> H1160 = <i>eurofast</i></p> <p><b>Circuitry</b></p> <p>2UP8X = Dual PNP N.O./N.C. 4UP8X = 4 PNP N.O./N.C. LI-UP8X = 1 PNP N.O./N.C. and 4-20 mA 2LIX = Dual 4-20 mA 2ARX = Dual N.O. Relay</p> <p><b>Housing</b></p> <p>A4P = 316 Stainless Steel with PBT Housing</p>	<p><b>Special Option Codes</b></p>
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FLOW

# TURCK

## Flow Monitors

### FTCI Flow and Temperature Monitors

- Flow and Temperature Outputs
- IP65
- Flow rates up to 12 GPM
- Great for Cooling Water, Weld Tip Protection, Process Chamber Cooling, & Hot Roller Applications



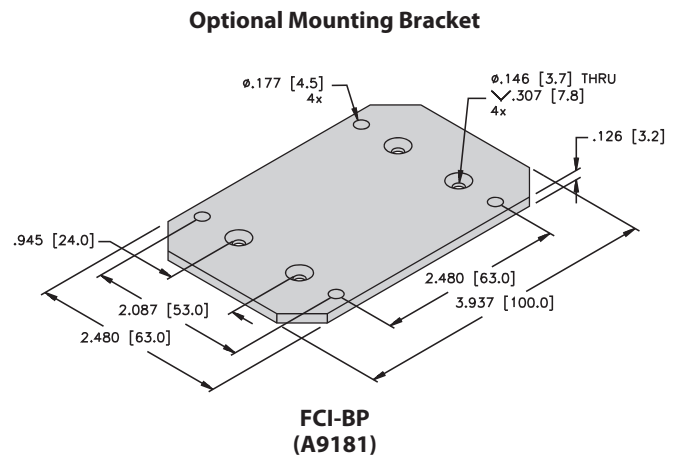
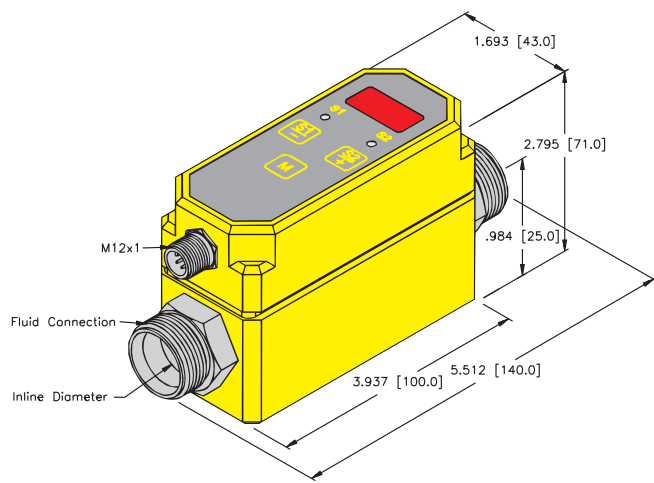
Part Number	Flow Monitoring Range (GPM)	Fluid Connection (swage)	In-line Diameter mm	Temperature Monitoring Range (°C)	Output 1: Flow or Temperature	Output 2: Flow	Output 3: Temperature	Output 4: Temperature	Water	Delonized Water	Water/Glycol Mixes <70%	Golden ZT	Golden HT135	Wiring Diagram #	Adapter Color Code
FTCI-3/8D10A4P-2UP8X-H1141	0.2-4	3/8"	10	-10 to +90	PNP NO/NC	PNP NO/NC	n/a	n/a	•	•	•	•	•	1	
FTCI-1/2D10A4P-2UP8X-H1141	0.2-5	1/2"	10	-10 to +90	PNP NO/NC	PNP NO/NC	n/a	n/a	•	•	•	•	•	1	
FTCI-3/4D15A4P-2UP8X-H1141	1-12	3/4"	15	-10 to +90	PNP NO/NC	PNP NO/NC	n/a	n/a	•	•	•	•	•	1	
FTCI-3/8D10A4P-LI-UP8X-H1141	0.2-4	3/8"	10	-10 to +90	PNP NO/NC	4-20 mA	n/a	n/a	•	•	•	•	•	2	
FTCI-1/2D10A4P-LI-UP8X-H1141	0.2-5	1/2"	10	-10 to +90	PNP NO/NC	4-20 mA	n/a	n/a	•	•	•	•	•	2	
FTCI-3/4D15A4P-LI-UP8X-H1141	1-12	3/4"	15	-10 to +90	PNP NO/NC	4-20 mA	n/a	n/a	•	•	•	•	•	2	
FTCI-3/8D10A4P-4UP8X-H1160	0.2-4	3/8"	10	-10 to +90	PNP NO/NC	PNP NO/NC	PNP NO/NC	PNP NO/NC	•	•	•	•	•	3	
FTCI-1/2D10A4P-4UP8X-H1160	0.2-5	1/2"	10	-10 to +90	PNP NO/NC	PNP NO/NC	PNP NO/NC	PNP NO/NC	•	•	•	•	•	3	
FTCI-3/4D15A4P-4UP8X-H1160	1-12	3/4"	15	-10 to +90	PNP NO/NC	PNP NO/NC	PNP NO/NC	PNP NO/NC	•	•	•	•	•	3	
FTCI-1/2D10A4P-2LIX-H1141	.5-5	1/2"	10	-10 to +84	4-20 mA	4-20 mA	n/a	n/a	•	•	•			4	
FTCI-3/4D10A4P-2LIX-H1141	1-12	3/4"	10	-10 to +84	4-20 mA	4-20 mA	n/a	n/a	•	•	•			4	
FCI-D10A4P-2ARX-H1160/D201	0.2-4	3/8"	10	-18 to +100	Relay NO	Relay NO	n/a	n/a	•	•	•	•	•	5	
FCI-D10A4P-2ARX-H1160/D203	0.2-4	3/8"	10	-18 to +100	Relay NO	Relay NO	n/a	n/a	•					5	
FCI-D10A4P-2ARX-H1160/D205	0.2-5	1/2"	10	-18 to +100	Relay NO	Relay NO	n/a	n/a	•	•	•	•	•	5	
FCI-D15A4P-2ARX-H1160/D209	1-12	3/4"	15	-18 to +100	Relay NO	Relay NO	n/a	n/a	•	•	•	•	•	5	

#### Specifications:

Electrical	
Operating Voltage	21.6-26.4 VDC
Current Consumption	<100 mA
Switching Current PNP outputs	200 mA
Analog Load 4-20 mA outputs	200-500Ω
Switching Current/Voltage Relay Outputs	<.5 A @ 30 VDC, <1 A @ 36 VDC
Environmental	
Protection	IP65
Pressure Rating	290 PSI
Ambient Temperature	0 to 60 °C
Materials	
Housing	PBT
Wetted Parts:	
Tubing	316 TI Stainless Steel
O-ring	FKM
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time	.5-3 seconds
Maximum Temperature Change	4.2 °C/second

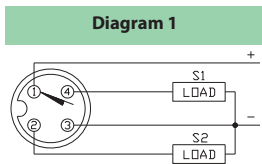
# Flow Monitors

## Drawings

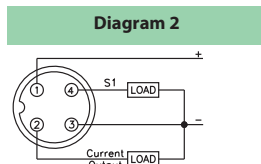


FLOW

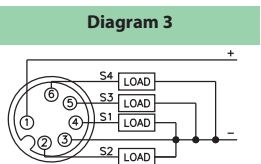
## Wiring Diagrams



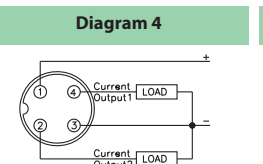
Mating Cordset:  
RK 4.4T-\*



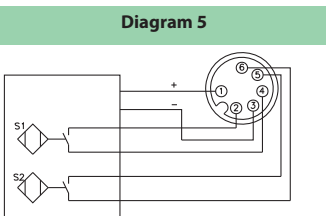
Mating Cordset:  
RK 4.4T-\*



Mating Cordset:  
RKC 6T-\*



Mating Cordset:  
RK 4.4T-\*

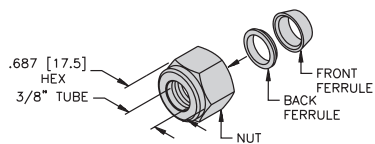


Mating Cordset:  
RKC 6T-\*

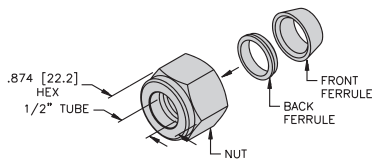
## Adapter Options

Material: 316 Stainless Steel

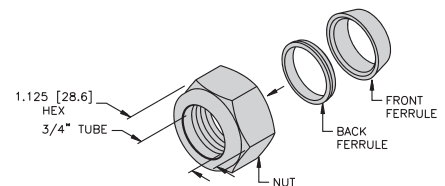
### FSV-SS 3/8 KIT (2 sets) (A9183)



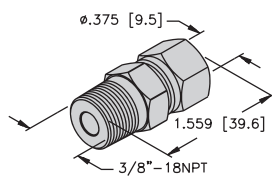
### FSV-SS 1/2 KIT (2 sets) (A9184)



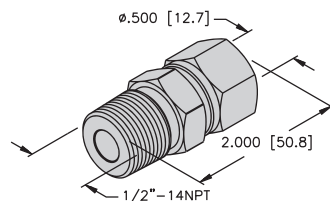
### FSV-SS 3/4 KIT (2 sets) (A9185)



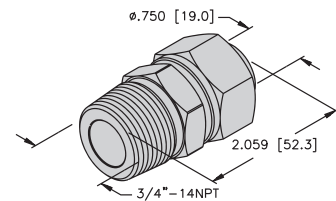
### FSV-SS 3/8 TS-NPT (A9307)



### FSV-SS 1/2 TS-NPT (A9305)



### FSV-SS 3/4 TS-NPT (A9306)



# FCI INLINE FLOW MONITOR

## PRODUCT OVERVIEW

### WHAT IS THE FCI INLINE FLOW MONITOR?

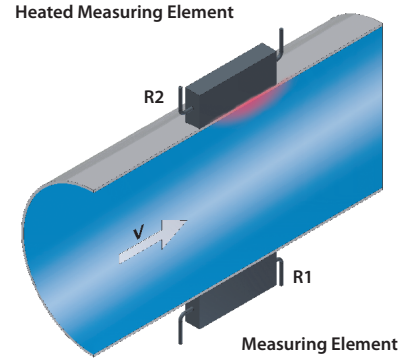
The FCI inline flow monitor operates using the calorimetric flow principle, which detects the transfer of heat in thermally conductive fluids. The temperature detecting elements are platinum RTDs. One of the elements (R1) detects the temperature of the fluid in the pipe and the resistor (R2) is connected to a heater. The heating element heats R2 to a temperature that is slightly above the temperature of the surrounding fluid. When there is no fluid flow, the difference between R1 and R2 remains constant. As the fluid moves through the sensor, heat is conducted away from the heated element causing the temperature of R2 to decrease. This heat loss causes the differential resistance input to the amplifier where the various outputs are generated. With FCI flow monitors, the temperature elements are bonded directly to the outside of a flow through tube. See probe section for more information about the calorimetric flow monitors.

### WHY CHOOSE THE FCI INLINE FLOW MONITOR?

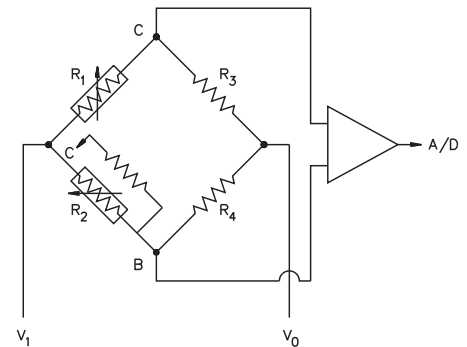
- No pressure loss
- Wide range of flow rates
- Fast response time
- Low flow rate detection and pulsed flow monitoring.
- Stackable
- Viscous fluids can flow freely through the fully ported sensor, since the flow does not need to be disrupted to be detected.

### WHERE CAN I USE THE FCI INLINE FLOW MONITOR?

- Flow/no flow
- Dispensing applications
- Viscous fluids
- Low and/or pulsing flows
- Set point applications



The resistance difference is measured by a Wheatstone bridge circuit. A change in resistance difference causes a change in bridge voltage. The flow set point is determined by comparing the bridge voltage to a reference voltage.



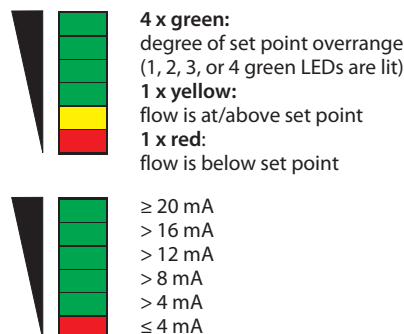
R1 - Monitors fluid temperature  
R2 - Heated by heating element  
R3 - Internal resistor  
R4 - Internal resistor

## Setup – Operating and Display Functions

### Self Contained Inline



### 6 LEDs for flow rate status indication:



**Switch Point Versions**  
Potentiometer for adjustment of flow switch point

**Analog Versions**  
Potentiometer for adjusting the 4 mA to the medium

Potentiometer for adjusting the span to 20 mA (not all applications may reach 20 mA)



# Flow Monitors

## Inline Flow Sensor Part Number Key



<p><b>Sensor Type</b></p> <p>FCI = Inline Flow Sensor</p>	<p><b>Fluid Connection</b></p> <p>TC = Tubing Connection          N1/8 = 1/8 NPT          N1/4 = 1/4 NPT          N3/4 = 3/4 NPT          Blank = G1/4</p>	<p><b>Inline Diameter (millimeters)</b></p> <p>D03 = 3 mm          D04 = 4 mm          D06 = 6 mm          D08 = 8 mm          D09 = 9 mm          D10 = 10 mm          D11 = 11 mm          D20 = 20 mm</p>	<p><b>Special Option Codes</b></p> <p>/D..</p>	<p><b>Electrical Connection</b></p> <p>H1141 = <i>eurofast</i>®, 4-pin          H1140 = <i>eurofast</i>, 4-pin          H1160 = <i>eurofast</i>, 6-pin</p>	<p><b>Circuitry</b></p> <p>AP8X = N.O. PNP          AN8X = N.O. NPN          ARX = N.O. Relay          RRX = N.C. Relay          LIX = 4-20 mA          NA = Requires Remote Amplifier          NAEX = Intrinsically Safe Requires Remote Amplifier</p>	<p><b>Housing</b></p> <p>A4 = 316 Stainless Steel          A4P = 316 Stainless Steel with PBT Housing          CTP = Ceramic / PTFE / PBT          HC22 = Hastelloy C22</p>
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FLOW

### Special Option Codes

- D Number**
- /D038 = 3/8 in. Tubing Connection
  - /D014 = Tri-Clamp Connection
  - /A = Airflow

# TURCK

## Flow Monitors

### Flow monitors for Water and Oils

- IP67
- Flow rates as low as 1 ml/min
- Great for Stamping Press Lubrication Oil Monitoring,

Weld Tip Protection, Pump Run Dry Protection, and other monitoring applications.



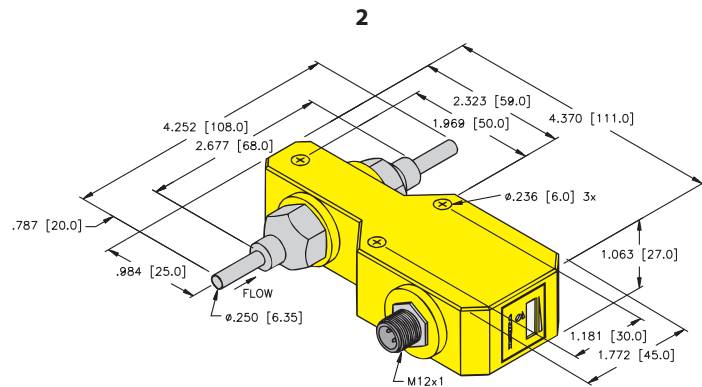
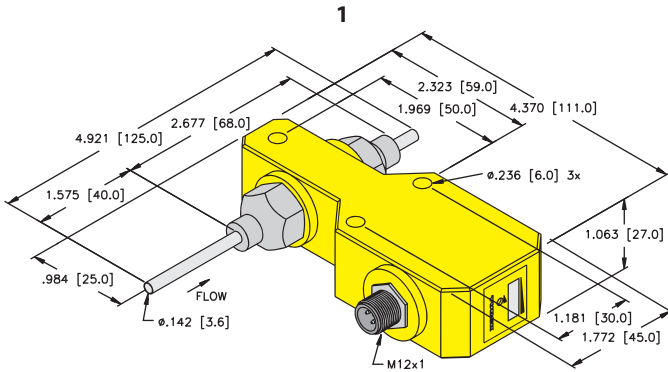
Part Number	Flow Detection Range Water (ml/min)	Flow Detection Range (ml/min) oil	Fluid Connection	Media Temperature (°C)	Output	Pressure Rating (PSI)	Wiring	Drawing
FCI-TCDO4A4P-LIX-H1141	1-200	Consult Factory	4 mm Tube	0 to 60	4-20 mA Non-linear Analog	14.5	1	1
FCI-TCDO4A4P-AP8X-H1141	1-200	Consult Factory	4 mm Tube	0 to 60	PNP N.O.	14.5	2	1
FCI-TCDO4A4P-ARX-H1140	1-200	Consult Factory	4 mm Tube	0 to 60	Relay N.O.	14.5	3	1
FCI-1/4TCDO4A4P-LIX-H1141	1-200	Consult Factory	1/4" reinforced tube	0 to 60	4-20 mA Non-linear Analog	145	1	2
FCI-1/4TCDO4A4P-AP8X-H1141	1-200	Consult Factory	1/4" reinforced tube	0 to 60	PNP N.O.	145	2	2

#### Specifications:

Electrical	
Operating Voltage	21.6-26.4 VDC
Current Consumption	<50 mA
Switching Current PNP outputs	200 mA
Analog Load 4-20 mA outputs	200-500 Ω
Switching Current/Voltage Relay Outputs	<1A at 30 VAC, <1A at 36 VDC
Environmental	
Protection	IP67
Ambient Temperature	0 to 60 °C
Materials	
Housing	PBT
Cable Connector	303 Stainless Steel
Wetted Parts:	
Tubing	316 TI Stainless Steel
Time Delay before Availability	5-15 seconds, 8 seconds typical
Response time	0.5-3 seconds
Maximum Temperature Change	6.6 °C/second

# Flow Monitors

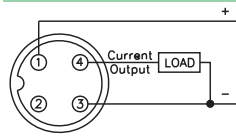
## Drawings



FLOW

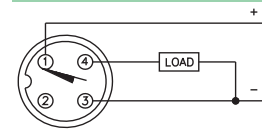
## Wiring Diagrams

Diagram 1



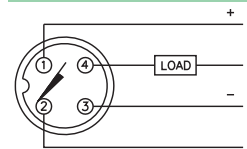
Mating Cordset:  
RK 4T-\*

Diagram 2



Mating Cordset:  
RK 4T-\*

Diagram 3



Mating Cordset:  
RK 4.4T-\*

# TURCK

## Flow Monitors

### Inline Flow Monitors

- Great for water and Oil
- IP67
- LED visualization of flow rate
- Great for Stamping Press Lubrication Oil Monitoring,

Weld Tip Protection, Pump Run Dry Protection, and other monitoring applications



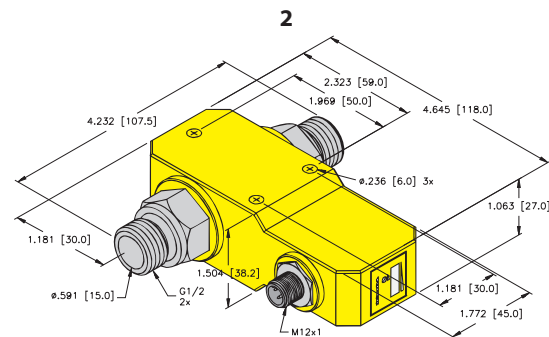
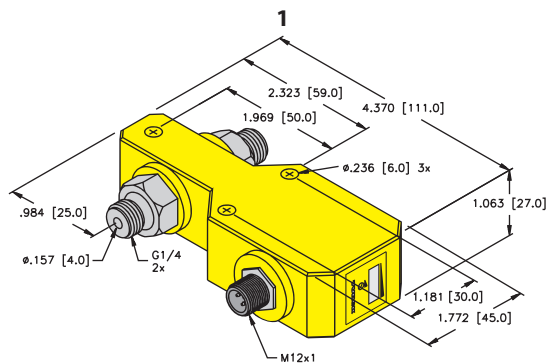
Part Number	Flow Detection Range Water (lpm)	Flow Detection Range Oil (lpm)	Fluid Connection	Media Temperature (°C)	Output: Flow	Current Consumption	Wiring	Adapter Color Code	Drawing
FCI-D04A4P-AP8X-H1141	.015-1	Consult Factory	G 1/4"	0 to 80	PNP N.O.	<50 mA	1		1
FCI-D04A4P-LIX-H1141	.015-1	Consult Factory	G 1/4"	0 to 80	4-20 mA Non-Linear Analog	<50 mA	2		1
FCI-D08A4P-ARX-H1140/D038	1-6	Consult Factory	3/8" swage	0 to 80	Relay N.O.	<50 mA	3		4
FCI-D10A4P-AP8X-H1141	1-6	Consult Factory	G 1/4"	0 to 80	PNP N.O.	<50 mA	1		1
FCI-D10A4P-ARX-H1140	1-6	Consult Factory	G 1/4"	0 to 80	Relay N.O.	<50 mA	3		1
FCI-D10A4P-LIX-H1141	1-6	Consult Factory	G 1/4"	0 to 80	4-20 mA Non-Linear Analog	<50 mA	2		1
FCI-D15A4P-AP8X-H1141	3-20	Consult Factory	G 1/2"	-20 to 80	PNP N.O.	<50 mA	1		2
FCI-D15A4P-ARX-H1140	3-20	Consult Factory	G 1/2"	-20 to 80	Relay N.O.	<50 mA	3		2
FCI-D15A4P-LIX-H1141	3-20	Consult Factory	G 1/2"	-20 to 80	4-20 mA Non-Linear Analog	<50 mA	2		2
FCI-N3/4D20A4P-AP8X-H1141	4-30	Consult Factory	3/4" NPT	0 to 80	PNP N.O.	<60 mA	1		3
FCI-N3/4D20A4P-LIX-H1141	4-30	Consult Factory	3/4" NPT	0 to 80	4-20 mA Non-Linear Analog	<60 mA	2		3
FCI-N3/4D20A4P-ARX-H1140	4-30	Consult Factory	3/4" NPT	0 to 80	Relay N.O.	<60 mA	3		3

### Specifications:

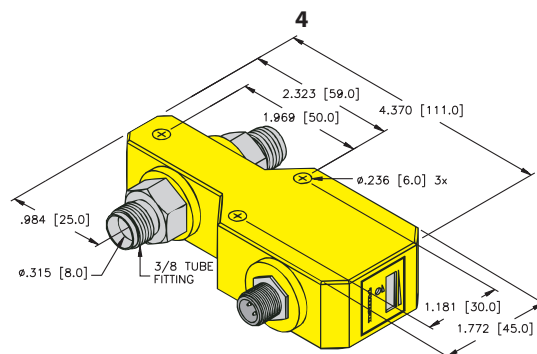
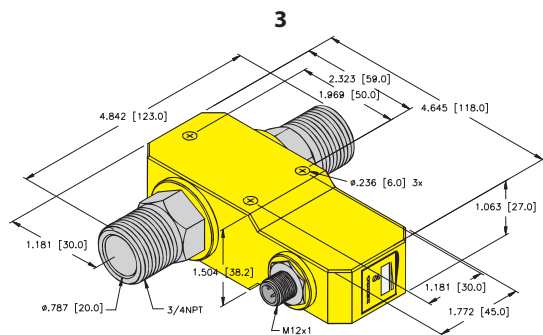
Electrical	
Operating Voltage	21.6-26.4 VDC
Switching Current PNP outputs	200 mA
Analog Load 4-20 mA outputs	200-500Ω
Switching Current/Voltage Relay Outputs	<1A at 30 VDC, <1A at 36 VAC
Environmental	
Protection	IP67
Pressure Rating	290 PSI
Ambient Temperature	0 to 60 °C
Materials	
Housing	PBT
Cable Connector	303 Stainless Steel
Wetted Parts:	
Tubing	316 TI Stainless Steel
Operational	
Time Delay before Availability	5-15 seconds 8 seconds typical
Response time	0.5-3 seconds
Maximum Temperature Change	6.6 °C/second

# Flow Monitors

## Drawings

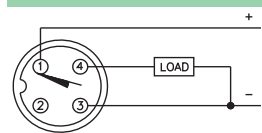


FLOW



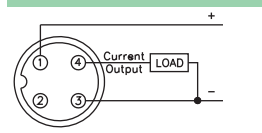
## Wiring Diagrams

Diagram 1



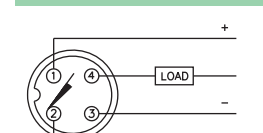
Mating Cordset:  
RK 4T-\*

Diagram 2



Mating Cordset:  
RK 4T-\*

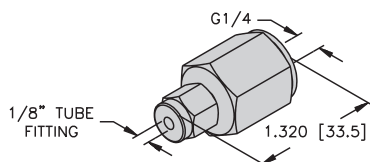
Diagram 3



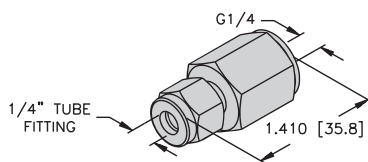
Mating Cordset:  
RK 4.4T-\*

## Adapter Options

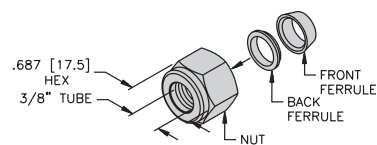
**FSV-SS-1/8x1/4 KIT**  
(A2535)



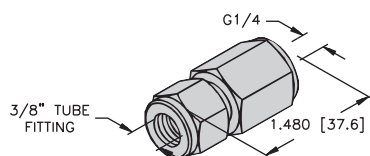
**FSV-SS-1/4x1/4 KIT**  
(A2534)



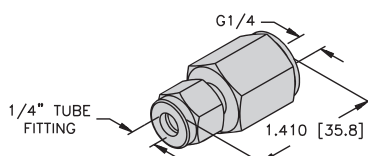
**FSV-SS 3/8 KIT (2 sets)**  
(A9183)



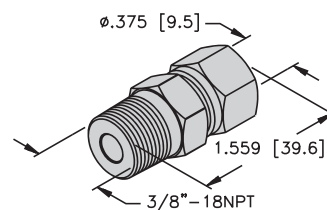
**FSV-SS-3/8x1/4**  
(A2533)



**FSV-SS-1/2x1/4**  
(A2536)



**FSV-SS 3/8 TS-NPT**  
(A9307)

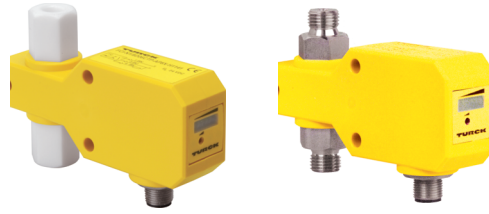


# TURCK

## Flow Monitors

### Inline Flow Monitors Chemical Resistant

- IP67
- LED visualization of flow rate
- Great for acids, chemicals, and flow/no flow or setpoint applications



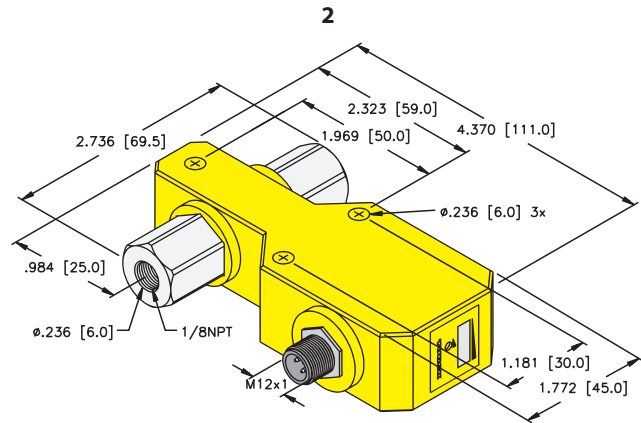
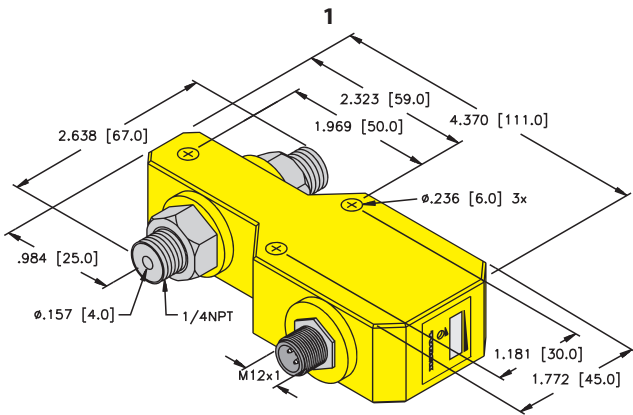
Part Number	Flow Detection Range Water (ml/min)	Flow Detection Range Oil	Wetted Materials	Fluid Connection	Media Temperature (°C)	Output: Flow	Pressure Rating	Wiring	Drawing
FCI-N1/4D04HC22P-AP8X-H1141	15-1000	Consult Factory	Hastelloy C22	1/4" NPT	0 to 60	PNP N.O.	290	1	1
FCI-N1/4D10HC22P-AP8X-H1141	100-6000	Consult Factory	Hastelloy C22	1/4" NPT	0 to 60	PNP N.O.	290	1	1
FCI-N1/8D06CTP-ARX-H1140	20-3000	Consult Factory	PTFE, Viton, Al2O3 Ceramic	1/8" NPT Female	0 to 60	Relay N.O.	72.5	2	2
FCI-N1/8D06CTP-AP8X-H1141	20-3000	Consult Factory	PTFE, Viton, Al2O3 Ceramic	1/8" NPT Female	0 to 60	PNP N.O.	72.5	1	2

#### Specifications:

Electrical	
Operating Voltage	21.6-26.4 VDC
Current Consumption	<50 mA
Switching Current PNP outputs	200 mA
Analog Load 4-20 mA outputs	200-500 Ω
Switching Current Relay Outputs	<1A at 60 VDC
Environmental	
Protection	IP67
Ambient Temperature	0 to 60 °C
Materials	
Housing	PBT
Cable Connector	303 Stainless Steel
Operational	
Time Delay before Availability	5-15 seconds 8 seconds typical
Response time	0.5-3 seconds
Maximum Temperature Change	6.6 °C/second

# Flow Monitors

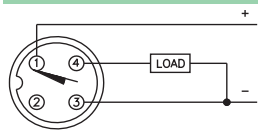
## Drawings



FLOW

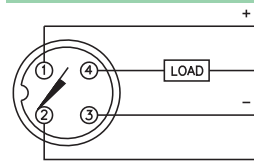
## Wiring Diagrams

Diagram 1



Mating Cordset:  
RK 4T-\*

Diagram 2



Mating Cordset:  
RK 4.4T-\*

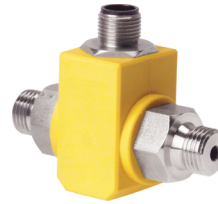


# TURCK

## Flow Monitors

### Remote Amplified Inline Flow Monitors

- Choose your output by selecting an amplifier
- IP67



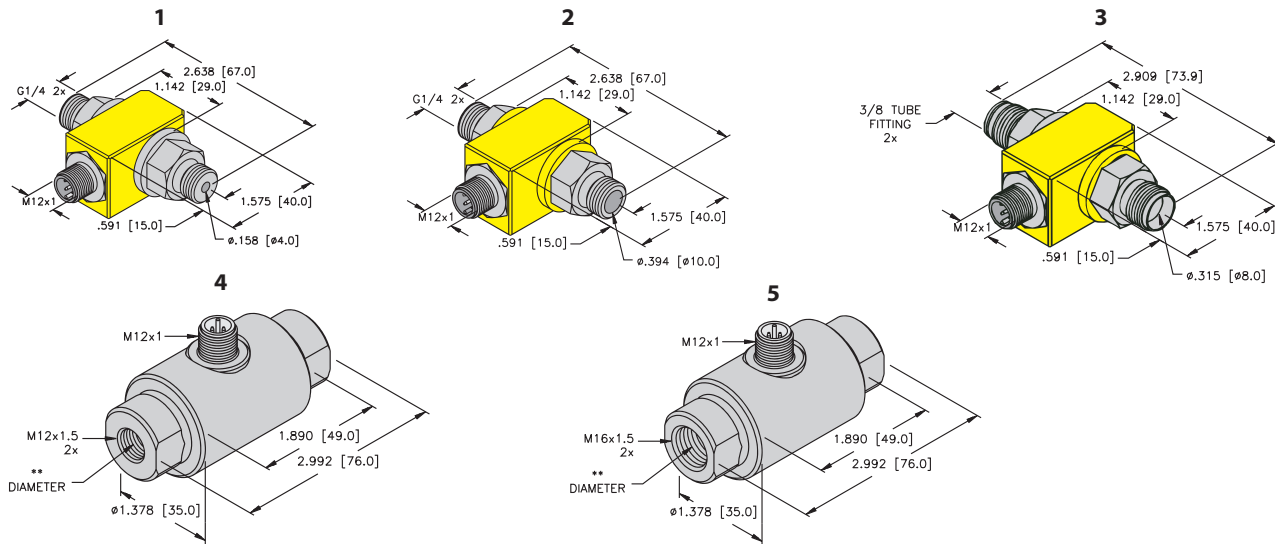
Part Number	Flow Detection Range Water (ml/min)	Flow Detection Range Oil (ml/min)	Fluid Connection	Ambient Temperature (°C)	Media Temperature (°C)	Pressure Rating (PSI)	Housing Material	Intrinsically Safe EEx'ib IIC T6, for use in explosion/hazardous zone 1	Wiring	Adapter Color Code	Drawing #
FCI-D04A4P-NA-H1141	15-800	Consult Factory	G 1/4"	-20 to 70	0 to 80	290	PBT		1		1
FCI-D10A4P-NA-H1141	200-6000	Consult Factory	G 1/4"	-20 to 70	0 to 80	290	PBT		1		2
FCI-D08A4P-NA-H1141/D038	200-6000	Consult Factory	3/8" swage	-20 to 70	0 to 80	290	PBT		1		3
FCI-D09A4-NA-H1141/M16	30-900	90-1800	M16x1.5	-25 to 70	-20 to 80	145	316 Ti SS		1		5
FCI-D03A4-NAEX-H1141/M12	5-150	25-300	M12x1.5	-25 to 60	-20 to 70	87	316 Ti SS	•	2		4
FCI-D03A4-NA-H1141/M16	5-150	15-300	M16x1.5	-25 to 70	-20 to 80	145	316 Ti SS		1		5
FCI-D09A4-NAEX-H1141/M16	50-900	150-1800	M16x1.5	-25 to 60	-20 to 70	87	316 Ti SS	•	2		5
FCI-D03A4-NA-H1141/M12	5-150	15-300	M12x1.5	-25 to 70	-20 to 80	145	316 Ti SS		1		4

#### Specifications:

Electrical	
See amplifiers on page C51	
Environmental	
Protection	IP67
Ambient Temperature	-20 to 70 °C
Materials	
Wetted Parts	316 Ti Stainless Steel
Cable Connector	303 Stainless Steel
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time	1-13 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

# Flow Monitors

## Drawings



## Wiring Diagrams

Diagram 1

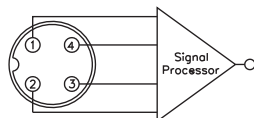
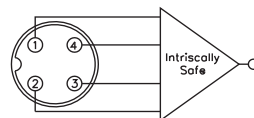


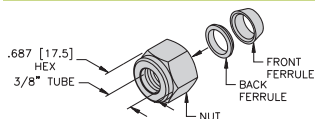
Diagram 2



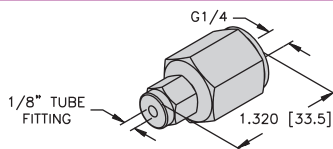
## Adapter Options

Material: 316 Stainless Steel.

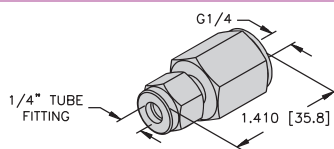
**FSV-SS-3/8 kit**  
(A9183)



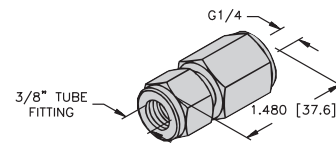
**Adapter G1/4 to 1/8 in. Tubing**  
FSV-SS-1/8X1/4 (A2535)



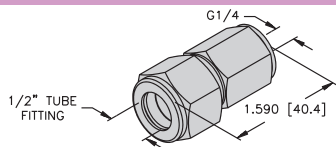
**Adapter G1/4 to 1/4 in. Tubing**  
FSV-SS-1/4X1/4 (A2534)



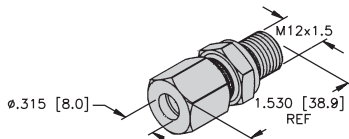
**Adapter G 1/4 to 3/8 in. Tubing**  
FSV-SS-3/8X1/4 (A2533)



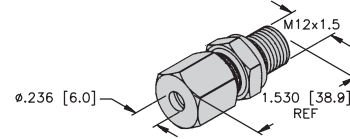
**Adapter G1/4 to 1/2 in. Tubing**  
FSV-SS-1/2X1/4 (A2536)



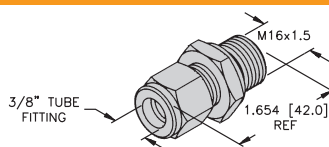
**Adapter M12 to 8 mm Tubing**  
FSV-D08/M12 (M6873004)



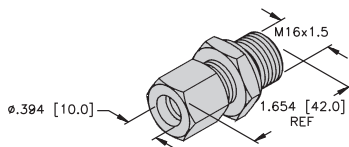
**Adapter M12 to 6 mm Tubing**  
FSV-D06/M12 (M6873002)



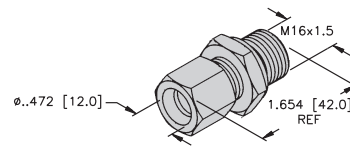
**Adapter M16 to 3/8 in. Tubing**  
FSV-D3/8-M16 (M6873005)



**Adapter M16 to 10 mm Tubing**  
FSV-D10/M16 (M6873001)



**Adapter M16 to 12 mm Tubing**  
FSV-D12/M16 (M6873003)



# FCS PROBE FLOW MONITOR

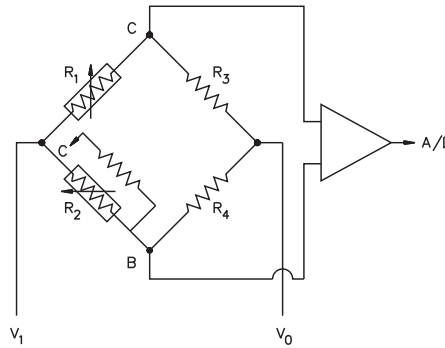
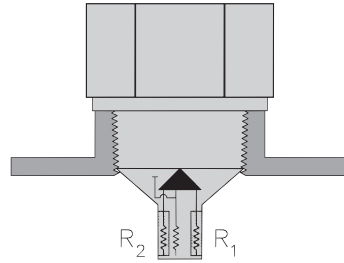
## PRODUCT OVERVIEW

### WHAT IS A FCS PROBE STYLE FLOW MONITOR?

Probe style flow monitors detect the speed of liquids and gases without using mechanical parts. These solid state flow monitors operate on the calorimetric principle: the measure of heat transfer from an object to a fluid.

The TURCK solid state flow monitors use two temperature dependent resistors. One of the resistors (R1) monitors the temperature of the surrounding fluid. The other resistor (R2) is connected to a heating element. The heating element heats R2 to a temperature that is slightly above the surrounding fluid temperature. When there is no fluid flow, the difference in resistance between R1 and R2 is a fixed value. As fluid moves over the flow monitor probe, heat is conducted away from the heating element causing the temperature on R2 to decrease. This heat loss changes the difference in resistance between R1 and R2.

The resistance difference is measured by a Wheatstone bridge circuit. A change in resistance difference causes a change in the bridge voltage. The flow set point is determined by comparing the bridge voltage to a reference voltage.



R1 - Monitors fluid temperature  
R2 - Heated by heating element  
R3 - Internal resistor  
R4 - Internal resistor

### Operating Range

Heat loss on the heating element will likewise determine the sensitivity of the monitor. The heat loss becomes a function of flow velocity and thermal conductivity of the fluid. The lower the thermal conductivity of the fluid, the faster the fluid has to flow to be detected.

Flow monitor operating ranges vary from one type of fluid to another. These operating ranges are proportional to the speed of the fluid that the monitor can detect. For example, at the same flow rate, air can conduct only a fraction of the heat away from the heating element compared to water.

### Response Time

The switch-on time is the time required for the flow monitor to detect and indicate that the flow speed is increasing.

The switch-off time is the time required for the flow monitor to detect and indicate that the flow speed is decreasing.

### Time Delay Before Availability

The availability is the time required, after power has been applied, for the flow monitor to reach a stable operating condition. The availability provides the time needed to energize the flow monitor and for the flow monitor to stabilize at the fluids temperature.

### Effects of Housing Material

The response time and temperature gradient is dependent on the housing material. Flow monitors that use Teflon<sup>®</sup> have a low thermal conductivity causing a slower response time to fluid temperature changes and to changes in the flow speed.

# FCS PROBE FLOW MONITOR

## PRODUCT OVERVIEW

### WHY CHOOSE A FCS PROBE STYLE FLOW MONITOR?

#### Temperature Gradient

The temperature gradient of a fluid indicates the change in fluid temperature within a specified time (unit of measure: °C (°F)/min). The temperature gradient of a device defines the maximum temperature rise that can be compensated by the monitor without malfunction.

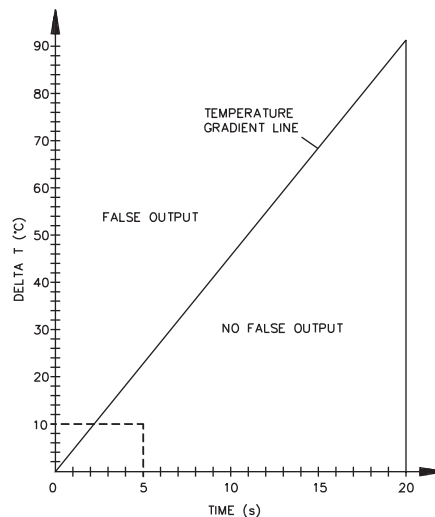
The monitor has the ability to compensate for sudden thermal shifts within the specified extremes. Sudden temperature changes exceeding the specified tolerances (temperature error) may cause the device to malfunction. Only when the monitor has adapted to the new temperature, will it provide an accurate measurement.

The temperature gradient for TURCK flow monitors is 4°C/second. This is 15 times higher than standard flow devices, which makes for a particularly accurate switch-point stability during variations in temperature.

The sensitivity to temperature rise of TURCK flow monitors has been reduced to a minimum (<12 s) and can accurately be determined in advance.

**Graph 1** can be used to determine if the TURCK flow monitor can compensate for a temperature change to a sensed medium. The dotted line in the graph indicates that a 10°C change has occurred in a time period of 5 seconds. Points (5,10) intersect in the "No False Output" region of the graph. This example illustrates an acceptable degree of temperature change in the application. As a result, the flow monitor can compensate for the fluid temperature change.

$$\text{Fahrenheit} = (1.8 \times \text{°C}) + 32$$



Graph 1 – Temperature gradient for stainless steel housing

### WHERE CAN I USE A FCS PROBE STYLE FLOW MONITOR?

- Large pipes: probe lengths available for up to 220 mm
- Flow/no flow detection
- Set point applications
- Linear analog for water applications
- High pressure, intrinsically safe, plastic versions
- Pump run dry protection

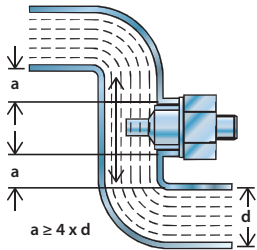
# FCS PROBE FLOW MONITOR

## PRODUCT OVERVIEW

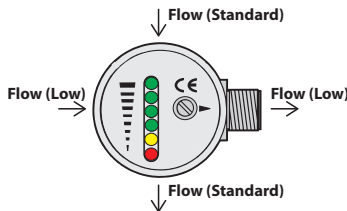
### Mounting Instructions

Areas of turbulent flow occur whenever there is a change in the pipe construction (e.g. pipe inlets, pipe outlets, pipe elbows). To avoid an inaccurate output, the following guidelines should be observed:

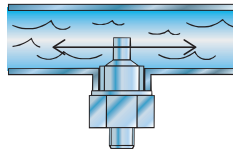
**A)** Pay special attention to the minimum distance ( $a \geq 4xd$ ) to tube bend and intersections.



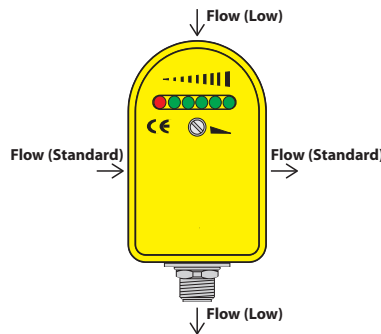
Proper Orientation For Self-Contained Metal Housing



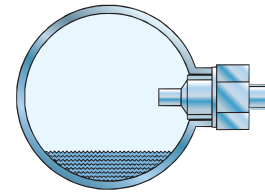
**B)** Flow monitor must be mounted from below in applications where medium does not completely fill the pipe.



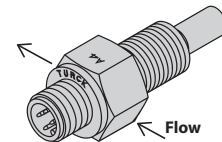
Proper Orientation For Self-Contained Plastic Housing



**C)** If a possibility of deposit build-up exists, mount the flow



Proper Orientation For Remote Insertion Probe

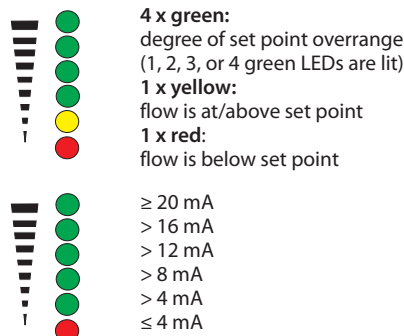


### Setup – Operating and Display Functions

#### Self Contained Insertion Probe



#### 6 LEDs for flow rate status indication:



Sealing screw (on front of device) covers the potentiometer.

Potentiometer for the adjustment of flow switch point. With analog devices the potentiometer is used to set the measuring range.

# Flow Monitors

## Flow Monitor Part Number Key - Insertion Probe Sensor



<p><b>Sensor Type</b></p> <p>FCS = Insertion Probe Flow Sensor          FCTS = Flow Sensor with Temperature Setpoint</p> <p><b>Fluid Connection</b></p> <p>N1/2 = 1/2 NPT          N3/4 = 3/4 NPT          G1/4 = G1/4 (1/4 BSPP)          G1/2 = G1/2 (1/2 BSPP)          GL1/2 = G1/2 (1/2 BSPP with additional threading)          50 = 1.5 inch Tri-clamp</p> <p><b>Housing</b></p> <p>A4 = 316 Stainless Steel Housing and Probe          A2P = 303 Stainless Steel Probe with PBT Housing          A4P = 316 Stainless Steel Probe with PBT Housing          AL = 303 Stainless Steel Probe          HB = Hastelloy B          HC22 = Hastelloy C22          T = Dyflor (PVDF)          TN = Titanium w/B3 Coating</p>	<p><b>Special Option Codes</b></p> <p>/A = Airflow          /L = Probe Length in mm          /D100 = +120°C (+248°F)          /D500 = 500 Bar rating          /D014 = Tri-clamp fitting</p> <p><b>Electrical Connection</b></p> <p>H1141 = <i>euromast</i><sup>®</sup>          H1140 = <i>euromast</i>          B1151 = <i>minifast</i><sup>®</sup>          B3141 = <i>microfast</i><sup>®</sup>          B3151 = <i>microfast</i></p> <p><b>Circuitry</b></p> <p>2AP8X = Dual N.O. PNP          AP8X = N.O. PNP          AN8X = N.O. NPN          ARX = N.O. Relay          RRX = N.C. Relay          LIX = 4-20 mA          NA = Remote (requires MK or MS 96)          NAEX = Intrinsically Safe</p>
--	---

FLOW

# TURCK

## Flow Monitors

### Probe style Flow Monitors

- Great for water or Oil
- IP65
- LED visualization of flow rate
- Great for Stamping Press Lubrication  
Oil Monitoring, Weld Tip Protection,  
Pump Run Dry Protection, and other  
monitoring applications



Part Number	Flow Detection Range: Water (cm/s)	Flow Detection Range: Oil (cm/s)	Operating Voltage	Current Consumption	Fluid Connection	Output: Flow	Probe Length (mm)		
							Wiring	Optional Adapters	Drawing
FCS-N1/2A4P-AP8X-H1141	5-150	10-300	24 VDC +/-10%	≤100	1/2" NPT	PNP N.O.	42	2	1
FCS-N1/2A4P-LIX-H1141	5-150	N/A	24 VDC +/-10%	≤100	1/2" NPT	4-20 mA Linear Analog	42	1	3
FCS-N1/2A4P-LIX-H1141/D037	5-150	10-300	24 VDC +/-10%	≤100	1/2" NPT	4-20 mA Non-Linear Analog	42	1	3
FCS-G1/2A4P-AP8X-H1141	1-150	3-300	24 VDC +/-10%	≤60	G 1/2"	PNP NO	31	2	2
FCS-N1/2A4P-AP8X-H1141/L060	1-150	3-300	24 VDC +/-10%	≤60	1/2" NPT	PNP N.O.	60	2	1
FCS-N1/2A4P-AP8X-H1141/L100	1-150	3-300	24 VDC +/-10%	≤60	1/2" NPT	PNP N.O.	100	2	1
FCS-N1/2A4P-AP8X-H1141/L120	1-150	3-300	24 VDC +/-10%	≤60	1/2" NPT	PNP N.O.	120	2	1
FCS-N1/2A4P-ARX-B1151 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	42	3	4
FCS-N1/2A4P-RRX-B1151 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.C.	42	4	4
FCS-N1/2A4P-ARX-B1151 230VAC	1-150	3-300	230 VAC +/-15%	≤30	1/2" NPT	Relay N.O.	42	7	4
FCS-N1/2A4P-ARX-B1151/L060/115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	60	3	4
FCS-N1/2A4P-ARX-B1151/L080/115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	80	3	4
FCS-N1/2A4P-ARX-B1151/L100/115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	100	3	4
FCS-N1/2A4P-ARX-B1151/L120 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	120	3	4
FCS-N1/2A4P-ARX-B1151/L160/115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	160	3	4
FCS-N1/2A4P-ARX-B3141 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	42	5	5
FCS-N1/2A4P-ARX-B3141/L060 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	60	5	5
FCS-N1/2A4P-ARX-B3151 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	42	6	5
FCS-N1/2A4P-ARX-B3151/L220 115VAC	1-150	3-300	115 VAC +/-15%	≤60	1/2" NPT	Relay N.O.	220	6	5

### Specifications

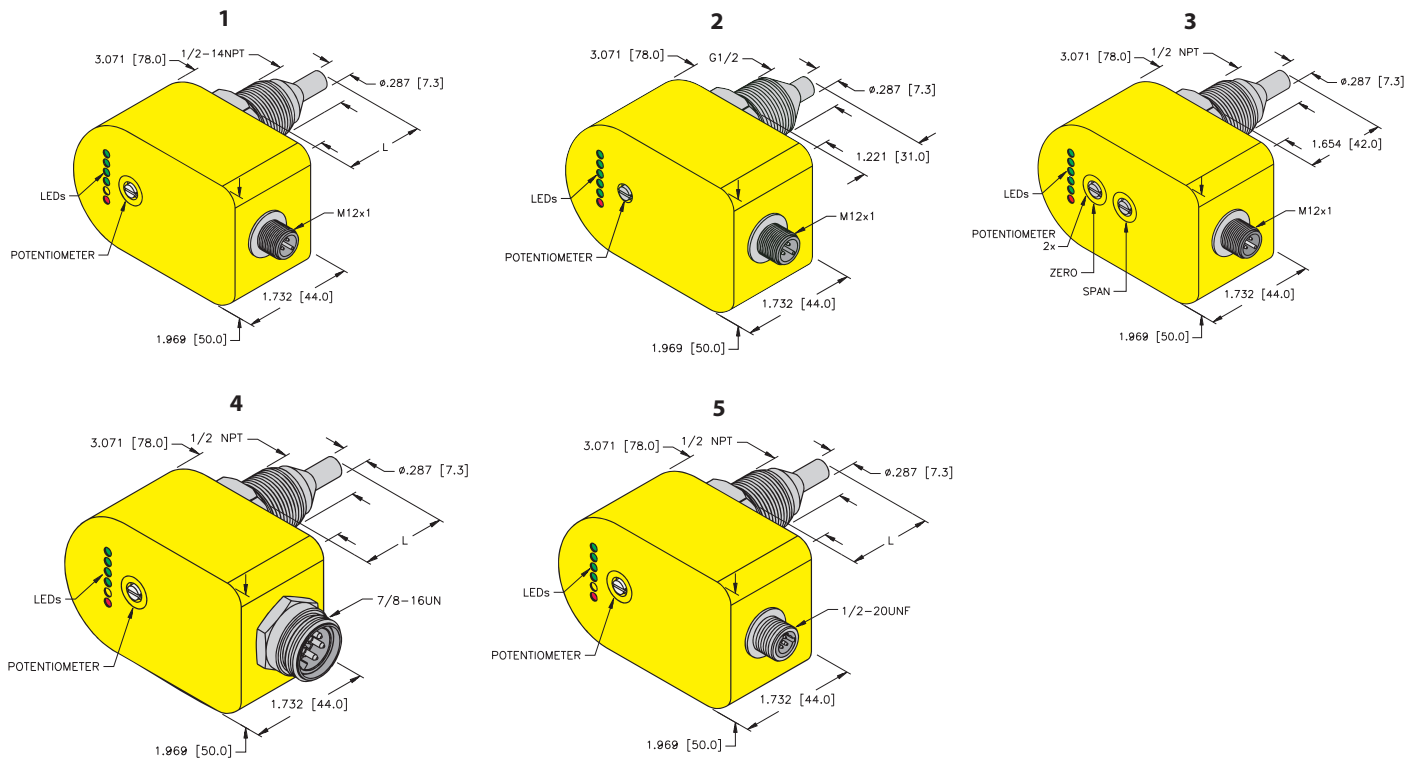
Electrical	
Switching Current PNP outputs	≤400 mA
Analog Load 4-20 mA outputs	≤500Ω
Switching Current Relay Outputs	≤2A at 60 VDC
Environmental	
Protection	IP65
Pressure Rating	1450 PSI
Ambient Temperature	-20 to 70 °C
Media Temperature	-20 to 80 °C

Materials	
Housing	PBT
Cable Connector	303 Stainless Steel
Wetted Parts	316 Ti Stainless Steel
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time	1-15 seconds, 2 seconds typical
Response time	1-13 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second



# Flow Monitors

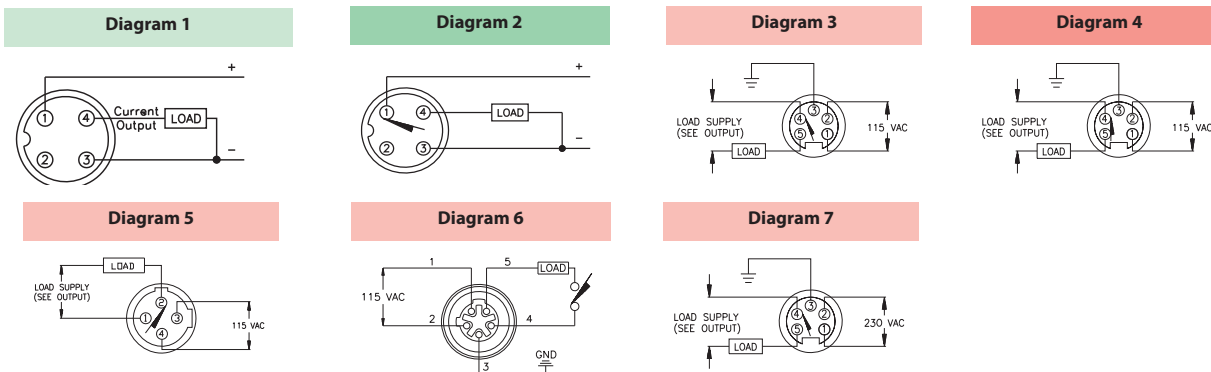
## Drawings



L = Probe length

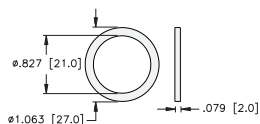
FLOW

## Wiring Diagrams

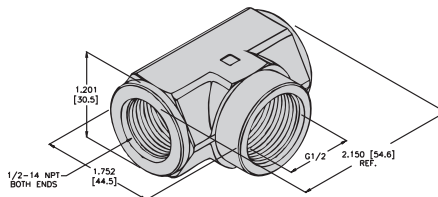


## Adapter Options

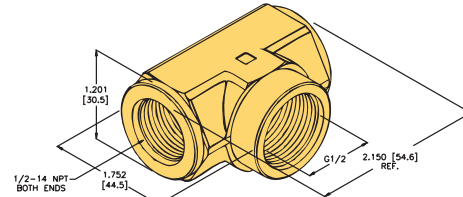
**G 1/2 Gasket**  
FD-G1/2AFM30/34 (M6875013)



**Pipe Tee (Stainless Steel)**  
N1/2-G1/2-SST (A6060)



**Pipe Tee (Brass)**  
N1/2-G1/2-BT (A6050)



# TURCK

## Flow Monitors

### Probe style Dual Set Point Flow Monitors

- Great for water and oil
- IP65
- LED visualization of flow rate



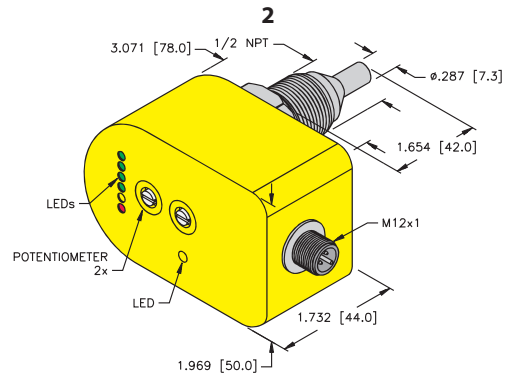
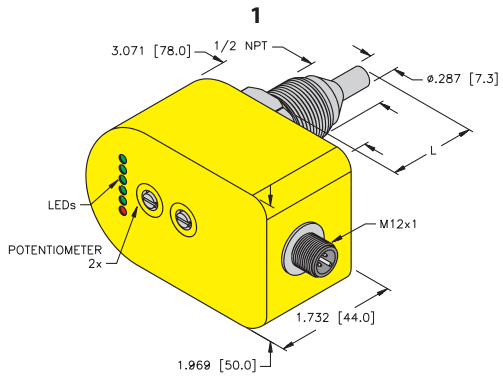
Part Number	Flow Detection Range Water (cm/s)	Flow Detection Range Oil (cm/s)	Operating Voltage	Fluid Connection	Output 1: Flow	Output 2	Probe Length (mm)	Wiring	Drawing
FCS-N1/2A4P-2AP8X-H1140	1-150	Consult Factory	24 VDC +/-10%	1/2" NPT	PNP N.O.	Flow: PNP N.O.	42	1	1
FCS-N1/2A4P-2AP8X-H1140/L080	1-150	3-300	24 VDC +/-10%	1/2" NPT	PNP N.O.	Flow: PNP N.O.	80	1	1
FTCS-N1/2A4P-2AP8X-H1140	1-150	3-300	24 VDC +/-10%	1/2" NPT	PNP N.O.	Temperature: PNP N.O. 0 to 80°C	42	2	2

#### Specifications:

Electrical	
Current Consumption	≤60 mA
Switching Current PNP outputs	≤400 mA
Environmental	
Protection	IP65
Pressure Rating	1450 PSI
Ambient Temperature	-20 to 70 °C
Media Temperature	-20 to 80 °C
Materials	
Housing	PBT
Cable Connector	303 Stainless Steel
Wetted Parts	316 Ti Stainless Steel
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time	1-15 seconds, 2 seconds typical
Response time	1-13 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

# Flow Monitors

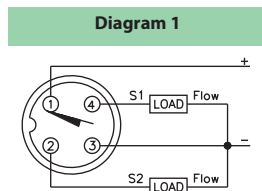
## Drawings



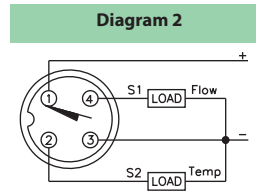
L = Probe length

FLOW

## Wiring Diagrams



Mating Cordset:  
RK 4.4T-\*



Mating Cordset:  
RK 4.4T-\*

# TURCK

## Flow Monitors

### Stainless Steel Flow Monitors

- Great for water or oil
- IP67
- LED visualization of flow rate
- Great for Stamping Press Lubrication oil Monitoring,

Weld Tip Protection, Pump Run Dry Protection, and other monitoring applications



Part Number	Flow Detection Range (cm/s)		Fluid Connection	Output: Flow	Probe Length (mm)	Wiring		
	Water	Oil				Wiring	Adapter	Drawing
FCS-N1/2A4-AN8X-H1141	1-150	3-300	1/2" NPT	NPN N.O.	40	2		1
FCS-N1/2A4-AP8X-H1141	1-150	3-300	1/2" NPT	PNP N.O.	40	1		1
FCS-N1/2A4-AP8X-H1141/L060	1-150	3-300	1/2" NPT	PNP N.O.	60	1		1
FCS-N1/2A4-AP8X-H1141/L100	1-150	3-300	1/2" NPT	PNP N.O.	100	1		1
FCS-N1/2A4-AP8X-H1141/L220	1-150	3-300	1/2" NPT	PNP N.O.	220	1		1
FCS-N1/2A4-ARX-H1140	1-150	3-300	1/2" NPT	Relay N.O.	40	3		1
FCS-GL1/2A4-AP8X-H1141	1-150	3-300	GL 1/2"	PNP N.O.	48	1		2
FCS-G1/2A4-AN8X-H1141	1-150	3-300	G 1/2"	NPN N.O.	30	2		3
FCS-G1/2A4-AP8X-H1141	1-150	3-300	G 1/2"	PNP N.O.	30	1		3
FCS-G1/2A4-AP8X-H1141/L080	1-150	3-300	G 1/2"	PNP N.O.	80	1		3
FCS-G1/4A4-AP8X-H1141	1-150	3-300	G 1/4"	PNP N.O.	25	1		4
FCS-G1/4A4-ARX-H1140	1-150	3-300	G 1/4"	Relay N.O.	25	3		4

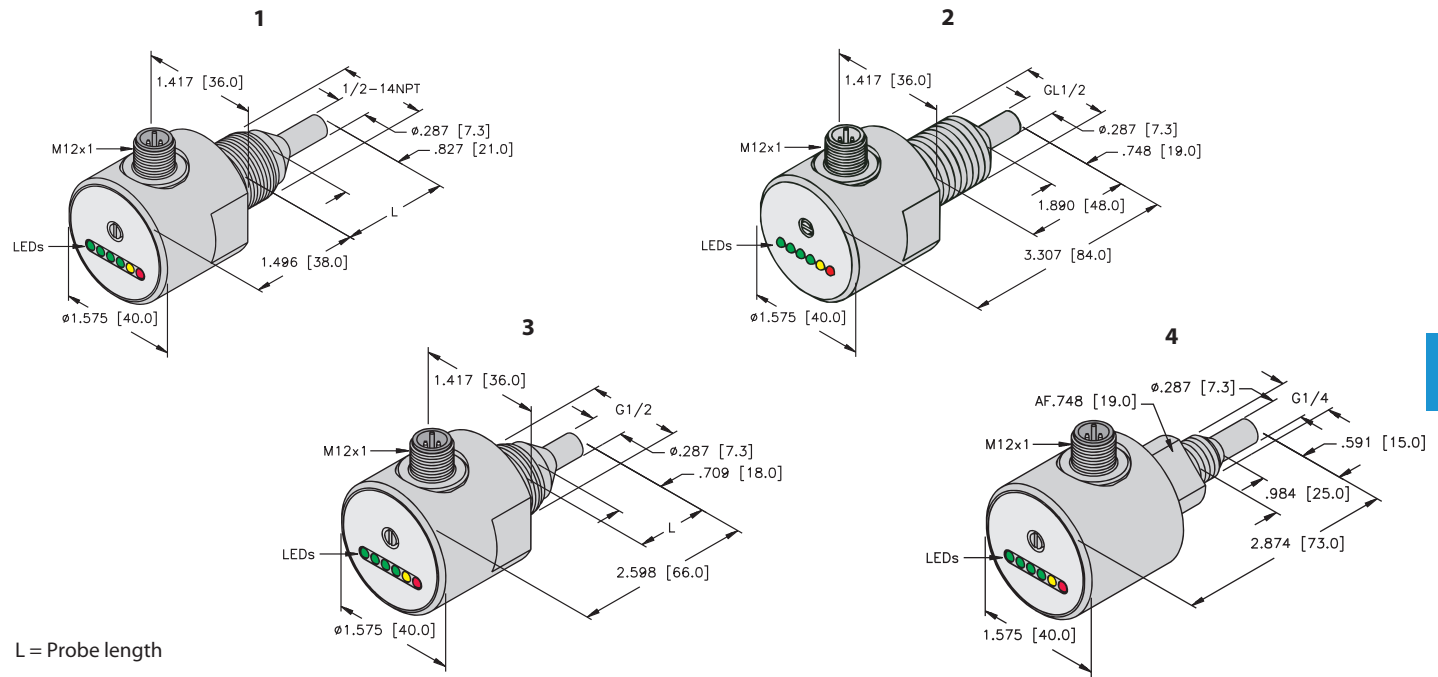
### Specifications:

Electrical	
Operating Voltage	24 VDC +/-10%
Switching Current PNP outputs	≤400 mA
Switching Current Relay Outputs	≤1 A at 60 VDC
Current Consumption	≤70 mA
Environmental	
Protection	IP67
Pressure Rating	1450 PSI
Ambient Temperature	-20 to 70 °C
Media Temperature	-20 to 80 °C
Materials	
Housing	316 Stainless Steel
Cable Connector	303 Stainless Steel
Wetted Parts	316 Ti Stainless Steel
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time (DC)	1-15 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

# Flow Monitors

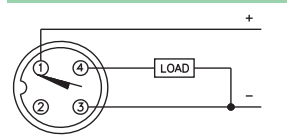
FLOW

## Drawings



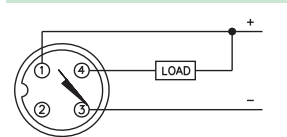
## Wiring Diagrams

Diagram 1



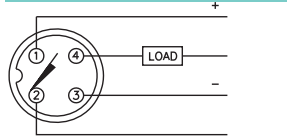
Mating Cordset: RK 4T-\*

Diagram 2



Mating Cordset: RK 4T-\*

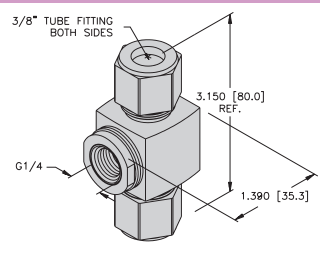
Diagram 3



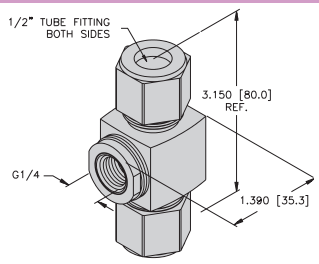
Mating Cordset: RK 4T-\*

## Adapter Options

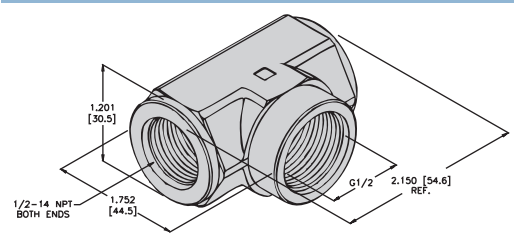
**Pipe Tee (316 Stainless Steel)**  
3/8 A4-AK (A6000)



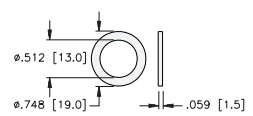
**Pipe Tee (316 Stainless Steel)**  
1/2 A4-AK (A3420)



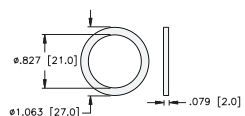
**Pipe Tee (Stainless Steel)**  
N1/2-G1/2-SST (A6060)



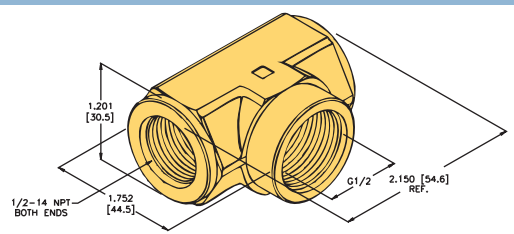
**Additional G 1/4 Gasket**  
FD-G1/4AFM30/34 (M6875010)



**Additional G 1/2 Gasket**  
FD-G1/2AFM30/34 (M6875013)



**Pipe Tee (Brass)**  
N1/2-G1/2-BT (A6050)



# TURCK

## Flow Monitors

### Tri-clamp style Flow Monitors

- IP67
- LED visualization of flow rate
- 3A approved for Food and Beverage applications



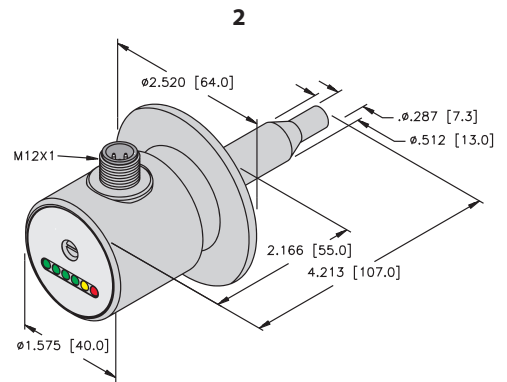
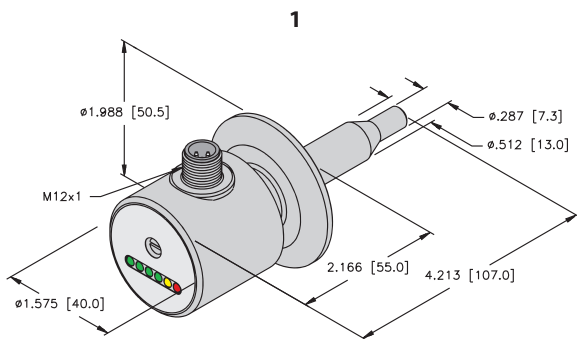
Part Number	Flow Detection Range Water (cm/s)	Flow Detection Range Oil (cm/s)	Fluid Connection	Output: Flow	Probe Length (mm)	Wiring	Drawing #
FCS-50A4-AP8X-H1141/D014	1-150	3-300	1.5" tri-clamp	PNP N.O.	52	1	1
FCS-64A4-AP8X-H1141/D014	1-150	3-300	2" tri-clamp	PNP N.O.	52	1	2

### Specifications:

Electrical	
Operating Voltage	24 VDC +/-10%
Switching Current PNP outputs	≤400 mA
Current Consumption	≤70 mA
Environmental	
Protection	IP67
Pressure Rating	1450 PSI
Ambient Temperature	-20 to 80 °C
Media Temperature	0 to 80 °C; 100°C for 10 minutes without damage
Materials	
Housing	316 Stainless Steel
Cable Connector	303 Stainless Steel
Wetted Parts	316 Ti Stainless Steel
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time (DC)	1-15 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

# Flow Monitors

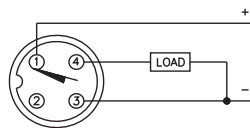
## Drawings



FLOW

## Wiring Diagram

Diagram 1



Mating Cordset:  
RKV 4T-\*



# TURCK

## Flow Monitors

### Chemically Resistant Probe style Flow Monitors

- PTFE and PVDF Options
- Self Contained or Remote Versions



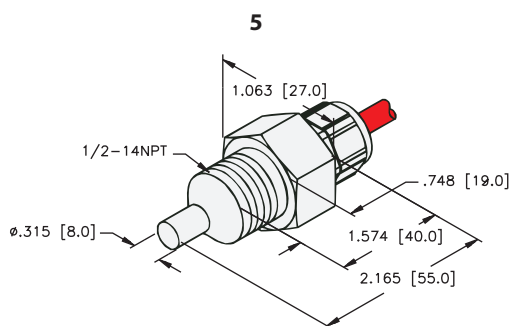
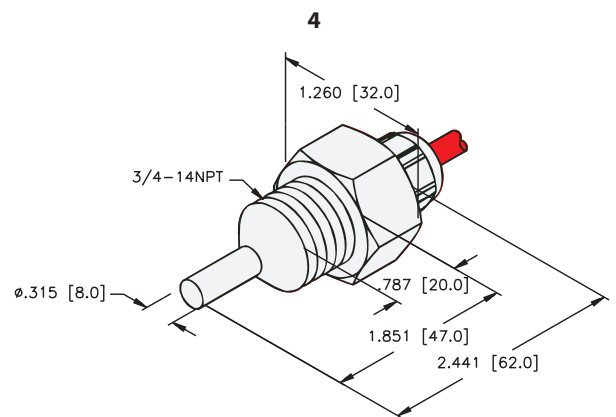
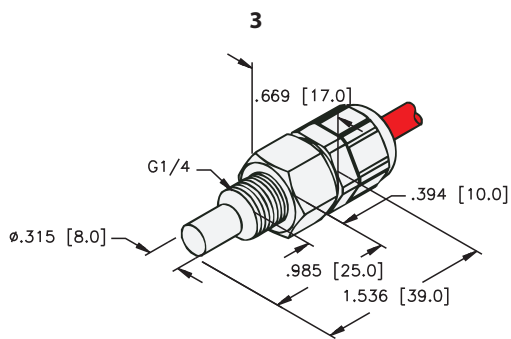
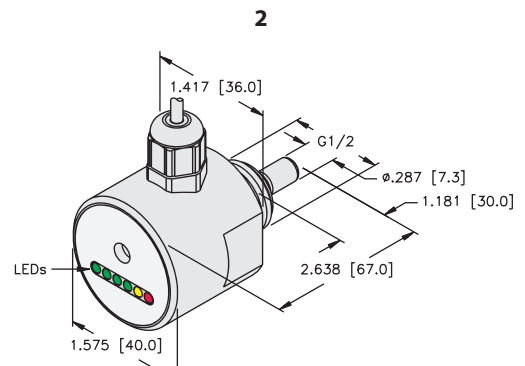
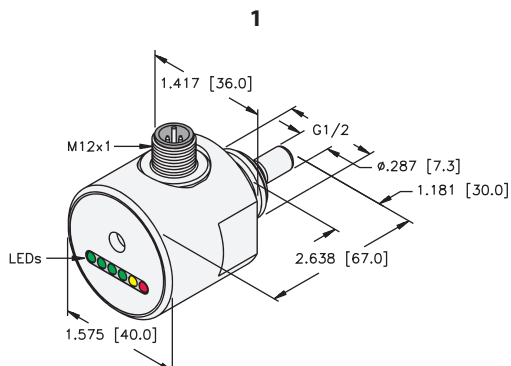
Part Number	Flow Detection Range Water (cm/s)	Flow Detection Range Oil (cm/s)	Fluid Connection	Output: Flow	Operating Voltage	Wetted Parts	Protection	Maximum Temperature Change	Probe Length (mm)	Wiring	Drawing #
FCS-G1/2DY-AP8X-H1141	1-70	2-100	G1/2"	PNP N.O.	24 VDC +/-10%	PVDF	IP67	0.05 °C/second	30	1	1
FCS-G1/2DY-AP8X	1-70	2-100	G1/2"	PNP N.O.	24 VDC +/-10%	PVDF	IP67	0.05 °C/second	30	2	2
FCS-G1/4T-NA	1-70	2-100	G1/4"	Remote Amplifier	Remote Amplifier	PTFE	IP68	1 °C/second	25	3	3
FCS-N3/4T-NA	1-70	2-100	3/4" NPT	Remote Amplifier	Remote Amplifier	PTFE	IP68	1 °C/second	47	3	4
FCS-N1/2T-NA	1-70	2-100	1/2" NPT	Remote Amplifier	Remote Amplifier	PTFE	IP68	1 °C/second	42	3	5

### Specifications:

Electrical	
Switching Current PNP outputs	≤400 mA
Current Consumption PNP outputs	≤70 mA
NA outputs require a remote amplifier	See page C51
Environmental	
Pressure Rating	72 PSI
Ambient Temperature	-25 to 70 °C
Media Temperature	-10 to 80 °C
Operational	
Time Delay before Availability	5-50 seconds 30 seconds typical
Response time	5-50 seconds, 30 seconds typical

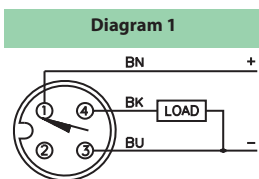
# Flow Monitors

## Drawings

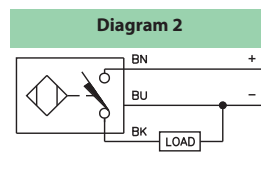


FLOW

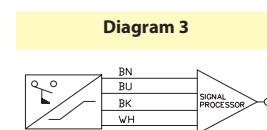
## Wiring Diagrams



Mating Cordset:  
RKK 4T-\*



2M/PTFE Cable



2M/PTFE Cable

# TURCK

## Flow Monitors

### Remote Amplified Flow Sensor

- IP68 Options
- Extended Probe Lengths
- High Temperature Ranges
- High Pressure Ratings



Part Number	Flow Detection Range, Water (cm/s)	Flow Detection Range, Oil (cm/s)	Fluid Connection	Wetted Parts	Protection	Probe Length (mm)	Pressure Rating (psi)	Ambient Temperature (°C)	Media Temperature (°C)	Wiring	Drawing #
FCS-G1/2A4-NA-H1141	1-150	3-300	G 1/2"	316 TI SS	IP67	31	1450	-25 to 80	-25 to 80	2	5
FCS-G1/4A4-NA-H1141	1-150	3-300	G 1/4"	316 TI SS	IP67	24	1450	-25 to 80	-25 to 80	2	4
FCS-N1/2A4-NA-H1141	1-150	3-300	1/2" NPT	316 TI SS	IP67	42	1450	-25 to 80	-25 to 80	2	2
FCS-N1/2A4-NA-H1141/L060	1-150	3-300	1/2" NPT	316 TI SS	IP67	60	1450	-25 to 80	-25 to 80	2	2
FCS-N1/2A4-NA-H1141/L220	1-150	3-300	1/2" NPT	316 TI SS	IP67	220	1450	-25 to 80	-25 to 80	2	2
FCS-N1/2A4-NA-H1141/L100	1-150	3-300	1/2" NPT	316 TI SS	IP67	100	1450	-25 to 80	-25 to 80	2	2
FCS-N3/4A4-NA-H1141	1-150	3-300	3/4" NPT	316 TI SS	IP67	47	1450	-25 to 80	-25 to 80	2	3
FCS-N1/2A4-NA	1-150	3-300	1/2" NPT	316 TI SS	IP67	42	1450	-25 to 80	-25 to 80	1	1
FCS-G1/4A4-NA/D100	1-150	3-300	G1/4"	316 TI SS	IP68	24	1450	-25 to 80	10 to 120	1	7
FCS-N1/2A4-NA/D100	1-150	3-300	1/2" NPT	316 TI SS	IP68	42	1450	-25 to 80	10 to 120	1	1
FCS-G1/2A4-NA/D100	1-150	3-300	G1/2"	316 TI SS	IP68	31	1450	-25 to 80	10 to 120	1	8
FCS-GL1/2A4-NA-H1141/D500	1-150	3-300	GL1/2"	316 TI SS	IP67	46	*	-25 to 80	-25 to 80	2	6

\* = 1000 dynamic, 5600 static

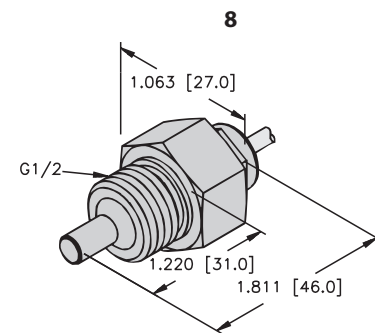
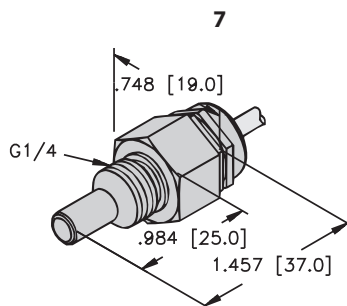
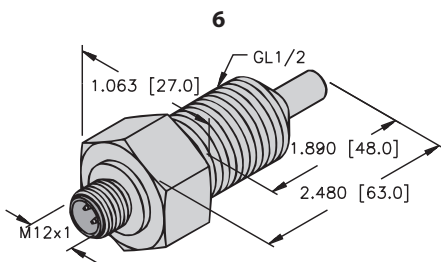
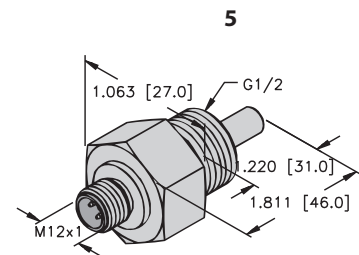
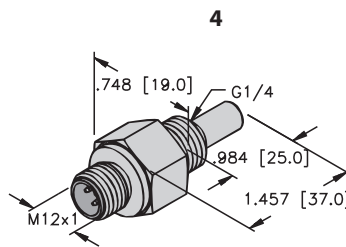
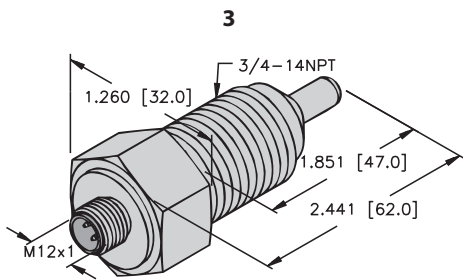
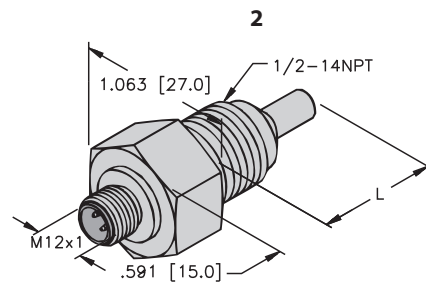
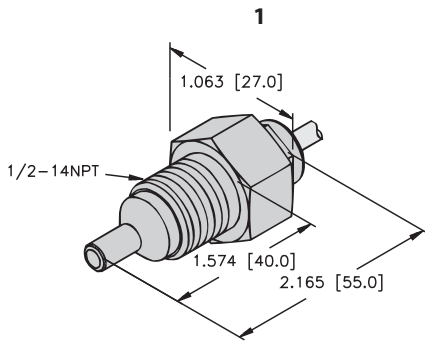
### Specifications:

Electrical	
Operating Voltage	Remote Amplifier
Output Characteristics	Remote Amplifier
NA outputs require a remote amplifier	See page C51
Operational	
Time Delay before Availability	2-15 seconds, 8 seconds typical
Response time	1-13 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

# Flow Monitors

## Drawings

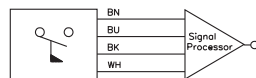
FLOW



L = Probe length

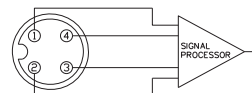
## Wiring Diagrams

Diagram 1



2M/PTFE Cable

Diagram 2



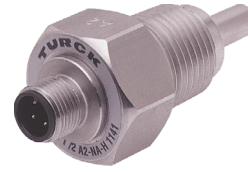
Mating Cordset:  
RK 4.4T-\*

# TURCK

## Flow Monitors

### Chemically Resistant Flow Probes

- Fast Response Times
- Hastelloy or Titanium Options



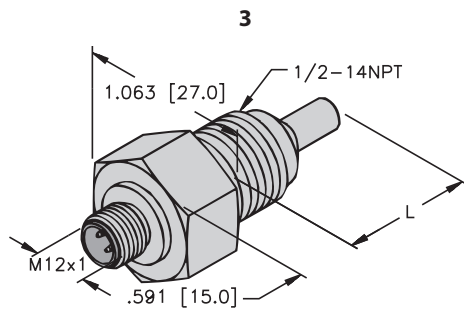
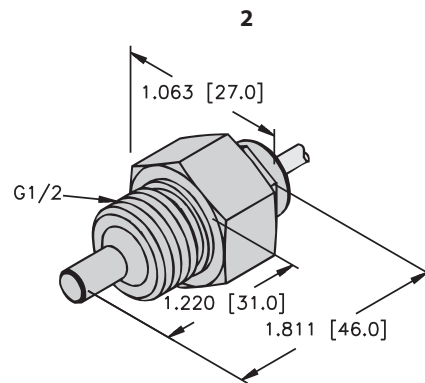
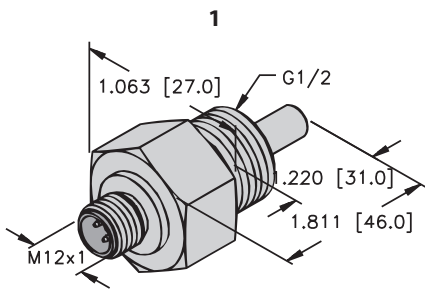
Part Number	Water (cm/s)	Oil (cm/s)	Fluid Connection	Housing Material Wetted Parts	Protection	Probe Length (mm)	Pressure Rating (psi)	Ambient Temperature (°C)	Media Temperature (°C)	Wiring	Drawing
FCS-G1/2TN-NA-H1141	1-150	3-300	G 1/2"	Titanium	IP67	31	1450	-25 to 80	-25 to 80	1	1
FCS-N1/2TN-NA-H1141/L080	1-150	3-300	1/2" NPT	Titanium	IP67	80	1450	-25 to 80	-25 to 80	1	3
FCS-G1/2HC22-NA	1-150	3-300	G 1/2"	Hastelloy C22	IP68	31	1450	-25 to 80	-25 to 80	2	2

### Specifications:

Electrical	
Operating Voltage	Remote Amplifier
Output Characteristics	Remote Amplifier
NA outputs require a remote amplifier	See page C51
Operational	
Time Delay before Availability	2-15 seconds, 8 seconds typical
Response time (DC)	1-13 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

# Flow Monitors

## Drawings

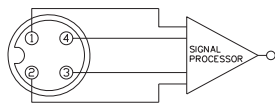


L = Probe length

FLOW

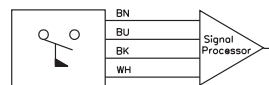
## Wiring Diagrams

Diagram 1



Mating Cordset:  
RK 4.4T-\*

Diagram 2



2M/PTFE Cable

# TURCK

## Flow Monitors

### Intrinsically Safe Flow Probes

- Atex approved Flow Monitors
- Require an Amplifier



Part Number	Water (cm/s)	Oil (cm/s)	Fluid Connection	Housing Material Wetted Parts	Protection	Probe Length	Pressure Rating (psi)	Ambient Temperature (°C)	Media Temperature (°C)	Wiring	Drawing
FCS-G1/4A4-NAEX	1-150	3-200	G 1/4"	316 TI SS	IP68	25	1450	-25 to 80	-25 to 80	1	3
FCS-N1/2A4-NAEX-H1141	1-150	3-300	1/2" NPT	316 TI SS	IP68	40	1450	-25 to 85	-25 to 85	2	1
FCS-N1/2A4-NAEX/D100	1-150	3-300	1/2" NPT	316 TI SS	IP68	40	1450	-25 to 80	10 to 120	1	2
FCS-N1/2A4-NAEX	1-150	3-200	1/2" NPT	316 TI SS	IP68	40	1450	-25 to 85	-25 to 85	1	2
FCS-GL1/2A4-NAEX/D500	1-150	3-300	GL1/2"	316 TI SS	IP67	46	*	-25 to 85	-25 to 85	1	4

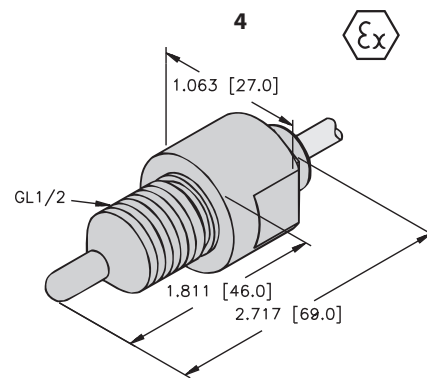
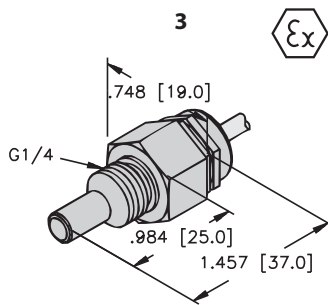
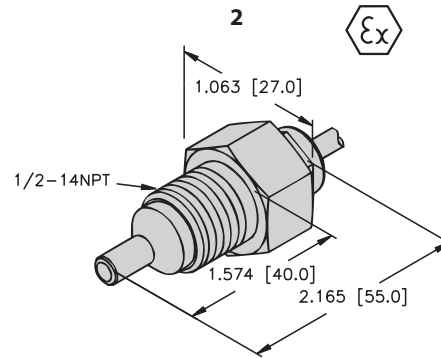
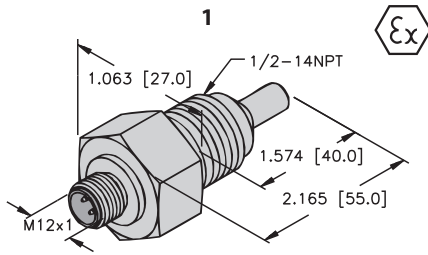
\* = 1000 dynamic, 5600 static

### Specifications:

Electrical	
Operating Voltage	Remote Amplifier
Output Characteristics	Remote Amplifier
NA outputs require a remote amplifier	See page C51
Intrinsically Safe Parameters	
Approval	Ex 112G, Eex Ib IIC T6
Maximum Power	.69 W
Internal Inductance/Capacitance	Negligible
Temperature Class	T6: Tm ≤50 °C, T5: Tm ≤65 °C, T4: Tm ≤70 °C
Operational	
Time Delay before Availability	2-15 seconds, 8 seconds typical
Response time	1-13 seconds, 2 seconds typical
Maximum Temperature Change	4.2 °C/second

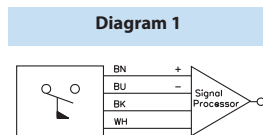
# Flow Monitors

## Drawings

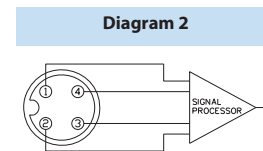


FLOW

## Wiring Diagrams



Cable: 2m/PTFE  
2m/PUR



Mating cordset:  
RK 4.41T-\*



# FCS AIR FLOW MONITOR

## PRODUCT OVERVIEW

### WHAT IS A FCS FLOW MONITOR?

A compact flow sensor for monitoring gaseous media. It is available in two versions: one that includes the sensor and signal processing unit in a single housing for local adjustment and display, and another where the sensors and signal processing unit are separated for remote monitoring purposes. In the case of the latter, the processor is housed in the control cabinet.

### WHY CHOOSE A FCS FLOW MONITOR?

- Easy adjustment via potentiometer
- Transistor, relay or current output
- Insertion principle:
  - » Pressure resistance up to 30 bar
  - » Adjustable range between 0.5 m/s and 30 m/s
- Inline principle:
  - » No pressure loss
  - » Response time within seconds
  - » Adjustable range between 0.5 m/s and 40 m/s

### WHERE CAN I USE A FCS FLOW MONITOR?

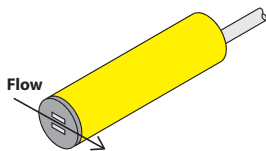
- Monitors that operate using the insertion principle are suited for most pipes.
- Monitors that operate using the inline principle are ideal for low flow rates and pipe diameters of up to 3/8".



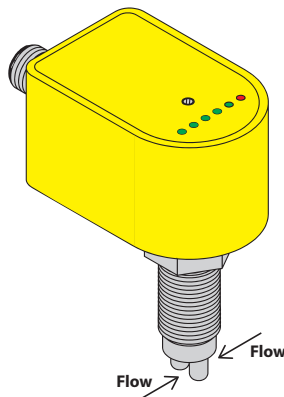
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## Mounting Instructions

Proper Orientation For Airflow

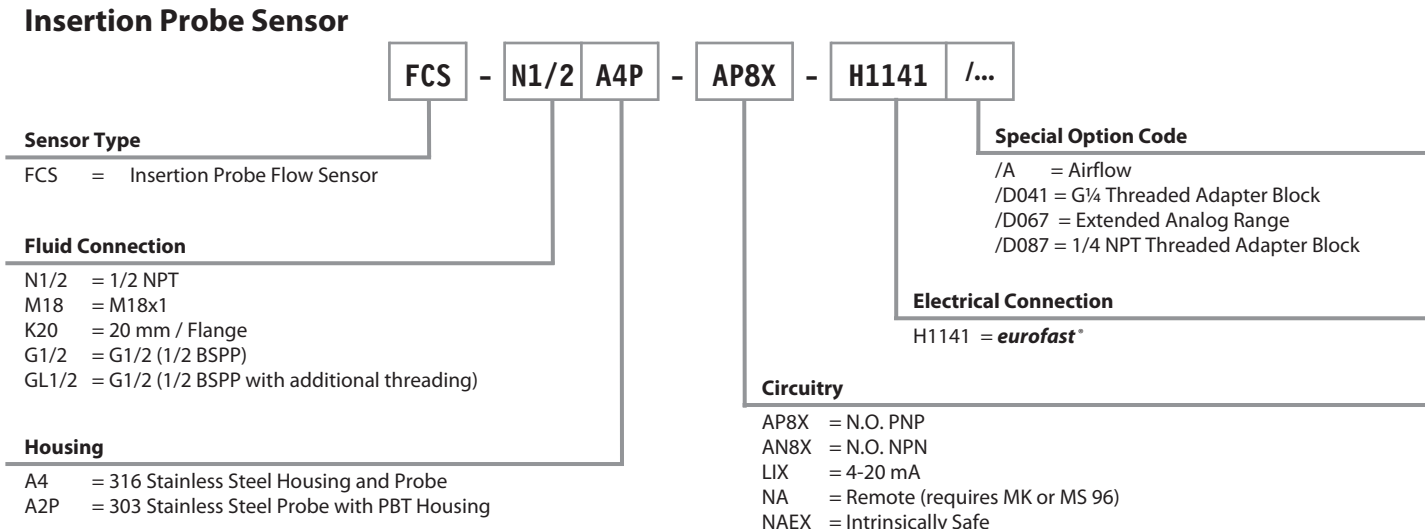


Proper Orientation For Dual Tips



# Flow Monitors

## Air Flow Monitor Part Number Key



FLOW



**Self Contained Airflow - DC**

Time Delay Before Availability . . . . . 20-40 seconds (30 seconds typical)  
Response Time . . . . . 1-5 seconds (2 seconds typical)  
Maximum Temperature Gradient . . . . . 3.3°C / Sec.

**Intrinsically Safe Remote Airflow - DC**

Time Delay Before Availability. . . . . 2-15 seconds (8 seconds typical)  
Response Time . . . . . 1-13 seconds (2 seconds typical)  
Maximum Temperature Gradient. . . . . 10°C / Min.

**Intrinsically Safe Parameters**

Approval . . . . . Ex 112G, EEx Ib IIC T6  
Maximum Power . . . . . 0.69 W  
Internal Inductance / Capacitance . . . . . Negligible  
Temperature Class . . . . . T6: T<sub>M</sub>≤50°C  
T5: T<sub>M</sub>≤65°C  
T4: T<sub>M</sub>≤70°C

# TURCK

## Flow Monitors

### Air Flow Monitors

- IP67
- Great for monitoring the flow of air and other inert gases



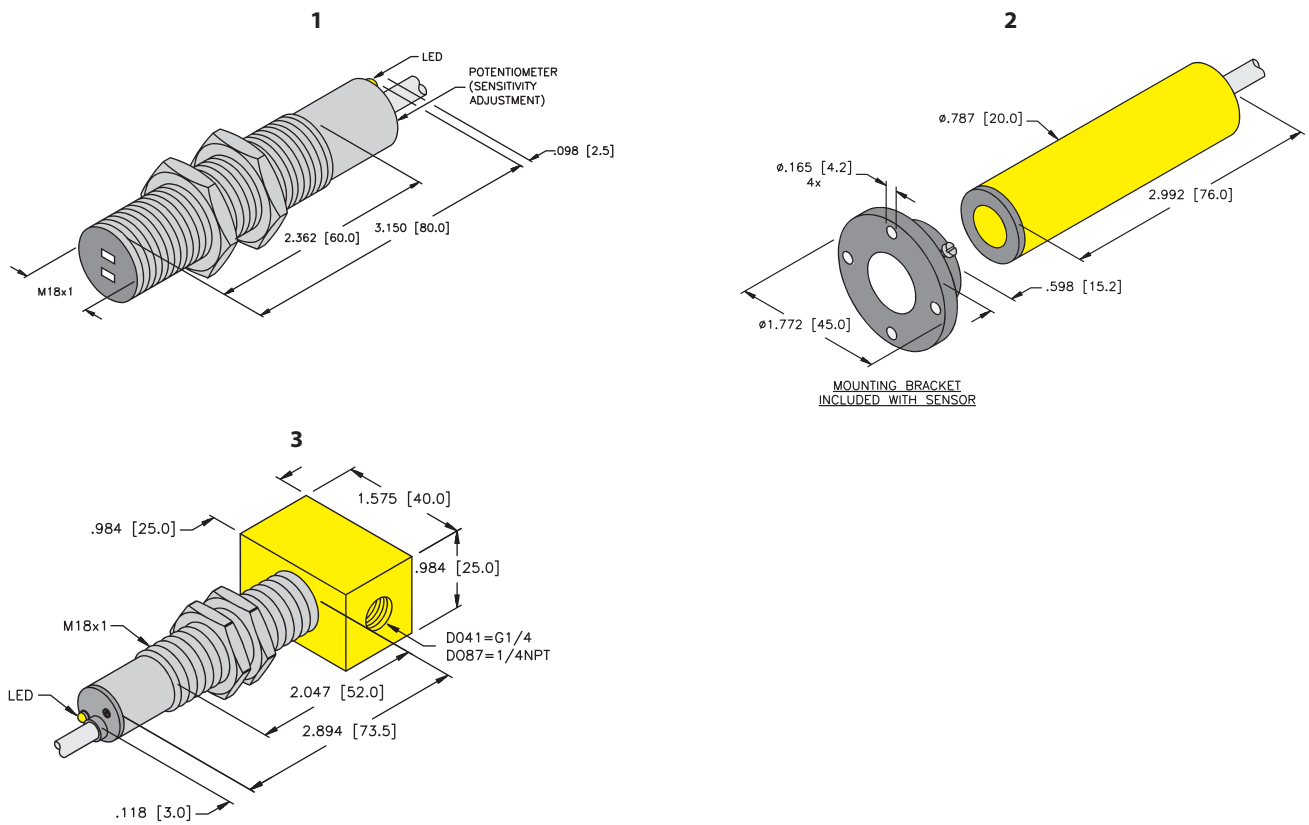
Part Number	Air (m/s) Flow Rate	Fluid Connection	Output: Flow	Pressure Rating (PSI)	Housing Material	Wiring	Drawing
FCS-M18-AP8X	.5-15	M18x1	PNP N.O.	145	Nickel Plated Brass	1	1
FCS-M18-AP8X/D041	.5-15	Mounting block G1/4 threads	PNP N.O.	145	Nickel Plated Brass	1	3
FCS-M18-AP8X/D087	.5-15	Mounting block 1/4" NPT threads	PNP N.O.	145	Nickel Plated Brass	1	3
FCS-K20-AP8X	.5-15	20mm Flange	PNP N.O.	14.5	PBT	1	2
FCS-M18-AN8X	.5-15	M18x1	NPN N.O.	145	Nickel Plated Brass	3	1
FCS-M18-LIX	.5-15	M18x1	4-20 mA Non-Linear Analog	145	Nickel Plated Brass	2	1
FCS-M18-LIX/D067	.5-45	M18x1	4-20 mA Non-Linear Analog	145	Nickel Plated Brass	2	1
FCS-M18-LIX/D041	.5-15	M18x1	4-20 mA Non-Linear Analog	145	Nickel Plated Brass	2	3
FCS-M18-LIX/D087	.5-15	M18x1	4-20 mA Non-Linear Analog	145	Nickel Plated Brass	2	3
FCS-K20-LIX	.5-15	20mm Flange	4-20 mA Non-Linear Analog	14.5	PBT	2	2

### Specifications:

Electrical	
Operating Voltage	24 VDC +/-20%
Switching Current PNP outputs	≤200 mA
Analog Load 4-20 mA outputs	≤500 Ω
Current Consumption	≤70 mA
Environmental	
Protection	IP67
Pressure Rating	1450 PSI
Ambient Temperature	-20 to 70 °C
Media Temperature	-20 to 70 °C
Operational	
Time Delay before Availability	20-40 seconds, 30 seconds typical
Response time	1-5 seconds, 2 seconds typical
Maximum Temperature Change	3.3 °C/second

# Flow Monitors

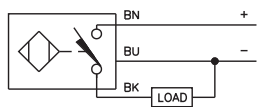
## Drawings



FLOW

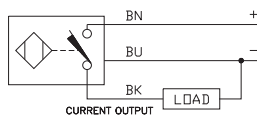
## Wiring Diagrams

**Diagram 1**



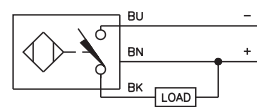
2M/PVC Cable

**Diagram 2**



2M/PVC Cable

**Diagram 3**



2M/PVC Cable

# TURCK

## Flow Monitors

### Air Flow Monitors

- IP65
- LED visualization of flow rate
- Great for monitoring the flow of air and other inert gases



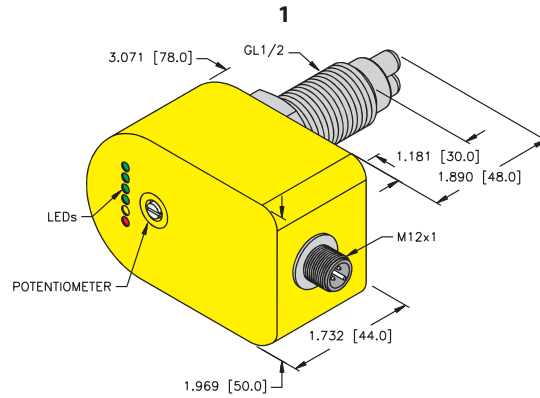
Part Number	Air (m/s) Flow Rate	Fluid Connection	Output: Flow	Wiring	Drawing
FCS-GL1/2A2P-LIX-H1141/A	.5-30	GL 1/2"	4-20 mA Non-Linear Analog	2	1
FCS-GL1/2A2P-AP8X-H1141/A	.5-30	GL 1/2"	PNP N.O.	1	1

### Specifications:

Electrical	
Operating Voltage	24 VDC +/-15%
Switching Current PNP outputs	≤200 mA
Analog Load 4-20 mA outputs	≤500 Ω
Current Consumption	≤80 mA
Environmental	
Protection	IP67
Pressure Rating	435 PSI
Ambient Temperature	-20 to 70 °C
Media Temperature	-20 to 70 °C
Materials	
Probe	AISI 303
Housing	PBT
Operational	
Time Delay before Availability	20-40 seconds, 30 seconds typical
Response time	1-5 seconds, 2 seconds typical
Maximum Temperature Change	3.3 °C/second

# Flow Monitors

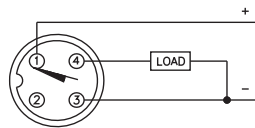
## Drawing



FLOW

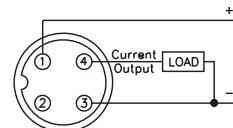
## Wiring Diagrams

**Diagram 1**



Mating cordset:  
RK 4T-\*

**Diagram 2**



Mating cordset:  
RK 4T-\*

# TURCK

## Flow Monitors

### Intrinsically Safe Air Flow Monitors

- IP67
- Remote Probes
- ATEX Approval Intrinsically Safe



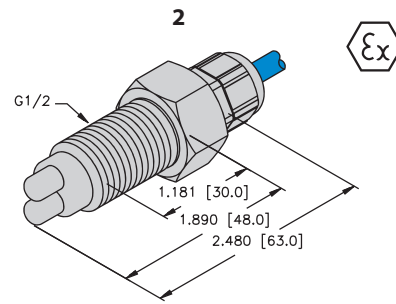
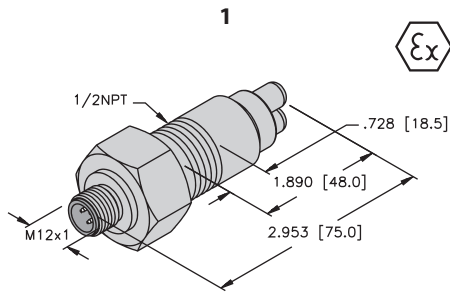
Part Number	Air (m/s)	Fluid Connection	Probe Length (mm)	Wiring	Drawing
FCS-N1/2A4-NAEX-H1141/A	2-25	1/2" NPT	48	1	1
FCS-GL1/2A4-NAEX0/A	2-25	GL 1/2"	48	2	2

### Specifications:

Electrical	
Operating Voltage	Remote Amplifier see page C51
Output Characteristic	Remote Amplifier see page C51
Environmental	
Protection	IP67
Pressure Rating	1450 PSI
Ambient Temperature	-25 to 60 °C
Media Temperature	-25 to 80 °C
Intrinsically Safe Parameters	
Approval	Ex 11 2G, Eex Ib IIC T6
Maximum Power	.69 W
Internal Inductance/Capacitance	Negligible
Temperature Class	T6: Tm ≤50 °C, T5: Tm ≤65 °C, T4: Tm ≤70 °C
Materials	
Housing	316Ti
Operational	
Time Delay before Availability	2-15 seconds 8 seconds typical
Response time (DC)	1-13 seconds, 2 seconds typical
Maximum Temperature Change	10° C/minute

# Flow Monitors

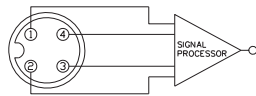
## Drawings



FLOW

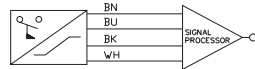
## Wiring Diagrams

**Diagram 1**



Mating Cordset:  
RK 4.41T-\*

**Diagram 2**



2M/PUR Cable

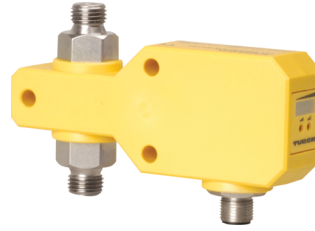


# TURCK

## Flow Monitors

### Inline Air Flow Monitors

- IP67
- LED visualization of flow rate
- Great for monitoring the flow of air and other inert gases



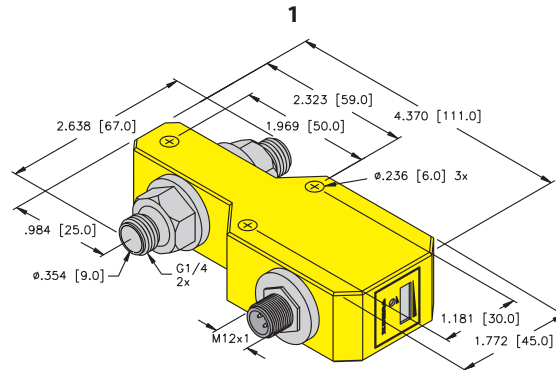
Part Number	Air (m/s)	Fluid Connection	Output: Flow	Switching Current (mA)	Switching Voltage	Analog Load ( $\Omega$ )	Wiring	Adapter	Drawing
FCI-D10A4P-LIX-H1141/A	.5-40	G 1/4"	4-20 mA Non-Linear Analog	-	-	$\leq 500$	2		1
FCI-D10A4P-AP8X-H1141/A	.5-40	G 1/4"	PNP N.O.	$\leq 200$	-	-	1		1
FCI-D10A4P-ARX-H1140/A	.5-40	G 1/4"	Relay N.O.	$\leq 1000$	30VAC/36VDC	-	3		1

### Specifications:

Electrical	
Operating Voltage	24 VDC +/-10%
Current Consumption	$\leq 80$ mA
Environmental	
Protection	IP67
Pressure Rating	290 PSI
Ambient Temperature	-20 to 70 °C
Media Temperature	-20 to 70 °C
Materials	
Tube	AISI 316Ti
Housing	PBT
Operational	
Time Delay before Availability	10-30 seconds
Response time (DC)	1-20 seconds
Maximum Temperature Change	20 °C/minute

# Flow Monitors

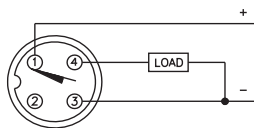
## Drawing



FLOW

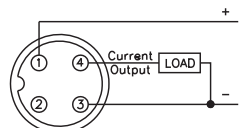
## Wiring Diagrams

**Diagram 1**



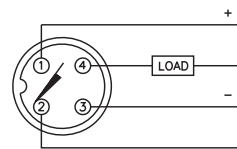
Mating cordset:  
RK 4T-\*

**Diagram 2**



Mating cordset:  
RK 4T-\*

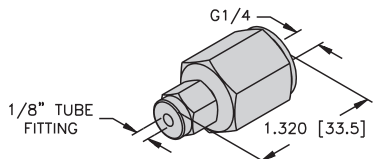
**Diagram 3**



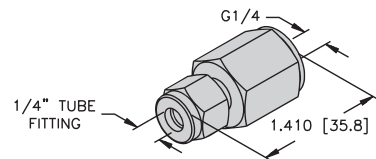
Mating cordset:  
RK 4.4T-\*

## Adaptor Options

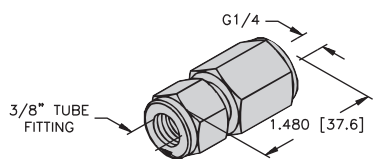
**FSV-SS-1/8x1/4**  
(A2535)



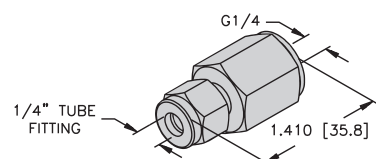
**FSV-SS-1/4x1/4**  
(A2534)



**FSV-SS-3/8x1/4**  
(A2533)



**FSV-SS-1/2x1/4**  
(A2536)



# TURCK

## Interface Technology

### Remote Amplifiers

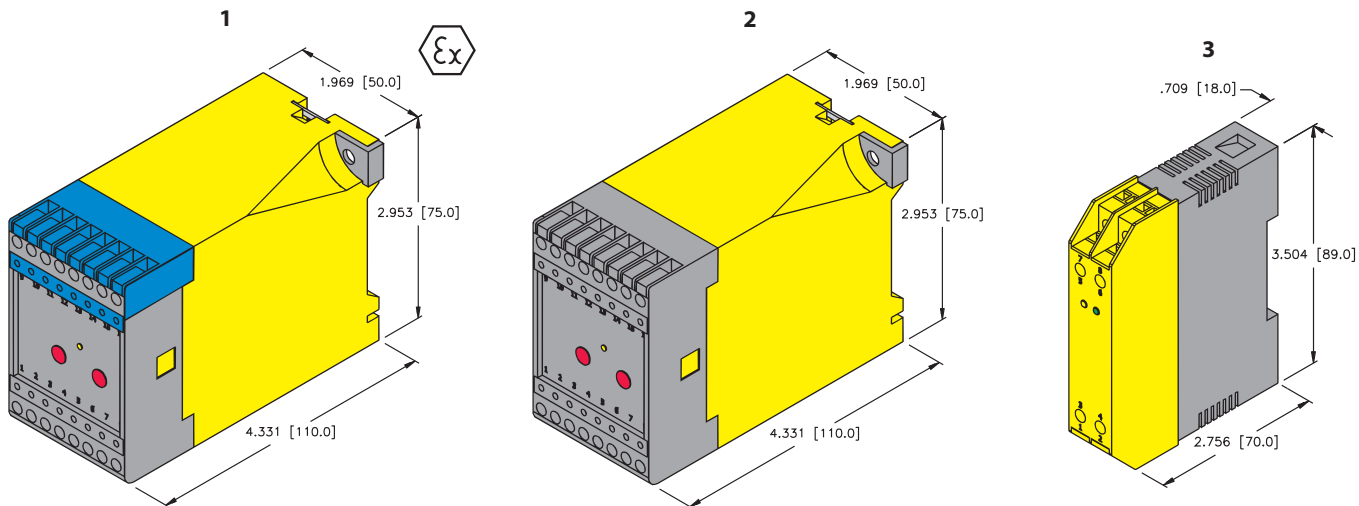
- Signal Processors For Remote Probes
- IP20



Part Number	Output	Intrinsically Safe Ex II(1) IIC [EEx ia] IIC	Wire-break detection	Dual Potentiometer for adjustment	Off Delay 0-25s adjustable	Temperature adjustable 20-100 °C	Short-Circuit/ Reverse Polarity Protection	Operating Voltage	Current Consumption (mA)	Switching Current	Mounting	Wiring	Drawing
MS96-11EX0-R/230VAC	Relay N.O./N.C.	•	•	•	•			198-242 VAC	≤28	≤4 A at 250 VAC / ≤0.8 A at 60 VDC	DIN 50022	1	1
MS96-11EX0-R/115VAC	Relay N.O./N.C.	•	•	•	•			99-121 VAC	≤75	≤4 A at 250 VAC / ≤0.8 A at 60 VDC	DIN 50022	1	1
MS96-11EX0-R/24VDC	Relay N.O./N.C.	•	•	•	•			21-28 VDC	≤125	≤4 A at 250 VAC / ≤0.8 A at 60 VDC	DIN 50022	1	1
MS96-12R/230VAC	Dual Relay N.O./N.C.		•	•	•	•		184-265 VAC	≤35	≤2 A at 250 VAC/≤2 A at 60 VDC	DIN 50022	2	2
MS96-12R/115VAC	Dual Relay N.O./N.C.		•	•	•	•		104-126 VAC	≤90	≤2 A at 250 VAC/≤2 A at 60 VDC	DIN 50022	2	2
MS96-12R/024VDC	Dual Relay N.O./N.C.		•	•	•	•		22-26 VDC	≤120	≤2 A at 250 VAC/≤2 A at 60 VDC	DIN 50022	2	2
MK 96-VP01	PNP N.O./N.C.			•			•	20-28 VDC	≤65	400 mA	DIN 50022 or 50035	4	3
MK 96-VN01	NPN N.O./N.C.			•			•	20-28 VDC	≤65	400 mA	DIN 50022 or 50035	5	3
MK 96-LI01	4-20 mA Non-Linear analog			•			•	20-28 VDC	≤100	Analog Load: ≤500 Ω	DIN 50022 or 50035	6	3
MK 96-11-R/024VDC	Relay N.O.							20-28 VDC	≤70	≤1 A at 230 VAC/≤2 A at 60 VDC	DIN 50022 or 50035	3	3

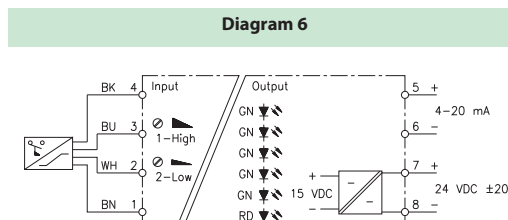
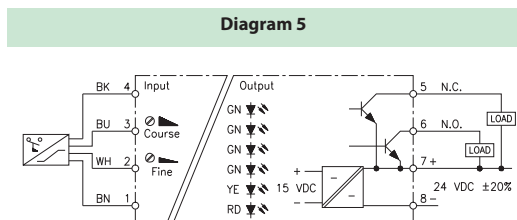
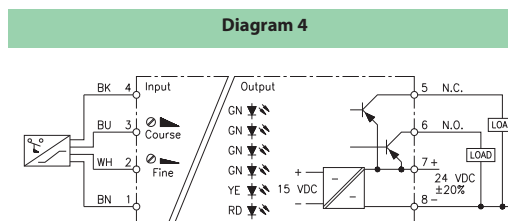
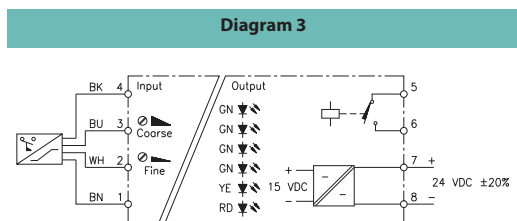
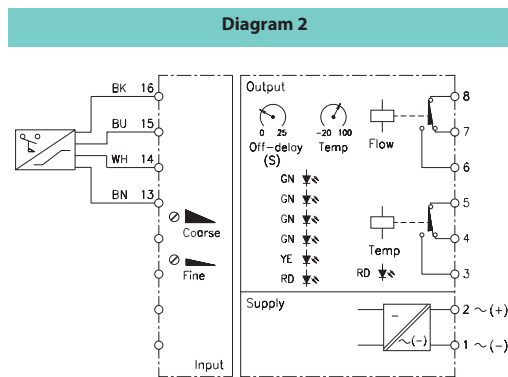
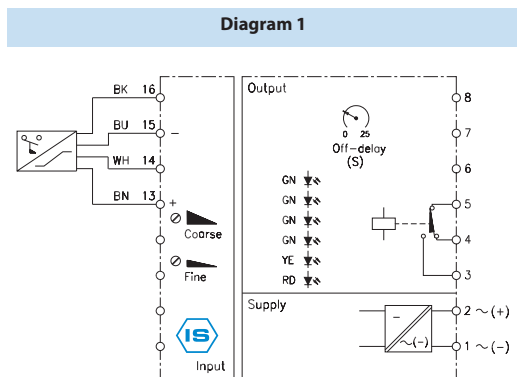
# Flow Monitors

## Drawings



FLOW

## Wiring Diagrams



# TURCK Flow Monitors

## Liquid Flow Conversion Chart (Water)

Flow velocity to flow volume for schedule 40 pipes of various sizes.

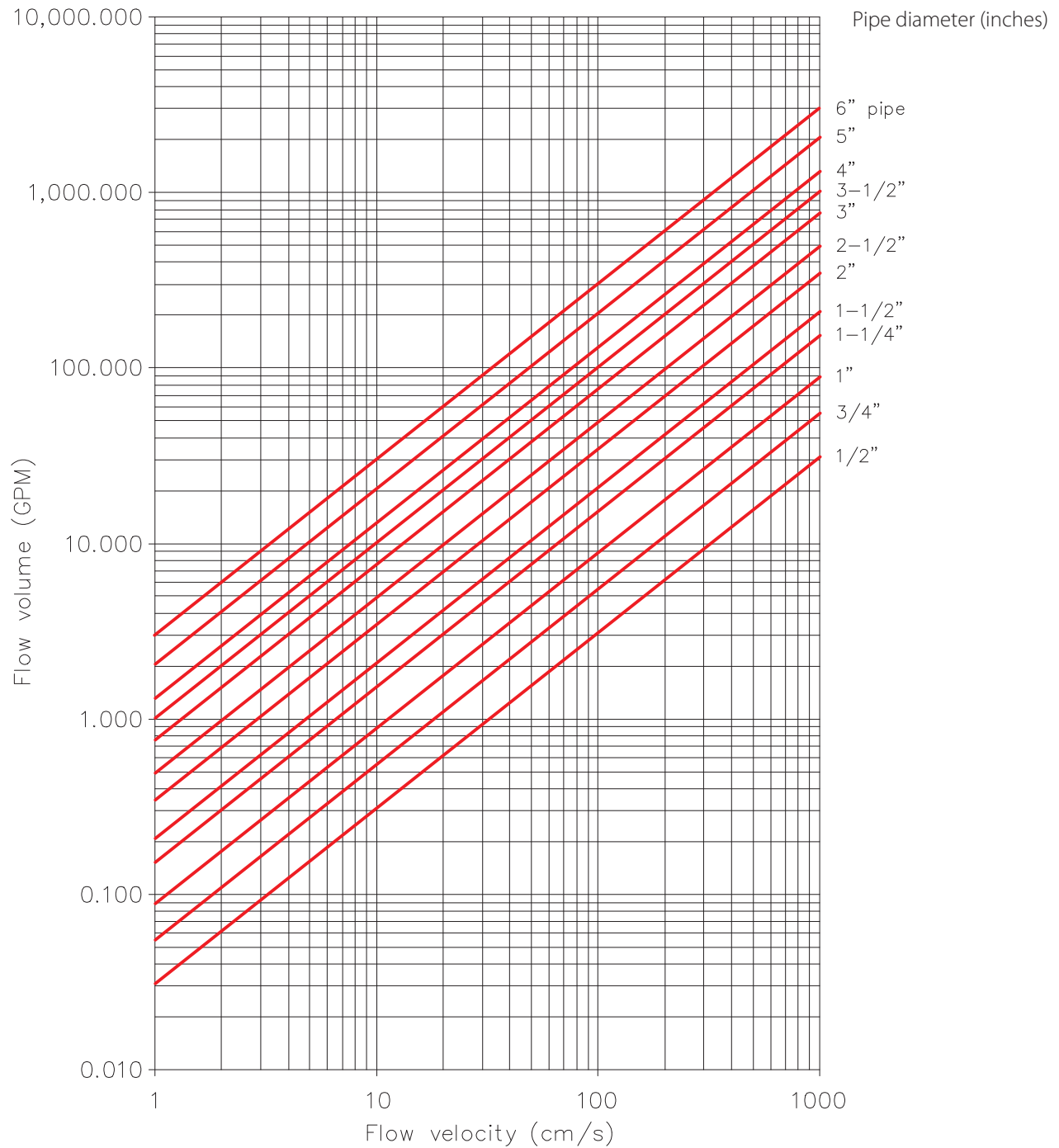
Flow Conversions:

$$\text{GPM} = .0803 \times \text{ID}^2 \times \text{FS}$$

GPM = Gallons per minute

ID = Inner pipe diameter in inches

FS = Flow speed in cm/s (centimeters/second)



# Flow Monitors

## Gas Flow Conversion Chart (Air)

Flow velocity to flow volume for schedule 40 pipes of various sizes.

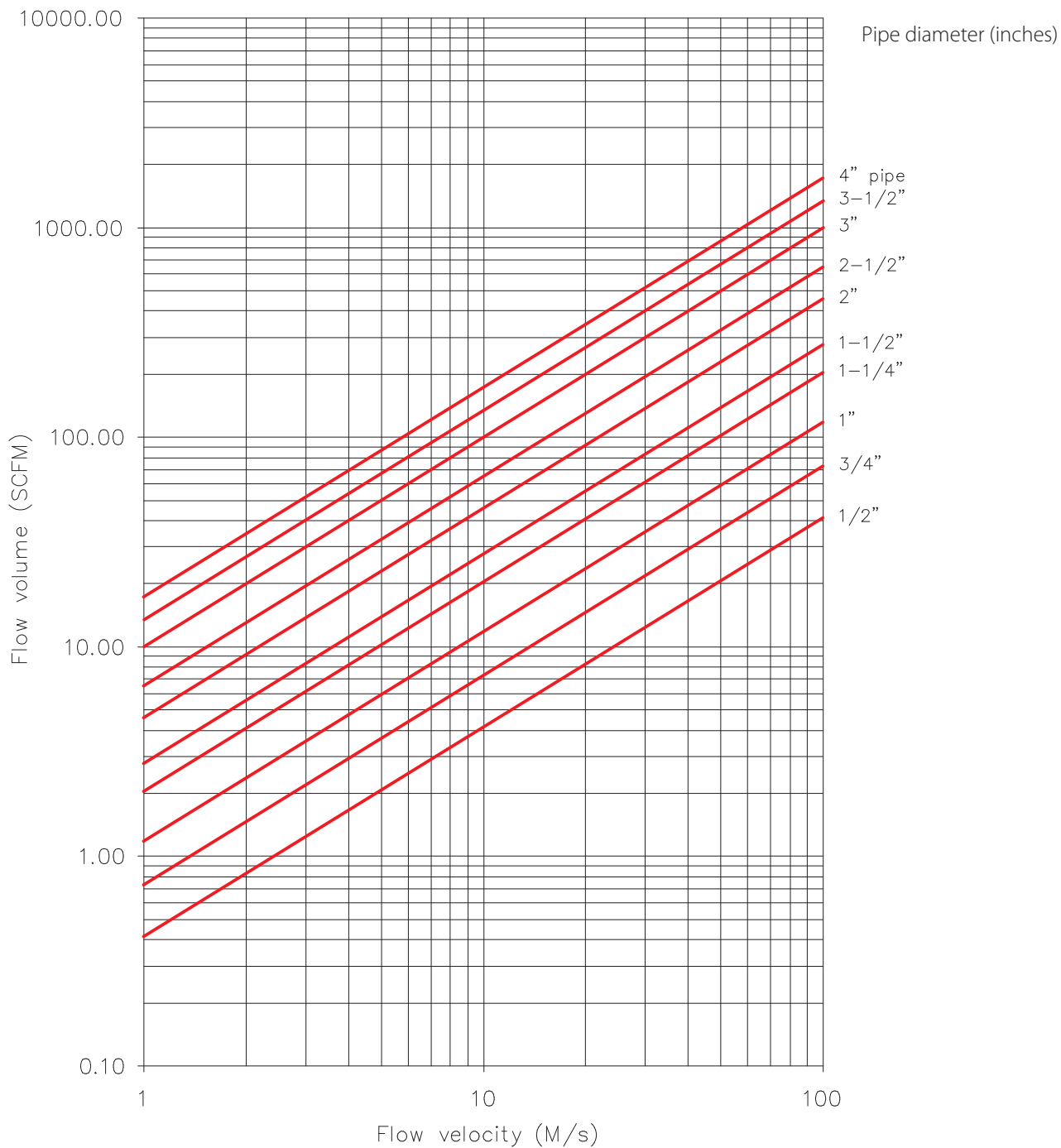
Flow Conversions:

$$\text{SCFM} = 1.0737 \times \text{ID}^2 \times \text{FSM}$$

SCFM = Standard cubic feet per minute

ID = Inner pipe diameter in inches

FSM = Flow speed in m/s (meters/second)



FLOW