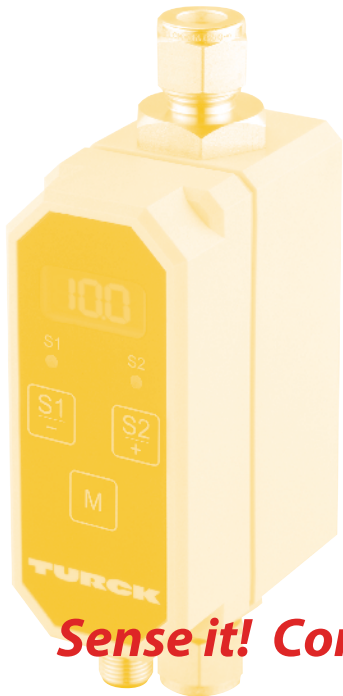


TURCK

Industrial Automation

FLOW SENSORS



Sense it! Connect it! Bus it! Solve it!

Flow sensors – The full range

Flow or flow rate monitoring of liquid and gaseous media plays an important role in the field of factory and process automation. There are multiple application possibilities for flow sensors but they mainly fulfill monitoring tasks in cooling circuits, exhaust ducts and

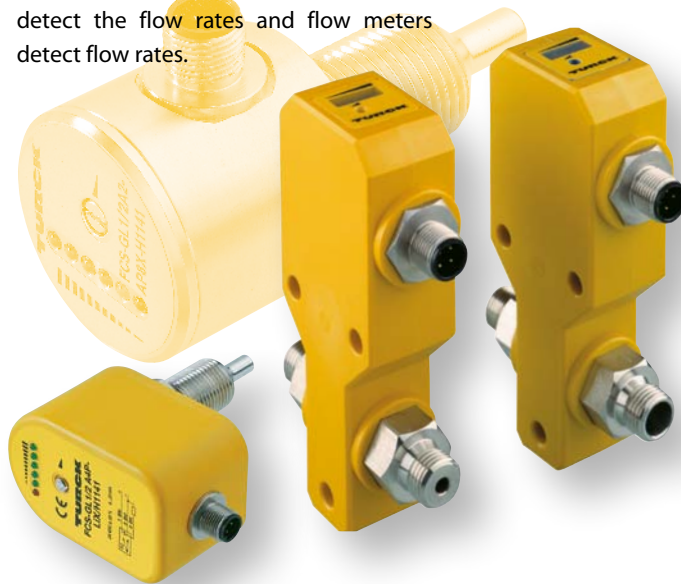
air-conditioning systems. In order to detect, display and signal critical changes of flow rates or flows to the control system, electronic flow sensors are increasingly applied. Whereby flow sensors detect the flow rates and flow meters detect flow rates.

Flow sensors

The detection of flow rates does not require exact and costly measuring but rather a reliable monitoring of limit values. Flow sensors thus have to provide a high degree of reproducibility. They detect not only limit values of flow rates but also the flow drift, meaning the increase or decrease of flow rate. Regarding the flow, the output signal is either analog or binary, depending on whether continuous measurement is required or the monitoring of a limit value.

Flow meters

Many processes require a steady flow rate of media in order to guarantee smooth operation and to maintain the quality level of production output. Therefore the measuring of flow rates not only requires a high degree of reproducibility but also accuracy. The current flow rate is shown on the display of the flow meter and a corresponding signal is given out. The output signal can either be analog or binary, depending on whether continuous measurement is required or the monitoring of a limit value.



Flow meter for liquid

FTCI series: Thermal inline flow meter

- Ideal for small nominal pipe diameters up to DN20, suited for small and middle flow rates of water and water/glycol mix
- No disturbing built-in components, free pipe cross section, no pressure loss
- Short response time within seconds
- Adjustable range between 1 l/min and 40 l/min
- Measuring tolerance $\leq 10\%$ of full scale
- Two transistor outputs or transistor and current output

FCVI series: Vortex flow meter

- Ideal for small nominal pipe diameters up to DN10, suited for small and middle flow rates of water



Flow sensors for liquid media

Compact devices for liquid media

- Sensors with integrated signal processor
- Sensor and signal processing unit incorporated in one housing, local adjustment and display
- Adjustment via potentiometer, easy handling
- Transistor, relay or current output
- Chemical resistant sensor materials: Hastelloy, titan, ceramics, plastic
- FCS series: Insertion principle
 - Suited for all nominal pipe diameters from DN20
 - Pressure resistance up to 100 bar
 - Adjustable range between 1 cm/s and 300 cm/s

- FCI series: Inline principle
 - Ideal for small nominal pipe diameters up to DN20,
 - Suited for small and middle flow rates,
 - No disturbing built-in components, free pipe cross section, no pressure loss
 - Short response time within seconds
 - Adjustable range between 1 ml/min and 30 l/min

Remote sensors for liquid media

- Sensor and signal processing unit as individual units
- Small housing styles and minimal space requirements

- Adjustment and display at the signal processor in the cabinet
- Adjustment via potentiometer, easy handling
- High degree of protection IP68, maximum mounting freedom
- Transistor, relay or current output
- Chemical resistant sensor materials: Hastelloy, titan, ceramics, plastic
- FCS series: Insertion principle
 - Suited for all nominal pipe diameters from DN20
 - Different immersion lengths
 - High-pressure version up to 500 bar
 - High temperature version up to 120 °C
 - Adjustable range between 1 cm/s and 300 cm/s

Monitoring flow rates and limit values

Flow sensors for liquid media

- Short response time within seconds
- Adjustable range between 2 l/min and 20 l/min
- Measuring tolerance $\leq 4\%$ of full scale
- Transistor and current output

FCMI series: Magnetic-inductive flow meter

- Ideal for small nominal pipe diameters up to DN15, suited for small and middle flow rates of electrical conductive media $\leq 20 \mu\text{S}/\text{cm}$
- No disturbing built-in components, free pipe cross section, no pressure loss
- Short response time within seconds
- Adjustable range between 1 l/min and 80 l/min
- Measuring tolerance $\leq 2\%$ of full scale
- Transistor and current output



Intrinsically safe sensors for liquid media

Intrinsically safe sensors for liquid media

- Sensor and signal processing unit are individual units
- Small housing styles and minimal space requirements
- Sensors for zone 0 and 1 available, mounting in explosion hazardous area
- Adjustment and display at the signal processor in the cabinet
- Adjustment via potentiometer, easy handling
- High degree of protection IP68
- Relay output
- Chemical resistant sensor materials: Hastelloy, titan, ceramics, plastic



Flow sensors for gaseous media

- FCI series: Inline principle
 - Ideal for small nominal pipe diameters up to DN10, suited for small flow rates
 - No disturbing built-in components, free pipe cross section, no pressure loss
 - Short response time within second
 - Adjustable range between 5 ml/min and 6 l/min



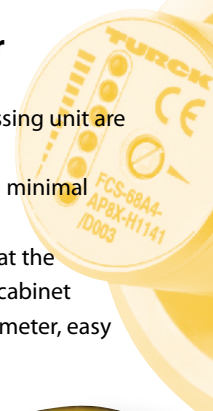
Compact devices for gaseous media

- Sensor and signal processing unit incorporated in on housing, local adjustment and display
- Easy adjustment via potentiometer
- Transistor, relay or current output
- FCS series: Insertion principle
 - Suited for all nominal pipe diameters from DN20
 - Pressure resistance up to 30 bar
 - Adjustable range between 0.5 m/s and 30 m/s
- FCI series: Inline principle
 - Ideal for small nominal pipe diameters up to DN10 therefore suited for small flow rates

- No disturbing built-in components, free pipe cross section, no pressure loss
- Short response time within seconds
- Adjustable range between 0.5 m/s and 40 m/s

Remote sensors for gaseous media

- Sensor and signal processing unit are individual units
- Small housing styles and minimal space requirements
- Adjustment and display at the processor in the control cabinet
- Adjustment via potentiometer, easy handling



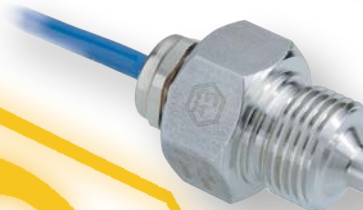
Precise Detection of flow rates

Sensors for the explosion hazardous area

- FCS series: Insertion principle
 - Suited for all nominal pipe diameters from DN20
 - Different immersion lengths
 - High-pressure version up to 500 bar (only for mounting in zone 1)
 - High-temperature version up to 120 °C (only for mounting in zone 1)
 - Adjustable range between 1 cm/s and 200 cm/s
- FCI series: Inline principle
 - Ideal for smaller nominal pipe diameters up to DN10, suited for smaller flow rates
 - Short response time within seconds
 - No disturbing built-in components, free pipe cross section, no pressure loss
 - Adjustable range between 10 ml/min and 1.8 l/min

Intrinsically safe sensors for gaseous media

- Sensor and signal processing unit are individual units
- Small housing styles and minimal space requirements
- Sensors for zone 0 and 1 available, mounting in explosion hazardous area
- Adjustment and display at the signal processor
- Adjustment via potentiometer, easy handling
- High degree of protection IP68, maximum mounting freedom
- Relay output
- FCS series: Insertion principle
 - Suited for all nominal pipe diameters from DN20
 - High-temperature version up to 120 °C
 - Adjustable range between 2 m/s and 20 m/s



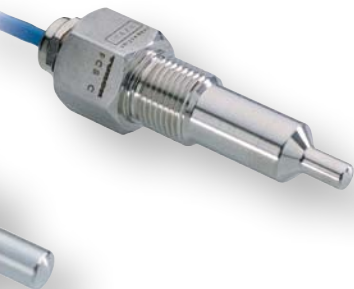
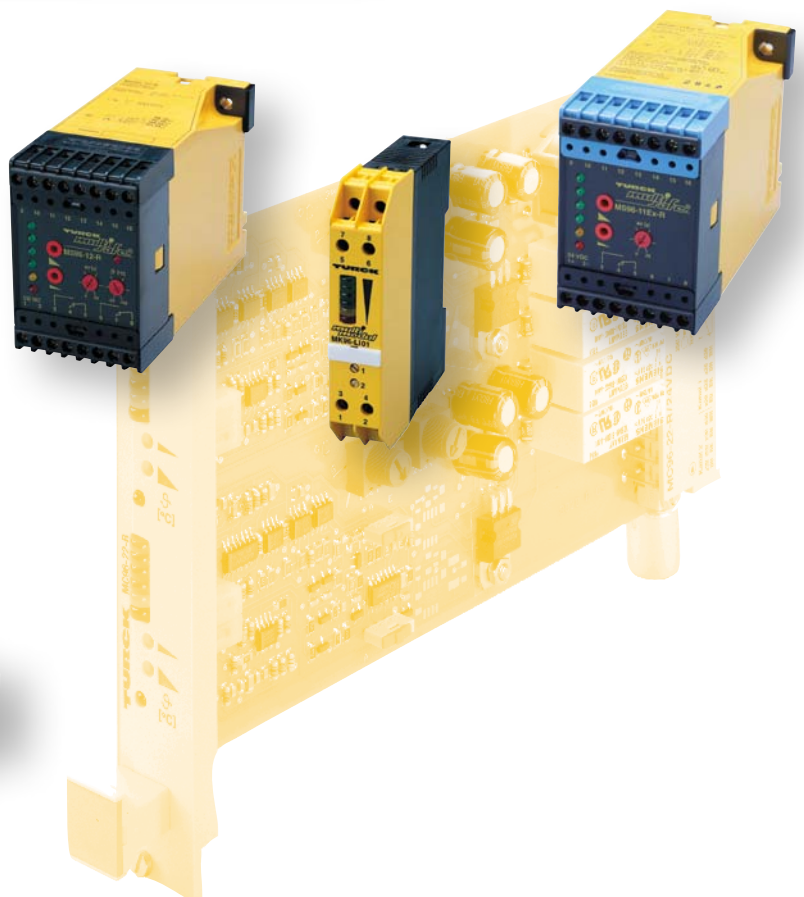
- High degree of protection IP68, maximum mounting freedom
- Transistor, relay or current output
- FCS series: Insertion principle
 - Suited for all nominal pipe diameters from DN20
 - High-temperature version up to 120 °C
 - Adjustable range between 0.5 m/s and 30 m/s



Signal processing

Signal processing unit to connect remote insertion and inline sensors

- Sensor and signal processing unit are individual units
- Small housing styles and minimal space requirements
- Adjustment and display at the signal processor in the control cabinet
- Adjustment via potentiometer, easy handling
- Three different versions are available: MS96/MK96/MC96
- Transistor, relay or current output
- Also for connection of sensors in zone 0 and 1



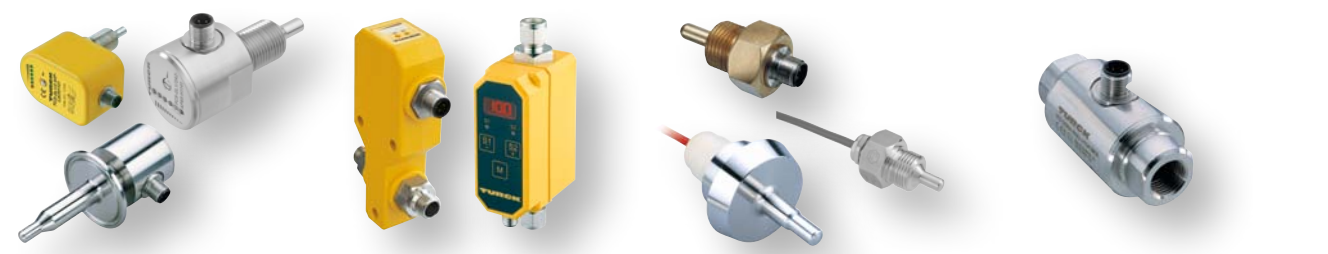
Flow/Flow rate/Selection guide

Self contained devices

Insertion devices
(pipe diameters from DN20)

Inline devices
(pipe diameters up to DN20)

Sensors for liquid media



Sensors for gaseous media



How to find the right sensor?

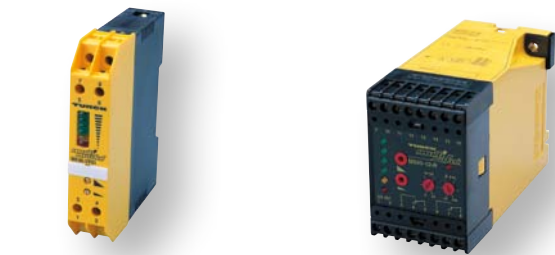
In order to find the right sensor, please consider your application requirements. Do you need a sensor for liquids, gases or the explosion hazardous area? Subsequently it is important to know if: A self contained device with integrated processing electronics is required (advantage: local signal processing and display in one device) or a remote sensor combined with a signal processing unit (advantage: small housing style, ideal for mounting in confined spaces)? Only EX-remote sensors with separately connected signal processing unit can be mounted in explosion hazardous areas. It is thus important to know the class of Ex-zone where the sensor has to be applied because sensor versions for liquid and gaseous media are also available for explosion hazardous areas.

Remote sensors

Insertion sensors
(pipe diameters from DN20)

Inline sensors
(pipe diameters up to DN20)

Signal processing units



Sensors for the Ex area: Zone 0 and 1



Ex-signal processing units



Overview - Device types

FCS – GL1/2A4P – AP8X – H1141 / L080 / D024

Series/Functional principle

FCS	insertion flow sensor
FCI	inline flow sensor
FTCS	insertion flow sensor with temperature monitoring
FTCI	thermal flow meter
FCMI	magnetic-inductive flow meter
FCVI	vortex flow meter

Mechanical connection

G1/4	thread G1/4"
G1/2	thread G1/2"
G3/4	thread G3/4"
GL1/2	thread G1/2" long
GL3/4	thread G3/4" long
N1/4	thread 1/4" NPT
N1/2	thread 1/2" NPT
N3/4	thread 3/4" NPT tube connection Ø 4 mm
D03	(FCI with barrel-Ø 3.6 mm)
D04	thread G1/4" (FCI with barrel-Ø 4 mm)
D06	female thread G1/4" (FCI with barrel-Ø 6 mm)
D10	thread G1/4" (FCI with barrel-Ø 9 mm)
D15	thread G1/2" (FCI with barrel-Ø 15 mm)
D20	thread G3/4" (FCI with barrel-Ø 19 mm)
TCD04	tube connection Ø 4 mm (FCI with barrel-Ø 3.6 mm)
34D10	Tri-Clamp, Ø 34 mm (FCI with barrel-Ø 10 mm)
10D08	compression ferrule fitting for smooth barrel; external Ø 10 mm
10D09	compression ferrule fitting for smooth barrel; external Ø 10 mm
10D10	compression ferrule fitting for smooth barrel; external Ø 10 mm
15D15	compression ferrule fitting for smooth barrel; external Ø 15 mm
18D15	compression ferrule fitting for smooth barrel; external Ø 18 mm
H	with coupling nut; female thread G1/2" or G1"
DN25	flange DN25/PN40 or Tri-Clamp DN25
DN50	flange DN50/PN40 or Tri-Clamp DN50
50	Tri-Clamp, Ø 50.5 mm
68	Varivent, Ø 68 mm
K20	smooth barrel Ø 20 mm (PBT-GF30)
M18	threaded barrel M18 x 1 (chrome-plated brass)

Sensor-/Housing material

A2	stainless steel A2 (1.4305)
A4	stainless steel A4 (1.4404 oder 1.4571)
HB2	Hastelloy B2 (2.4617)
HC4	Hastelloy C4 (2.4610)
HC22	Hastelloy C22 (2.4603)
TN	titanium alloy (3.7235)
T	teflon
DY	Dyflor
CT	ceramics/teflon
P	plastic housing

Electrical versions

AP8X	NO, pnp output
AN8X	NO, npn output
RP8X	NC, pnp output
2AP8X	2 x NO, pnp output
ARX	NO, relay output
VRX	change-over, relay output
LIX	analog output, current
LUX	analog output, voltage
2UP8X	2 x NO/NC prog., pnp output
LIUP8X	NO/NC prog., pnp output and analog output, current
NA	sensor without integrated signal processing unit (signal processing units MS96/MK96/MC96)
NAEX	sensor for Ex-zone 1 without integrated signal processing unit (signal processing unit MS96/MC96)
NAEX0	sensor for Ex-zone 0 without integrated signal processing unit (signal processing unit MS96/MC96)

Electrical connections

H1141	M12 x 1, standard pin configuration
H1140	M12 x 1, special pin configuration,
(no text)	2 m connection cable

Additional features

L065	insertion length 65 mm (incl. thread)
L080	insertion length 80 mm (incl. thread)
L115	insertion length 115 mm (incl. thread)
L120	insertion length 120 mm (incl. thread)
L200	insertion length 200 mm (incl. thread)
M12	process connection female thread M12 x 1.5
M16	process connection female thread M16 x 1.5
D003	process connection Varivent
D014	process connection Tri-Clamp
D024	material test certificate 3.1b
D037	analog output nonlinear
D041	sensor glued to mounting block
D090	high- temperature version up to 100 °C
D100	high- temperature version up to 120 °C
D500	high-pressure version up to 500 bar
24VDC	supply voltage 24 V
230VAC	supply voltage 230 V
A	air-flow sensor (gaseous media)

Special cable lengths

5M	5 m connection cable
10M	10 m connection cable

Type code – Example
FCS-GL1/2A4P-AP8X-H1141/L080/D024:

Insertion-flow sensor – thread G1/2" long, plastic housing, stainless steel sensor A4 – compatible with signal processing unit: NO, pnp output – M12 x 1 connector/insertion length 80 mm (incl. thread) / with material test certificate 3.1b

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