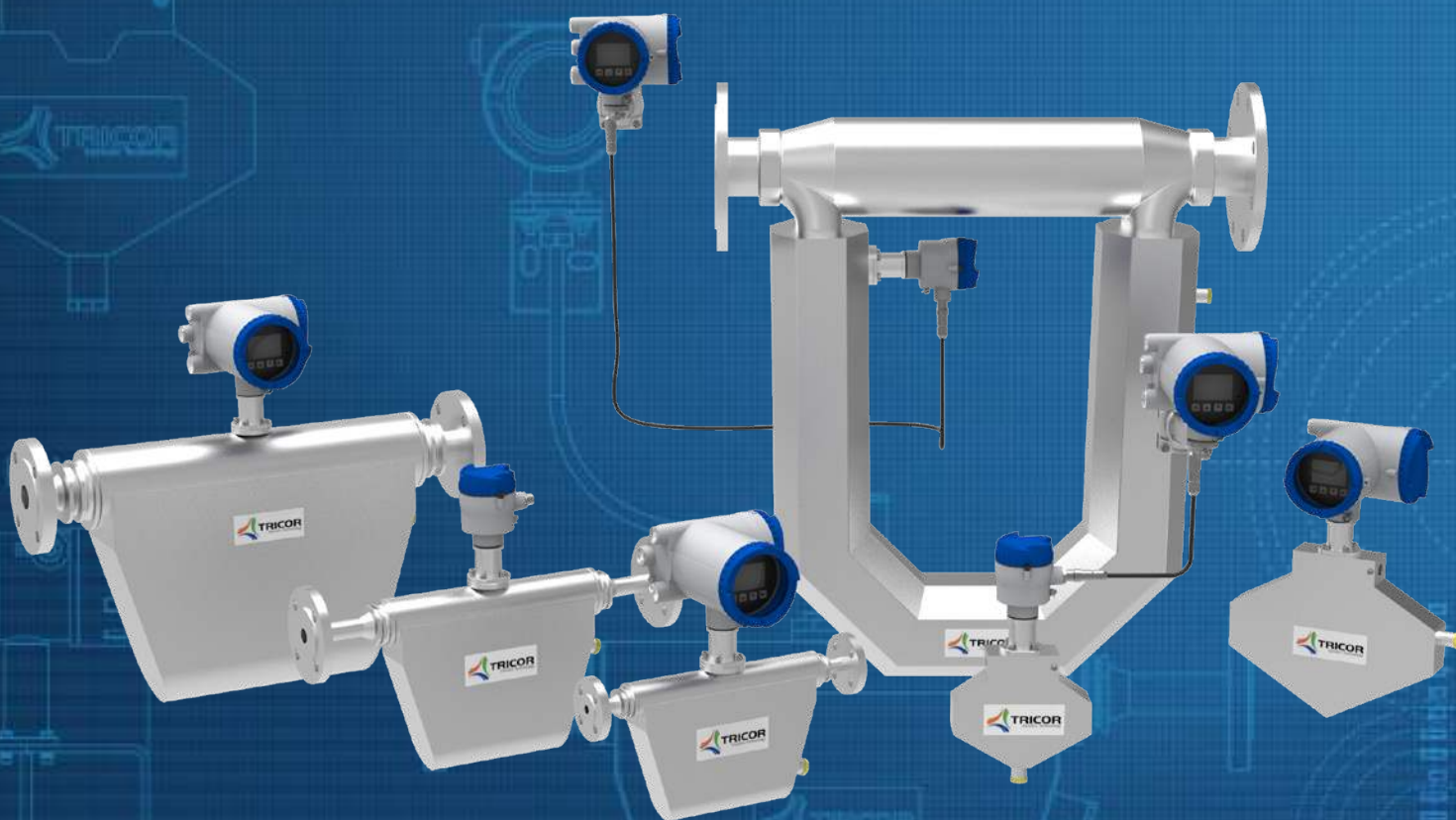




AW-LAKE
PROCESS FLOW MEASUREMENT



TRICOR CORIOLIS MASS FLOW METERS | PRO SERIES

www.tricorflow.com | sales@aw-lake.com | 414.574.4300

ABOUT

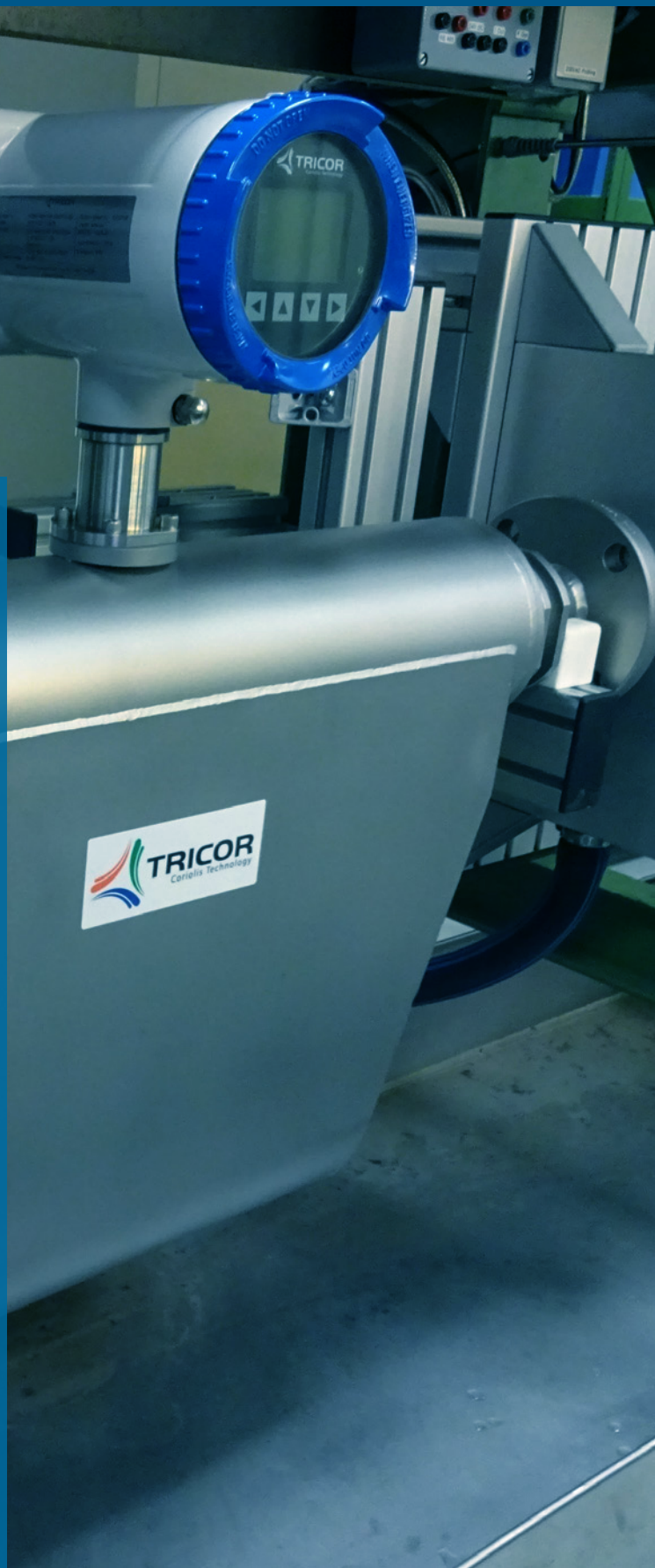
The TRICOR PRO Coriolis mass flow meter is a high performance, environmentally hardened meter designed for robustness in oil and gas and outdoor industrial applications.

FEATURES

- > Digital Signal Processing:
 - Fast response to rapid flow changes, 100 Hz update rate with $\leq 10\text{ms}$ response
 - High robustness to process vibration and noise
 - Advanced diagnostics
- > Ease of Use:
 - On-board SD Card logging, document storage, and traceability functions
 - Modular universal 4-channel IO configuration
 - Modern customizable displays, 6 views and trend curves
 - Adaptive pump filtering
 - Trouble-shooting wizard
- > Fraction concentration reporting of two-part mixtures (16 built-in fractionation tables, expandable to custom fluids)
- > Secure with user access control management
- > Single multi-voltage power supply

ADDITIONAL OPTIONS

- > Multiple protocols supported - choose from: Modbus, HART®, Profibus DP, Profibus PA
- > Direct meter mount and remote mount options
- > Calibration maintenance services



TRICOR FLOW SENSORS | PRO SERIES

TRICOR's Diamond Shape Coriolis Mass Flow Meters range in flow rate from 325 to 3100 kg/hr (12-114 lb/min) and withstand pressures up to 2900 psi (200 bar). The mechanical advantages of this diamond shape (D-shape) tube design include the best signal-to-noise ratio and reduced effects of external vibrations, thus improving zero stability.

TRICOR's U-Shape Coriolis Mass Flow Meters range in flow rate from 5500 to 65,000 kg/hr (202-8450 lb/min) and withstand pressures up to 1450 psi (100 bar) with the exception of the TCM 5500, which is rated up to 5,000 psi (345 bar). These meters have good overall accuracy, zero stability, and pressure drop. The simple self-draining U-shape tube design provides for easy cleaning/flushing.



TCMP 0325

Mass Flow Rate (max): 12 lb/min, 325 kg/h
Volumetric Flow Rate (max): 1.43 gpm, 325 l/h, 49 bbl/d
Standard Pressure Rating: up to 2900 psi, 200 bar
Nominal Meter Size: 1/8", DN4

TCMP 0650

Mass Flow Rate (max): 24 lb/min, 650 kg/h
Volumetric Flow Rate (max): 2.86 gpm, 650 l/h, 98 bbl/d
Standard Pressure Rating: up to 2900 psi, 200 bar
Nominal Meter Size: 1/8", DN4

TCMP 1550

Mass Flow Rate (max): 57 lb/min, 1550 kg/h
Volumetric Flow Rate (max): 6.82 gpm, 1550 l/h, 234 bbl/d
Standard Pressure Rating: up to 2900 psi, 200 bar
Nominal Meter Size: 1/4", DN6

TCMP 3100

Mass Flow Rate (max): 114 lb/min, 3100 kg/h
Volumetric Flow Rate (max): 13.65 gpm, 3100 l/h, 468 bbl/d
Standard Pressure Rating: up to 2900 psi, 200 bar
Nominal Meter Size: 1/4", DN6



TCMP 5500

Mass Flow Rate (max): 202 lb/min, 5500 kg/h
Volumetric Flow Rate (max): 24.22 gpm, 5500 l/h, 830 bbl/d
Maximum Pressure Rating: up to 5000 psi, 345 bar
Nominal Meter Size: 1/2", DN15

TCMP 7900

Mass Flow Rate (max): 290 lb/min, 7900 kg/h
Volumetric Flow Rate (max): 34.78 gpm, 7900 l/h, 1193 bbl/d
Standard Pressure Rating: up to 1450 psi, 100 bar
Nominal Meter Size: 1/2", DN15

TCMP 028K

Mass Flow Rate (max): 1029 lb/min, 28,000 kg/h
Volumetric Flow Rate (max): 123.3 gpm, 28,000 l/h, 4227 bbl/d
Standard Pressure Rating: up to 1450 psi, 100 bar
Nominal Meter Size: 1", DN25

TCMP 065K

Mass Flow Rate (max): 2388 lb/min, 65,000 kg/h
Volumetric Flow Rate (max): 286.2 gpm, 65,000 l/h, 9812 bbl/d
Standard Pressure Rating: up to 1450 psi, 100 bar
Nominal Meter Size: 2", DN50

TCMP 230K

Mass Flow Rate (max): 8450 lb/min, 230,000 kg/h
Volumetric Flow Rate (max): 1012 gpm, 230,000 l/h, 34,700 bbl/d
Standard Pressure Rating: up to 1450 psi, 100 bar
Nominal Meter Size: 3", DN80



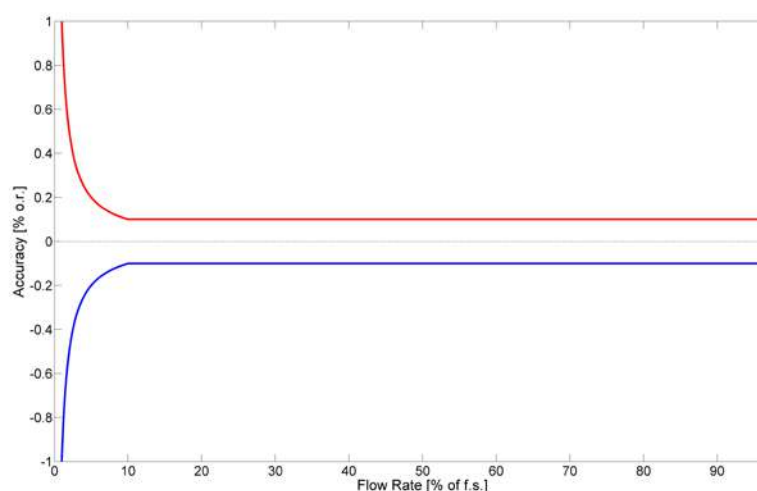
► TECHNICAL DATA FOR LIQUIDS

FLOW RATE FOR LIQUIDS

Model Number	Max. Flow Rate (water) (Lbs/Min) (Kg/Hr)		Basic Mass Flow Accuracy (% of flow rate)	Zero Stability (% of full scale)	Repeatability (% of flow rate)
TCM 0325	12	325	±0.1	±0.01	±0.05
TCM 0650	24	650			
TCM 1550	57	1550			
TCM 3100	114	3100			
TCM 5500	202	5500			
TCM 7900	290	7900			
TCM 028K	1029	28,000			
TCM 065K	2388	65,000			
TCM 230K	8450	230,000			

Density Measuring Range	Density Accuracy	Density Repeatability
0 - 2500 kg/m ³ , 2.5 g/cm ³ (higher ranges on request)	±1.0 kg/m ³ , ±0.001 g/cm ³ (special calibration on request)	±0.5 kg/m ³ , ±0.0005 g/cm ³

► ACCURACY FOR LIQUIDS



Flow Rate of Full Scale	Accuracy
>10%	± Base Accuracy
<10%	$\pm \frac{\text{Zero Point}}{\text{Measured Value}} * 100$

Notes: Calibration for Liquids and Gases:

The TRICOR flowmeters are always factory calibrated with water.

Calibration Conditions: Water: 68°F ... 77°F (20°C ... 25°C), ambient temperature: 68°F ... 77°F (20°C ... 25°C)

All specifications are based on above mentioned calibration reference conditions, a flow calibration protocol is attached to each instrument.

Stated accuracy combines the effects of repeatability, linearity and hysteresis.

Typical flow dynamics based on max. flow rate is 100:1.

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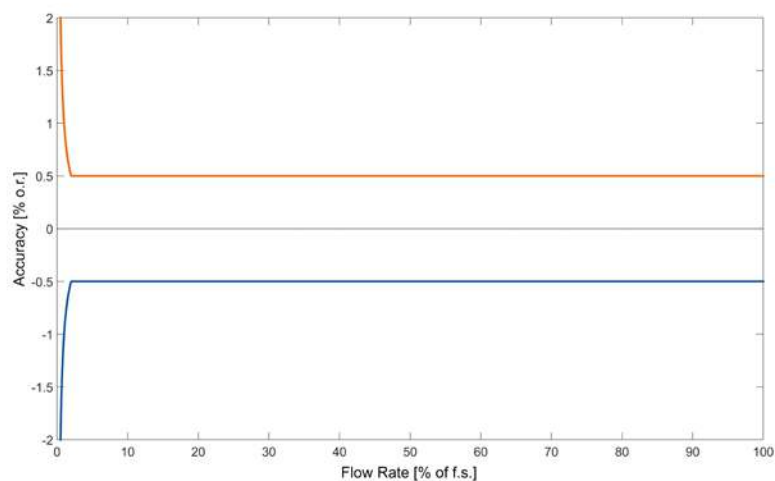
► TECHNICAL DATA FOR GASES

FLOW RATE FOR GASES

Model Number	Normal Flow Rate				Zero Stability in	Basic Accuracy	Repeatability
	(lbs/min) ^{1,3}	(kg/h) ^{1,3}	(SCFM) ^{1,2}	(nm ³ /h) ^{1,2}	lb/min (kg/h)	(% of flow rate)	(% of flow rate)
TCM 0325	3	78	109	64	0.0012 (0.0325)	±0.5	±0.25
TCM 0650	7	177	247	146	0.0024 (0.065)		
TCM 1550	12	333	464	273	0.0057 (0.155)		
TCM 3100	27	740	1031	607	0.0114 (0.31)		
TCM 5500	34	910	1268	747	0.020 (0.55)		
TCM 7900	53	1430	1993	1173	0.029 (0.79)		
TCM 028K	188	5100	7109	4184	0.103 (2.8)		
TCM 065K	575	15,650	21,813	12,838	0.029 (6.5)		
TCM 230K	1797	48,900	68,157	40,115	0.845 (23)		

Density Measuring Range	Density Accuracy	Density Repeatability
See comment ³⁾	±2.0 kg/m ³ , ±0.002 g/cm ³ (special calibration on request)	±1 kg/m ³ , ±0.001 g/cm ³

► ACCURACY FOR GASES



Flow Rate of Full Scale	Accuracy
>10%	± Base Accuracy
<10%	$\pm \frac{\text{Zero Point}}{\text{Measured Value}} * 100$

Notes: Max. allowed flow velocity (Ma 0.5)

For gas applications, flow rate and pressure drop for individual sensor sizes are dependent on operating temperature, pressure and fluid composition. Therefore, when selecting a sensor for any particular gas application, please use the TSP (TRICOR Sizing Program) or contact us.

¹⁾ Nominal flow rates that produce approximately 3 bar (43 psi) pressure drop for natural gas at 50 bar (725 psi) operational pressure.

²⁾ Normal reference conditions (Nm³/h) are 1.013 bar and 0°C. Standard (SCFM) reference conditions are 14.7 psi and 60°F.

³⁾ Flow rate and density range depend on the gas density and the pressure range.



► TECHNICAL SPECIFICATIONS

GENERAL

Model Number	Nominal Meter Size (in) (DN)		Internal Tube Diameter (in) (mm)		Tube Arrangement
TCM 0325	1/8"	DN4	0.157"	4 mm*	2 serial
TCM 0650	1/8"	DN4	0.157"	4 mm	2 parallel
TCM 1550	1/4"	DN6	0.315"	8 mm*	2 serial
TCM 3100	1/4"	DN6	0.315"	8 mm	2 parallel
TCM 5500	1/2"	DN15	0.276"	7 mm	2 parallel
TCM 7900	1/2"	DN15	0.354"	9 mm	2 parallel
TCM 028K	1"	DN25	0.630"	16 mm	2 parallel
TCM 065K	2"	DN50	1.1"	28 mm	2 parallel
TCM 230K	3"	DN80	1.693"	43 mm	2 parallel

*Double loop design.

TEMPERATURE

Temperature Repeatability	±0.36°F (±0.2°C)
Temperature Accuracy	±1.8°F ±0.5 % of reading (±1°C ±0.5 % of reading)
Process Temperature (Non Ex)	40°F ... +212°F (-40°C ... +100°C) (standard) -40°F ... +302°F (-40°C ... +150°C) (optional) -76°F ... +392°F (-60°C ... +200°C) (optional)
Process Temperature (Ex)	meter mount -40°F ... +158°F (-40°C ... +70°C) (T4) (n/a for the TCM 230K) remote version -40°F ... +158°F (-40°C ... +70°C) (T4) -40°F ... +275°F (-40°C ... +135°C) (T3) -76°F ... +392°F (-60°C ... +200°C) (T2)
Ambient Temperature	-40°F ... +158°F (-40°C ... +70°C)
Storage Temperature	-40°F ... +212°F (-40°C ... +100°C)



Direct Meter Mount
(TCD 9100)



Wall Mount (TCD 9200)

TCD 9100/9200 TRANSMITTER

The TCD 9000 Series Mass Flow Transmitters are equipped with Digital Signal Processing, allowing for fast response, resistance to process vibration/noise, and advanced diagnostics. These transmitters provide a modular Universal I/O configuration with up to 4 fully configurable channels as well as onboard SD card for logging, document storage and traceability functions. The modern, customizable display offers 6 views and trend curves for optimal process monitoring.

Programmable Output Values:

Mass flow, volume flow, total mass, total volume, corrected volume, density, temperature, fraction

Supply Voltage: 20...27 VDC, $\pm 10\%$ or 100...240 VDC, $\pm 10\%$

Interfaces & IO:

- **Ch1:** RS485 (MODBUS-RTU) is standard, or choice of HART®, Profibus PA, Profibus DP, and 4...20mA
- **Ch2-Ch4:** User-configurable, modular IO cards offer:
 - > Current output (0...20 mA or 4...20mA)
 - > Digital output (pulse, frequency, active)
 - > Digital input (15 ... 30 VDC, 2 ... 15mA)
- **Relay:** Voltage free contact, 30 VAC, 100mA
- **Wireless Option:** SignalFire wireless mesh network (external connection to Modbus or 4...20 mA)

Protection Class: IP67/NEMA 4X

Hazardous Area Approvals:

- cCSAus – Class 1, Div. 1, Groups A, B, C, D or C, D, T2...T4
- ATEX – Zone 1: Group IIC or IIB, T2...T6; Zone 2: II 3G Ex nA IIC T2...T4 Gc
- IECEx – Zone 1: Group IIC or IIB, T2...T4

Graphic Display: 240x160px, 6 programmable views



TCD 9010 TRANSMITTER

The TCD 9010 electronic transmitter is a direct meter mount solution that is perfect for space constrained applications (such as Marine). This offering is a highly robust minimal footprint supporting Modbus only interface without display and without modular I/O options.

Supply Voltage: 12 ... 27 VDC

Power Consumption: 1.1 W

Interface: Modbus RTU

Cable Gland: 1/2" NPT (M20 on request)

Housing Material: Aluminum

Hazardous Area Approvals:

- cCSAus – Class 1, Div. 1, Groups A, B, C, D or C, D, T2...T4
- ATEX – Zone 1: Group IIC or IIB, T2...T4; Zone 2: II 3G Ex nA IIC T2...T4 Gc
- IECEx – Zone 1: Group IIC or IIB, T2...T4

AW-Lake

2440 W. Corporate Preserve Dr. #600
Oak Creek, WI 53134 USA
414.574.4300
www.aw-lake.com

KEM Küppers Elektromechanik

GmbH Liebigstraße 5
85757 Karlsfeld, Germany
+49 (0)8131 59391-0
www.kem-kueppers.com

TASI Flow China

Rm. 2429 Jin Yuan
Office Building, No. 36
CN - BeiYuan Road, Beijing 100012
+86 10 520 037 38

