

TRICOR Series TCM Coriolis Mass Flow Meters

Technical Datasheet



TRICOR - Coriolis Mass Flow Meters

Description

The TRICOR Coriolis mass flow meter from TASI Flow is the workhorse of process operations: performing multiple measurements simultaneously with customizable process parameters and multiple communication languages. TRICOR mechanically balances every meter, assuring the dual tubes are dynamically aligned and in perfect balance before flow begins. The unique design and cutting edge manufacturing procedures ensure a meter with the highest resistance to external influences.

Features

- All-in-one instrument: direct measurement of mass flow, density and temperature, calculated measurement of volumetric flow
- No moving parts: low maintenance, no need for re-calibration
- Easy to install: no straight run of pipe required and multiple mounting options available
- Mechanically balanced tubes and superior mechanical design for best-in-class density measurement
- Exceptional mechanical design resists external interference
- API gravity reading in software
- Exceptional ease of use and fast setup time: we will pre-program your process parameters and reporting preferences
- Frequency output up to 10,000 Hz resolution
- Superior meter calibration: DAkkS-Accreditation as per DIN EN ISO/IEC 17025:2005
- Easily accessible, integrated meter diagnostics to verify meter health & performance
- Hazardous area certifications: ATEX, IECEx, CSA
- Customized process connections available

Additional Options

- Net Oil software
- High pressure designs available up to 345 bar/5000 PSI
- Special calibrations for an oil viscosity up to 100 mm²/s
- Integrated pressure compensation
- Customizable installation length
- Extended warranty and startup program



Product Overview

Compact version



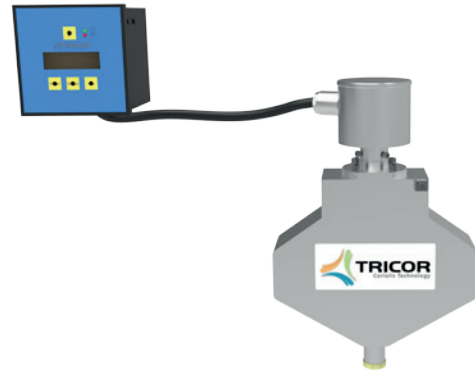
Compact version



Exd housing: Wall mounted (remote version)



Housing: Panel mounted (remote version)



Version with TCE 6000 and TRD 8001



Remote Display TRD 8001



TRICOR - Coriolis Mass Flow Meters

Technical Data - TCM Transducer

	TCM 0325	TCM 0650	TCM 1550	TCM 3100	TCM 5500	TCM 7900	TCM 028K	TCM 065K	TCM 230K	
Max. Flow Rate (kg/h)	325	650	1550	3100	5500	7900	28000	65000	230000	
Max. Flow Rate (lb/min)	11	22	55	110	200	290	1030	2390	8400	
Basic Accuracy (0.1% o.r.)	±0.1									
Zero Stability (% f.s.)	±0.01									
Repeatability (% o.r.)	±0.05									
Density Measuring Range	0 - 2500 kg/m ³ , 2.5 g/cm ³ (higher ranges on request)									
Density Accuracy	±1.0 kg/m ³ , ±0.001 g/cm ³ (special calibration on request)									
Density Repeatability	±0.5 kg/m ³ , ±0.0005 g/cm ³									
Temperature Accuracy	±1 °C ±0.5 % of reading (±1.8 °F ±0.5 % of reading)									
Temperature Repeatability	±0.2 °C (±0.36 °F)									
Process and Ambient										
Process Connections	female thread 1/2" adaptors for flanges, diary and tri-clamp				flanges EN1092, ANSI B16.5, DIN2512, threaded tri-clamp					
Max. Pressure Standard (Option)	200 bar/2900 PSI (345 bar/5000 PSI)				100 bar/1450 PSI					
Pressure Drop at Max. Flow H ₂ O	for detail information please contact us									
Process Temperature (non Ex)	-40 °C ... +100 °C (-40 °F ... +212 °F) (standard) -40 °C ... +150 °C (-40 °F ... +302 °F) (optional) -60 °C ... +200 °C (-76 °F ... +392 °F) (optional)									
Process Temperature (Ex)	meter mount	-40 °C ... +70 °C (-40 °F ... +158 °F) (T4)							n/a	
	remote version	-40 °C ... +70 °C (-40 °F ... +158 °F) (T4) -40 °C ... +135 °C (-40 °F ... +275 °F) (T3) -60 °C ... +200 °C (-76 °F ... +292 °F) (T2)								
Ambient Temperature	-40 °C ... +70 °C (-40 °F ... +158 °F)									
Storage Temperature	-40 °C ... +100 °C (-40 °F ... +212 °F)									
Electr. Connections Remote	screw type terminals									
Electr. Connections Meter Mount	none (internally connected to the electronics)									
Ingress Protection	IP65 (IP66/IP67 on request)									
General										
Tube Arrangement	2 serial	2 parallel	2 serial	2 parallel	2 parallel	2 parallel	2 parallel	2 parallel	2 parallel	
Tube Inner Diameter	4 mm	4 mm	8 mm	8 mm	7 mm	9 mm	16 mm	28 mm	43 mm	
Tube Material	1.4404 / AISI 316L									
Housing Material	1.4404 / AISI 316L								1.4301 / AISI 304	
Dimensions	see drawings									

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

Technical Data - TCE 8000 Transmitter

General	
Display	graphic, 132 x 32 dot
Supply Voltage	24 V DC, $\pm 20\%$ or 90 ... 264 V (version dependent)
Programming	via front keyboard or Windows-based TRICOR configurator program (MODBUS)
Interface	RS 485 (MODBUS-RTU), Option HART®, other options on request
EMC	according to EN 61000-6-4 and 61000-6-2
Power Consumption	max. 6 W
ExD Housing: Wall-mounted	
Dimensions	see drawing
Electrical Connections	cage clamp terminals
Cable Glands	for 7-13 mm cables
Housing Material	aluminium diecast
Protection Class	IP65 (IP66/IP67 on request)
Weight	3.8 kg/8.3 lb with 3 m cable
Temperature	ambient: -40 °C up to +70 °C (-40 °F ... +158 °F) storage and transport: -40 °C up to +80 °C (-40 °F up to +176 °F)
Housing: Panel-mounted	
Dimensions	see drawing
Electrical Connections	cage clamp terminals
Housing Material	Noryl
Protection Class	front: IP50, rear: IP30
Weight	0.4 kg/0.88 lb
Temperature	ambient: 0 °C to +60 °C (32 °F to +140 °F) storage and transport: -20 °C up to +70 °C (-4 °F up to +158 °F)
Analog Output	
Current Outputs (2x)	4 ... 20 mA passive, two-wire, isolated
Resolution	14 bit
Linearity	$\pm 0.05\%$ of full scale
Temperature Drift	0.05 % per 10 K
Load	< 620 Ω (at 24 V supply)
Output Value	programmable: flow, total, density, temperature
Pulse Output	
Frequency Range	0.5 - 10000 Hz
Output Signal	active push pull output for flow rate
Status In- and Output	
Status Output	push pull programmable
Control Input	programmable
Analog Input (option)	
Input Type	4-20 mA active for two-wire passive pressure sensor
Resolution	12 bit
Linearity	$\pm 0.05\%$ of full scale
Temperature Drift	0.05 % per 10 K
Supply Voltage	> 20 V (at 20 mA sensor current)

Technical Data - TCE 6000 Transmitter

General	
Supply Voltage	24 V DC, $\pm 20\%$
Programming	via interface
Interface	RS485, USB (option)
EMC	according to EN 61000-6-4 and EN 61000-6-2
Power Consumption	max. 4 W
Connections	connectors M12
Housing Material	aluminium diecast
Temperature	ambient: $-40\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+158\text{ }^{\circ}\text{F}$) storage: $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+176\text{ }^{\circ}\text{F}$)
Protection Class	IP65
Analog Output	
Current Output	4 ... 20 mA active
Resolution	14 bit
Linearity	$\pm 0.05\%$
Temperature Drift	0.05 % per 10 K
Load	$< 800\ \Omega$
Output Value	programmable: flow, total, density, temperature
Pulse Output	
Frequency Range	0.5 - 10000 Hz
Output Signal	active push pull output for flow rate
Status In- and Output	
Status Output	push pull programmable (option)
Control Input	programmable (standard: 1 input/option: 2 inputs)

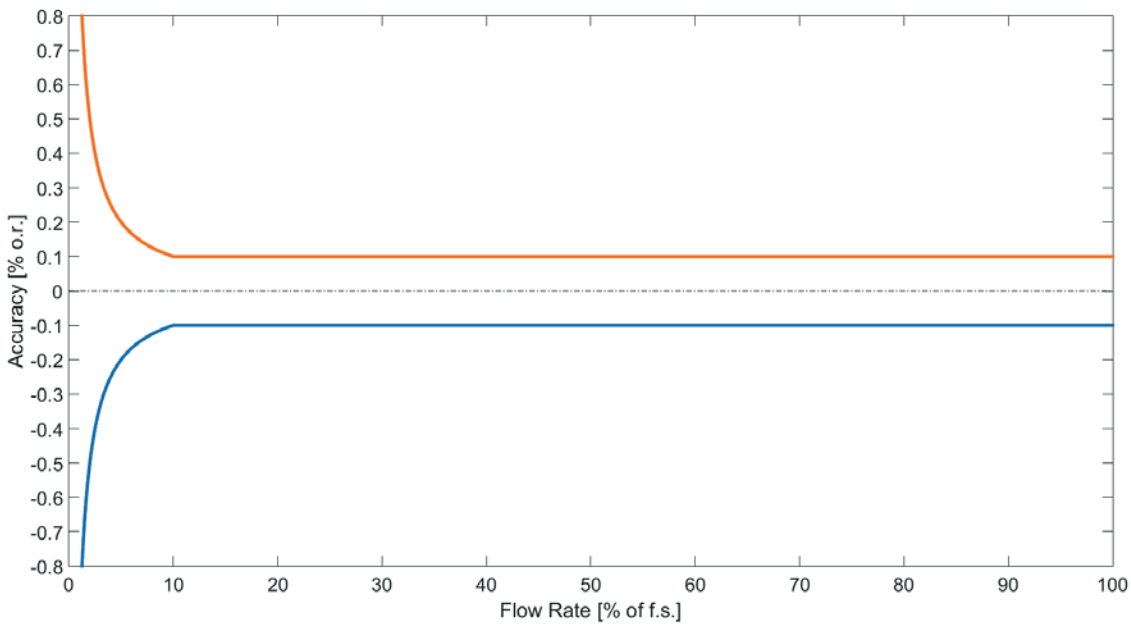
Technical Data - TRD 8001 Remote Display

Display	graphic, 132 x 32 dot
Supply Voltage	via interface
Programming	via front keyboard
Interface to TCE	RS 485
EMC	according to EN 61000-6-4 and 61000-6-2
Dimensions	90 x 120 x 50 mm (h x w x d)
Connections	connectors M12, B coded
Housing Material	ABS- FR (plastic, flame retardant)
Protection Class	IP64
Weight	0.4 kg/0.88 lb
Temperature	operation: $0\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ ($32\text{ }^{\circ}\text{F}$ to $+140\text{ }^{\circ}\text{F}$) storage and transport: $-20\text{ }^{\circ}\text{C}$ up to $+80\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ to $+176\text{ }^{\circ}\text{F}$)
Wall Mount	hidden screws

Ex Certifications

ATEX	Zone 1: Group IIC or IIB, T2...T4 Zone 2: II 3G Ex nA IIC T4 Gc
IECEX	Zone 1: Group IIC or IIB, T2...T4
cCSAus Ex	Class 1, Division 1: Group A, B, C, D or C, D, T2...T4 Class 1, Division 2: Group A, B, C, D or C, D, T2...T4
GOST (TR-TS)	Group IIC or IIB, T2 ... T4

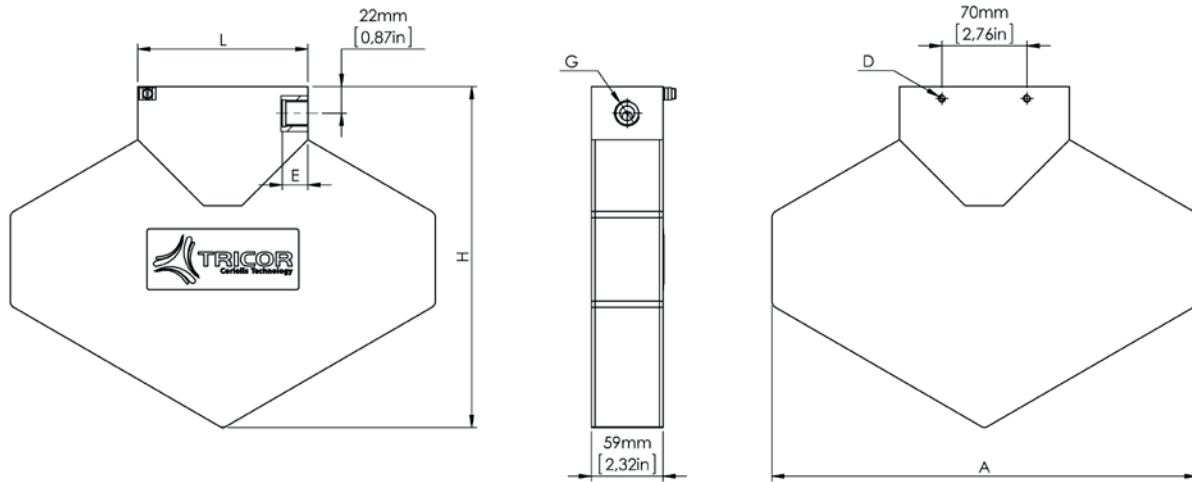
Accuracy



Flow Rate of full Scale	Accuracy
10 - 100 %	Base Accuracy
0 - 10 %	$\pm \frac{\text{Zero Stability}}{\text{Measured Value}} * 100 \%$

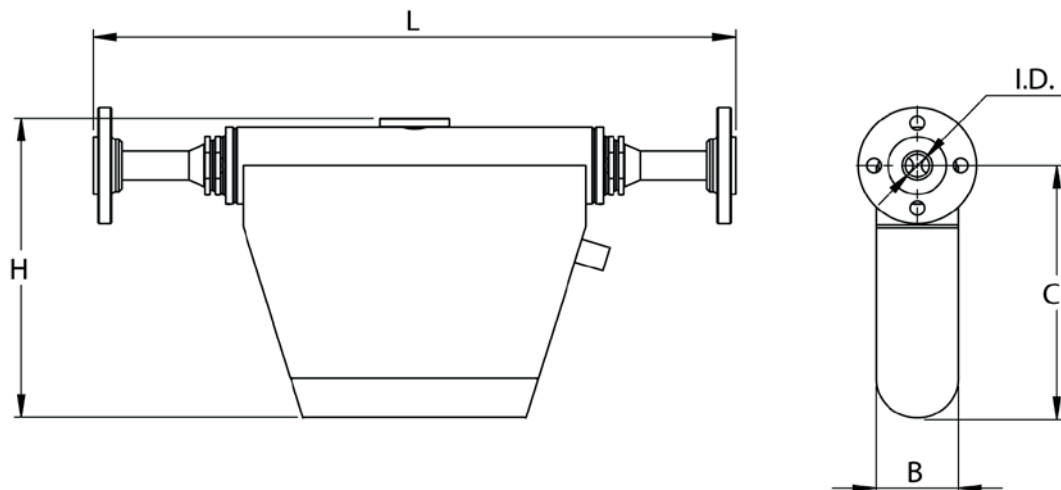
TRICOR - Coriolis Mass Flow Meters

TCM 0325 to TCM 3100



Sensor Type	A	C	D	E	H	L*	G**
TCM 0325	214 mm (8.4 in)	160 mm (6.3 in)	M6 ↓ 10	15 mm (0.6 in)	182 mm (7.2 in)	110 mm (4.3 in)	G 1/2"
TCM 0650	214 mm (8.4 in)	160 mm (6.3 in)	M6 ↓ 10	15 mm (0.6 in)	182 mm (7.2 in)	110 mm (4.3 in)	G 1/2"
TCM 1550	350 mm (13.8 in)	258 mm (10.2 in)	M6 ↓ 10	18 mm (0.7 in)	280 mm (11 in)	140 mm (5.5 in)	G 1/2"
TCM 3100	350 mm (13.8 in)	258 mm (10.2 in)	M6 ↓ 10	18 mm (0.7 in)	280 mm (11 in)	140 mm (5.5 in)	G 1/2"

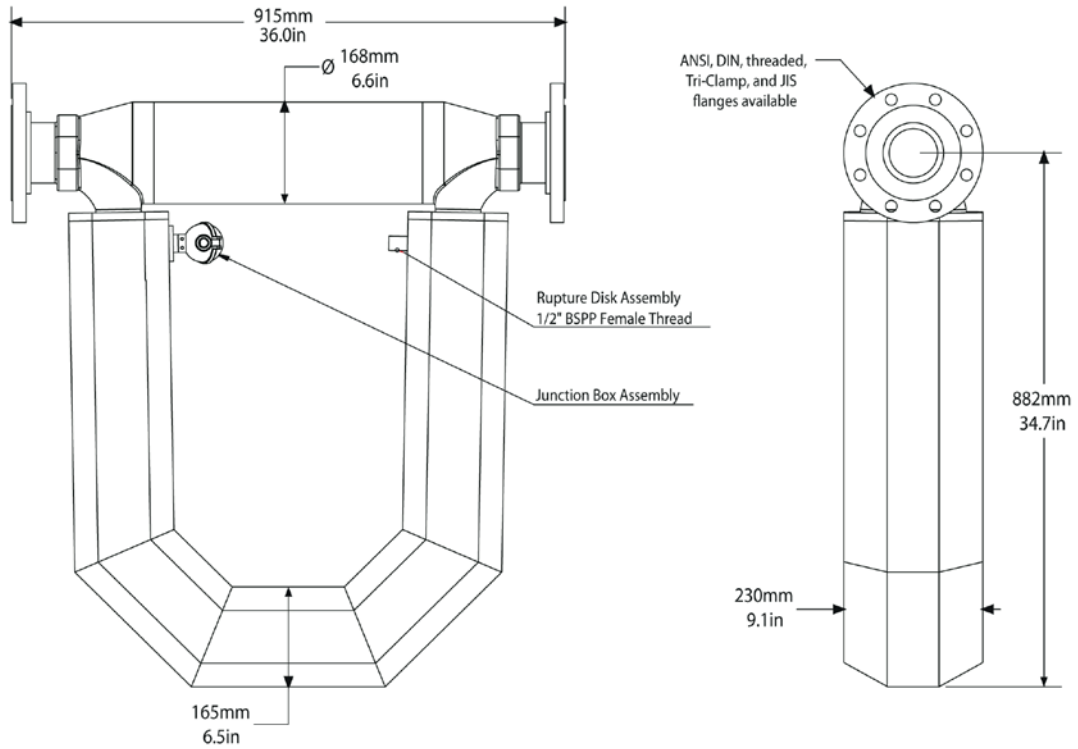
TCM 5500 to TCM 065K



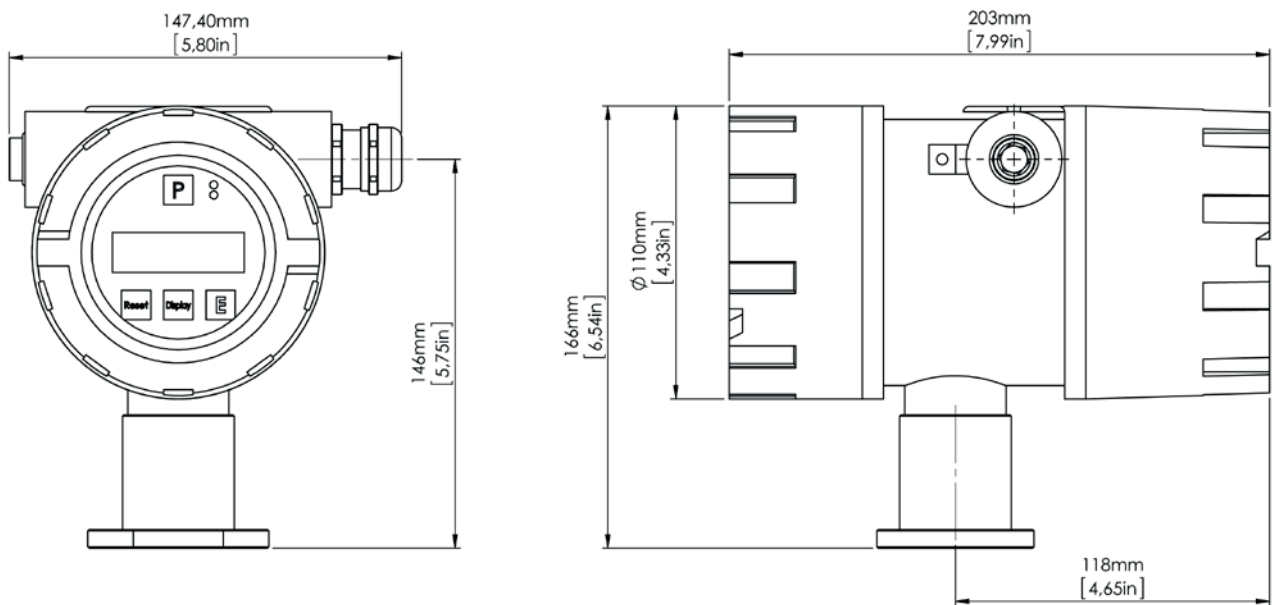
Sensor Type	B	C	H	L*	I.D.	Connection**
TCM 5500, 7900	61 mm (2.4 in)	204 mm (8 in)	260 mm (10.2 in)	460 mm (18.1 in)	Ø 13 mm (Ø 0.5 in)	on request
TCM 028K	80 mm (3.5 in)	253 mm (10 in)	315 mm (12.4 in)	625 mm (24.6 in)	Ø 23 mm (Ø 0.9 in)	on request
TCM 065K	151 mm (5.4 in)	387 mm (18.9 in)	480 mm (32.7 in)	830 mm (32.7 in)	Ø 40 mm (Ø 1.6 in)	on request

* further lengths on request
 ** other connections on request

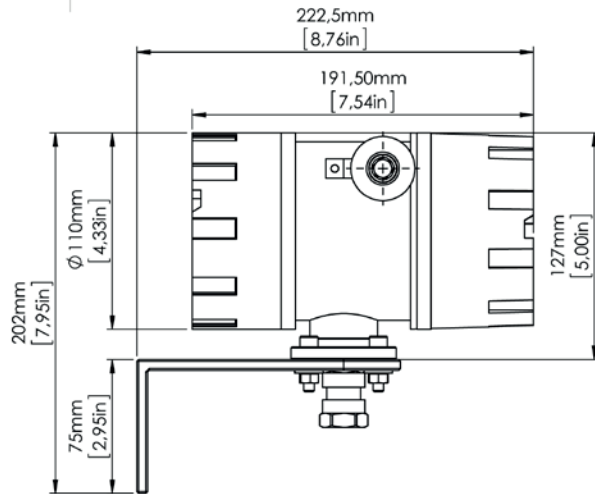
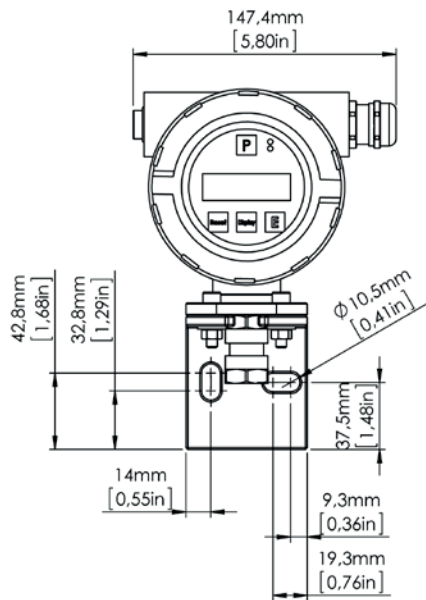
TCM 230K



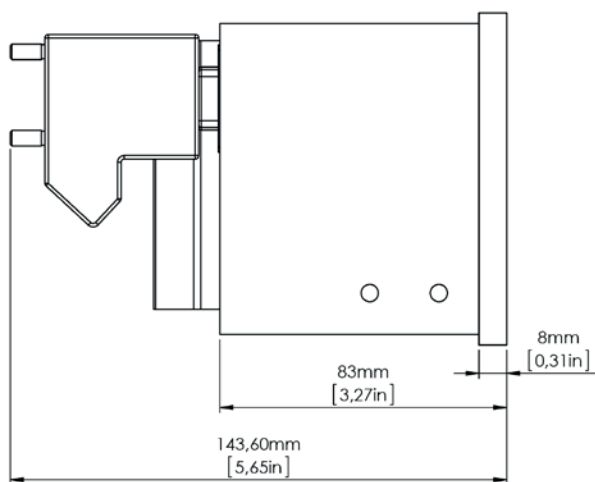
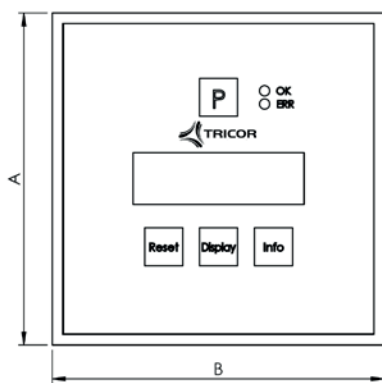
Meter-Mount Electronics TCE 8000 (C)



Wall-Mount Electronics TCE 8000 (W)

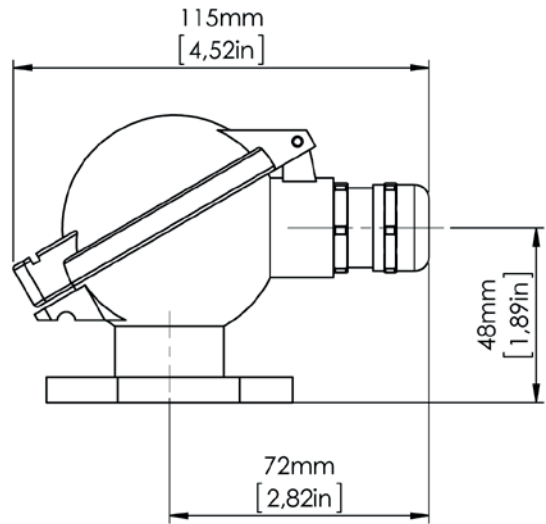
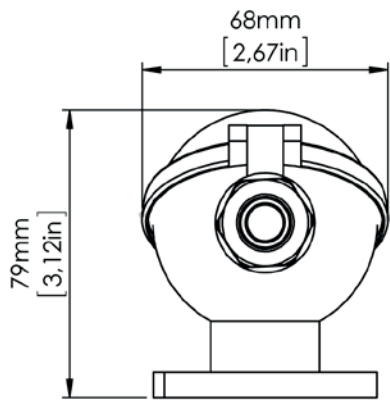


Panel-Mounted Housing

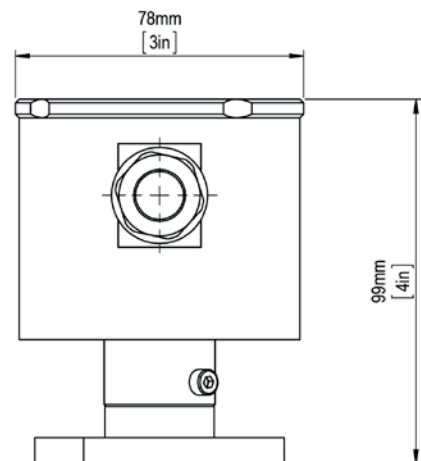
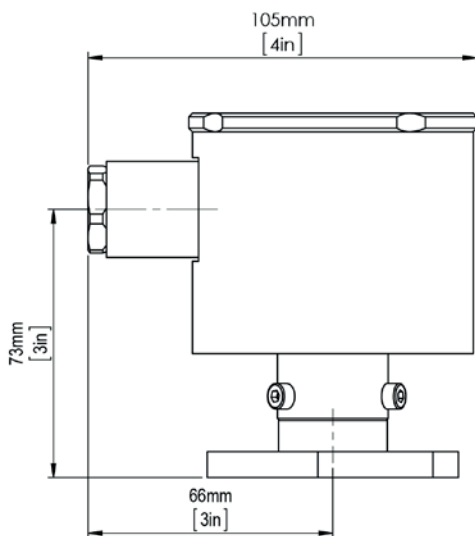


Type	A	B
TCE 80** - S	96 mm (3.8 in)	96 mm (3.8 in)
TCE 80** - L	96 mm (3.8 in)	144 mm (5.7 in)

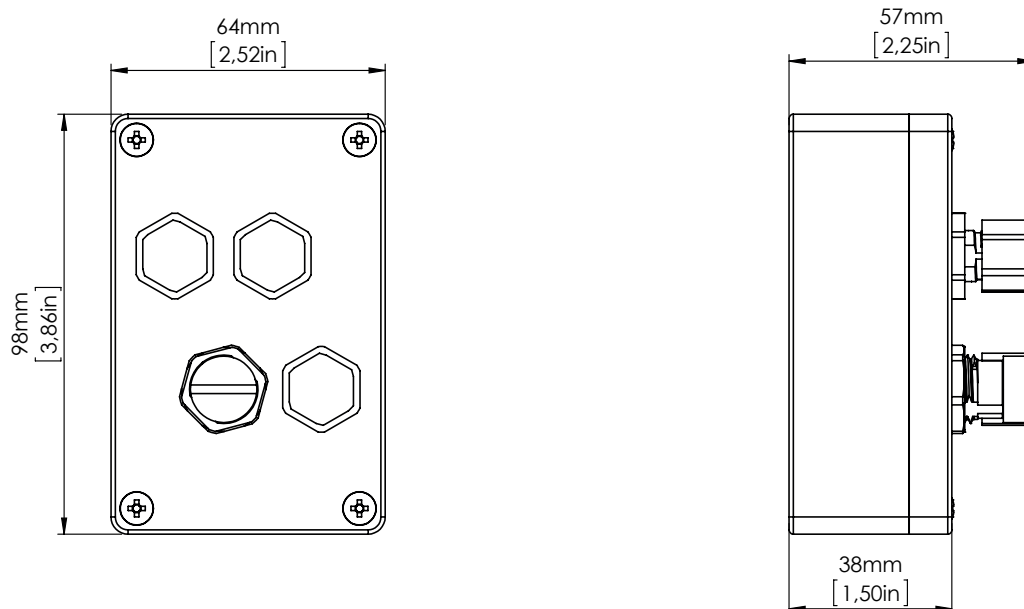
Standard Connection Head (A)



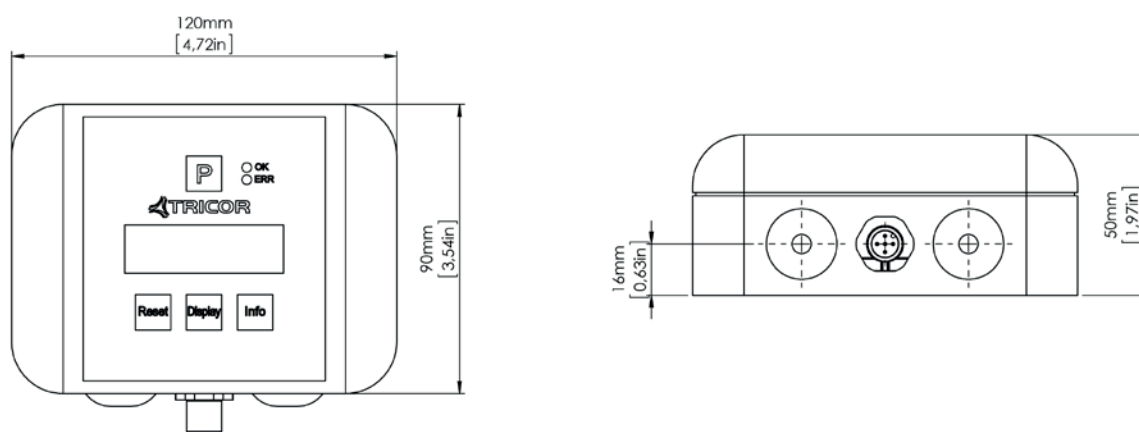
High Temperature Connection Head



Meter-Mount Electronics TCE 6000 (F)



Remote Display TRD 8001



Ordering Information TCM Meter (Series TRICOR)

TCM	XXXX	-	XX	-	X	X	X	X	-	X	X	X	X	-	Ex	-	XX
Process connections¹⁾																	
ANSI flange			A*														
ANSI flange			B*														
DIN flange			D*														
Female thread			F*														
Mechanical options																	
Medium Temperature range:																	
-40°C...+100°C (-40 °F...+212 °F)																	S
-40°C...+150°C (-4 0°F...+302 °F) Ex _{max} : 135 °C (275 °F)																	H
-40°C...+70°C (-40 °F...+158 °F) Ex, compact																	E
-60 °C ... +200 °C (-76 °F ... +392 °F)																	T
Pressure range																	
With rupture disc max. 5 BAR (72.5 PSI)																	G
1050 bar process pressure																	P
Mechanical Design																	
Standard																	S
Face to face length																	
Standard (other length on request)																	S
Electronics options																	
Electronics type																	
Junction box (Alu)										A	Z	Z	S				
Junction box (1.4404/316L)										H							
Meter mount electronics TCE 8000 ²⁾										C							
Meter mount electronics TCE 6000 ³⁾⁴⁾										F							
Interface⁵⁾																	
RS485 (Modbus RTU)												S					
RS485 (Modbus RTU) and HART®												A					
RS485 (Modbus RTU) + FF (not with Ex)												B					
FF (Foundation Fieldbus®)												D					
RS485 (Modbus RTU) + USB (only TCE 6000)												F					
Not used												Z					
Supply voltage																	
24 V DC												D					
90 ... 264 V AC												M					
Not used												Z					
Options																	
Pressure compensation, 4 ... 20 mA input (TCE 8000)																	A
8 pin I/O connector (TCE 6000 only)																	B
No option																	S
EX-protection																	
ATEX + IECEx Zone1: Group IIC, T2...T4																	Ex
ATEX Zone 2: II3G Ex nA IIC, T4 Gc																	Exn
cCSAus: Class 1, Division 1: Group A, B, C, D or C, D, T2...T4																	Ex1
cCSAus: Class 1, Division 2: Group A, B, C, D or C, D, T2...T4																	Ex2
ATEX+IECEX, Zone 1: Group IIC or IIB, T2...T4 and cCSAus: Class 1, Div. 1: Group A, B, C, D or C, D, T2...T4																	Ex3
GOST (TR-TS): Group IIC or IIB, T2 ... T4																	ExR
Special Options																	
NOC (Net Oil Computer)																	01

1) Ask KEM/AWL for technically possible flanges

2) For TCM compact version with Ex-protection temperature class T4 only

3) Only in the following options: FSDS (5 PIN I/O and RS485 MODBUS RTU or FFDB (5&8 PIN I/O, RS 485 MODBUS RTU, USB)

4) Ex-protection only available in the option Exn

5) Other interfaces on request

TRICOR - Coriolis Mass Flow Meters

Ordering Information TCE Transmitter (Series 8000)

TCE	8 0 X X	- X	- X X X X	- XX	- XX
For TCM 0325 to TCM 7900	8 0 0 1				
For TCM 028K to TCM 065K	8 0 1 1				
For TCM 230K	8 0 1 2				
Housing					
Wall mount (NPT)		W			
Wall mount (M20 x 1.5)		I			
Panel mount		S			
Panel mount, wide for "Ex", "associated equipment"		L			
Options					
Interface¹⁾					
RS485 (MODBUS RTU)			S		
RS485 (MODBUS RTU) + HART [®]			A		
Supply Voltage					
24 V DC + 90 ... 264 V AC (only housing S+L)			B		
24 V DC			D		
90 ... 264 V AC (only housing W)			M		
Electronic Options					
Standard			S		
Pressure compensation and 4-20 mA input			A		
Cable length					
3 Meters (≈ 10 ft.), Standard (housing W)				S	
6 Meters (≈ 20 ft.), (housing W)				B	
10 Meters (≈ 33 ft.), (housing W)				C	
15 Meters (≈ 49 ft.), (housing W)				D	
20 Meters (≈ 65 ft.), (housing W)				E	
D-SUB Connector, (housing L+S) separate cable required				N	
EX-Protection					
ATEX + IECEx Zone1: Group IIC, T2...T4					Ex
ATEX Zone 2: II3G Ex nA IIC, T4 Gc					Exn
cCSAus: Class 1, Division 1: Group A, B, C, D or C, D, T2...T4					Ex1
cCSAus: Class 1, Division 2: Group A, B, C, D or C, D, T2...T4					Ex2
ATEX+IECEX, Zone 1: Group IIC or IIB, T2...T4 and cCSAus: Class 1, Div. 1: Group A, B, C, D or C, D, T2...T4					Ex3
GOST (TR-TS): Group IIC or IIB, T2 ... T4					ExR
Special Options					
NOC (Net Oil Computer)					

01

1) Other interfaces on request

Accessories

Connection Cable for TCE 8000-S or TCE 8000-L to TCM

TCC	0	2	-	X	X
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Lenght

3 Meter (Standard)	(≈ 10 ft.)	0	3
6 Meter	(≈ 20 ft.)	0	6
10 Meter	(≈ 33 ft.)	1	0
15 Meter	(≈ 49 ft.)	1	5
20 Meter	(≈ 66 ft.)	2	0

Additional Accessories

IPS9-9	Front cover IP65 for TCE 80**-S-*
IPS9-14	Front cover IP65 for TCE 80**-L-*
TRD 8001	Add. Remote display for meter mount version
TRD-TCE-6-2	Connection cable TRD-TCE 6000, 2 meter
TRD-TCE-6-5	Connection cable TRD-TCE 6000, 5 meter
TCD 4600	Gauge Volume Totalizer
KAB-USB-TCE	USB Cable, USB to mini USB M12, 2 meter, for TCE 6000
CON.USB.RS	Adaptor cable USB to RS 485, 1.8 meter



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