

# VersaFlow TWC 9000/TWC 010 Coriolis Mass Flow Converter Specifications

34-VF-03-04 September 2011



## The High-Performance Solution

The TWC 9000 is a universal coriolis meter converter suitable for a wide range of applications and installations. A common platform allows easy selection for the output options required, and is suitable for mounting in various housing configurations.

The TWC 9000 is also suitable for all current and future mass flow sensors. The split architecture solution for the mass flow family ensures maximum security and redundant back up of calibration parameters, should a failure occur. There is no need for reprogramming after a failed unit is replaced.

The TWC 010 implements all sensor drive and signal evaluation functions into an integrated front-end electronics module permanently fixed to the sensor.

This cost effective solution eliminates unwanted and expensive I/O and display functions associated with traditional signal converters and transmitters, and is designed for use in OEM systems or packages where a PLC or DCS is already used for other functions.

The TWC 010 Modbus communications is a simple 4-wire (1 pair data and 1 pair power) interface which is all that is required to connect the VersaFlow Coriolis meter to the PLC or DCS, utilizing its embedded Modbus RTU over RS485 connection. This allows programming, commissioning and measurement over a single data connection.

## Highlights

- Advanced diagnostic functions
- Excellent long-term stability
- Easy to install and configure
- Highest process safety
- Industry standard outputs including NAMUR
- Common hardware for all housings



Figure 1 – VersaFlow TWC 9000 Converter



Figure 2 – VersaFlow TWC 010 Converter

## Industries

- Chemicals
- Food & Beverage
- Machinery
- Minerals & Mining
- Oil & Gas
- Pharmaceuticals
- Power Plants
- Pulp & Paper
- Water & Wastewater

## Applications

- Liquids and gases
- Slurries and viscous products
- Concentration measurement
- Measurement of volume flow
- Measurement of density and reference density
- Custody transfer loading /unloading
- Custody transfer measurements

### Mass Flowmeter Product Family

All meters consist of a sensor and a converter, which may be mounted integral to the sensor, or remotely, either with a field mount kit, a wall mount housing or a 19" rack mount module.

A sensor mount converter (TWC 010) with a Modbus® output only is also possible for OEM manufacturers or where the user does not require a converter with analogue outputs.

#### Converter: Common Hardware for all Converters makes Spares Holding Simpler



1. TWC 9000 C: Compact or integrally mounted on sensor
2. TWC 9000 F: Field mount up to 300 m / 1000 ft from sensor
3. TWC 9000 W: Wall mount for non-hazardous areas
4. TWC 9000 R: 19" Rack mount module for control room installation
5. TWC 010: Sensor electronics with Modbus output

### Sensor: Sensors for any Applications



1. VersaFlow Coriolis 100 The general purpose solution for the process industry
2. VersaFlow Coriolis 1000: The optimum solution for chemical, food & beverage and pharmaceutical industry
3. VersaFlow Coriolis 200: Large diameter meter suitable for custody transfer measurement

### Model

C (compact) (Integral Mounted)	TWC 9000 C, TWC010
F (field), W (wall), R (19" rack) (Remote Mounted)	TWC 9000 F, TWC 9000 W, TWC 9000 R

**Display (TWC 9000)**

With local display (2 meas. pages: 1 status page, 1 graphical page)	Standard
User interface via 4 optical keys	Standard

**Languages**

English, French, German, Spanish	Standard
Other languages (pending)	Standard

**Combinations**

VersaFlow Coriolis 100	DN15...50 / ½...2"
VersaFlow Coriolis 1000	DN06...80 / ¼...3"
VersaFlow Coriolis 200	DN100... 250/ 4"...10"

**Communication**

	<b>TWC 9000</b>	<b>TWC010</b>
Current, pulse & status output, frequency output, limit switch	Standard	Not Available
HART communication, control input, 3 counters	Standard	Not Available
Ex-i	Option	Not Available
Foundation Fieldbus	Option	Not Available
Profibus PA	Option	Not Available
Profibus DP	Option	Not Available
RS 485 MODBUS	Option	Not Available
Modbus RTU over RS485	Not Available	Standard

**Verification**

Integrated verification, diagnostics:	Standard
- instrument / process / measurement	Standard
- advanced diagnostics	Optional

**Measuring System**

Measuring principle	Coriolis principle
Application range	Measurement of mass flow, density, temperature, volume flow, flow velocity, concentration

**Design**

Modular construction	The measuring system consists of a measuring sensor and a signal converter. All sensors are also available in Ex-versions.
----------------------	---

**Signal Converter**

Compact version (C)	TWC9000C, TWC010C
Field housing (F) -	TWC9000F
Wall-mounted housing (W) -	TWC9000W
19" rack-mounted housing (R) -	TWC9000R
	Compact and field housing versions are also available in Ex versions

## Options

Outputs / inputs	Current- (incl. HART®), pulse, frequency, and/or status output, limit switch and/or control input (depending on the I/O version)
Counters	2 (optional 3) internal counters with a max. of 8 counter places (e.g. for counting volume and/or mass units)
Verification	Integrated verification, diagnostic functions: measuring device, process, measured value, stabilization
Concentration measurement	Concentration and concentration flow
Communication interfaces	Foundation Fieldbus, Modbus, HART®

## Display and User interface

Graphic display	LC display, backlit white.
	Size: 128 x 64 pixels, corresponds to 59 x 31 mm = 2.32" x 1.22"
	Display can be turned in steps of 90°.
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Operating elements	4 optical keys for operator control of the signal converter without opening the housing.
	Infrared interface for reading and writing all parameters with IR interface (option) without opening the housing.
Remote control	PACTware® (incl. Device Type Manager (DTM))
	HART® Hand Held Communicator from Emerson Process
	AMS® from Emerson Process
	PDM® from Siemens
	All DTMs and drivers are available free of charge from the manufacturer's website.

## Display functions

Operating menu	Setting the parameters using 2 measured value pages, 1 status page, 1 graphics page (measured values and graphics are freely adjustable)
Language display texts (as language package)	Standard: English, French, German, Dutch, Portuguese, Swedish, Spanish, Italian
	Eastern Europe (in preparation): English, Slovenian, Czech, Hungarian
	Northern Europe (in preparation): English, Danish, Polish
	China (in preparation): English, Chinese
	Russia: English, Russian
Measurement functions	Units: Metric, British and US units selectable as desired from lists for volume/mass flow and counting, velocity, temperature, pressure
	Measured values: Mass flow, total mass, temperature, density, volume flow, total volume, velocity, flow direction (not displayed unit – but available via outputs), BRIX, Baume, NaOH, Plato, API, mass concentration, volume concentration
Diagnostic functions	Standards: according to VDI / NAMUR / WIB 2650 (pending) and functions going beyond that.
	Status messages: Output of status messages optional via display, current and/or status output, HART® or bus interface
	Sensor diagnostics: Sensor values, drive level, measuring tube frequency, MT (measuring tube) strain, IC (inner cylinder) strain, sensor electronics/board electronics temperature, 2-phase flow signal

**Measuring accuracy**

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Pressure: 1 bar / 14.5 psi
Maximum measuring error	±0.10% of the measured value ± zero point stability (depending on the measuring sensor)
	Current output electronics: ±5 µA
Repeatability	±0.05% ± zero point stability (depending on the measuring sensor)

**Operating conditions****Temperature**

Process temperature	Refer to technical data for the measuring sensor.
Ambient temperature	Depends on the version and combination of outputs.
	It is a good idea to protect the converter from external heat sources such as direct sunlight as higher temperatures reduce the life cycle of all electronic components.
	-40...+65°C / -40...+149°F
	Stainless Steel housing: -40...+55°C / -40...+131°F
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Storage temperature	-50...+70°C / -58...+158°F

**Pressure**

Medium	Refer to technical data for the measuring sensor.
Ambient pressure Atmosphere	Atmosphere

**Chemical properties**

Physical condition	Liquids, gases and slurries
Flow rate	Refer to technical data for the measuring sensor.

**Other conditions**

Protection category acc. to IEC 529 / EN 60529	C (compact version) & F (field housing): IP66/67 (acc. to NEMA 4/4X)
	W (wall-mounted housing): IP 65 (acc. to NEMA 4/4x)
	R (19" rack-mounted housing): IP 20 (acc. to NEMA 1)

**Materials**

Signal converter housing	<b>Standard</b>
	Version C and F: die-cast Aluminium (polyurethane-coated)
	Version W: polyamide - polycarbonate
	Version R: Aluminium, Stainless Steel and Aluminium sheet, partially polyestercoated
	<b>Option</b>
	Versions C and F: Stainless Steel 316 L (1.4408)
Measuring sensor	See the technical data for the measuring sensor for housing materials, process connections, measuring tubes, accessories and gaskets.

**Electrical connection**

General	Electrical connection is carried out in conformity with the VDE 0100 directive Regulations for electrical power installations with line voltages up to 1000 V or equivalent national regulations.
Power supply	Standard: 100...230 VAC (-15% / +10%), 50/60 Hz
	Option 1: 24 VDC (-55% / +30%)
	Option 2: 24 VAC/DC (AC: -15% / +10%, 50/60 Hz; DC: -25% / +30%)
Power consumption	AC: 22 VA
	DC: 12 W
Signal cable	Only for remote versions.
	4 core shielded cable. Detailed specifications available on request.
	Length: max. 300 m / 1000 ft
Cable entries Standard:	M20 x 1.5 (8...12 mm)
	Option: ½" NPT, PF ½

**Approvals and certificates**

CE	The device fulfils the statutory requirements of the EC directives. The manufacturer certifies that these requirements have been met by applying the CE marking.
Non-Ex	Standard

**Hazardous Areas****Option (only version C)**

ATEX	II 2 G Ex d [ib] IIC T6...T1
	II 2 G Ex de [ib] IIC T6...T1
	II 2 D Ex tD A21 IP6x T160°C (dep. on the measuring sensor) without heating jacket or sensor insulation
	II 2 D Ex tD A21 IP6x T170°C (dep. on the measuring sensor) with heating jacket and sensor insulation
	II 2(1) G Ex d [ia/ib] IIC T6...T1
	II 2(1) G Ex de [ia/ib] IIC T6...T1
	II 2(1) D Ex tD [iaD] A21 IP6x T160°C (dep. on the measuring sensor) without heating jacket or sensor insulation
	II 2(1) D Ex tD [iaD] A21 IP6x T170°C (dep. on the measuring sensor) with heating jacket and sensor insulation

**Option (only version F)**

ATEX	II 2 G Ex d [ib] IIC T6
	II 2 G Ex de [ib] IIC T6
	II 2(1) G Ex d [ia/ib] IIC T6
	II 2(1) G Ex de [ia/ib] IIC T6
	II 2 D Ex tD [ibD] A21 IP6x T80°C
	II 2(1) G Ex tD [iaD/ibD] A21 IP6x T80°C
NEPSI	Ex de ib [ia/ib] IIC T6
	Ex d ib [ia/ib] IIC T6

**Optional (only versions C and F)**

FM / CSA	Class II, Div 1 groups E, F, G
	Class III, Div 1 hazardous areas
	Class I, Div 2 groups B, C, D
	Class II, Div 2 groups F, G
	Class III, Div 2 hazardous areas
IECEX (pending)	Ex zone 1 + 2

**Custody transfer**

Without	Standard
Option	Liquids other than water 2004/22/EC (MID) acc. to OIML R 117-1

**Other standards and approvals**

Shock and vibration resistance	IEC 68-2-3
Electromagnetic compatibility (EMC)	2004/108/EC in conjunction with EN 61326-1 (A1, A2)
European Pressure Equipment Directive	PED 97/23 (only for compact versions)
NAMUR	NE 21, NE 43, NE 53

**Inputs and Outputs (TWC9000)**

General	All outputs are electrically isolated from each other and from all other circuits.
	All operating data and output values can be adjusted.
Description of used abbreviations	<p><math>U_{ext}</math> = external voltage; <math>R_L</math> = load + resistance;  <math>U_o</math> = terminal voltage; <math>I_{nom}</math> = nominal current  Safety limit values (Ex-i):  <math>U_i</math> = max. input voltage; <math>I_i</math> = max. input current; <math>P_i</math> = max. input power rating;  <math>C_i</math> = max. input capacity; <math>L_i</math> = max. input inductivity</p>

**Current output**

Output data	Volume flow, mass flow, temperature, density, flow velocity, diagnostic value, 2-phase signal
	Concentration and concentration flow are also possible with available concentration measurement (optional).
Temperature coefficient	Typically $\pm 30$ ppm/K
Settings	<b>Without HART®</b>
	Q = 0%: 0...20 mA; Q = 100%: 10...20 mA
	Error identification: 3...22 mA
	<b>With HART®</b>
	Q = 0%: 4...20 mA; Q = 100%: 10...20 mA
Error identification: 3...22 mA	

**Inputs and Outputs (TWC9000)****Current output (continued)**

Operating data	Basic I/Os	Modular I/Os	Ex i
Active	$U_{\text{int, nom}} = 24 \text{ VDC}$ $I \leq 22 \text{ mA}$ $R_L \leq 1 \text{ k}\Omega$		$U_{\text{int, nom}} = 20 \text{ VDC}$ $I \leq 22 \text{ mA}$ $R_L \leq 450 \Omega$
			$U_0 = 21 \text{ V}$ $I_0 = 90 \text{ mA}$ $P_0 = 0.5 \text{ W}$ $C_0 = 90 \text{ nF} / L_0 = 2 \text{ mH}$ $C_0 = 110 \text{ nF} / L_0 = 0.5 \text{ mH}$
Passive	$U_{\text{ext}} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_0 \leq 1.8 \text{ V}$ $R_L \leq (U_{\text{ext}} - U_0) / I_{\text{max}}$		$U_{\text{ext}} \leq 32 \text{ VDC}$ $I \leq 22 \text{ mA}$ $U_0 \leq 4 \text{ V}$ $R_L \leq (U_{\text{ext}} - U_0) / I_{\text{max}}$
			$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i \sim 0 \text{ mH}$

**HART®**

Description	HART® protocol via active and passive current output
	HART® version: V5
	Universal HART® parameter: completely integrated
Load	$\geq 250 \Omega$ at HART® test point; Note maximum load for current output!
Multidrop operation	Yes, current output = 4 mA
	Multidrop address adjustable in operation menu 1...15
Device driver	Available for FC 375, AMS, PDM, FDT/DTM
Registration (HART Communication Foundation)	Yes

**Pulse or frequency output**

Output data	Pulse output: volume flow, mass flow, mass or volume of dissolved substance with activated concentration measurement
	Frequency output: flow velocity, mass flow, temperature, density, diagnostic value
	Optional: concentration, flow of the dissolved substance
Function	Adjustable as pulse or frequency output
Pulse rate/frequency	0.01...10000 pulses/s or Hz
Settings	Mass or volume per pulse or max. frequency for 100% flow
	Pulse width: setting automatic, symmetric or fixed (0.05...2000 ms)



Operating data	Basic I/Os	Modular I/Os	Ex i
Active	-	<p><math>U_{nom} = 24 \text{ VDC}</math></p> <hr/> <p><math>f_{max}</math> in operating menu set to</p> <p><math>f_{max} \leq 100 \text{ Hz}</math>:</p> <p><math>I \leq 20 \text{ mA}</math></p> <p>open:</p> <p><math>I \leq 0.05 \text{ mA}</math></p> <p>closed:</p> <p><math>U_{0, nom} = 24 \text{ V}</math></p> <p>at <math>I = 20\text{mA}</math></p> <hr/> <p><math>f_{max}</math> in operating menu set to</p> <p><math>100 \text{ Hz} &lt; f_{max} \leq 10 \text{ kHz}</math>:</p> <p><math>I \leq 20 \text{ mA}</math></p> <p>open:</p> <p><math>I \leq 0.05 \text{ mA}</math></p> <p>closed:</p> <p><math>U_{0, nom} = 22.5 \text{ V}</math></p> <p>at <math>I = 1\text{mA}</math></p> <p><math>U_{0, nom} = 21.5 \text{ V}</math></p> <p>at <math>I = 10\text{mA}</math></p> <p><math>U_{0, nom} = 19 \text{ V}</math></p> <p>at <math>I = 20\text{mA}</math></p>	-
Passive	<p><math>U_{ext} \leq 32 \text{ VDC}</math></p> <hr/> <p><math>f_{max}</math> in operating menu set to</p> <p><math>f_{max} \leq 100 \text{ Hz}</math>:</p> <p><math>I \leq 100 \text{ mA}</math></p> <p>open:</p> <p><math>I \leq 0.05 \text{ mA}</math> at <math>U_{ext} = 32 \text{ VDC}</math></p> <p>closed:</p> <p><math>U_{0, max} = 0.2 \text{ V}</math> at <math>I \leq 10 \text{ mA}</math></p> <p><math>U_{0, max} = 2 \text{ V}</math> at <math>I \leq 100 \text{ mA}</math></p> <hr/> <p><math>f_{max}</math> in operating menu set to</p> <p><math>100 \text{ Hz} &lt; f_{max} \leq 10 \text{ kHz}</math>:</p> <p><math>I \leq 20 \text{ mA}</math></p> <p>open:</p> <p><math>I \leq 0.05 \text{ mA}</math> at <math>U_{ext} = 32 \text{ VDC}</math></p> <p>closed:</p> <p><math>U_{0, max} = 1.5 \text{ V}</math> at <math>I \leq 1 \text{ mA}</math></p> <p><math>U_{0, max} = 2.5 \text{ V}</math> at <math>I \leq 10 \text{ mA}</math></p> <p><math>U_{0, max} = 5.0 \text{ V}</math> at <math>I \leq 20 \text{ mA}</math></p>		-

NAMUR	-	Passive to EN 60947-5-6	Passive to EN 60947-5-6
		open: $I_{nom} = 0.6 \text{ mA}$  closed: $I_{nom} = 3.8 \text{ mA}$	open: $I_{nom} = 0.43 \text{ mA}$  closed: $I_{nom} = 4.5 \text{ mA}$  $U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i \sim 0 \text{ mH}$

**Low flow cut-off**

Function	Switching point and hysteresis separately adjustable for each output, counter and the display
Switching point	Set in increments of 0.1.
	0...20% (current output, frequency output)
Hysteresis	Set in increments of 0.1.
	0...5% (current output, frequency output)

**Time constant**

Function	The time constant corresponds to the elapsed time until 67% of the end value has been reached according to a step function.
Settings	Set in increments of 0.1.
	0...100 s

**Status output / limit switch**

Function and settings	Adjustable as automatic measuring range conversion, display of flow direction, overflow, error, switching point		
	Valve control with activated dosing function		
	Status and/or control: ON or OFF		
Operating data	<b>Basic I/Os</b>	<b>Modular I/Os</b>	<b>Ex i</b>
		$U_{int} = 24 \text{ VDC}$ $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 24 \text{ V}$ at $I = 20 \text{ mA}$	

Passive	$U_{\text{ext}} \leq 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{\text{ext}} = 32 \text{ VDC}$ closed: $U_{0, \text{max}} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, \text{max}} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	$U_{\text{ext}} = 32 \text{ VDC}$ $I \leq 100 \text{ mA}$ $R_{L, \text{max}} = 47 \text{ k}\Omega$ $R_{L, \text{min}} = (U_{\text{ext}} - U_0) / I_{\text{max}}$ open: $I \leq 0.05 \text{ mA}$ at $U_{\text{ext}} = 32 \text{ VDC}$ closed: $U_{0, \text{max}} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, \text{max}} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	
NAMUR		Passive to EN 60947-5-6 open: $I_{\text{nom}} = 0.6 \text{ mA}$ closed: $I_{\text{nom}} = 3.8 \text{ mA}$	Passive to EN 60947-5-6 open: $I_{\text{nom}} = 0.43 \text{ mA}$ closed: $I_{\text{nom}} = 4.5 \text{ mA}$  $U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i = 0 \text{ mH}$

**Control input**

Function	Hold output values (e.g. when cleaning), set value of outputs to "zero", counter and error reset, hold counter, range conversion, zero point calibration. Start of dosing when dosing function is activated.		
Operating data	<b>Basic I/Os</b>	<b>Modular I/Os</b>	<b>Ex i</b>
Active		$U_{\text{int}} = 24 \text{ VDC}$ Ext. contact open: $U_{0, \text{nom}} = 22 \text{ V}$ Ext. contact closed: $I_{\text{nom}} = 4 \text{ mA}$ Contact closed (on): $U_0 \geq 12 \text{ V}$ with $I_{\text{nom}} = 1.9 \text{ mA}$ Contact open (off): $U_0 \leq 10 \text{ V}$ with $I_{\text{nom}} = 1.9 \text{ mA}$	

Passive	$8\text{ V} \leq U_{\text{ext}} \leq 32\text{ VDC}$ $I_{\text{max}} = 6.5\text{ mA}$ at $U_{\text{ext}} \leq 24\text{ VDC}$ $I_{\text{max}} = 8.2\text{ mA}$ at $U_{\text{ext}} \leq 32\text{ VDC}$ Contact closed (on): $U_0 \geq 8\text{ V}$ with $I_{\text{nom}} = 2.8\text{ mA}$ Contact open (off): $U_0 \leq 2.5\text{ V}$ with $I_{\text{nom}} = 0.4\text{ mA}$	$3\text{ V} \leq U_{\text{ext}} \leq 32\text{ VDC}$ $I_{\text{max}} = 9.5\text{ mA}$ at $U_{\text{ext}} \leq 24\text{ V}$ $I_{\text{max}} = 9.5\text{ mA}$ at $U_{\text{ext}} \leq 32\text{ V}$ Contact closed (on): $U_0 \geq 3\text{ V}$ with $I_{\text{nom}} = 1.9\text{ mA}$ Contact open (off): $U_0 \leq 2.5\text{ V}$ with $I_{\text{nom}} = 1.9\text{ mA}$	$U_{\text{ext}} \leq 32\text{ VDC}$ $I \leq 6\text{ mA}$ at $U_{\text{ext}} = 24\text{ V}$ $I \leq 6.6\text{ mA}$ at $U_{\text{ext}} = 32\text{ V}$ On: $U_0 \geq 5.5\text{ V}$ or $I \geq 4\text{ mA}$ Off: $U_0 \leq 3.5\text{ V}$ or $I \leq 0.5\text{ mA}$
			$U_i = 30\text{ V}$ $I_i = 100\text{ mA}$ $P_i = 1\text{ W}$ $C_i = 10\text{ nF}$ $L_i = 0\text{ mH}$
NAMUR		Active to EN 60947-5-6 Terminals open: $U_{0, \text{nom}} = 8.7\text{ V}$ Contact closed (on): $U_{0, \text{nom}} = 6.3\text{ V}$ with $I_{\text{nom}} > 1.9\text{ mA}$ Contact open (off): $U_{0, \text{nom}} = 6.3\text{ V}$ with $I_{\text{nom}} < 1.9\text{ mA}$ Detection of cable break: $U_0 \geq 8.1\text{ V}$ with $I \leq 0.1\text{ mA}$ Detection of cable short circuit: $U_0 \leq 1.2\text{ V}$ with $I \geq 6.7\text{ mA}$	

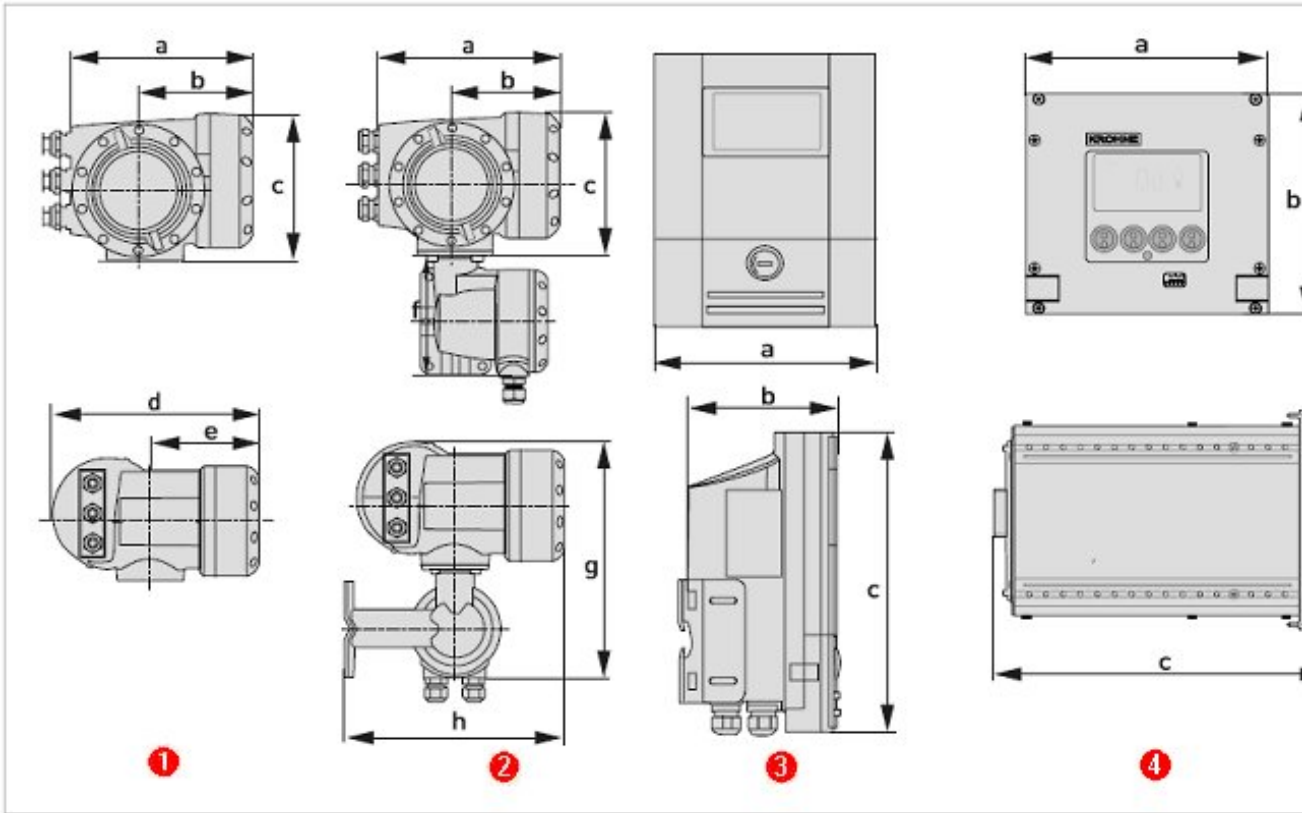
**FOUNDATION Fieldbus**

Description	Galvanically isolated acc. to IEC 61158
	Current consumption: 10.5 mA
	Permissible bus voltage: 9...32 V; in Ex application: 9...24 V
	Bus interface with integrated reverse polarity protection
	Link Master function (LM) supported
	Tested with Interoperable Test Kit (ITK) version 5.1
Function blocks	6 x analogue Input, 3 x integrator, 1 x PID
Output data	Mass flow, volume flow, density, temperature of tube, several concentration measurements and diagnostic data

**Modbus**

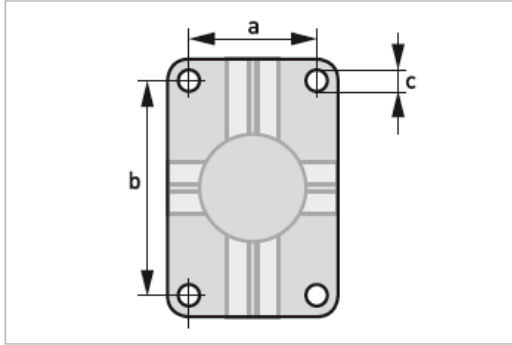
Description	Modbus RTU, Master / Slave, RS485
Address range	1...247
Supported function codes	01, 03, 04, 05, 08, 16
Broadcast	Supported with function code 16
Supported Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

**Dimensions and Weights**

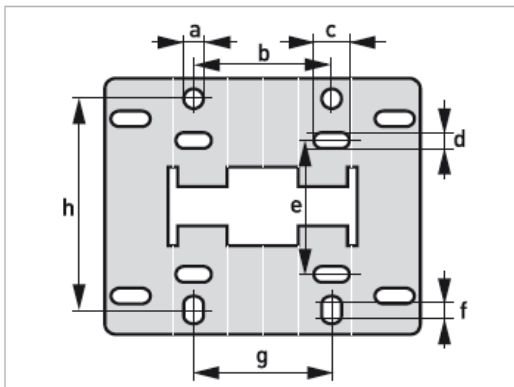


- 1 Compact version (TWC 9000 C)
- 2 Field housing (TWC 9000 F) - remote version
- 3 Wall-mounted housing (TWC 9000 W) - remote version
- 4 19" rack (TWC 9000 R) - remote version

Version	Dimensions – mm (inches)								Weight Kg (lbs)
	a	b	c	d	e	f	g	h	
TWC 9000 C	202 (7.95)	120 (4.75)	155 (6.10)	260 (10.20)	137 (5.40)				4.2 (9.30)
TWC 9000 F	202 (7.95)	120 (4.75)	155 (6.10)			140.5 (5.50)	295.8 (11.60)	277 (10.90)	5.7 (12.60)
TWC 9000 W	198 (7.80)	138 (5.40)	299 (11.80)						2.4 (5.30)
TWC 9000 R	142 (5.59)	129 (5.08)	195 (7.68)						1.2 (2.65)

**Mounting plate, field housing****Dimensions in mm and inches**

	mm	inches
a	60	2.4
b	100	3.9
c	Ø9	Ø0.4

**Mounting plate, wall-mounted housing****Dimensions in mm and inches**

	mm	inches
a	Ø9	Ø0.4
b	64	2.5
c	16	0.6
d	6	0.2
e	63	2.5
f	4	0.2
g	64	2.5
h	98	3.85

Refer to Coriolis Sensor Specification for TWC 010 dimensions.

**I/O Modules**

	I/O		1st module		2nd module	
1	Basic	0	no module possible	0	no module possible	
2	Ex-i (Ia + Pp)	1	Ex-i (Ia + Pp/Cp)			
3	Ex-i (Ip + Pp)	2	Ex-i (Ip + Pp/Cp)			
4	Modular (Ia + Pa)	8	no module	8	no module	
6	Modular (Ia + Pp)	A	Ia	A	Ia	Ia = current output - active
7	Modular (Ia + Pn)	B	Ip	B	Ip	Ip = current output - passive
8	Modular (Ip + Pa)	C	Pa/Sa	C	Pa/Sa	Pa/Sa = pulse/status output - active, high current
B	Modular (Ip + Pp)	E	Pp/Sp	E	Pp/Sp	Pp/Sp = pulse/status output - passive, high current
C	Modular (Ip + Pn)	F	Pn/Sn	F	Pn/Sn	Pn/Sn = pulse/status output - passive, Namur
D	Profibus PA	G	Ca	G	Ca	Ca = control input - active, high current
E	Foundation Fieldbus	H	Cn	H	Cn	Cn = control input - active, Namur
F	Profibus DP	K	Cp	K	Cp	Cp = control input - passive, high current
G	RS485 Modbus					
H	RS485 Modbus with interactive termination					

The TWC 9000 with standard basic I/O covers almost all applications, having 4 I/Os:

- active/passive current output (+HART)
- passive pulse/status output
- passive status output
- passive status output / control input

The I/O-module combination is thus 1-0-0 (see above).

The TWC 9000 with modular I/O can be tailor-made to any application:

- Suppose you require a converter with passive pulse output and 3 passive current outputs. The I/O-module combination then becomes B-B-B.
- Suppose you require a converter with 2 active pulse/status outputs. The I/O module combination then becomes either 4-C-8 or 8-C-8 (depending on whether active or passive current output is required). The latter '8' indicates that 1 additional module can be added in the future.
- Suppose you require a converter with Profibus PA communication, 1 active current output and 1 passive control input. The I/O module combination then becomes D-A-K.

For I/O-module combinations, not described in the overview on the right, please consult HONEYWELL.

**Example for Combination of I/O's**

**Basic I/O**

1	2	3
1	0	0

**Ex - I/O**

1	2	3
2	0	0
	1	
	2	

**Ex - I/O**

1	2	3
3	0	0
	1	
	2	

**Ex - I/O**

1	2	3
D	0	0
	1	
	2	

**Ex - I/O**

1	2	3
E	0	0
	1	
	2	

**Modular I/O**

Comm	1st	2nd
4	8	8
	A	8
		A
		C
		G
	C	8
		C
		G
	G	8
		G

**Modular I/O**

Comm	1st	2nd
6	8	8
	A	8
		A
		E
		K
		8
	E	8
		E
		K
	K	8
		K

**Modular I/O**

Comm	1st	2nd
7	8	8
	A	8
		A
		F
		H
		8
	F	8
		F
		H
	H	8
		H

**Modular I/O**

Comm	1st	2nd
8	8	8
	B	8
		B
		C
		G
		8
	C	8
		C
		G
	G	8
		G



Modular I/O		
Comm	1 <sup>st</sup>	2 <sup>nd</sup>
<b>D</b>	8	8
	A	8
		A
		C
		K
	C	8
		C
		K
	K	8
		K

Modular I/O		
Comm	1 <sup>st</sup>	2 <sup>nd</sup>
<b>E</b>	8	8
	A	8
		A
		C
		K
	C	8
		C
		K
	K	8
		K

Modular I/O		
Comm	1 <sup>st</sup>	2 <sup>nd</sup>
<b>G</b>	8	8
	A	8
		A
		C
		K
	C	8
		C
		K
	K	8
		K

Modular I/O		
Comm	1 <sup>st</sup>	2 <sup>nd</sup>
<b>H</b>	8	8
	A	8
		A
		C
		K
	C	8
		C
		K
	K	8
		K

Modular I/O		
Comm	1st	2nd
<b>B</b>	8	8
	B	8
		B
		E
		K
	E	8
		E
		K
	K	8
		K

Modular I/O		
Comm	1st	2 <sup>nd</sup> d
<b>C</b>	8	8
	B	8
		B
		F
		H
	F	8
		F
		H
	H	8
		H

Modular I/O		
Comm	1st	2nd
<b>F</b>	8	0
	A	0
	B	0
	C	0
	E	0
	F	0
	G	0
	H	0
	K	0



### Technical Data – TWC 010

Communication protocol	Modbus RTU over RS485
Baud rate	9600 ... 38400 baud
Power supply	12 V DC $\pm$ 5% and 200 mA max. current
Cable required	2 x twisted pair with overall screen (1 pair power and 1 pair signal)
Maximum cable length	300 m / 1000 ft
Connection topography	Point-to-point or multidrop
Functionality	Full ability to program meter measurement configuration. All measurement variables available as readable address registers
ATEX	Ex ib IIC T6
FM/CSA	Class I Div 1; class I Div 2
NEPSI	Ex ib IIC T1..T6

*Specifications are subject to change without notice.*



**Honeywell**  
AUTHORIZED DISTRIBUTOR

**De Gidts & Feldman BV**  
**The Netherlands**  
**www.dgfg.nl**



**De Gidts & Feldman**  
INSTRUMENTATION & FILTRATION

**For More Information**

Learn more about how Honeywell's VersaFlow TWC 9000/TWC 010 Coriolis Mass Flow Converter can be suitable for a wide range of applications and installations, visit our website [www.honeywell.com/ps/hfs](http://www.honeywell.com/ps/hfs) or contact your Honeywell account manager.

**Honeywell Process Solutions**

1860 West Rose Garden Lane  
Phoenix, Arizona 85027  
Tel: 1-800-423-9883 or 1-800-343-0228  
[www.honeywell.com/ps](http://www.honeywell.com/ps)

34-VF-03-04  
September 2011  
© 2011 Honeywell International Inc.

**Honeywell**