

Technical Information

VersaFlow TWC 9400 Coriolis Mass Flow Converter Specification 34-VF-03-28, Feb 2022



The high-performance signal converter for all applications

The TWC 9400 Coriolis mass flow signal converter will provide the highest performance possible across a wide range of applications. For the measurement of liquids or gases, cryogenic to high temperature fluids, single or multi-phase fluids and advanced digital signal processing techniques is used to give stable and accurate measurements of mass flow, density and temperature.

Conforming to the NAMUR standard NE107 for status and error handling, the TWC 9400 features enhanced meter diagnostics. This provides extensive self-checking of internal circuits and information regarding the health of the flow sensor, but just as importantly, vital information about the process and process conditions.

Highlights

- High performance signal converter with multiple output options
- Partial proof test capable
- Smart diagnostics, covering entire devices in less than a minute
- NE107 status indicated by display background light
- Entrained Gas Management (EGM) – the new standard for entrained gas immunity
- Excellent long-term stability
- Optical and mechanical keys for ease of use
- Redundant data storage in signal converter housing
- Real time clock for logging events
- Overall, flexible lock concept
- HART® 7

Industries

- | | |
|-----------------------------|------------------------------|
| • Water & Wastewater | • Oil & Gas |
| • Chemicals & Petrochemical | • Minerals, Metals & Minings |
| • Power Plants | • Pulp & Paper |
| • Machinery | • Pharmaceuticals |



Figure 1 - VersaFlow TWC 9400 Converter in field housing

1. Supply voltage: 100...230VAC (standard) and 24VDC
2. Communication with any third-party system possible via HART or Modbus
3. Intuitive navigation for ease of operation

Applications

- Liquids and gases
- Liquids with gas entrainment
- Slurries and viscous products
- Concentration measurement for quality control
- Measurement of volume flow
- Measurement of density and reference density
- Custody transfer measurements

Mass Flowmeter Product Family

Options and variants

Compact design for standard applications

The TWC 9400 mass flow signal converter is available in different variants and offers superior performance in any conceivable application. From process control in chemistry, to density and concentration measurements in the food and beverage industry, to custody transfer filling and transport measurements for oil and gas right down to conveyor systems in the pulp and paper industry.

Coriolis mass flow measuring systems measure the mass and volume flow, the density and the temperature of liquids and gases. In addition, the concentration in mixtures and slurries can also be determined.

Thanks to Entrained Gas Management (EGM) the TWC 9400 systems offer high performance with air entrainment, delivering continuous measurement even with 0...100% gas entrainment.



Figure 2 - Coriolis 6000+ TWC9400C – compact

For standard applications the compact housing is mounted directly on the measuring sensor. In the unlikely event of a failure, the electronics can be easily exchanged and reconfigured using a backup data set that is stored in the housing.



Figure 3 – Coriolis 200+TWC9400C – compact

The signal converter in the robust field housing is generally used when it is difficult to access the measuring point or when ambient conditions do not allow the use of the compact version.



Figure 3 - Signal converter in field housing

Signal converter/flow sensor combination possibilities

Table 1

Flow sensor	Flow sensor + signal converter TWC 9400	
	Compact	Remote filed housing
VersaFlow Coriolis 100	TWC 9400C	TWC 9400F
VersaFlow Coriolis 1000	TWC 9400C	TWC 9400F
VersaFlow Coriolis 6000	TWC 9400C	TWC 9400F
VersaFlow Coriolis 200	TWC 9400C	TWC 9400F

Measuring principle

The signal converter has been designed to work with all the measuring tube designs used in the mass flowmeters. For information regarding the measuring principle for a specific measuring tube design, please refer to the technical documentation of the relevant flow sensor.

Technical Data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website.

Measuring system

Table 2

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

Design

Table 3

Modular construction	The measuring system consists of a flow sensor and a signal converter.
Flow sensor	
VersaFlow Coriolis 100	DN15...50/ 1/2...2"
VersaFlow Coriolis 1000	DN04 & 80 / 1/8...3"
VersaFlow Coriolis 6000	DN06...200 / 1/4... 8"
VersaFlow Coriolis 200	DN100 / 4"
	All flow sensors are also available in an Ex-version.
Signal Converter	
Compact version (C)	TWC9400C
Field housing (F) – remote version	TWC9400F
	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	Universal concentration measurement, °Brix, °Baume, °Plato, alcohol concentration, NaOH and API density
Communication interfaces	HART® & Modbus

Table 4

Display and User interface	
Graphic display	LC display, backlit white.
	Size: 128x64 pixels, corresponds to 59x31mm = 2.32"x1.22"
	Display can be turned in 90° steps
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Operating elements	4 push button/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))
	All DTMs and drivers are available free of charge from the manufacturer's website.

Table 5

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)
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: VDI / NAMUR / WIB 2650 and NE107
	Status messages: Output of status messages optional via display, current and/or status output, HART® or bus interface
	Sensor and sensor electronics diagnosis: Sensor signal integrity, sensor and drive coils diagnostics, measurement channels check, comparison of internal signals with references, drive circuit integrity, process temperature, CPU diagnostics, process temperature circuit monitoring, internal data integrity check, redundant calibration
	Signal converter and inputs/outputs: Data bus monitoring, current output connections, current readback with redundant calibration, factory calibration integrity, electronics temperature, CPU diagnostics, voltage monitoring

Measuring accuracy

Table 6

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Pressure: 1 bar / 14.5 psi
Maximum measuring error	Refer to technical data for the flow sensor.

Operating conditions

Table 7

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.
	Die-cast aluminium housing: -40...+60°C/ -40...+140°F
	Stainless Steel housing: -40...+60°C/ -40...+140°F
	Ambient temperatures below -25°C / -13°F, may affect the readability of the display.
Storage temperature	-40...+70°C/ -40...+158°F

Operating Conditions Table 7 cont'd.

Pressure	
Medium	Refer to technical data for the measuring sensor.
Ambient pressure Atmosphere	Atmospheric
Chemical properties	
Physical condition	Liquids, gases and slurries
Flow rate	Refer to technical data for the measuring sensor.
Other conditions	
Ingress protection acc. to IEC529/ EN60529	IP66/67 (acc. to NEMA4/4X)

Installation conditions

Table 8

Installation	For detailed information, refer to chapter "Installation conditions".
Dimensions and weights	For detailed information refer to chapter "Dimensions and weights".

Materials

Table 9

Signal converter housing	Standard: die-cast aluminium (polyurethane coated)
	Option: stainless steel 316 (1.4408)
Flow sensor	For housing material, process connections, measuring tubes, accessories and gaskets, refer to technical data for the flow sensor

Electrical connection

Table 10

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%)
Power consumption	AC: 22 VA DC: 12 W
Signal cable	Only for remote versions. 10 core shielded cable. Detailed specifications available on request. Length: max. 20 m / 65.6 ft
Cable entries Standard:	Standard: M20 x 1.5 (8...12 mm) Option: ½" NPT, PF ½

Inputs and outputs

Table 11

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 abbreviations	U _{ext} = external voltage; R _L = load + resistance; U ₀ = terminal voltage; I _{nom} = nominal current Safety limit values (Exi): U _i = max. input voltage; I _i = max. input current; P _i = max. input power rating; C _i = max. input capacity; L _i = max. input inductivity

Current output

Table 12

Output data	Volume flow, mass flow, temperature, density, flow velocity, diagnostic values, 2-phase signal	
	Concentration and concentration flow are also possible with available concentration measurement (optional).	
Resolution	<1µA	
Uncertainty	±5µA	
Temperature coefficient	Typically ±30ppm/K	
Settings	Without HART®	
	Q = 0%: 0...20mA; Q = 100%: 10...20mA	
	Alarm signal: selectable 0...22mA	
	With HART®	
	Q = 0%: 4...20mA; Q = 100%: 10...20mA	
	Alarm signal: selectable 3...22mA	
Operating data	Modular I/Os	Ex i
Active	U _{int, nom} = 24VDC I ≤ 22mA R _L ≤ 1kΩ	U _{int, nom} = 20 VDC I ≤ 22 mA R _L ≤ 450 Ω
		U ₀ = 21V I ₀ = 90 mA P ₀ = 0.5 W C ₀ = 90 nF / L ₀ = 2 mH C ₀ = 110 nF / L ₀ = 0.5 mH
Passive	U _{ext} ≤ 30 VDC I ≤ 22 mA U ₀ ≥ 1.8 V R _L ≤ (U _{ext} - U ₀) / I _{max}	U _{ext} ≤ 32 VDC I ≤ 22 mA U ₀ ≥ 4 V R _L ≤ (U _{ext} - U ₀) / I _{max}
		U _i = 30 V I _i = 100 mA P _i = 1 W C _i = 10 nF L _i ~ 0 mH

Table 13

HART®	
Description	HART® protocol via active and passive current output
	HART® version: V7
	Universal HART® parameter: completely integrated
Load	≥250Ω at HART® test point; Note maximum load for current output!
Multi-Drop operation	Disabled loop current mode, output current = 0%, e.g. 4mA
	Multi-Drop address adjustable in operation menu 0...63
Device drivers	Available for FC 375/475, AMS, PDM, FDT/DTM
Registration (HART Communication Foundation)	Yes
Pulse output or frequency output	
Output data	Pulse output: volume flow, mass flow, mass or volume of dissolved substance during activated concentration measurement
	Frequency output: flow velocity, mass flow, temperature, density, diagnostic value Optional: concentration, flow of the dissolved substance
Function	Can be set as a pulse output 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: adjustable as automatic, symmetric or fixed (0.05...2000ms)

Table 13 cont'd

Operating data	Modular I/Os	Ex i
Active	$U_{nom} = 24 \text{ VDC}$ f_{max} in operating menu set to $f_{max} \leq 100 \text{ Hz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 24 \text{ V}$ at $I = 20 \text{ mA}$	-
	f_{max} in operating menu set to $100 \text{ Hz} <$ $f_{max} \leq 10 \text{ kHz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 22.5 \text{ V}$ at $I = 1 \text{ mA}$ $U_{0, nom} = 21.5 \text{ V}$ at $I = 10 \text{ mA}$ $U_{0, nom} = 19 \text{ V}$ at $I = 20 \text{ mA}$	
Passive	$U_{ext} \leq 32 \text{ V DC}$ f_{max} in operating menu set to $f_{max} \leq 100 \text{ Hz}$: $I \leq 100 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$ closed: $U_{0, max} = 0.2 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, max} = 2 \text{ V}$ at $I \leq 100 \text{ mA}$	
	f_{max} in operating menu set to $100 \text{ Hz} <$ $f_{max} \leq 10 \text{ kHz}$: $I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ at $U_{ext} = 32 \text{ VDC}$ closed: $U_{0, max} = 1.5 \text{ V}$ at $I \leq 1 \text{ mA}$ $U_{0, max} = 2.5 \text{ V}$ at $I \leq 10 \text{ mA}$ $U_{0, max} = 5.0 \text{ V}$ at $I \leq 20 \text{ mA}$	
NAMUR	Passive to EN60947-5-6: $U_{ext} = 8.2 \text{ V} \pm 0.1 \text{ V DC}$ $R = 1 \text{ k} \Omega \pm 10 \Omega$ open: $I_{nom} = 0.6 \text{ mA}$ closed: $I_{nom} = 3.8 \text{ mA}$	Passive to EN60947-5-6: open: $I_{nom} = 0.43 \text{ mA}$ closed: $I_{nom} = 4.5 \text{ mA}$
		$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$

Table 14

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)	
Damping		
Function	The time constant corresponds to the elapsed time until 63% of the end value has been reached according to a step function.	
Settings	Set in increments of 0.1seconds.	
	0...100seconds	
Status output / limit switch		
Function and settings	Adjustable as automatic measuring range conversion, display of flow direction, overflow, error or switching point.	
	Valve control with activated dosing function	
	Status and/or control: ON or OFF	
Operating data	Modular I/Os	Ex i
Active	$U_{int} = 24 \text{ V DC}$	-
	$I \leq 20 \text{ mA}$ open: $I \leq 0.05 \text{ mA}$ closed: $U_{0, nom} = 24 \text{ V at } I = 20 \text{ mA}$	
Passive	$U_{ext} \leq 32 \text{ V DC}$ $I \leq 100\text{mA}$ $R_{L, max} = 47 \text{ k } \Omega$ $R_{L, min} = (U_{ext}-U_0) / I_{max}$ open: $I \leq 0.05 \text{ mA at } U_{ext} = 32 \text{ VDC}$ closed: $U_{0, max} = 0.2 \text{ V at } I \leq 10 \text{ mA}$ $U_{0, max} = 2 \text{ V at } I \leq 100 \text{ mA}$	-
NAMUR	Passive to EN60947-5-6 $U_{ext}=8.2 \text{ V } \pm 0.1 \text{ VDC}$ $R = 1 \text{ k}\Omega \pm 10\Omega$ open: $I_{nom} = 0.6 \text{ mA}$ closed: $I_{nom} = 3.8 \text{ mA}$	Passive to EN60947-5-6 open: $I_{nom} = 0.43\text{mA}$ closed: $I_{nom} = 4.5\text{mA}$
		$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i = 0 \text{ mH}$

Table 15

Control input		
Function	Hold value of the outputs (e.g. for cleaning work), set value of the outputs to "zero", counter and error reset, stop counter, range conversion, zero calibration	
	Start of dosing when dosing function is activated.	
Operating data	Modular I/Os	Ex i
Active	$U_{int} = 24 \text{ V DC}$ $I \leq 20 \text{ mA}$ External contact open: $U_{0, nom} = 22 \text{ V}$ External contact closed: $I_{nom} = 4 \text{ mA}$ Contact open (off): $U_0 \geq 12 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$ Contact closed (on): $U_0 \leq 10 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$	-
Passive	$3 \text{ V} \leq U_{ext} \leq 32 \text{ VDC}$ $I_{max} = 9.5 \text{ mA}$ at $U_{ext} \square\square 24 \text{ V}$ $I_{max} = 9.5 \text{ mA}$ at $U_{ext} \square\square 32 \text{ V}$ Contact closed (on): $U_0 \geq 3 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$ Contact open (off): $U_0 \leq 2.5 \text{ V}$ with $I_{nom} = 1.9 \text{ mA}$	$U_{ext} \leq 32 \text{ VDC}$ $I \leq 6 \text{ mA}$ at $U_{ext} = 24 \text{ V}$ $I \leq 6.5 \text{ mA}$ at $U_{ext} = 32 \text{ V}$ On: $U_0 \geq 5.5 \text{ V}$ with $I \geq 4 \text{ mA}$ Off: $U_0 \leq 3.5 \text{ V}$ with $I \leq 0.5 \text{ mA}$
		$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1 \text{ W}$ $C_i = 10 \text{ nF}$ $L_i = 0 \text{ mH}$
NAMUR	Active to EN 60947-5-6 Terminals open: $U_{0, nom} = 8.7 \text{ V}$ Contact closed (on): $U_{0, nom} = 6.3 \text{ V}$ with $I_{nom} > 1.9 \text{ mA}$ Contact open (off): $U_{0, nom} = 6.3 \text{ V}$ with $I_{nom} < 1.9 \text{ mA}$ 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 $I \geq 6.7 \text{ mA}$	

Table 16

Modbus	
Description	Modbus RTU, Master/Slave, RS485
Address range	1...247
Supported function codes	01, 03, 04, 05, 08, 16, 43
Supported Baud rate	1200, 2400, 3600, 4800, 9600, 19200, 38400, 57600, 115200 Baud

Example for Combination of I/O's

Modular I/O Position

1	2	3	1	2	3	1	2	3	1	2	3
4	8	8	6	8	8	7	8	8	8	8	8
		C			E			F			C
		A			8			A			8
	A	8		A	8		A	8		B	8
		A			A			A			B
		C			E			F			C
		G			K			H			G
	C	C		E	E		F	F		C	C
		G			K			H			G

Modular I/O Position

1	2	3	1	2	3
B	8	8	C	8	8
		E			F
		B			8
	B	8		B	8
		B			B
		E			F
		K			H
	E	E		F	F
		K			H

Modbus Position

1	2	3
G	8	8
	A	8
		A
		C
		K
	C	8
		C
		K

Approvals and certificates

Table 17

CE	This device fulfils the statutory requirements of the relevant EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.
	For full information of the EU directives & standards and the approved certifications, please refer to the CE declaration or the manufacturer website
Non-Ex	Standard
Functional safety acc. to EN 61508	Depends on I/O variant and flow sensor. For detailed information refer to the "Safety manual".
Hazardous areas	
Option (C version only)	
ATEX	II 1/2 (1) G - Ex d ia [ia Ga] IIC T6 Ga/Gb
	II 1/2 (1) G - Ex de ia [ia Ga] IIC T6...T1 Ga/Gb
	II 2 (1) G - Ex d ia [ia Ga] IIC T6...T1 Gb
	II 2 (1) G - Ex de ia [ia Ga] IIC T6...T1 Gb
	II 2 (1) D - Ex t [ia Da] IIIC Txxx Db
	II 1/2 G - Ex d ia IIC T6...T1 Ga/Gb; II 1/2 G - Ex de ia IIC T6...T1 Ga/Gb
	II 2 G - Ex d ia IIC T6...T1 Gb; II 2 G - Ex de ia IIC T6...T1 Gb
	II 2 D - Ex t IIIC Txxx°C Db
Option (F version only)	
ATEX	II 2 (1) G - Ex d [ia Ga] IIC T6 Gb
	II 2 (1) G - Ex de [ia Ga] IIC T6 Gb
	II 2 (1) D - Ex t [ia Da] IIIC T75°C Db
	II 2 G - Ex d [ia] IIC T6 Gb; II 2 G - Ex de [ia] IIC T6 Gb
	II 2 D - Ex t IIIC T75 Db
Option	
FM / CSA	FM: Class I, Div 1 groups A, B, C, D
	CSA: Class I, Div 1 groups C, D
	Class II, Div 1 groups E, F, G
	Class III, Div 1 hazardous areas
	FM: Class I, Div 2 groups A, B, C, D
	CSA: Class I, Div 2 groups C, D
	Class II, Div 2 groups E, F, G
	Class III, Div 2 hazardous areas
IECEX	Ex zone 1 + 2
Custody transfer	
Without	Standard
With (OIML R117-1)	Specials
Other standards and approvals	
Vibration resistance	IEC EN 60068-2-6 10 cycles 10-150-10 Hz with: 0.15 mm for 10-60 Hz and 20 m/s ² for 60-150 Hz
NAMUR	NE 21, NE 43, NE 53, NE 107

Dimensions and Weights

Housing

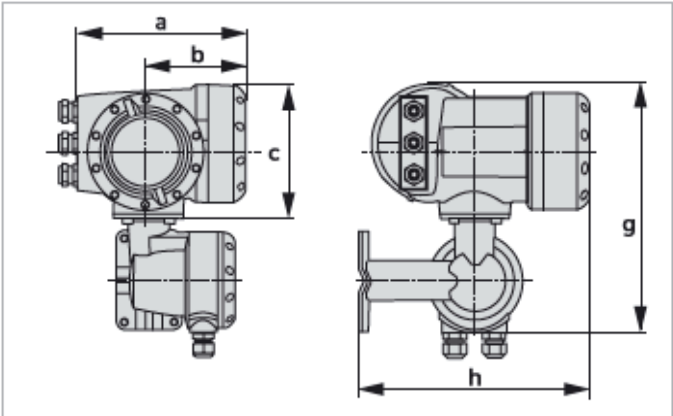


Figure 4 - Dimensions for field housing (F) - remote version

Dimensions [mm / inch]					Weight [kg / lb]
a	b	c	g	h	
202 / 7.75	120 / 4.75	155 / 6.10	295.8 / 11.60	277 / 10.90	5.7 / 12.60

Mounting plate, field housing

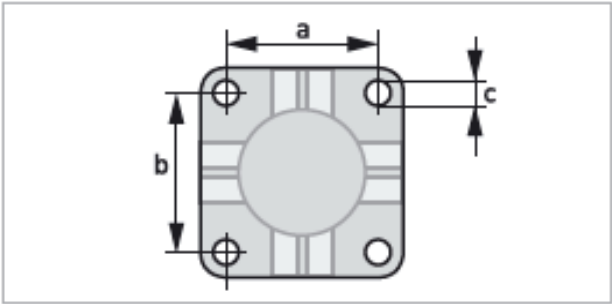


Figure 5

Dimensions in mm and inch

	[mm]	[inch]
a	72	2.8
b	72	2.8
c	Ø9	Ø0.4

Intended use

The mass flowmeters are designed exclusively to directly measure mass flow rates, product density and temperature as well to indirectly measure parameters such as the total volume and concentration of dissolved substances as well as the volume flow rate.

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

If the device is not used according to the operating conditions (refer to chapter Technical data), the intended protection could be affected.

This device is a Group 1, Class A device as specified within CISPR11:2009. It is intended for use in industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

Installation specifications

The following precautions must be taken to ensure reliable installation.

- Make sure that there is adequate space to the sides.
- Protect the signal converter from direct sunlight and install a sun shade if necessary.
- Signal converters installed in control cabinets require adequate cooling, e.g. by fan or heat exchanger.
- Do not expose the signal converter to intense vibrations. The measuring devices are tested for a vibration level as described in chapter "Technical data".

Mounting of the compact version

Turning the housing of the compact version is not permitted.

- The signal converter is mounted directly on the flow sensor. For installation of the flowmeter, please observe the instructions in the supplied product documentation for the flow sensor.

Mounting the field housing, remote version

Remarks for sanitary applications

- To prevent contamination and dirt deposits behind the mounting plate, a cover plug must be installed between the wall and the mounting plate.
- Pipe mounting is not suitable for sanitary applications!

Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

Pipe mounting

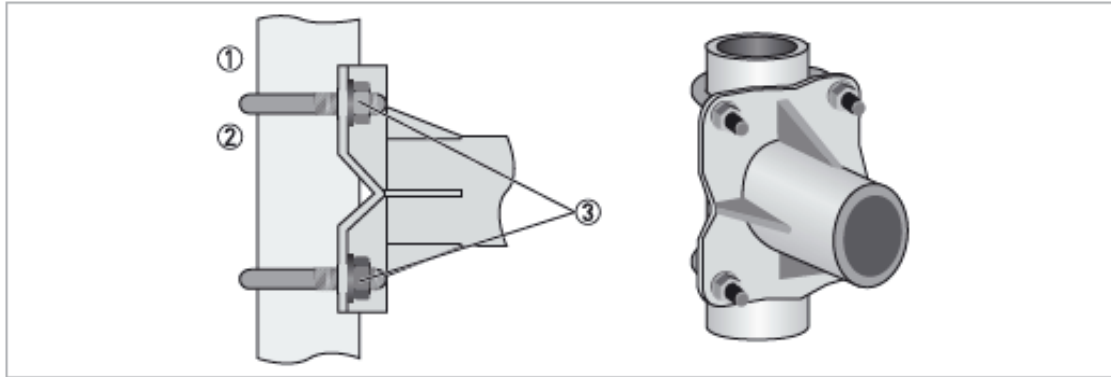


Figure 6 - Pipe mounting of the field housing

1. Fix the signal converter to the pipe.
2. Fasten the signal converter using standard U-bolts and washers.
3. Tighten the nuts.

Wall mounting

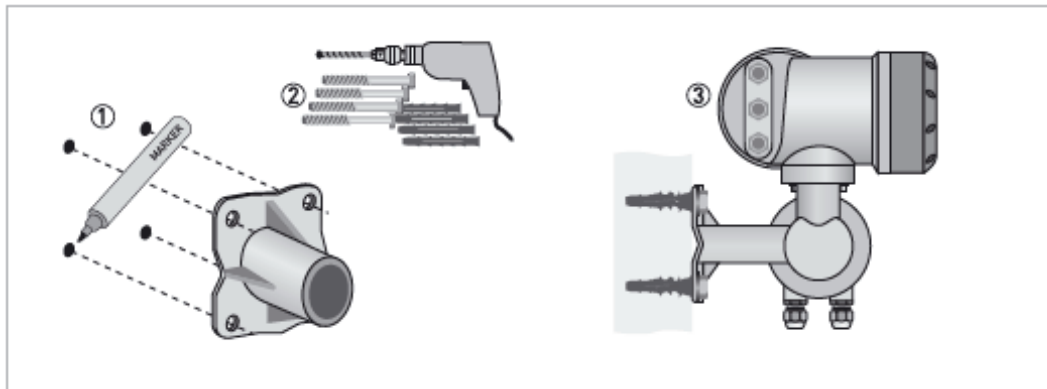
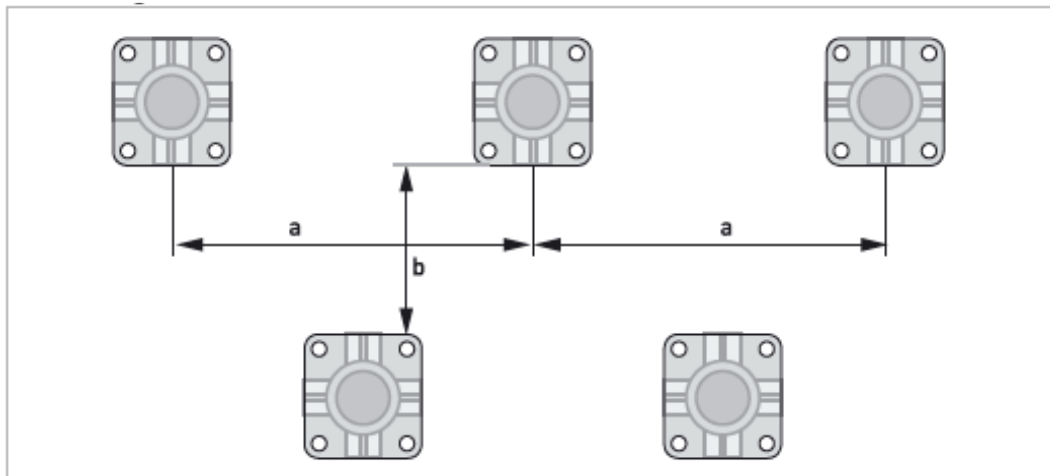


Figure 7 - Wall mounting of the field housing

1. Prepare the holes with the aid of the mounting plate. For further information refer to Mounting plate, field housing on page 11.
2. Fasten the mounting plate securely to the wall.
3. Screw the signal converter to the mounting plate with the nuts and washers.

**Figure 8**

- $a \geq 600\text{mm} / 23.6''$
- $b \geq 250\text{mm} / 9.8''$

Safety instructions

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

Observe the national regulations for electrical installations!

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

Connection diagram

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

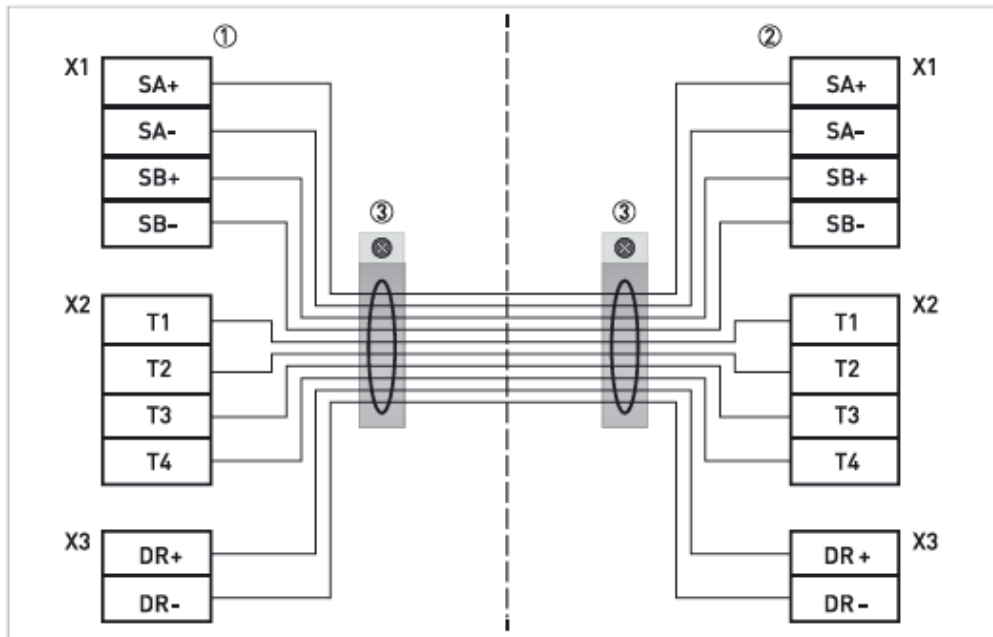


Figure 9 - Connection diagram

1. Terminal compartment for signal converter
2. Terminal compartment for flow sensor
3. Connect shielding to spring terminal (drain wire and overall shield)

Cable	Cable	Connection terminal
Cable pair	Colour	
1	yellow	X1 SA+
1	black	X1 SA-
2	green	X1 SB+
2	black	X1 SB-
3	blue	X2 T1
3	black	X2 T2
4	red	X2 T3
4	black	X2 T4
5	white	X3 DR+
5	black	X3 DR-

Grounding the flow sensor

There should be no difference in potential between the flow sensor and the housing or protective earth of the signal converter!

- The flow sensor must be properly grounded.
- The grounding cable should not transmit any interference voltages.
- Do not use the grounding cable to connect more than one device to ground.
- The flow sensors are connected to ground by means of a functional grounding conductor FE.
- In hazardous areas, grounding is used at the same time for equipotential bonding. Additional grounding instructions are provided in the supplementary "Ex documentation", which are only supplied together with hazardous area equipment.

Connecting power - all housing variants

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

- The protection category depends on the housing versions (IP65...67 to IEC529 / EN60529 or NEMA4/4X/6).
- The housings of the devices, which are designed to protect the electronic equipment from dust and moisture, should be kept well closed at all times. Creepage distances and clearances are dimensioned to VDE0110 and IEC664 for pollution severity 2. Supply circuits are designed for overvoltage category III and the output circuits for overvoltage category II.
- Fuse protection ($I_N \leq 16\text{ A}$) for the infeed power circuit, as well as a separator (switch, circuit breaker) to isolate the signal converter must be provided close to the device. The separator must be marked as the separator for this device.

100...230VAC (tolerance range: -15% / +10%)

- Note the power supply voltage and frequency (50...60Hz) on the nameplate.
- The protective ground terminal PEPEPEPE of the power supply must be connected to the separate U-clamp terminal in the terminal compartment of the signal converter

240VAC + 5% is included in the tolerance range.

24VDC (tolerance range: -55% / +30%)

- Note the data on the nameplate!
- For measurement process reasons, a functional ground FEFEFEFE must be connected to the separate U-clamp terminal in the terminal compartment of the signal converter.
- When connecting to functional extra-low voltages, provide a facility for protective separation (PELV) (acc. to VDE0100 / VDE0106 and/or IEC364 / IEC536 or relevant national regulations).

For 24VDC, 12VDC - 10% is included in the tolerance range.

Power supply connection

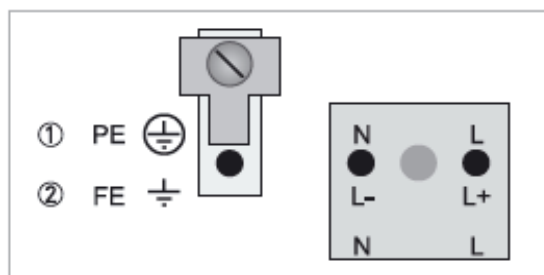


Figure 11

1. 100...230VAC (-15% / +10%), 22VA
2. 24VDC (-55% / +30%), 12W

Inputs and outputs, overview

Combinations of the inputs/outputs (I/Os)

This signal converter is available with various input/output combinations.

Modular version

- Depending on the task, the device can be configured with various output modules.

Exi version

- Depending on the task, the device can be configured with various output modules.
- Current outputs can be active or passive.

Bus systems

- The device allows intrinsically safe and non intrinsically safe bus interfaces in combination with additional modules.
- For connection and operation of bus systems, note the supplementary instructions.

Ex option

- For hazardous areas, all of the input/output variants for the housing designs C and F can be delivered with terminal compartment in Exd (pressure-resistant casing) or Exe (increased safety).
- For connection and operation of Ex devices, note the supplementary instructions.

Sales and Service

For application assistance, current specifications, ordering, pricing, and name of the nearest Authorized Distributor, contact one of the offices below.

ASIA PACIFIC

Honeywell Process Solutions,
Phone: + 800 12026455 or
+44 (0) 1202645583

(TAC) hfs-tac-support@honeywell.com

Australia

Honeywell Limited
Phone: +(61) 7-3846 1255
FAX: +(61) 7-3840 6481
Toll Free 1300-36-39-36
Toll Free Fax:
1300-36-04-70

China – PRC - Shanghai

Honeywell China Inc.
Phone: (86-21) 5257-4568
Fax: (86-21) 6237-2826

Singapore

Honeywell Pte Ltd.
Phone: +(65) 6580 3278
Fax: +(65) 6445-3033

South Korea

Honeywell Korea Co Ltd
Phone: +(822) 799 6114
Fax: +(822) 792 9015

EMEA

Honeywell Process Solutions,
Phone: + 800 12026455 or
+44 (0) 1202645583

Email: (Sales)

FP-Sales-Apps@Honeywell.com

or

(TAC)

hfs-tac-support@honeywell.com

Web

Knowledge Base search
engine <http://bit.ly/2N5Vldi>

AMERICAS

Honeywell Process Solutions,
Phone: (TAC) (800) 423-9883
or (215) 641-3610
(Sales) 1-800-343-0228

Email: (Sales)

FP-Sales-Apps@Honeywell.com

or

(TAC)

hfs-tac-support@honeywell.com

Web

Knowledge Base search
engine <http://bit.ly/2N5Vldi>

Specifications are subject to change without notice.

For more information

To learn more about VersaFlow,
visit <https://process.honeywell.com>
Or contact your Honeywell Account Manager

Process Solutions

Honeywell
1250 W Sam Houston Pkwy S
Houston, TX 77042

Honeywell Control Systems Ltd
Honeywell House, Skimped Hill Lane
Bracknell, England, RG12 1EB

Shanghai City Centre, 100 Jungi Road
Shanghai, China 20061

<https://process.honeywell.com>

www.fluidic-ltd.co.uk



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