VERSAFLOW VORTEX 200 Supplementary Instructions

Vortex flowmeter

Equipment category II 2 G and II 2 D, EPL Gb and Db
in protection type "Flameproof enclosure" Ex d and
in protection type "Increased safety" Ex e and
in protection type "Equipment - dust ignition protection by enclosure" Ex t

Honeywell

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1.1 General notes

This additional instruction applies to explosion-protected versions of vortex flowmeters with protection type flameproof enclosure "d", increased safety "e" and equipment dust-ignition protection through enclosure "t", equipment protection level EPL Gb and EPL Db.
It completes the standard manual for the non-explosion protected versions.

The information given in this instruction contains only the data relevant to explosion protection. The technical details given in the manual for the non-explosion protected versions remain unchanged unless they will be excluded or replaced by this instruction.

1.2 EU conformity

The manufacturer declares with the EU declaration of conformity on his own responsibility conformity with the protection goals of directive 2014/34/EU for use in hazardous areas with gas and dust.

The EU declaration of conformity for the equipment category II 2 G and II 2 D is based on the EU type examination certificate:

KIWA 18 ATEX 0035X

The "X" after the certificate number refers to special conditions for safe use of the device, which have been listed in these instructions.

1.3 Approval according to the IECEx scheme

Conformity for use in hazardous areas with gas and dust was tested in accordance with the "IECEx Certification Scheme for Explosive Atmospheres" according to
IEC 60079-0:2011, IEC 60079-1:2014, IEC 60079-7:2006, IEC 60079-11:2011 and
IEC 60079-31:2013.

The number of the IECEx certificate is:

IECEx KIWA 18.0016X

The "X" after the certificate number refers to special conditions for safe use of the device, which have been listed in these instructions.
If needed, the IECEx certificate can be downloaded from the manufacturer's website.

1.4 Safety instructions

If these instructions are not followed, there is a risk of explosion.

Assembly, installation, start-up and maintenance may only be performed by personnel trained in explosion protection!

CAUTION!
Operating conditions and place of installation may require compliance with additional standards, directives or laws. The responsibility for compliance rests solely with the operator or his agent.

2.1 Device description

Vortex flowmeters measure and display the flow of flammable and non-flammable gases and liquids. The signal converter includes either a 4...20 mA signal output with optional HART® communication or a bus connection. There are bus connections available for connecting to a Foundation Fieldbus or Profibus PA. Signal converters with signal output have a separate binary output and a separate current input.

The VersaFlow Vortex 200 remote version consists of the VersaFlow Vortex 200F flow sensor and the TWV 9200...-Ex signal converter.

2.2 Marking

The marking of the devices in accordance with the description code is shown on the nameplates below. On both the compact devices and the remote versions, the main plate is located on the signal converter housing. On the remote versions there is an additional marking on the flow sensor.

Compact versions with two signal converters for dual measurement (dual version) are each marked with a nameplate, which is attached to each of the signal converter housings.
The details relevant to explosion protection are identical on both nameplates.

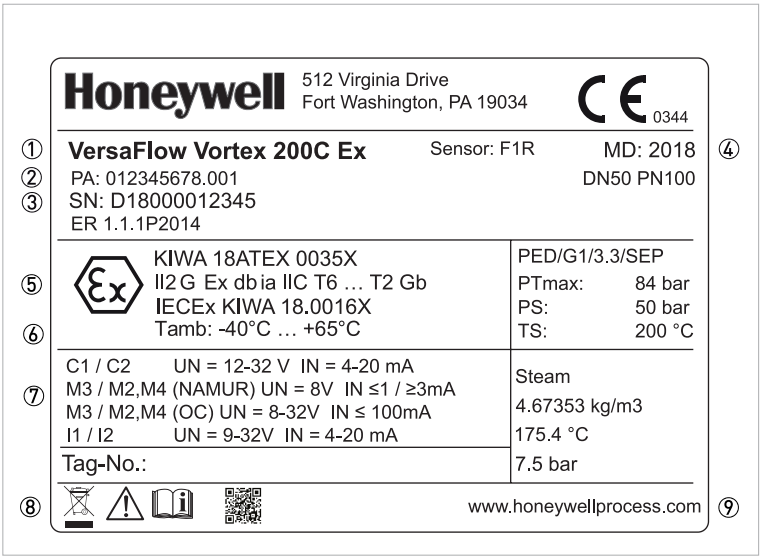


Figure 2-1: Example of a nameplate for the compact version

① Device version VersaFlow Vortex 200 C
② Production order number
③ Serial number
④ Year of manufacture
⑤ Marking according to KIWA 18 ATEX 0035X and IECEx KIWA 18.0016X
⑥ Permissible ambient temperature range
⑦ Electrical connection data
⑧ Safety instructions, disposal and data matrix
⑨ Internet address of the manufacturer

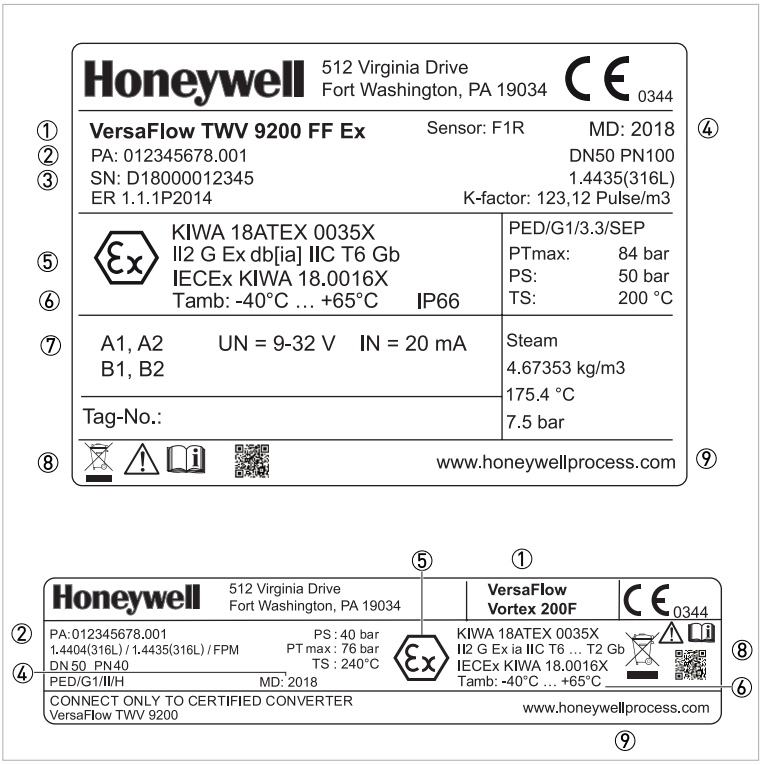


Figure 2-2: Example of nameplates for the remote version

① Device version TWV 9200... -Ex / VersaFlow Vortex 200F
② Production order number
③ Serial number
④ Year of manufacture
⑤ Marking according to KIWA 18 ATEX 0035X and IECEx KIWA 18.0016X
⑥ Permissible ambient temperature range
⑦ Electrical connection data
⑧ Safety instructions, disposal and data matrix
⑨ Internet address of the manufacturer

2.3 Flammable products

Atmospheric conditions:

The standard atmospheric conditions under which it may be assumed that Ex equipment can be operated are:

- Temperature: -20...+60°C / -4...+140°F
- Pressure: 80...110 kPa (0.8...1.1 bar) / 11.6...15.9 psi
- Air with normal oxygen content, typically 21%v/v

Ex equipment operating outside the standard temperature range must be tested and certified (e.g. for ambient temperature range -40...+65°C / -40...+149°F).
Ex equipment operating outside the standard atmospheric pressure range and standard oxygen content is not permitted.

Operating conditions:

Vortex flowmeters operate outside the standard atmospheric pressure range, which means that explosion protection, regardless of the zone assignment, is fundamentally not applicable for the measuring unit (piping).

CAUTION!
Operation with flammable products is only permitted as long as no explosive fuel/air mixture builds up inside of the piping at the same time the atmospheric conditions are exceeded.

The operator is responsible to ensure that the flowmeter is operated safely in terms of the temperature and pressure of the products used. In case of operation with flammable products the measuring units must be included in the periodic pressure tests of the piping.

2.4 Equipment category

Vortex flowmeters are designed in category II 2 G / II 2 D or EPL Gb and EPL Db according to EN 60079-0, EN 60079-1 and EN 60079-31 for use in zone 1 or zone 21. The inside of the measuring unit is also approved for zone 1.

Vortex flowmeters are designed according to the "IECEx-Scheme" according to "Equipment Protection Level [EPL] Gb or [EPL] Db".

INFORMATION!
Definition of zone 1 according to EN 1127-1, Appendix B:
An area in which an explosive atmosphere, as a result of the mixture of flammable substances in the form of gas, steam or mist with air, under normal operation may occasionally occur.

Definition of zone 21 according to EN 1127-1, Appendix B:
An area in which an explosive atmosphere may occasionally occur in the form of a cloud of flammable dust in the air under normal operation.

2.5 Types of protection

Electronics compartment	**Ex db (Gb) or Ex tb (Db)**
Terminal compartment	**either Ex db or Ex eb (Gb) or Ex tb (Db)**
Flow sensor	**Ex ia (Gb or Db)**

Table 2-1: Used types of protection

ATEX	**II 2 G**	**Ex db ia IIC T6...T2 Gb** or **Ex db eb ia IIC T6...T2 Gb**
IECEx	**Ex db ia IIC T6...T2 Gb** or **Ex db eb ia IIC T6...T2 Gb**	

Table 2-2: Marking for the flameproof version of compact versions

ATEX	**II 2 G**	**Ex db [ia] IIC T6 Gb** (signal converter) or **Ex db eb [ia] IIC T6 Gb**
	II 2 G	**Ex ia IIC T6...T2 Gb** (flow sensor)
IECEx	**Ex db [ia] IIC T6 Gb** (signal converter) or **Ex db eb [ia] IIC T6 Gb**	
	Ex ia IIC T6...T2 Gb (flow sensor)	

Table 2-3: Marking for the flameproof version of remote versions

ATEX	**II 2 D**	**Ex tb ia IIIC T70°C...T240°C Db**
IECEx	**Ex tb ia IIIC T70°C...T240°C Db**	

Table 2-4: Marking for the dustproof version of compact versions

ATEX	**II 2 D**	**Ex tb [ia] IIIC T70°C Db** (signal converter)
	II 2 D	**Ex ia IIIC T70°C...T240°C Db** (flow sensor)
IECEx	**Ex tb [ia] IIIC T70°C Db** (signal converter)	
	Ex ia IIIC T70°C...T240°C Db (flow sensor)	

Table 2-5: Marking for the dustproof version of remote versions

The marking contains the following information:

II	Explosion protection, group II
2	Equipment category 2
G	Gas explosion protection
D	Dust ignition protection
Ex db	Protection type "Flameproof enclosure"
Ex eb	Protection type "Increased safety"
Ex tb	Protection type "Equipment - dust ignition protection by enclosure"
Ex ia	Protection type "Intrinsic safety", protection level "ia" (flow sensor, compact device)
Ex [ia]	Protection type "Intrinsic safety", protection level "ia" (flow sensor circuit, remote version)
IIC	Gas group, suitable for gas groups IIC, IIB and IIA
IIIC	Dust group, suitable for groups IIIC, IIIB and IIIA
T6...T2	Temperature class range, suitable for temperature class T1...T6
T70°C	Maximum surface temperature of the signal converter housing without dust coating at ambient temperature 65°C / 149°F and product temperature 65°C / 149°F
T70°C...T240°C	Maximum surface temperature of the flow sensor housing without dust coating at ambient temperature 65°C / 149°F (is determined by the product temperature)
Gb	EPL, suitable for zone 1 and zone 2
Db	EPL, suitable for zone 21 and zone 22

Table 2-6: Description of the marking

2.6 Ambient temperature / temperature classes

Because of the influence of the temperature of the product, no fixed temperature class is assigned to vortex flowmeters. The temperature class of these devices is rather a function of the product temperature and ambient temperature that is present and the specific device version. The classification is outlined in the following tables.

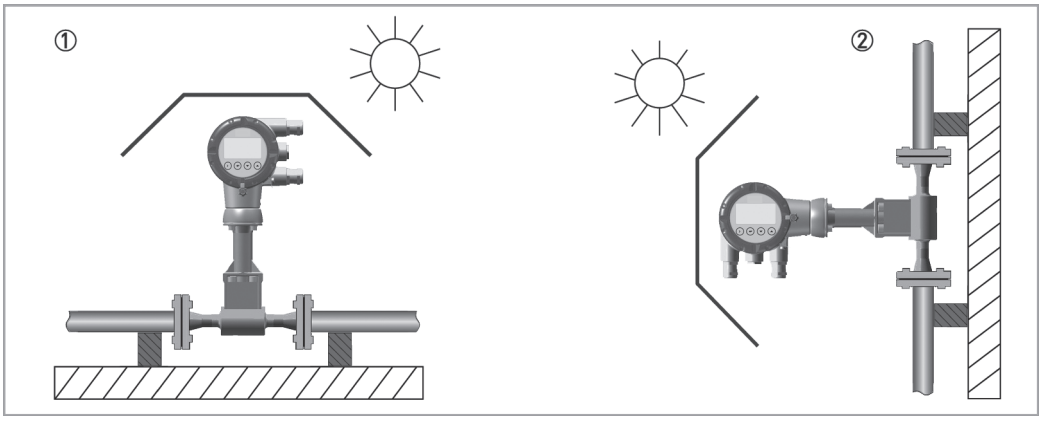
The tables take into account the following parameters:

- Ambient temperature T_{amb}
- Product temperature T_m
- Nominal size DN
- Heat resistance of the connecting cable

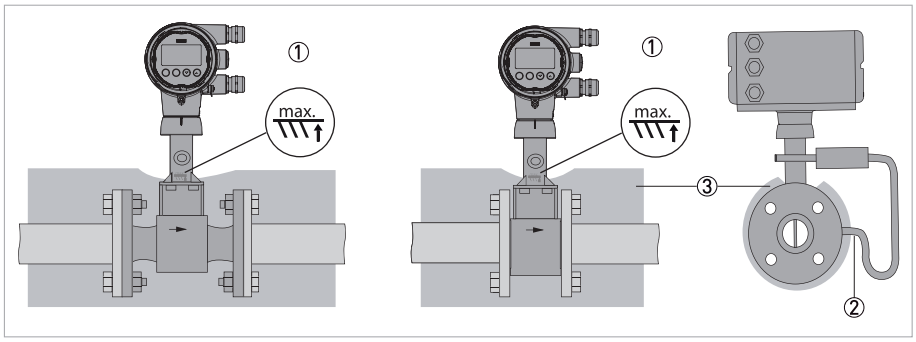
INFORMATION!

The maximum permissible product temperatures listed in the tables are valid under the following conditions:

- *The measuring device is installed and operated in accordance with the manufacturer's installation instructions.*
- *It must be ensured that the flowmeter is not heated by the effects of additional heat radiation (sunshine, neighbouring system components) and thus operated above the permissible ambient temperature range.*



- *Insulation must be limited to the piping. Unobstructed ventilation of the signal converter must be ensured.*



The permitted ambient temperature range is indicated on the nameplate; depending on the device version it is T_{amb} = -40...+65°C / -40...+149°F.

The minimum product temperature is -40°C / -40°F.

When using in zone 21, observe the maximum permissible product and ambient temperatures for temperature class 2 and the information for use of a heat-resistant connecting cable and cable entry.

Max. permissible product and ambient temperatures with signal converter or connection box mounted above the flow sensor

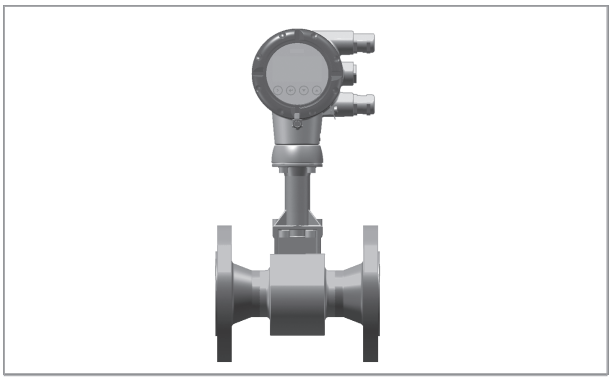


Figure 2-3: Signal converter above the flow sensor

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °C	60	65	60	65	60	65	40	60	65	40	60	65
Nominal size												
DN15…25	80	65	100	100	135	135 ①	200	200 ①	165 ①	240	200 ①	165 ①
DN40…50	80	65	100	100	135	135 ①	200	175 ①	150 ①	240	175 ①	150 ①
DN65…100	80	65	100	100 ①	135 ①	130 ①	200	150 ①	130 ①	235 ①	150 ①	130 ①
DN150...300	75	65	100	100	135	135 ①	200	185 ①	155 ①	240	185 ①	155 ①

Table 2-7: Temperature class in °C

① Permanent service temperature of connecting cable and cable entry min. 80°C

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °F	140	149	140	149	140	149	104	140	149	104	140	149
Nominal size												
DN15…25	176	149	212	212	275	275 ①	392	392 ①	329 ①	464	392 ①	329 ①
DN40…50	176	149	212	212	275	275 ①	392	347 ①	302 ①	464	347 ①	302 ①
DN65…100	176	149	212	212 ①	275 ①	266 ①	392	302 ①	266 ①	455 ①	302 ①	266 ①
DN150...300	167	149	212	212	275	275 ①	392	365 ①	311 ①	464	365 ①	311 ①

Table 2-8: Temperature class in °F

① Permanent service temperature of connecting cable and cable entry min. 176°F

Max. permissible product and ambient temperatures with signal converter or connection box mounted at side or underneath the flow sensor

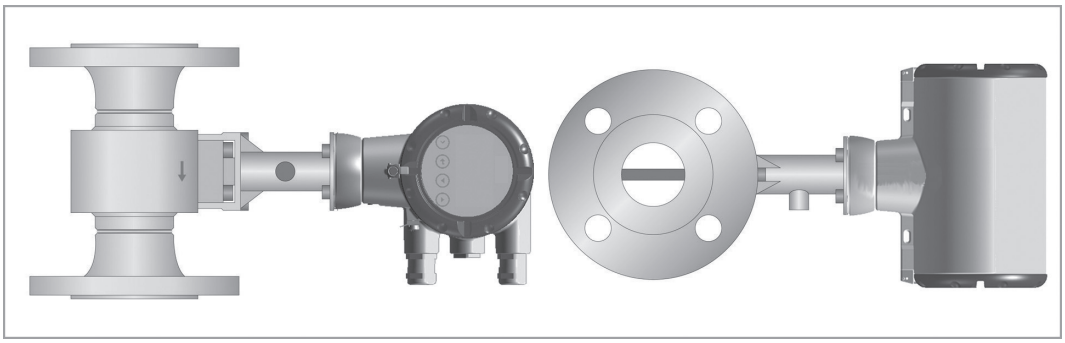


Figure 2-4: Signal converter at side of the flow sensor

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °C	60	65	60	65	60	65	40	60	65	40	60	65
Nominal size												
DN15…25	85	65	100	100	135	135	200	200	200 ①	240	240	240 ①
DN40…50	80	65	100	100	135	135	200	200	200 ①	240	240	240 ①
DN65…100	85	65	100	100	135	135 ①	200	200 ①	200 ①	240	240 ①	240 ①
DN150...300	80	65	100	100	135	135	200	200	200 ①	240	240	240 ①

Table 2-9: Temperature class in °C

① Permanent service temperature of connecting cable and cable entry min. 80°C

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °F	140	149	140	149	140	149	104	140	149	104	140	149
Nominal size												
DN15…25	185	149	212	212	275	275	392	392	392 ①	464	464	464 ①
DN40…50	176	149	212	212	275	275	392	392	392 ①	464	464	464 ①
DN65…100	185	149	212	212	275	275 ①	392	392 ①	392 ①	464	464 ①	464 ①
DN150...300	176	149	212	212	275	275	392	392	392 ①	464	464	464 ①

Table 2-10: Temperature class in °F

① Permanent service temperature of connecting cable and cable entry min. 176°F

Max. permissible product and ambient temperatures for devices with painted flow sensors / signal converters or connection box mounted above the flow sensor

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °C	60	65	60	65	60	65	40	60	65	40	60	65
Nominal size												
DN15…25	70	65	100	95 ①	120 ①	115 ①	120	120 ①	115 ①	120	120 ①	115 ①
DN40…50	70	65	100	95 ①	115 ①	105 ①	120	115 ①	105 ①	120	115 ①	105 ①
DN65…100	70	65	100 ①	90 ①	105 ①	95 ①	120	105 ①	95 ①	120	105 ①	95 ①
DN150…300	65	65	95	90 ①	120 ①	110 ①	120	120 ①	110 ①	120	120 ①	110 ①

Table 2-11: Temperature class in °C

① Permanent service temperature of connecting cable and cable entry min. 80°C

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °F	140	149	140	149	140	149	104	140	149	104	140	149
Nominal size												
DN15…25	159	149	212	203 ①	248 ①	239 ①	248	248 ①	239 ①	248	248 ①	239 ①
DN40…50	159	149	212	203 ①	239 ①	221 ①	248	239 ①	221 ①	248	239 ①	221 ①
DN65…100	158	149	212 ①	194 ①	221 ①	203 ①	248	221 ①	203 ①	248	221 ①	203 ①
DN150…300	149	149	203	194 ①	248 ①	230 ①	248	248 ①	230 ①	248	248 ①	230 ①

Table 2-12: Temperature class in °F

① Permanent service temperature of connecting cable and cable entry min. 176°F

Max. permissible product and ambient temperatures for devices with painted flow sensors / signal converters or connection box mounted at side or underneath the flow sensor

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °C	60	65	60	65	60	65	40	60	65	40	60	65
Nominal size												
DN15…25	65	65	95	90	120	120 ①	120	120	120 ①	120	120	120 ①
DN40…50	65	65	85	80	120 ①	120 ①	120	120 ①	120 ①	120	120 ①	120 ①
DN65…100	65	65	95	90 ①	120 ①	120 ①	120	120 ①	120 ①	120	120 ①	120 ①
DN150...300	65	65	85	85	120	120 ①	120	120	120 ①	120	120	120 ①

Table 2-13: Temperature class in °C

① Permanent service temperature of connecting cable and cable entry min. 80°C

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °F	140	149	140	149	140	149	104	140	149	104	140	149
Nominal size												
DN15…25	149	149	203	194	248	248 ①	248	248	248 ①	248	248	248 ①
DN40…50	149	149	185	176	248 ①	248 ①	248	248 ①	248 ①	248	248 ①	248 ①
DN65…100	149	149	203	248 ①	248 ①	248 ①	248	248 ①	248 ①	248	248 ①	248 ①
DN150...300	149	149	185	248	248	248 ①	248	248	248 ①	248	248	248 ①

Table 2-14: Temperature class in °F

① Permanent service temperature of connecting cable and cable entry min. 176°F

Max. permissible product and ambient temperatures with signal converter in stainless steel (bright) or connection box in stainless steel (bright) mounted above the flow sensor

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °C	60	65	60	65	60	65	40	60	65	40	60	65
Nominal size												
DN15…25	75	65	100	100	135	135 ①	200	170 ①	145 ①	225	170 ①	145 ①
DN40…50	75	65	100	100 ①	135 ①	130 ①	200	150 ①	130 ①	235	150 ①	130 ①
DN65…100	75	65	100	100 ①	135 ①	115 ①	195 ①	135 ①	115 ①	195 ①	135 ①	115 ①
DN150...300	75	65	100	100 ①	135 ①	135 ①	200	155 ①	135 ①	230	155 ①	135 ①

Table 2-15: Temperature class in °C

① Permanent service temperature of connecting cable and cable entry min. 80°C

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °F	140	149	140	149	140	149	104	140	149	104	140	149
Nominal size												
DN15…25	167	149	212	212	275	275 ①	392	338 ①	293 ①	437	338 ①	293 ①
DN40…50	167	149	212	212 ①	275 ①	266 ①	392	302 ①	266 ①	455	302 ①	266 ①
DN65…100	167	149	212	212 ①	274 ①	239 ①	383 ①	274 ①	239 ①	383 ①	274 ①	239 ①
DN150...300	167	149	212	212 ①	275 ①	275 ①	392	311 ①	275 ①	446	311 ①	275 ①

Table 2-16: Temperature class in °F

① Permanent service temperature of connecting cable and cable entry min. 176°F

Max. permissible product and ambient temperatures with signal converter in stainless steel (bright) or connection box in stainless steel (bright) mounted at side or underneath the flow sensor

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °C	60	65	60	65	60	65	40	60	65	40	60	65
Nominal size												
DN15…25	85	65	100	100	135	135	200	200	200 ①	240	240	240 ①
DN40…50	75	65	100	100	135	135 ①	200	200	200 ①	240	235 ①	225 ①
DN65…100	85	65	100	100	135	135 ①	200	200 ①	200 ①	240	240 ①	225 ①
DN150...300	75	65	100	100	135	135	200	200	200 ①	240	240	235 ①

Table 2-17: Temperature class in °C

① Permanent service temperature of connecting cable and cable entry min. 80°C

Temperature class	T6		T5		T4		T3			T2		
T_{amb} in °F	140	149	140	149	140	149	104	140	149	104	140	149
Nominal size												
DN15…25	185	149	212	212	275	275	392	392	392 ①	464	464	464 ①
DN40…50	167	149	212	212	275	275 ①	392	392	392 ①	464	455 ①	437 ①
DN65…100	185	149	212	212	275	275 ①	392	392 ①	392 ①	464	464 ①	437 ①
DN150...300	167	149	212	212	275	275	392	392	392 ①	464	464	455 ①

Table 2-18: Temperature class in °F

① Permanent service temperature of connecting cable and cable entry min. 176°F

2.7 Surface temperature for equipment protection level Db

For use in areas with combustible dust it should be noted that the indicated maximum surface temperature of T70°C at an ambient temperature of 65°C / 149°F and a product temperature of 65°C / 149°F is valid without a dust layer.

For higher product temperatures the maximum surface temperature is defined by the product.

2.8 Electrical data

Signal circuits

The vortex flowmeter signal circuits may only be connected to circuits with the following maximum values. A safety value of U_m = 253 V is considered for the power supply units.

Device version	Circuit Terminals	Nominal voltage	Nominal current
VersaFlow Vortex 200 C -Ex TWV 9200 -Ex	Current output 4...20 mA C1, C2	12...32 VDC	4...20 mA
	Binary output M1, M2, M3, M4	8...32 VDC	≤100 mA
	Current input I1, I2	9...32 VDC	4...20 mA
VersaFlow Vortex 200 C FF -Ex TWV 9200 FF -Ex ①	Bus connection A1, A2 B1, B2	9...32 VDC	20 mA
VersaFlow Vortex 200 C PA -Ex TWV 9200 PA -Ex ②			

Table 2-19: Maximum values for signal circuits

① Further information for operation of the FF transmitter are provided in separate supplementary instructions.
② Further information for operation of the PA transmitter are provided in separate supplementary instructions.

Flow sensor circuits

For the compact versions, the intrinsically safe flow sensor circuits are designed as internal circuits.

For the remote versions, the intrinsically safe flow sensor circuits are led through.
The maximum permissible safety values of the flow sensor circuits are listed below:

Remote signal converter, flow sensor circuit (terminal 1 to 7, colour-coded)

U_o = 6.65 V; I_o = 1107 mA; P_o = 650 mW; C_o = 1.5 µF; L_o = 73 µH

Remote flow sensor (terminal 1 to 7, colour-coded)

U_i = 7 V; I_i = 1107 mA; P_i = 650 mW; C_i = 0; L_i = 0

INFORMATION!
The verification of intrinsic safety for the interconnection between the flow sensor an the signal converter is not necessary, if the cable length does not exceed 50 m / 164 ft and the supplied cable is used.

3.1 Mounting

Mounting and setup must be carried out according to the applicable installation standards (e.g. IEC 60079-14) by qualified personnel trained in explosion protection.
The information given in the manual and these instructions must always be observed.

Vortex flowmeters must be installed in such a way that

- no external forces are affecting the indication unit.
- the device is accessible for any necessary visual inspections and can be viewed from all sides.
- the nameplate is clearly visible.
- it can be operated from a location with secure footing.

CAUTION!
The manufacturer is not liable for any damage resulting from improper use or use other than the intended purpose. This applies in particular to hazards due to insufficient corrosion resistance and suitability of the materials in contact with product.

Aligning the signal converter

The signal converter and the connection box for the remote versions may be aligned on the base or the wall bracket up to a maximum of ± 180 . For this reason, the M4 hexagon socket screw connecting the base and the signal converter or the connection box must be loosened. Once the signal converter or the connection box has been turned, it must be screwed back on to the base again (tightening torque 2 Nm).

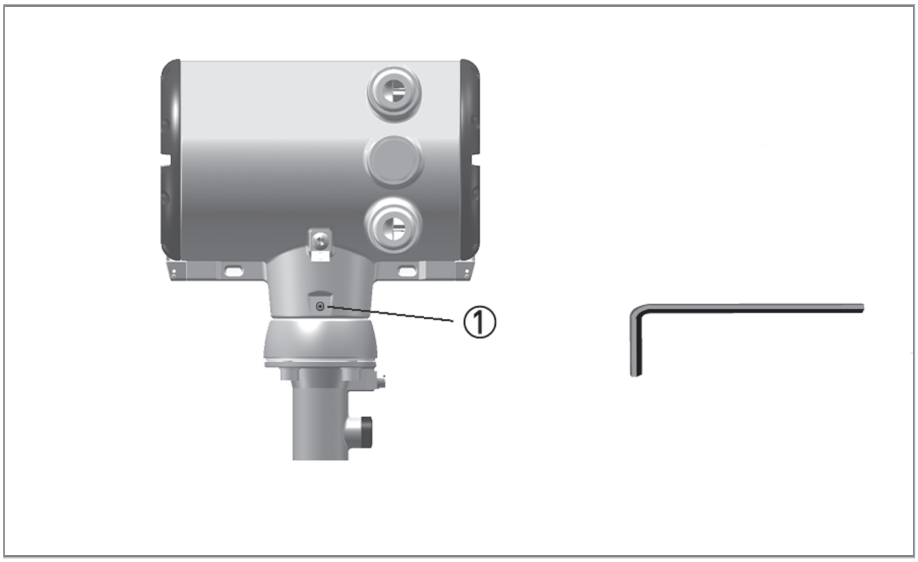


Figure 3-1: Aligning the signal converter

① M4 hexagon socket screw on connection housing

- De-energise the signal converter.
- Loosen the hexagon socket screw ①.
- Turn the signal converter or the connection box.
- Screw signal converter or connection box back to the base again.

3.2 Special conditions

Flameproof joints in the housing

The housing must be replaced if there is any damage to the joint area. The flameproof thread gaps and the cylindrical joint between the terminal and the electronics compartments must be inspected visually after opening.

WARNING!
Repairs of the flameproof joints are not allowed.

Electrostatics

For painted versions, risks due to electrostatic charge must be minimized.
For further information refer to *Electrostatic charge* on page 28.

Thermal and electrical data

Observe the maximum ambient and product temperatures and electrical data. For further information refer to *Ambient temperature / temperature classes* on page 9 and refer to *Surface temperature for equipment protection level Db* on page 17 and refer to *Electrical data* on page 17.

4.1 General notes

Rated values for insulation

- The insulation of the flowmeter VersaFlow Vortex 200 - Ex is rated in compliance with IEC 60 664-1.
  The following rating parameters are taken into account:
- Overvoltage category for signal and instrument loops: II
- Pollution degree of the insulation: 2

Terminal compartment

The signal circuit is electrically connected in the terminal compartment of the signal converter. The terminal compartment is designed in protection type "d" or "e" or in protection type "t". Unused entries are to be closed in accordance with IEC 60079-1, IEC 60079-7 or IEC 60079-31. The entry of the cables in the connection terminal is possible in the following way.

- Device version Ex db ia IIC T6...T2 Gb or Ex db [ia] IIC T6
  Direct entry of the connecting cables by way of approved flameproof cable glands (M20x1.5) into the flameproof terminal compartment (V ≤ 2000 cm³). The cable glands require a separate test certificate in accordance with IEC 60079-1. Observe the requirements of the test certificate for the cable glands.
  or
  Direct entry of the connecting cables by way of conduits into the flameproof enclosed terminal compartment of the device. Once the conduit has been screwed in, it must form a flameproof joint with the housing with a minimum thread length of 8 mm. A suitable mechanical stopping box must be provided in accordance with installation provisions.
  The conduit must be installed in compliance with its separate test certificate.
- Device version Ex db eb ia IIC T6...T2 Gb or Ex db eb [ia] IIC T6
  Direct entry of the connecting cables by way of approved cable glands (M20x1.5) into the terminal compartment in protection type increased safety.
  The cable glands require a separate test certificate in accordance with IEC 60079-7.
  Observe the requirements of the test certificate for the cable glands.
- Device version Ex tb ia IIIC T70...T240 Db or Ex tb [ia] IIIC T70°C Db
  Direct entry of the connecting cables by way of approved dustproof cable glands (M20x1.5) into the dustproof terminal compartment (V ≤ 2000 cm³).
  The cable glands require a separate test certificate in accordance with IEC 60079-31.
  Observe the requirements of the test certificate for the cable glands.

Connecting cables

The connecting cables should be selected according to the applicable installation standards (e.g. IEC 60079-14) and the maximum operating temperature.

The connecting cable between the flow sensor and the wall bracket for remote versions is part of the supply.

- The connecting cables must be fixed and laid so they are sufficiently protected against damage.
- Lay cables so as to ensure that there is sufficient distance between surfaces of the flow sensor and the connecting cable.
- If the blind plugs / cable entries supplied separately on customer request, the influence of the components on the IP protection class of the housing or the thermal data must be validated.
  Recommendation:
  IP protection class: ≥ IP66/67 according to IEC 60529
  Temperature range: -40...+80°C / -40...+176°F
- The outer diameter of the connecting cable must be within the sealing range of the cable entry (7...12 mm / 0.28...0.47").
- Unused cable entries are to be closed in accordance with IEC 60079-1 and/or IEC 60079-7 and/or IEC 60079-31 (>IP66/67).
- Before connecting or loosening the equipotential bonding cable, ensure there are no differences in potential.

Ensure that the gaskets and incised gasket ring are tight.

CAUTION!
The IP protection category of the signal converter housing is largely determined by the cable gland used and the installation.

Connection terminals

The capacity of the connection terminals is 0.5 mm² to 2.5 mm².
The torque of the connection terminals is 0.6 Nm.

4.2 Power supply

The vortex flowmeter does not require a separate power supply.
The required supply for the built-in electronics is provided via the 4...20 mA current output or the bus connection.

4.3 Inputs / Outputs

The terminal assignment of the built-in electrical equipment is described in the standard documentation. The signal circuits of the vortex flowmeter may only be connected to downstream devices or circuits that satisfy the requirements of protective extra-low voltage (PELV).

Connecting the power supply and the I/O functions

- Before connecting or disconnecting the electrical connection cables of the device, make sure that all cables leading to the converter are isolated from the ground of the hazardous area. This also applies to protective earth (PE) and equipotential bonding conductors (PA).
- All connecting cable conductors and shields that are not securely connected to the equipotential grounding system of the hazardous area shall be carefully isolated from each other and from ground (test voltage 1500 V_{eff} for non-intrinsically safe cables).

4.4 Grounding and equipotential bonding

CAUTION!
Equipotential bonding
Vortex signal converters and flow sensors must be included in the on-site equipotential bonding system according to the installation standard! They are connected to the PA terminals.

For compact versions and measuring devices with flange connections, the flow sensor is conductively connected to the pipeline.
For compact versions and measuring device of the type "sandwich", a separate conductor connected either to the internal or external PA terminal must be provided to connect to the equipotential bonding.

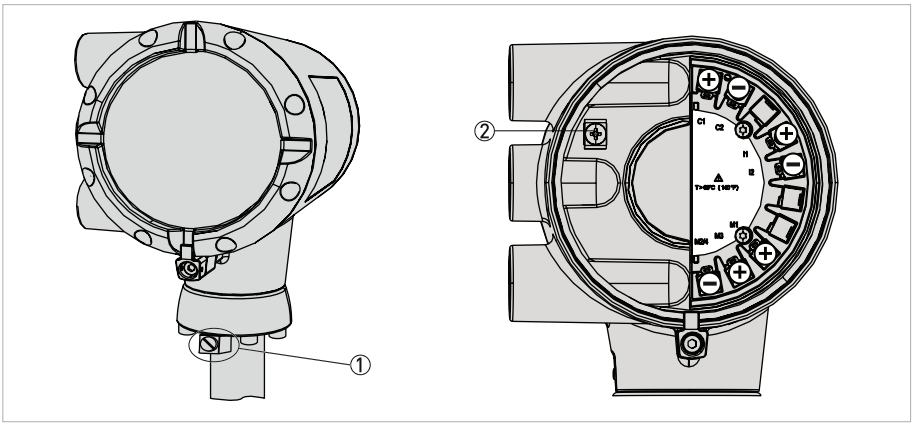


Figure 4-1: Ground connection of the compact version

① Electrical grounding connection on connection piece between the flow sensor and the signal converter
② Electrical grounding terminal in the housing

For remote versions the connection of the flow sensor can either be made via the PA connection in the terminal compartment of the signal converter or via the external PA connection.

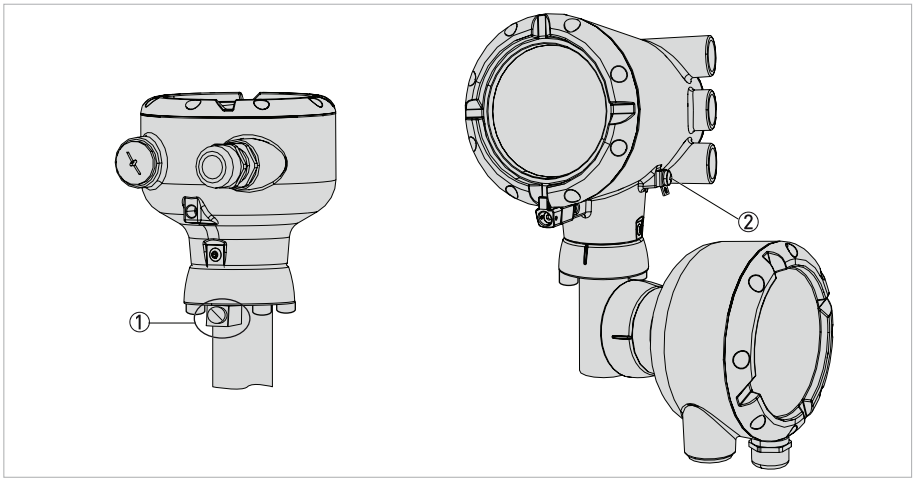


Figure 4-2: Ground connection of the remote version

① Electrical grounding connection on the flow sensor
② Electrical grounding connection on the housing of the signal converter

4.5 Flow sensor circuits (remote version only)

Observe the following points when connecting the flow sensor to the signal converter:

- Use only the supplied connecting cable (max. length 50 m / 164 ft).
- Before connecting or loosening the equipotential bonding cable, ensure there are no differences in potential.
- Connect the connecting cable shield to the equipotential bonding of the hazardous area in the wall bracket. On the flow sensor side, the shield must be carefully isolated from the earth (test voltage 500 V_{eff}) and connected via the terminal end to the corresponding connector on the terminal block.
- The terminal compartments of the flow sensor circuits are supplied with a bridge between the internal PA connection and the terminal with the designation "gnye". This connection must not be separated.

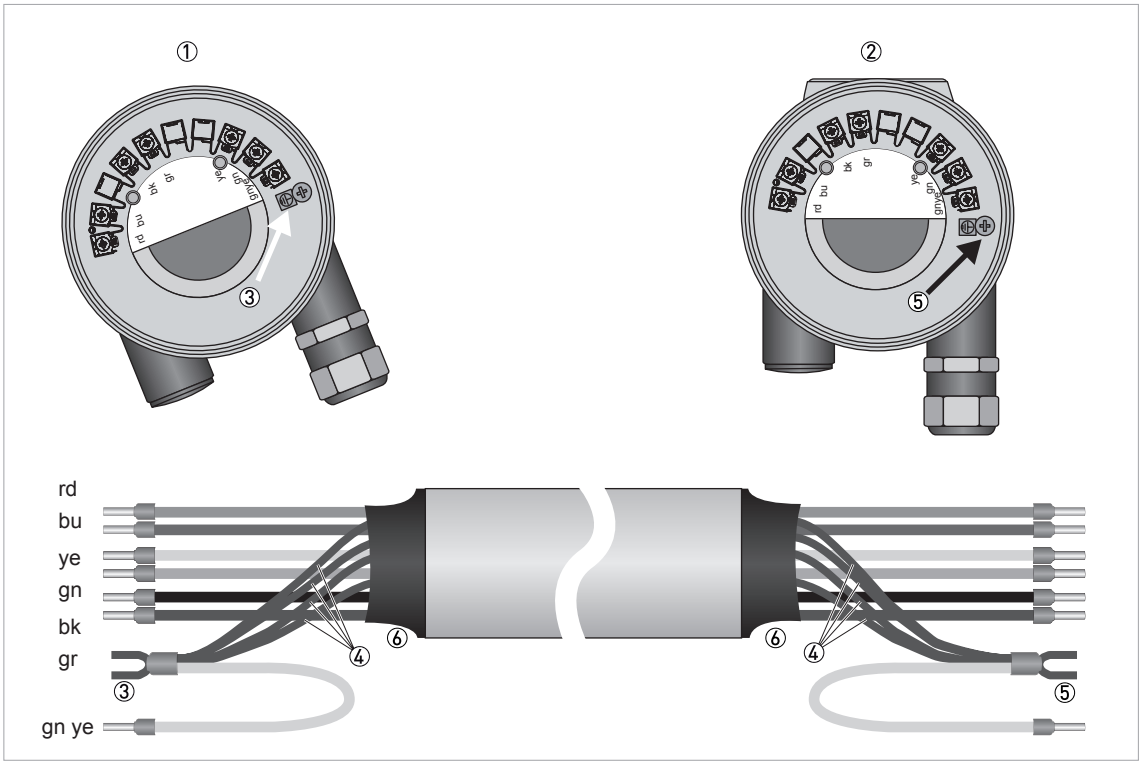


Figure 4-3: Connection of remote version

① Connection terminal flow sensor
② Connection terminal signal converter
③ Connection shielding flow sensor
④ Shielding (drain wire and overall shield)
⑤ Connection shielding signal converter
⑥ Heat shrink tubing

The flow sensor circuit is designed in protection type "intrinsic safety Ex ia IIC".

5.1 Start-up

Start-up is only permitted when the measuring device:

- is correctly installed in the system and connected.
- has been checked for the proper state with regard to its installation and connection requirements.
- has been correctly locked to the electronics and terminal compartment.
  The electronics and terminal compartment of the vortex flowmeter must be locked during operation. The covers for the electronics and terminal compartment are secured by a lock. First manually tighten the covers until the stop. Then loosen the covers (≤ 90°) so that the lock (special closure) can be secured in the next possible position in the cover.
  Use a WS3 Allen key to turn the screw.
  No waiting period is necessary prior to opening the housing.

The operator of the system has to check prior to start-up, if the start-up was in compliance with the national regulations for checks.

If the device needs to be configured due to the existence of an explosive atmosphere, this can be done using the supplied bar magnets. There is no need to open the housing as it can be done through the glass window of the electronics compartment or digitally via the signal output (HART® interface).

5.2 Operation

Vortex flowmeters must be operated in such a way that they remain within the maximum and minimum permissible temperatures and pressures and the electrical limit values.

Vortex flowmeters may only be operated if the equipment parts necessary for safety are effective in the long run, and are not rendered inoperable during operation.

In case of operation with flammable products the measuring units must be included in the periodic pressure tests of the system.

Opening the signal converter (protection type "flameproof enclosure" or "dustproof housing" or "terminal compartment in increased safety") in hazardous areas is only permitted in a de-energised state.

5.3 Electrostatic charge

In order to avoid ignition hazards due to electrostatic charge, vortex flowmeters may not be used in areas with:

- processes that generate strong charges,
- mechanical friction and cutting processes,
- spraying of electrons (e.g. in the vicinity of electrostatic painting systems) or
- pneumatically conveyed dust is exposed.

CAUTION!
Electrostatic charging of the housing surface by friction must be avoided.
The devices must not be dry cleaned.

6.1 Maintenance

Maintenance work of a safety-relevant nature within the meaning of explosion protection may only be carried out by the manufacturer, his authorised representative or under the supervision of authorised inspectors.

Treat cover threads as necessary with the lubricating paint UNIMOLY C220®.

For systems in hazardous areas, regular tests are required in order to maintain the proper condition.

The following checks are recommended:

- Check the housing, the cable entries and the feed lines for corrosion and/or damage.
- Checking the measuring unit and the piping connections for leakage.
- Check the measuring unit and the indicator for dust deposits.
- Including the flowmeter in the regular pressure test of the process line.

6.2 Dismantling

Exchanging the built-in equipment

The dismantling and installation is within the responsibility of the operator.

Due to the modular design of the vortex flowmeters, from a safety perspective, the electrical equipment built into the signal converter can be replaced with identical spare parts. To do so, remove the housing cover. Close the housing cover immediately after the spare parts are exchanged. Ensure that the cover seal is tight.

General notes

Only identical displays or components from the manufacturer may be used.

The device must be de-energised, if it is absolutely necessary to open the flameproof enclosure or the dustproof electronics compartment in the presence of a potentially explosive atmosphere.

Before connecting or disconnecting the electrical connection cables of the device, make sure that all cables leading to the signal converter are isolated from the ground of the hazardous area. This also applies to protective earth (PE) or functional earth (FE) and equipotential bonding conductors (PA).

Display

The display can be rotated in 90° increments. It is connected to the connector as shown in the following figure.

Exchanging the signal converter insert

It is permitted to replace the entire VersaFlow Vortex 200 signal converter insert with a brand-new version identical in type.

Take special note of the following figure and

- ensure that the type is the same by checking the nameplates.
- the connecting cable of the flow sensor circuits is to be laid in the cutout provided between the signal converter insert and housing. Avoid damage such as that caused by crushing.
- proper connection of the flow sensor ⑤ and the display connector ①.
- tighten the mounting screws M4 ⑦ evenly.

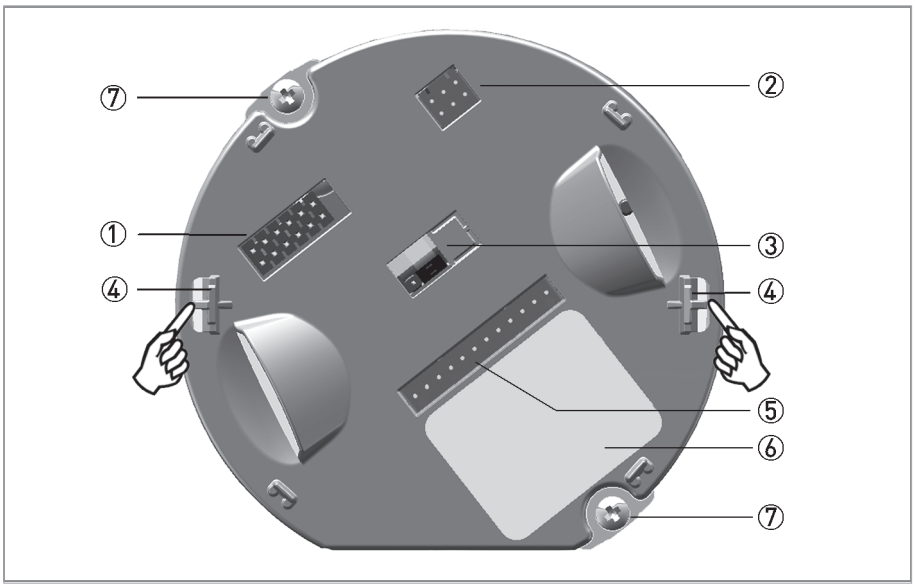


Figure 6-1: Connection of the signal converter module

① Connector for LC display
② Service connector
③ SIL jumper
④ Display clamps
⑤ Connection to the flow sensor
⑥ Nameplate of the signal converter insert
⑦ Fixing screw

Exchanging the entire device

The dismantling and installation is within the responsibility of the operator.

Before disconnecting the electric connecting cable of the device, make sure that all cables leading to the indication unit are isolated from the ground of the hazardous area. This also applies to functional earthing conductors (FE) and equipotential bonding conductors (PA).

Observe the information above. Also, ensure that all process connections and the pipeline are depressurised and free of product. Where environmentally critical products are concerned, carefully decontaminate the wetted parts of the flange system after dismantling.

CAUTION!

- *Pressurised pipes have to be depressurised before removing the measuring unit.*
- *In the case of environmentally critical or hazardous products, appropriate safety precautions must be taken with regard to residual liquids in the measuring unit.*
- *New gaskets have to be used when re-installing the device in the piping.*

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