

Instruction

MI 021-519 en

FEBRUARY 2020

Model 9500A Magnetic Flow Tube

Master Instruction

All rights reserved. It is prohibited to reproduce this documentation, or any part thereof, without the prior written authorisation of Schneider Electric Systems USA, Inc.

Copyright 2019-2020 Schneider Electric Systems USA, Inc.

1	Safety instructions	5
1.1	Intended use	5
1.2	Certification	5
1.3	Safety instructions from the manufacturer	6
1.3.1	Copyright and data protection	6
1.3.2	Disclaimer	6
1.3.3	Product liability and warranty	7
1.3.4	Information concerning the documentation	7
1.3.5	Warnings and symbols used	8
1.4	Safety instructions for the operator	9
2	Device description	10
2.1	Scope of delivery	10
2.2	Device description	11
2.3	Nameplate	12
3	Installation	13
3.1	General notes on installation	13
3.2	Storage	13
3.3	Transport	13
3.4	Pre-installation requirements	14
3.5	General requirements	14
3.5.1	Vibrations	14
3.5.2	Magnetic field	14
3.6	Installation conditions	15
3.6.1	Inlet and outlet	15
3.6.2	Bends in 2 or 3 dimensions	15
3.6.3	T-section	16
3.6.4	Bends	16
3.6.5	Open discharge	17
3.6.6	Control valve	17
3.6.7	Pump	17
3.6.8	Air venting and vacuum forces	18
3.6.9	Flange deviation	19
3.6.10	Mounting position	19
3.6.11	Mounting	20
3.6.12	Torques and pressures	20

4 Electrical connections	24
<hr/>	
4.1 Safety instructions.....	24
4.2 Grounding	24
4.3 Virtual reference for IMT33A (4, N and H version).....	26
4.4 Connection diagrams	26
5 Service	27
<hr/>	
5.1 Spare parts availability.....	27
5.2 Availability of services	27
5.3 Returning the device to the manufacturer.....	27
5.3.1 General information.....	27
5.3.2 Preapproval form - Customer returned process-wetted products.....	28
5.4 Disposal	29
6 Technical data	30
<hr/>	
6.1 Measuring principle.....	30
6.2 Technical data.....	31
6.3 Measuring accuracy	37
6.4 Dimensions and weights	38
6.5 Pressure derating.....	42
6.6 Vacuum load	44
7 Notes	45
<hr/>	

1.1 Intended use

**CAUTION!**

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

**NOTICE!**

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The electromagnetic flowmeter is designed exclusively to measure the flow of electrically conductive, liquid media.

**WARNING!**

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

1.2 Certification

CE marking



The manufacturer certifies successful testing of the product by applying the CE marking.

This device fulfils the statutory requirements of the relevant EU directives.

For full information of the EU directives and standards and the approved certifications, please refer to the EU Declaration of Conformity or the website of the manufacturer.

**DANGER!**

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

1.3 Safety instructions from the manufacturer

1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

**DANGER!**

This warning refers to the immediate danger when working with electricity.

**DANGER!**

This warning refers to the immediate danger of burns caused by heat or hot surfaces.

**DANGER!**

This warning refers to the immediate danger when using this device in a hazardous atmosphere.

**DANGER!**

These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death.

**WARNING!**

Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.

**CAUTION!**

Disregarding these instructions can result in damage to the device or to parts of the operator's plant.

**NOTICE!**

These instructions contain important information for the handling of the device.

**LEGAL NOTICE!**

This note contains information on statutory directives and standards.

• **HANDLING**

This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➔ **RESULT**

This symbol refers to all important consequences of the previous actions.

1.4 Safety instructions for the operator

**WARNING!**

In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

2.1 Scope of delivery

**NOTICE!**

Do a check of the packing list to make sure that you have all the elements given in the order.

**NOTICE!**

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**NOTICE!**

The remote version will arrive in two cartons. One carton contains the signal transmitter and one carton contains the flow tube.

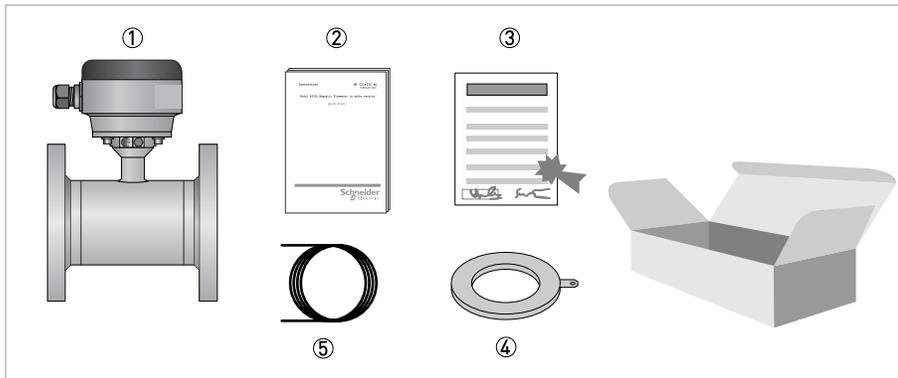


Figure 2-1: Scope of delivery

- ① Ordered flowmeter
- ② Product documentation
- ③ Factory calibration report
- ④ Grounding rings (optional)
- ⑤ Signal cable (remote versions only)

**NOTICE!**

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.

2.2 Device description

Your measuring device is supplied ready for operation. The factory settings for the operating data have been made in accordance with your order specifications.

The following versions are available:

- Compact version (the transmitter is mounted directly on the flow tube)
- Remote version (a measuring tube with connection box and a separate transmitter)

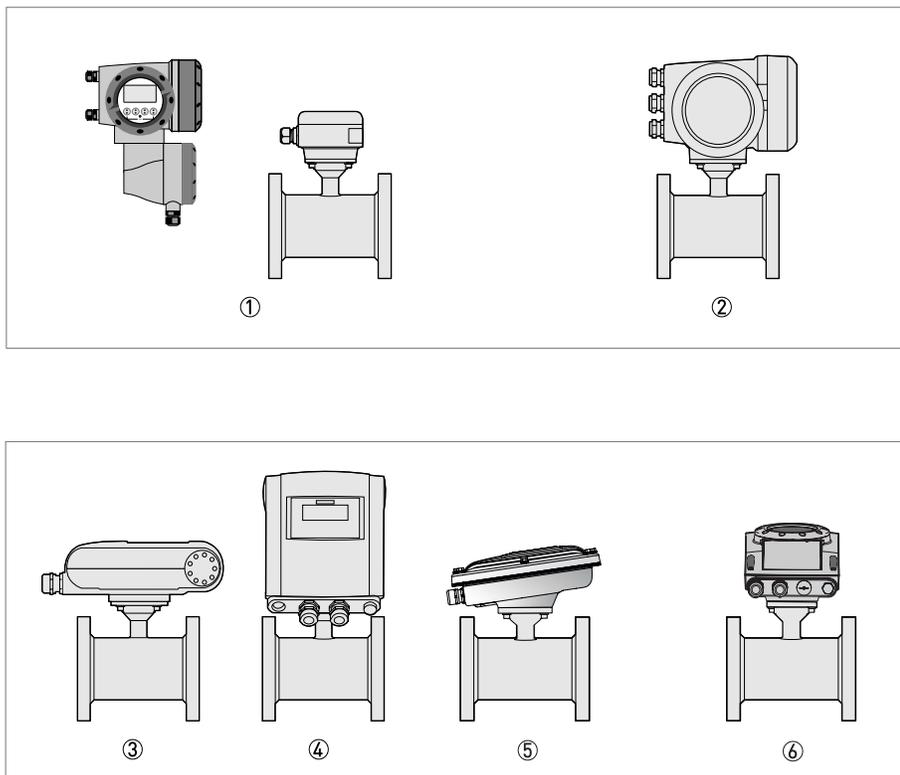


Figure 2-2: Device versions

- ① Remote version
- ② Compact version with signal transmitter IMT33A
- ③ Compact version with signal transmitter IMT31A (0°)
- ④ Compact version with signal transmitter IMT31A (45°)
- ⑤ Compact version with stainless steel signal transmitter IMT31A (10°)
- ⑥ Compact version with signal transmitter IMT30A (10°)

2.3 Nameplate



NOTICE!

Check the device nameplate to ensure that the device is delivered according to your order. Additional information (e.g. correct supply voltage), can be found in the documentation of the transmitter.

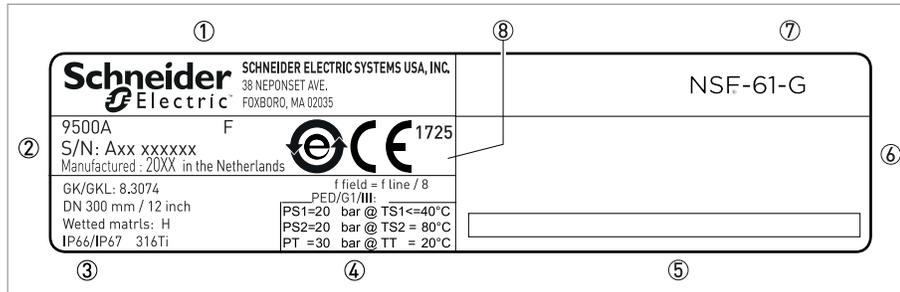


Figure 2-3: Example of nameplate

- ① Name and address of the manufacturer
- ② Type designation of the flowmeter, serial number and manufacturing date
- ③ Calibration data
- ④ PED data
- ⑤ Tag number
- ⑥ Additional information
- ⑦ NSF product certification marking
- ⑧ Disposal logo and CE sign with number(s) of notified body / bodies

3.1 General notes on installation



NOTICE!

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.



NOTICE!

Do a check of the packing list to make sure that you have all the elements given in the order.



NOTICE!

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.

3.2 Storage

- Store the device in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the device in its original packaging.
- Storage temperature: -50...+70°C / -58...+158°F

3.3 Transport

Signal converter

- No special requirements.

Compact version

- Do not lift the device by the signal converter housing.
- Do not use lifting chains.
- To transport flange devices, use lifting straps. Wrap these around both process connections.

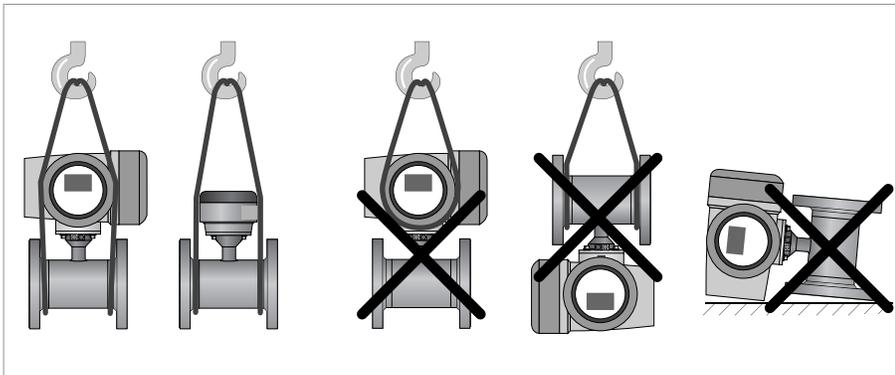


Figure 3-1: Transport

3.4 Pre-installation requirements

Make sure that you have all necessary tools available:

- Allen key (4 mm)
- Small screwdriver
- Wrench for cable glands
- Wrench for wall mounting bracket (remote version only)
- Torque wrench for installing flowmeter in pipeline

3.5 General requirements



NOTICE!

The following precautions must be taken to ensure reliable installation.

- *Make sure that there is adequate space to the sides.*
- *Protect the transmitter from direct sunlight and install a sun shade if necessary.*
- *Transmitters installed in control cabinets require adequate cooling, e.g. by fan or heat exchanger.*
- *Do not expose the transmitter to intense vibration. The flowmeters are tested for a vibration level in accordance with IEC 60068-2-64.*
- *Avoid magnetic field! Keep at least 5 DN distance between electromagnetic flow tubes.*

3.5.1 Vibrations

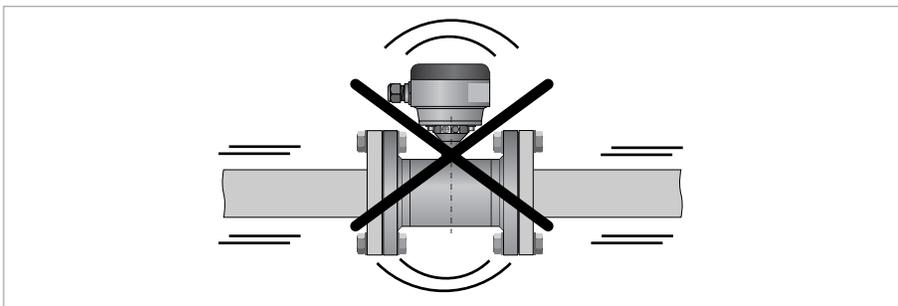


Figure 3-2: Avoid vibrations

3.5.2 Magnetic field

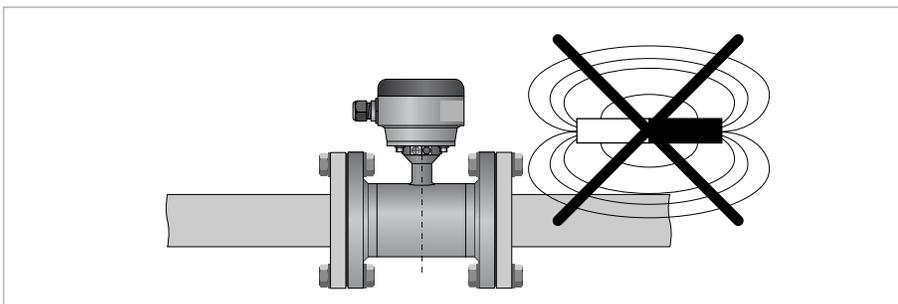


Figure 3-3: Avoid magnetic field

3.6 Installation conditions

3.6.1 Inlet and outlet

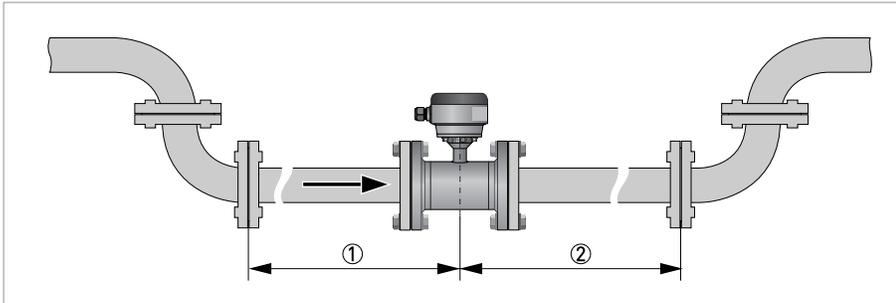


Figure 3-4: Recommended inlet and outlet

- ① Refer to chapter "Bends in 2 or 3 dimensions"
- ② ≥ 2 DN



NOTICE!

9700A flow tube up to DN10 - 3/8":

The inlet and outlet sections are enclosed inside the tube.

3.6.2 Bends in 2 or 3 dimensions

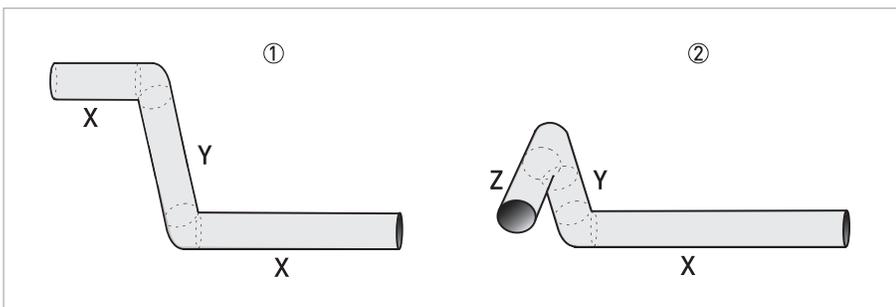


Figure 3-5: 2 and/or 3 dimensional bends upstream of the flowmeter

- ① 2 dimensions = X/Y
 - ② 3 dimensions = X/Y/Z
- Inlet length: using bends in 2 dimensions: ≥ 5 DN; when having bends in 3 dimensions: ≥ 10 DN



NOTICE!

2 dimensional bends occur in a vertical **or** horizontal plane (X/Y) only, while 3 dimensional bends occur in both vertical **and** horizontal plane (X/Y/Z).

3.6.3 T-section

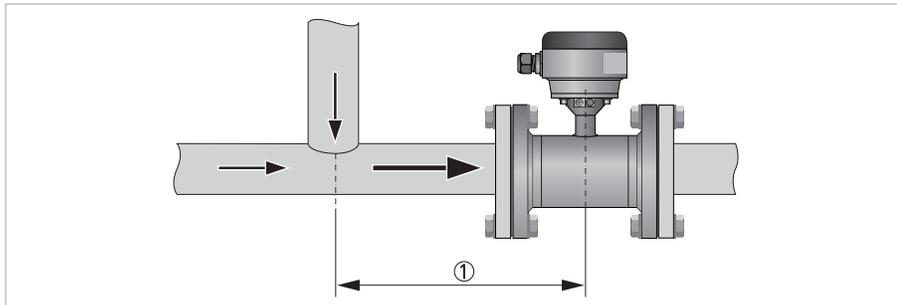


Figure 3-6: Distance behind a T-section

① ≥ 10 DN

3.6.4 Bends

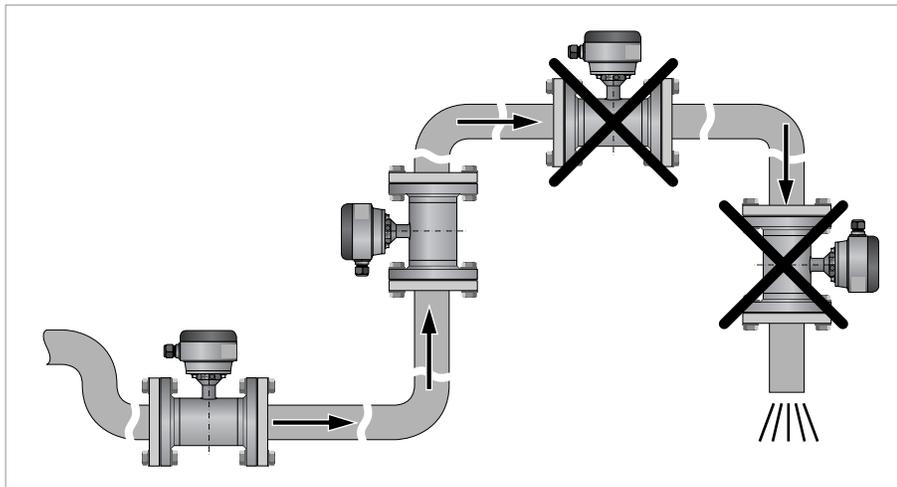


Figure 3-7: Installation in bending pipes (90°)

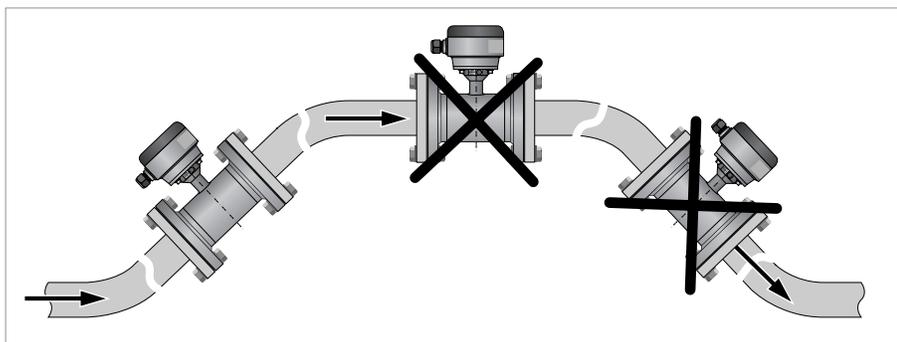


Figure 3-8: Installation in bending pipes (45°)



CAUTION!

Avoid draining or partial filling of the flow tube

3.6.5 Open discharge

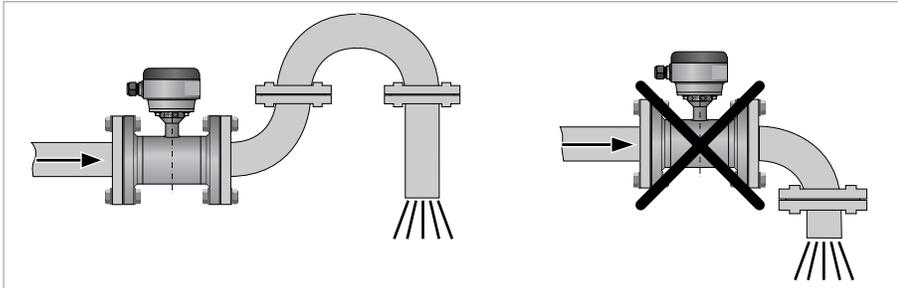


Figure 3-9: Installation in front of an open discharge

3.6.6 Control valve

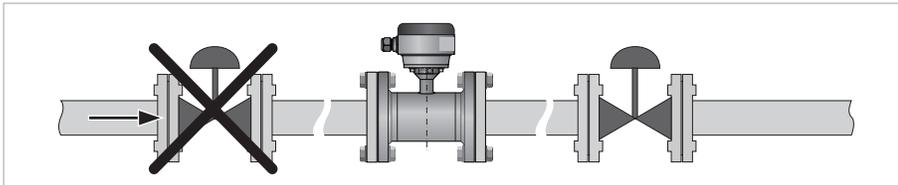


Figure 3-10: Installation in front of a control valve

3.6.7 Pump

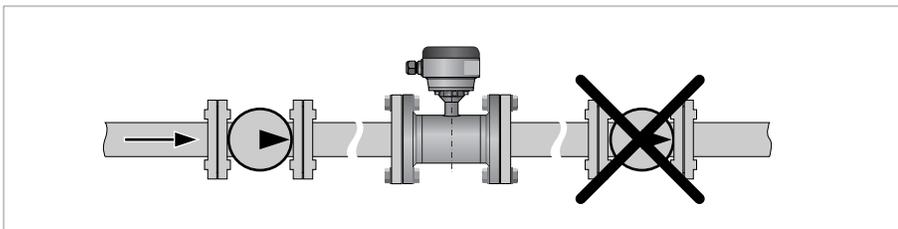


Figure 3-11: Installation behind a pump

3.6.8 Air venting and vacuum forces

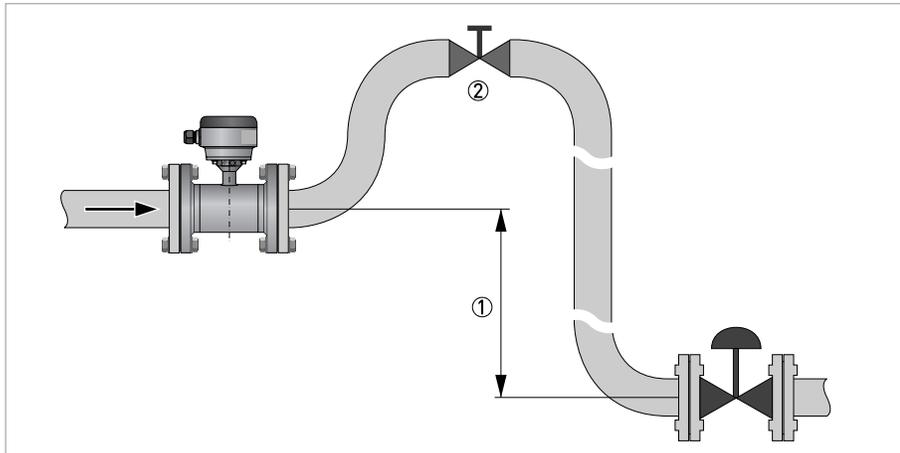


Figure 3-12: Air venting

- ① $\geq 5 \text{ m} / 17 \text{ ft}$
- ② Air ventilation point

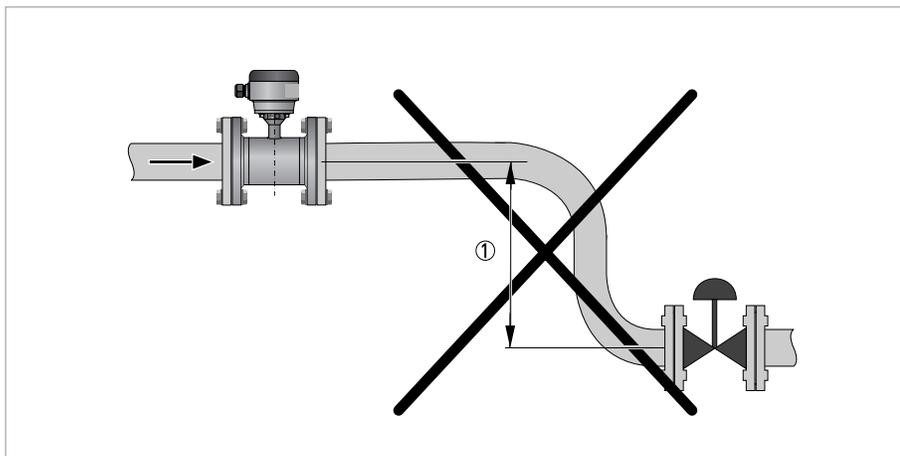


Figure 3-13: Vacuum

- ① $\geq 5 \text{ m} / 17 \text{ ft}$

3.6.9 Flange deviation



CAUTION!

Max. permissible deviation of pipe flange faces:
 $L_{max} - L_{min} \leq 0.5 \text{ mm} / 0.02''$

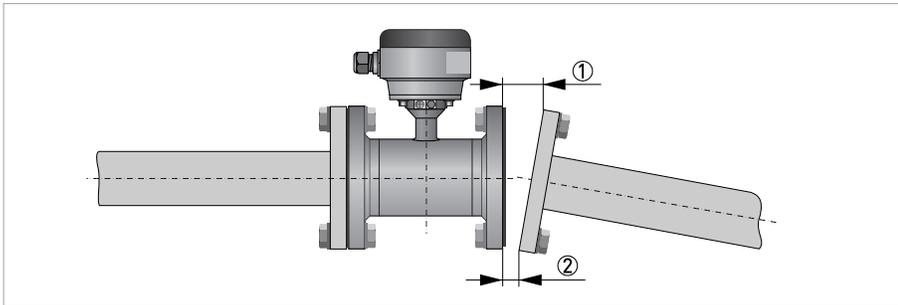


Figure 3-14: Flange deviation

- ① L_{max}
- ② L_{min}

3.6.10 Mounting position

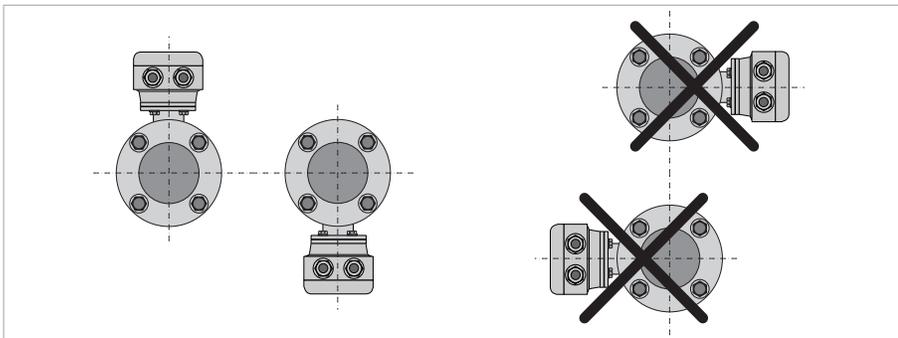


Figure 3-15: Mounting position

- Install flow tube in line with the pipe axis.
- Pipe flange faces must be parallel to each other.

3.6.11 Mounting

**CAUTION!**

Please take care to use the proper gasket to prevent damaging the liner of the flowmeter. In general, the use of spiral wound gaskets is not advised, as it could severely damage the liner of the flowmeter.

3.6.12 Torques and pressures

The maximum pressure and torques values for the flowmeter are theoretical and calculated for optimum conditions and use with carbon steel flanges.

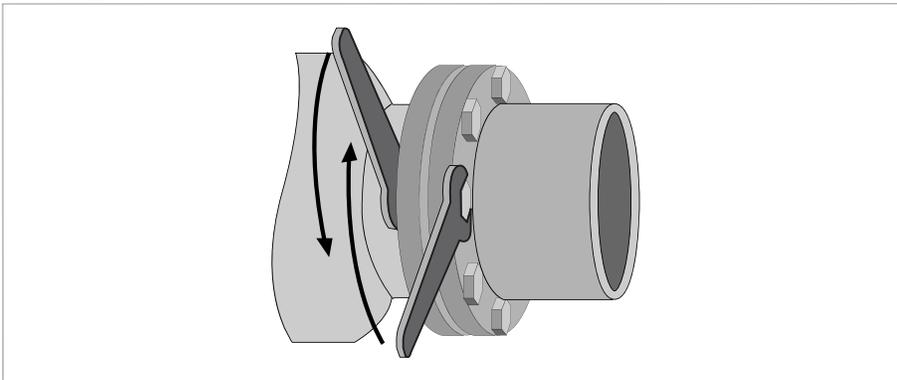


Figure 3-16: Tightening of bolts



- Always tighten the bolts uniformly and in diagonally opposite sequence.
- Do not exceed the maximum torque value.
- Step 1: Apply approx. 50% of max. torque given in table.
- Step 2: Apply approx. 80% of max. torque given in table.
- Step 3: Apply 100% of max. torque given in table.

Nominal size DN [mm]	Pressure rating	Bolts	Max. torque [Nm] ^①	
			Polyolefin	Hard rubber
25	PN 40	4 x M 12	-	11
32	PN 40	4 x M 16	-	19
40	PN 40	4 x M 16	-	25
50	PN 40	4 x M 16	-	31
65	PN 16	② x M 16	-	42
65	PN 40	8 x M 16	-	21
80	PN 40	8 x M 16	-	25
100	PN 16	8 x M 16	-	30
125	PN 16	8 x M 16	-	40
150	PN 16	8 x M 20	-	47
200	PN 10	8 x M 20	68	68
200	PN 16	12 x M 20	45	45
250	PN 10	12 x M 20	65	65
250	PN 16	12 x M 24	78	78
300	PN 10	12 x M 20	76	76
300	PN 16	12 x M 24	105	105
350	PN 10	16 x M 20	75	75
400	PN 10	16 x M 24	104	104
450	PN 10	20 x M 24	93	93
500	PN 10	20 x M 24	107	107
600	PN 10	20 x M 27	138	138
700	PN 10	24 x M 27	163	163
800	PN 10	24 x M 30	219	219
900	PN 10	28 x M 30	205	205
1000	PN 10	28 x M 33	261	261

① The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer. Therefore the values should be regarded as indicative only.

② DN65 / PN16 is available with standard 8 bolt holes.

Nominal size [inch]	Flange class [lb]	Bolts	Max. torque [lb.ft] ①	
			Polyolefin	Hard rubber
1	150	4 x 1/2"	-	3.2
1 1/2	150	4 x 1/2"	-	9
2	150	4 x 5/8"	-	17
3	150	4 x 5/8"	-	29
4	150	8 x 5/8"	-	23
6	150	8 x 3/4"	-	38
8	150	8 x 3/4"	51	51
10	150	12 x 7/8"	58	58
12	150	12 x 7/8"	77	77
14	150	12 x 1"	69	69
16	150	16 x 1"	67	67
18	150	16 x 1 1/8"	105	105
20	150	20 x 1 1/8"	94	94
24	150	20 x 1 1/4"	133	133
28	150	28 x 1 1/4"	119	119
32	150	28 x 1 1/2"	191	191
36	150	32 x 1 1/2"	198	198
40	150	36 x 1 1/2"	198	198

① The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer. Therefore the values should be regarded as indicative only.

Nominal size [inch]	Flange class [lb]	Bolts	Max. torque [lb.ft] ①	
			Polyolefin	Hard rubber
1	300	4 x 5/8"	-	5
1 1/2	300	4 x 3/4"	-	20
2	300	8 x 5/8"	-	13
3	300	8 x 3/4"	-	30
4	300	8 x 3/4"	-	47
6	300	12 x 3/4"	-	38
8	300	12 x 7/8"	60	60
10	300	16 x 1"	75	75
12	300	16 x 1 1/8"	113	113
14	300	20 x 1 1/4"	71	71
16	300	20 x 1 1/4"	92	92
18	300	24 x 1 1/4"	108	108
20	300	24 x 1 1/4"	121	121
24	300	24 x 1 1/2"	189	189

① The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer. Therefore the values should be regarded as indicative only.



CAUTION!

- Pressures are applicable at 20°C / 68°F.
- For higher temperatures, the pressure ratings are as per ASME B16.5.

4.1 Safety instructions

**DANGER!**

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

**DANGER!**

Observe the national regulations for electrical installations!

**WARNING!**

*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.*

**NOTICE!**

*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.*

4.2 Grounding

**DANGER!**

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

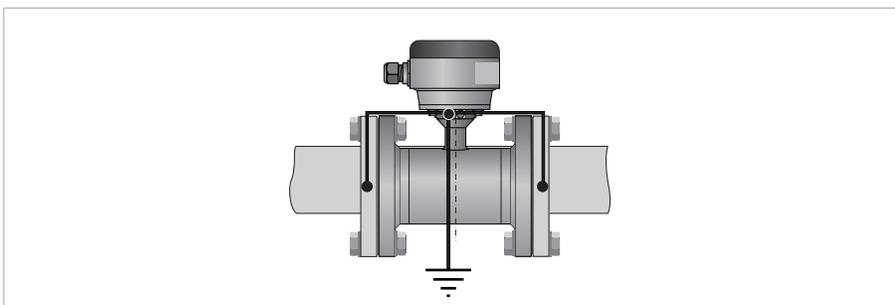


Figure 4-1: Grounding

Metal pipelines, not internally coated. Grounding without grounding rings.

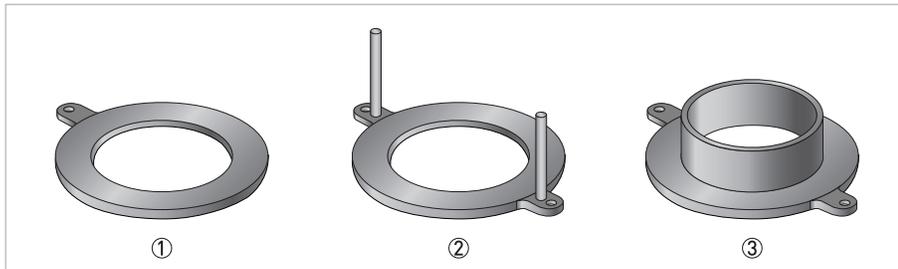


Figure 4-2: Different types of grounding rings

- ① Grounding ring number 1
- ② Grounding ring number 2
- ③ Grounding ring number 3

Grounding ring number 1:

- Thickness : 3 mm / 0.1" (tantalum: 0.5 mm / 0.02")

Grounding ring number 2:

- Thickness : 3 mm / 0.1"
- Prevents damage to the flanges during transport and installation
- Especially for flow sensors tube with PTFE liner

Grounding ring number 3:

- Thickness : 3 mm / 0.1"
- With cylindrical neck (length 30 mm / 1.25" for DN10...150 / 3/8...6")
- Offers liner protection against abrasive fluids

4.3 Virtual reference for IMT33A (4, N and H version)

The virtual reference option on the transmitter IMT33A provides complete isolation of the measurement circuit.

Benefits of virtual reference:

- Grounding rings or grounding electrodes can be omitted.
- Safety increases by reducing the number of potential leakage points.
- The installation of the flowmeters is much easier.

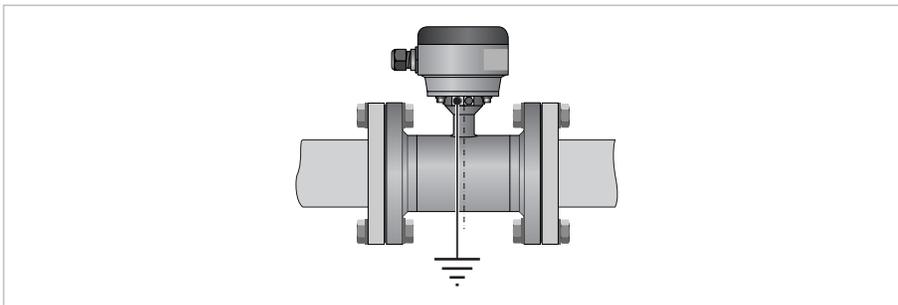


Figure 4-3: Virtual reference

Minimum requirements:

- Size: \geq DN10 / 3/8"
- Electrical conductivity: \geq 200 μ S/cm
- Signal cable: max. 50 m / 164 ft, type DS

4.4 Connection diagrams



NOTICE!

For the connection diagrams refer to the documentation of the applicable transmitter.

5.1 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

5.2 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.



NOTICE!

For more precise information, please contact your local sales office.

5.3 Returning the device to the manufacturer

5.3.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.



WARNING!

Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*



WARNING!

If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*

CLEANING STATEMENT

(Note: Your item will not be serviced unless the following cleaning statement has been signed):

I certify that the above referenced item has been properly purged and cleaned, complies with U.S. Department of Transportation shipping requirements and DOES NOT present a health and/or safety hazard (as defined by OSHA) to our Customer Repair personnel.

Print name: _____

Signature: _____

Print title: _____

Date: _____

Please fax the completed form to the Customer Satisfaction Center +1-508-549-4999

5.4 Disposal**LEGAL NOTICE!**

Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**. The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

6.1 Measuring principle

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils.

Inside of the fluid, a voltage U is generated:

$$U = v * k * B * D$$

in which:

v = mean flow velocity

k = factor correcting for geometry

B = magnetic field strength

D = inner diameter of flowmeter

The signal voltage U is picked off by electrodes and is proportional to the mean flow velocity v and thus the flow rate Q . A signal transmitter is used to amplify the signal voltage, filter it and convert it into signals for totalizing, recording and output processing.

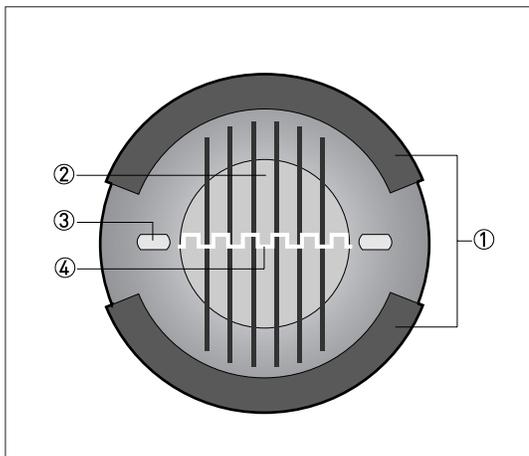


Figure 6-1: Measuring principle

- ① Field coils
- ② Magnetic field
- ③ Electrodes
- ④ Induced voltage (proportional to flow velocity)

6.2 Technical data



NOTICE!

- *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

Measuring principle	Faraday's law of induction
Application range	Electrically conductive fluids
Measured value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

Design

Features	Fully welded maintenance-free flow tube.
	Large diameter range DN25...2000
	Rugged liners approved for drinking water.
	Large standard range but also available in customer specific diameter, length and pressure rating.
Modular construction	The measurement system consists of a flow tube and a signal transmitter. It is available as compact and as separate version. Additional information can be found in the documentation of the signal transmitter.
Compact version	With signal transmitter IMT30A: 9500A + IMT30A 4
	With signal transmitter IMT31A: 9500A + IMT31A 4
	With signal transmitter IMT33A: 9500A + IMT33A 4
Remote version	In wall mount version with signal transmitter IMT30A: 9500A + IMT30A N
	In wall mount version with signal transmitter IMT31A: 9500A + IMT31A N
	In field or wall mount version with signal transmitter IMT33A: 9500A + IMT33A N or H
Nominal diameter	With signal transmitter IMT30A: DN25...1200 / 1...48"
	With signal transmitter IMT31A: DN25...1200 / 1...48"
	With signal transmitter IMT33A: DN25...2000 / 1...80"

Measuring accuracy

Maximum measuring error	IMT30A: down to 0.5% of the measured value ± 1 mm/s
	IMT31A: down to 0.3% of the measured value ± 1 mm/s
	IMT33A: down to 0.2% of the measured value ± 1 mm/s
	The maximum measuring error depends on the installation conditions.
	For detailed information refer to <i>Measuring accuracy</i> on page 37.
Repeatability	$\pm 0.1\%$ of the measured value, minimum 1 mm/s
Calibration / Verification	Standard:
	2 point calibration by a direct volume comparison.

Operating conditions

Temperature	
For detailed information in pressure / temperature refer to <i>Pressure derating</i> on page 42.	
	For Ex versions different temperatures are valid. Please refer to the relevant Ex documentation for details.
Process temperature	Hard rubber liner: $-5\dots+80^{\circ}\text{C}$ / $+23\dots+176^{\circ}\text{F}$
	Polypropylene liner: $-5\dots+90^{\circ}\text{C}$ / $+23\dots+194^{\circ}\text{F}$
	Polyolefin liner: $-5\dots+80^{\circ}\text{C}$ / $+23\dots+176^{\circ}\text{F}$
Ambient temperature	Standard (with aluminum signal transmitter housing): standard flanges $-20\dots+65^{\circ}\text{C}$ / $-4\dots+149^{\circ}\text{F}$
	Option (with aluminum signal transmitter housing): low temperature carbon steel flanges or stainless steel flanges $-40\dots+65^{\circ}\text{C}$ / $-40\dots+149^{\circ}\text{F}$
	Option (with stainless steel signal transmitter housing): low temperature carbon steel flanges or stainless steel flanges $-40\dots+55^{\circ}\text{C}$ / $-40\dots+130^{\circ}\text{F}$
Protect electronics against self-heating at ambient temperatures above $+55^{\circ}\text{C}$ / $+131^{\circ}\text{F}$.	
Storage temperature	$-50\dots+70^{\circ}\text{C}$ / $-58\dots+158^{\circ}\text{F}$
Measuring range	$-12\dots+12$ m/s / $-40\dots+40$ ft/s

Pressure	
For detailed information in pressure / temperature refer to <i>Pressure derating</i> on page 42.	
EN 1092-1	DN1200...2000: PN 6
	DN200...1000: PN 10
	DN65 and DN100...150: PN 16
	DN25...50 and DN80: PN 40
ASME B16.5	1...24": 150 & 300 lb RF
JIS	DN50...1000 / 2...40": 10 K
	DN25...40 / 1...1½": 20 K
AWWA (class B or D FF)	Option:
	DN700...1000 / 28...40": ≤ 10 bar / 145 psi
	DN1200...2000 / 48...80": ≤ 6 bar / 87 psi
DIN	PN 16 - 6 bar rated; DN700...2000
	PN 10 - 6 bar rated; DN700...2000
	PN 6 - 2 bar rated; DN700...2000
Vacuum load	For detailed information refer to <i>Vacuum load</i> on page 44.
Pressure loss	Negligible
Chemical properties	
Physical condition	Electrically conductive liquids
Electrical conductivity	Standard: ≥ 5 μS/cm
	Demineralised water: ≥ 20 μS/cm
Permissible gas content (volume)	IMT30A: ≤ 3%
	IMT31A: ≤ 3%
	IMT33A: ≤ 5%
Permissible solid content (volume)	IMT30A: ≤ 10%
	IMT31A: ≤ 10%
	IMT33A: ≤ 70%

Installation conditions

Installation	Assure that the flow tube is always fully filled.
	For detailed information refer to the manual of the flow tube and signal transmitter.
Flow direction	Forward and reverse
	Arrow on flow tube indicates flow direction.
Inlet run	≥ 5 DN
Outlet run	≥ 2 DN
Dimensions and weights	For detailed information refer to <i>Dimensions and weights</i> on page 38.

Materials

Flow tube housing	Sheet steel
Measuring tube	Austenitic stainless steel
Flanges	Carbon steel
Liner	Standard:
	DN25...150 / 1...6": polypropylene
	DN200...2000 / 8...80": hard rubber
	Option:
	DN25...150 / 1...6": hard rubber DN200...1000 / 8...40": polyolefin
Protective coating	On exterior of the meter: flanges, housing, signal transmitter (compact version) and / or connection box (field version)
	Standard: polyurethane coating
	Option: subsoil coating, offshore coating
Connection box	Only for remote versions
	Standard: die-cast aluminum
	Option: stainless steel
Measuring electrodes	Standard: Hastelloy® C
	Option: stainless steel, titanium
Grounding rings	Standard: stainless steel
	Option: Hastelloy® C, titanium, tantalum
	Grounding rings can be omitted with virtual reference option for the signal transmitter IMT33A.
Reference electrode (optional)	Standard: Hastelloy® C
	Option: stainless steel, titanium

Process connections

Flange	
EN 1092-1	DN25...2000 in PN 2.5...40
ASME	1...24" in 150 & 300 lb RF
JIS	DN25...1000 in 10...20 K
AWWA	DN700...2000 in 6...10 bar
Design of gasket surface	RF

Electrical connections

	For full detail refer to the relevant documentation of the signal transmitter.
Signal cable (remote versions only)	
Type A (DS)	In combination with the signal transmitter IMT30A, IMT31A and IMT33A Standard cable, double shielded. Max. length: 600 m / 1968 ft (depends on electrical conductivity and flow tube)
Type B (BTS)	Only in combination with the signal transmitter IMT33A Optional cable, triple shielded. Max. length: 600 m / 1968 ft (depends on electrical conductivity and flow tube)
I/O	For full details of I/O options, including data streams and protocols, see technical datasheet of the relevant signal transmitter.

Approvals and certificates

CE	
This device fulfils the statutory requirements of the EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
	For full information of the EU directive & standards and the approved certifications; please refer to the EU Declaration of Conformity or the website of the manufacturer.
Hazardous area	
ATEX	Please check the relevant Ex documentation for details.
	Compact version with signal transmitter IMT31A
	II 2 GD
	Compact version with signal transmitter IMT33A
	II 2 GD or II 2(1) GD
	Remote version
	II 2 GD
FM	In combination with signal transmitter IMT33A
	Class I, Div. 2, Groups A, B, C and D
	Class II, Div. 2, Groups F and G
	Class III, Div. 2, Groups F and G
CSA	In combination with signal transmitter IMT33A
	Class I, Div. 2, Groups A, B, C and D
	Class II, Div. 2, Groups F and G
Other approvals and standards	
Drinking water approvals	Hard rubber liner: NSF / ANSI standard 61 / ACS, KTW(<60°C), DVGW-W270, KIWA on request.
	Polypropylene liner: ACS, KIWA/ATA, KTW, NSF / ANSI standard 61, DVGW-W270, WRAS
	Polyolefin liner: ACS, KIWA/ATA, KTW, DVGW-W270, WRAS
Protection category acc. to IEC 60529	Standard:
	IP66/67, NEMA 4/4X/6
	Option:
	IP68, NEMA 6P
	IP68 is only available for separate design and with a stainless steel connection box.
Shock test	IEC 60068-2-27
	30 g for 18 ms
Vibration test	IEC 60068-2-64
	f = 20...2000 Hz, rms = 4.5 g, t = 30 min

6.3 Measuring accuracy

Every electromagnetic flowmeter is calibrated by direct volume comparison. The wet calibration validates the performance of the flowmeter under reference conditions against accuracy limits.

The accuracy limits of electromagnetic flowmeters are typically the result of the combined effect of linearity, zero point stability and calibration uncertainty.

Reference conditions

- Medium: water
- Temperature: +5...+35°C / +41...+95°F
- Operating pressure: 0.1...5 barg / 1.5...72.5 psig
- Inlet section: ≥ 5 DN
- Outlet section: ≥ 2 DN

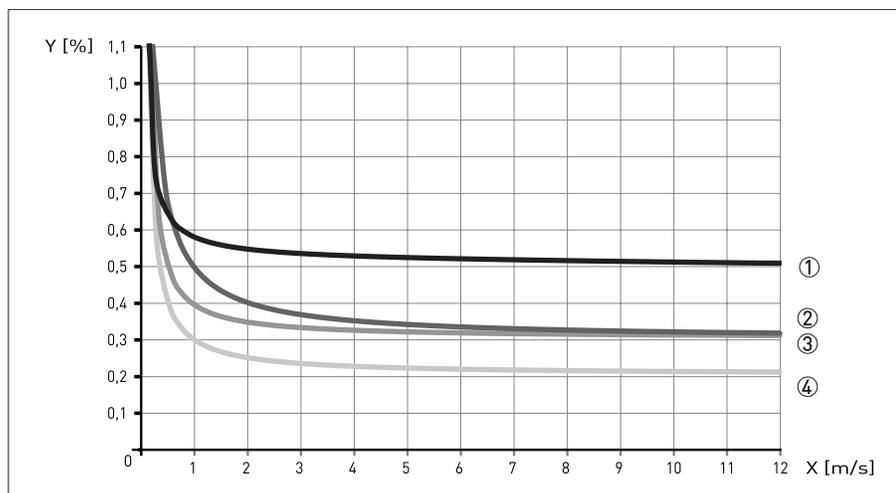


Figure 6-2: Flow velocity vs. accuracy

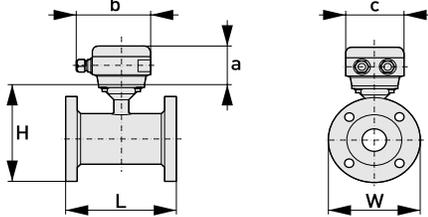
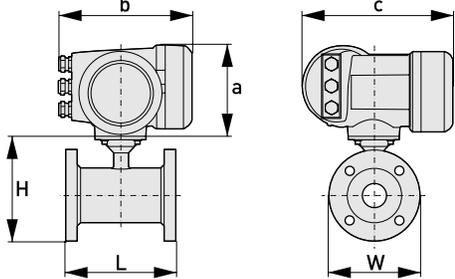
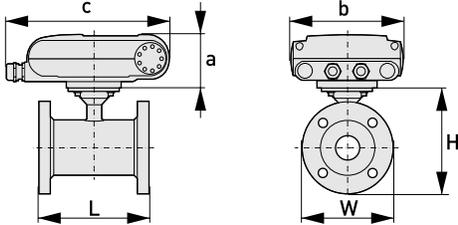
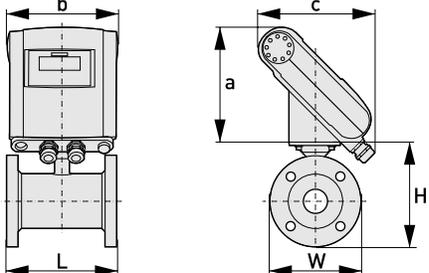
X [m/s] : flow velocity

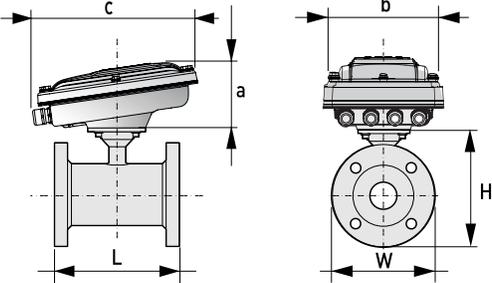
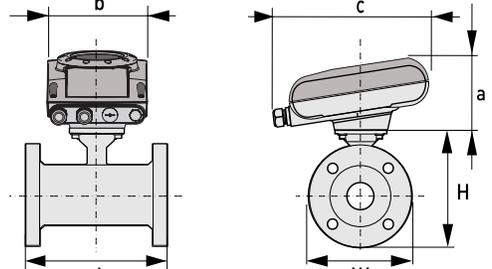
Y [%]: deviation from the actual measured value (mv)

Accuracy

Flow tube diameter	Signal transmitter type	Accuracy	Curve
DN25...1200 / 1...48"	IMT30A	0.5% of mv + 1 mm/s	①
DN25...1200 / 1...48"	IMT31A	0.3% of mv + 1 mm/s	③
DN25...1600 / 1...64"	IMT33A	0.2% of mv + 1 mm/s	④
DN1800...2000 / > 64"	IMT33A	0.3% of mv + 2 mm/s	②

6.4 Dimensions and weights

<p>Remote version</p>		<p>a = 88 mm / 3.5"</p> <p>b = 139 mm / 5.5" ①</p> <p>c = 106 mm / 4.2"</p> <p>Total height = H + a</p>
<p>Compact version with: IMT33A</p>		<p>a = 155 mm / 6.1"</p> <p>b = 230 mm / 9.1" ①</p> <p>c = 260 mm / 10.2"</p> <p>Total height = H + a</p>
<p>Compact version with: IMT31A (0°)</p>		<p>a = 82 mm / 3.2"</p> <p>b = 161 mm / 6.3"</p> <p>c = 257 mm / 10.1" ①</p> <p>Total height = H + a</p>
<p>Compact version with: IMT31A (45°)</p>		<p>a = 186 mm / 7.3"</p> <p>b = 161 mm / 6.3"</p> <p>c = 184 mm / 7.3" ①</p> <p>Total height = H + a</p>

<p>Compact version with: stainless steel IMT31A (10°)</p>		<p>a = 100 mm / 4" b = 187 mm / 7.36" ① c = 270 mm / 10.63" Total height = H + a</p>
<p>Compact version with: IMT30A (10°)</p>		<p>a = 101 mm / 3.98" b = 157 mm / 6.18" c = 260 mm / 10.24" ① Total height = H + a</p>

① The value may vary depending on the used cable glands.

**NOTICE!**

- All data given in the following tables are based on standard versions of the flow tube only.
- Especially for smaller nominal sizes of the flow tube, the signal transmitter can be bigger than the tube.
- Note that for other pressure ratings than mentioned, the dimensions may be different.
- For full information on signal transmitter dimensions see relevant documentation.

EN 1092-1

Nominal size DN [mm]	Dimensions [mm]				Approx. weight [kg]
	Standard length	ISO Insertion length	H	W	
25	150	200	140	115	5
32	150	200	157	140	6
40	150	200	166	150	7
50	200	200	186	165	11
65	200	200	200	185	9
80	200	200	209	200	14
100	250	250	237	220	15
125	250	250	266	250	19
150	300	300	300	285	27
200	350	350	361	340	34
250	400	450	408	395	48
300	500	500	458	445	58
350	500	550	510	505	78
400	600	600	568	565	101
450	600	-	618	615	111
500	600	-	671	670	130
600	600	-	781	780	165
700	700	-	898	895	248
800	800	-	1012	1015	331
900	900	-	1114	1115	430
1000	1000	-	1225	1230	507
1200	1200	-	1417	1405	555
1400	1400	-	1619	1630	765
1600	1600	-	1819	1830	1035
1800	1800	-	2027	2045	1470
2000	2000	-	2259	2265	1860

ASME B16.5 / 150 lb flanges

Nominal size [inch]	Dimensions [inch]			Approx. weight [lb]
	L	H	W	
1"	5.91	5.39	4.25	9
1¼"	5.91	5.75	4.63	13
1½"	5.91	6.10	5.00	15
2"	7.87	7.05	5.98	18
2½"	7.87	7.72	7	22
3"	7.87	8.03	7.50	26
4"	9.84	9.49	9.00	44
5"	9.84	10.55	10.00	49
6"	11.81	11.69	11.00	64
8"	13.78	14.25	13.50	95
10"	15.75	16.30	16.00	143
12"	19.69	18.78	19.00	207
14"	27.56	20.67	21.00	284
16"	31.50	22.95	23.50	364
18"	31.50	24.72	25.00	410
20"	31.50	26.97	27.50	492
24"	31.50	31.38	32.00	675

ASME B16.5 / 300 lb flanges

Nominal size [inch]	Dimensions [inch]			Approx. weight [lb]
	L	H	W	
1"	5.91	5.71	4.87	11
1¼"	7.87	6.30	5.25	17
1½"	7.87	6.65	6.13	20
2"	9.84	7.32	6.50	22
2½"	9.84	7.95	7.5	25
3"	9.84	8.43	8.25	31
4"	11.81	10.00	10.00	44
6"	12.60	12.44	12.50	73
8"	15.75	15.04	15.00	157
10"	19.69	17.05	17.50	247
12"	23.62	20.00	20.50	375
14"	27.56	21.65	23.00	474
16"	31.50	23.98	25.50	639
20"	31.50	28.46	30.50	937
24"	31.50	33.39	36.00	1345

6.5 Pressure derating

The graphs below refer to the maximum pressure as a function of the temperature for the flanges of the flowmeter (per specified flange material).

Please note that the specified values only refer to the flanges. The maximum value for the flowmeter can further be limited by the maximum value for other materials (i.e. the liner)

For A = Carbon steel A 105 & B = Stainless steel 316L

X/Y axes in all graphs; X = Temperature in [°C] / Y = Pressure in [bar]
 x/y axes in all graphs; x = Temperature in [°F] / y = Pressure in [psi]

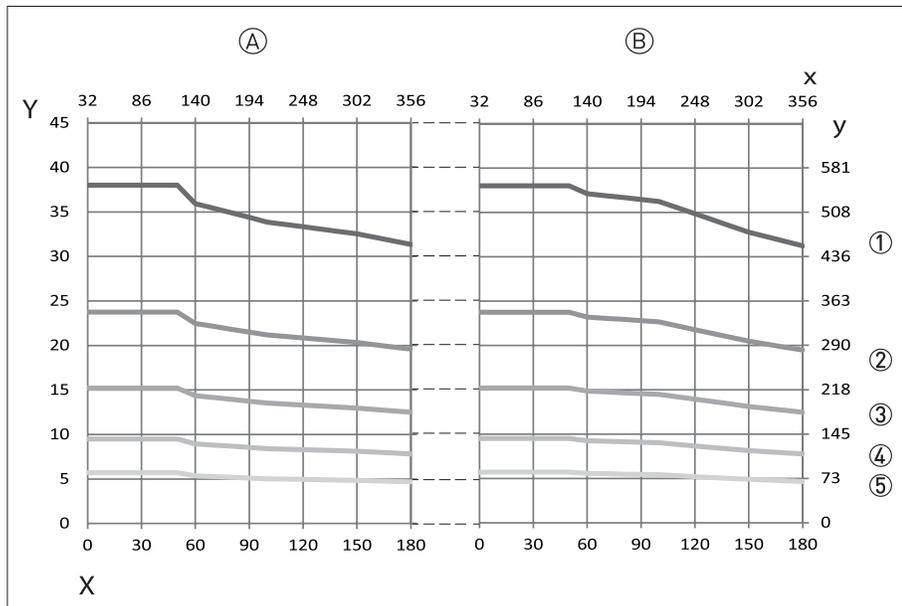


Figure 6-3: Pressure derating; EN 1092-1

- ① PN 40
- ② PN 25
- ③ PN 16
- ④ PN 10
- ⑤ PN 6

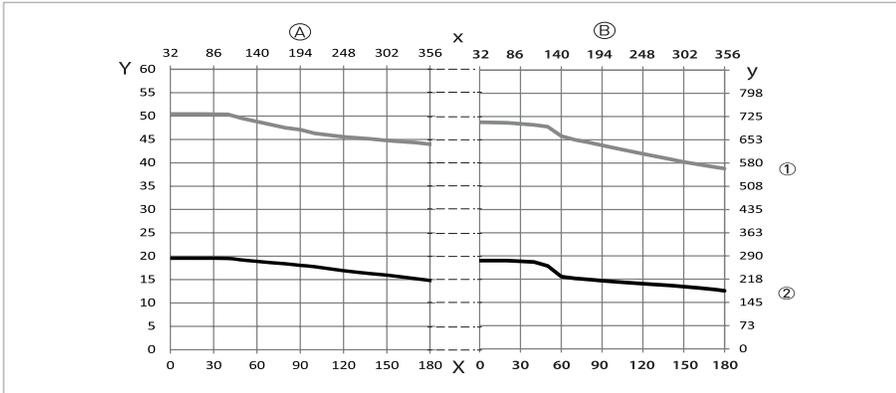


Figure 6-4: Pressure derating; ANSI B16.5

- ① 300 lbs
- ② 150 lbs

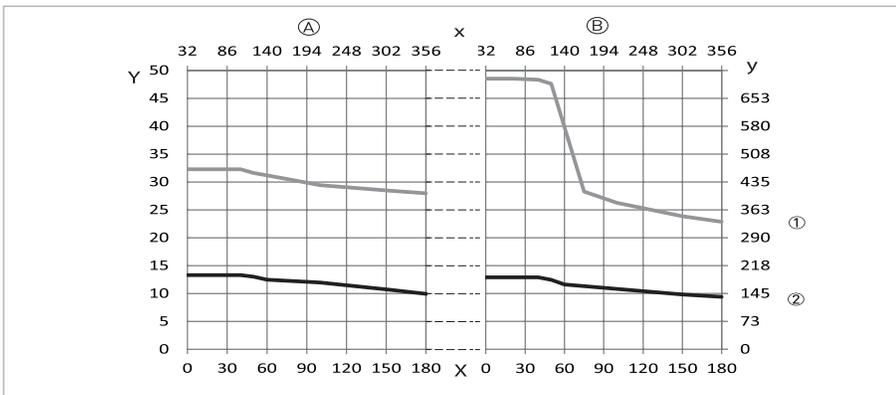


Figure 6-5: Pressure derating; JIS B2220

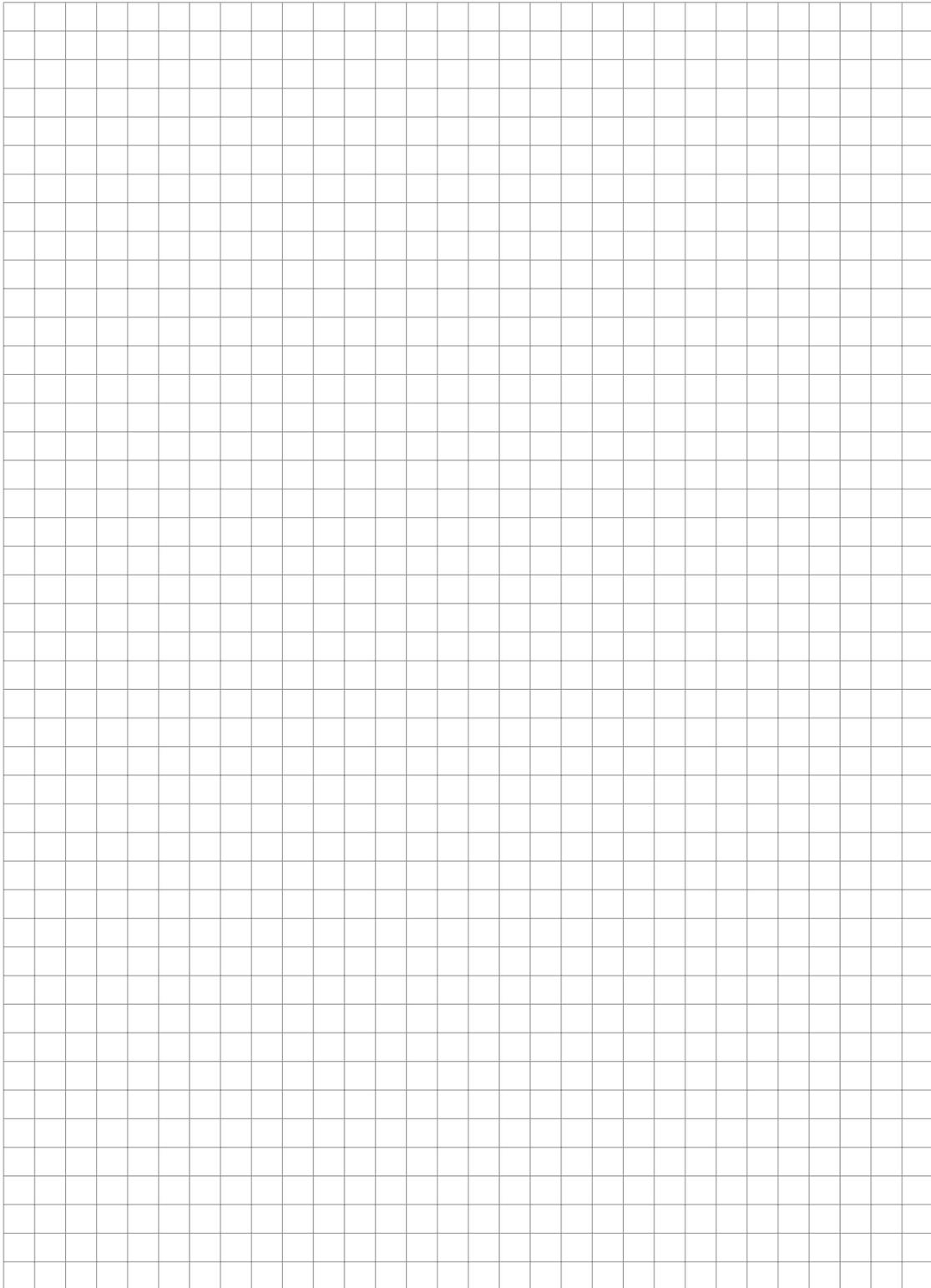
- ① 20K
- ② 10K

6.6 Vacuum load

Diameter	Vacuum load in mbar abs. at a process temperature of			
[mm]	20°C	40°C	60°C	80°C
Hard rubber				
DN25...300	250	250	400	400
DN350...1000	500	500	600	600
DN1200...2000	600	600	750	750
Polyolefin				
DN200...1000	0	0	0	0

Diameter	Vacuum load in psia at process temperature of			
[inch]	68°F	104°F	140°F	176°F
Hard rubber				
1...12	3.6	3.6	5.8	5.8
14...40	7.3	7.3	8.7	8.7
48...80	8.7	8.7	10.9	10.9
Polyolefin				
8...40	0	0	0	0







Schneider Electric Systems USA, Inc. Global Customer Support
38 Neponset Avenue Inside U.S.: 1-866-746-6477
Foxboro, MA 02035 Outside U.S.: 1-508-549-2424
United States of America <https://pasupport.schneider-electric.com>
<http://www.se.com>

Copyright 2020 Schneider Electric Systems USA, Inc.
All rights reserved.

The Schneider Electric brand and any trademarks of
Schneider Electric SE or its subsidiaries are the property
of Schneider Electric SE or its subsidiaries.
All other trademarks are the property of their respective
owners.

