SIEMENS

Introduction	1
Description	2
Installing/mounting	3
Connecting	4
Service and maintenance	5
Technical data	6
Certificates and support	Α

Speed sensors SITRANS WS300

Operating Instructions

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

ADANGER

indicates that death or severe personal injury will result if proper precautions are not taken.

indicates that death or severe personal injury may result if proper precautions are not taken.

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by [®] are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

1	Introduction	n	5
	1.1	Operating instructions scope	5
	1.2	Purpose of this documentation	5
	1.3	Industrial Use Note	5
2	Descriptior	٦	7
	2.1	SITRANS WS300 speed sensor overview	7
3	Installing/m	nounting	9
	3.1	Installation note	9
	3.2	Dimension drawings	9
	3.3	Mounting	10
	3.4	Mounting to a tail pulley	11
	3.5	Mounting to a bend or snub pulley	13
	3.6	Mounting using optional threaded shaft coupling	15
	3.7	General installation steps	16
	3.8 3.8.1 3.8.2	Hazardous area installations Product nameplates Instructions specific to hazardous area installation	18
4	Connecting]	
	4.1	Interconnection	21
	4.2 4.2.1 4.2.2 4.2.3	Terminals (standard version) Terminal connections to Siemens Milltronics integrators Terminal connections to SIWAREX FTC integrator Terminal connections to WL241	23 23
	4.3 4.3.1 4.3.2 4.3.3	Terminals (IS version) Terminal connections to Siemens Milltronics integrators Terminal connections to SIWAREX FTC integrator Terminal connections to WP241	24 24
5	Service an	d maintenance	
	5.1	Inspection	27
	5.2	Recommended spare parts	27

6	Technical da	ıta	29
	6.1	Power	29
	6.2	Ambient temperature	29
	6.3	Inputs	29
	6.4	Outputs	29
	6.5	Construction	30
	6.6	Approvals	30
Α	Certificates a	and support	33
	A.1	Certificates	33
	A.2	Technical support	33

Introduction

1.1 Operating instructions scope

This instruction manual covers the installation, operation, and maintenance of the WS300 speed sensor.

1.2 Purpose of this documentation

We strongly recommend reading this manual, and any manual for a product used in conjunction with the WS300 (such as a belt scale integrator), for proper installation and operation of any component of the weighing system. Adhering to the installation and operating procedures ensures a quick, trouble-free installation and allows for the maximum accuracy and reliability of your weighing system.

1.3 Industrial Use Note

Note

This product is intended for use in industrial areas.

In a domestic environment this device may cause radio interference.

Introduction

1.3 Industrial Use Note

Description

2.1 SITRANS WS300 speed sensor overview

SITRANS WS300 speed sensor is a low- to high-resolution shaft driven speed sensor. It measures the shaft's rotation by sending pulses to the integrator. The WS300 is certified for use in hazardous and non-hazardous locations.

This small, light-weight speed sensor features:

- Optional resolutions for accurate measurement over a range of belt speeds
- Long bearing life
- Corrosion resistance

Pulses are generated for each rotation of the WS300 shaft. These pulses are typically fed into a Milltronics belt scale integrator. The integrator interprets the pulses and uses them in the calculation of belt speed, flow rate, and material totalization.

The WS300 works with the following integrators:

- Milltronics BW100
- Milltronics BW500
- SIWAREX FTC
- Competitive integrators consult your local Siemens representative

The WS300 sensors can also be used with older model Siemens integrators:

- Compuscale
- Compuscale II
- Compuscale IIA
- Compuscale III
- Compu-M

For further information about Siemens products, go to www.siemens.com/protectionautomation (www.siemens.com/protectionautomation)

Description

2.1 SITRANS WS300 speed sensor overview

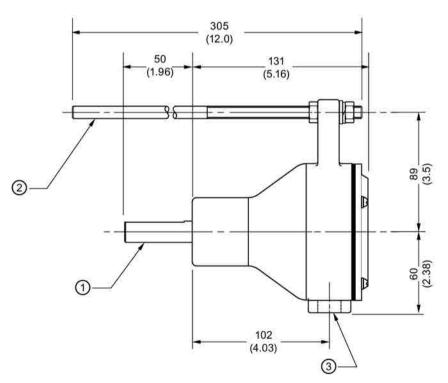
Installing/mounting

3.1 Installation note

Note

Installation shall be performed only by qualified personnel in accordance with local governing regulations.

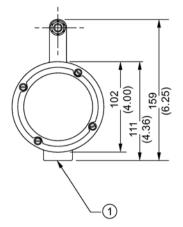
3.2 Dimension drawings



Dimensions in mm (inch)

- ① Shaft ø: 15.9 mm (5/8 inch)
- ② Rod ø: 8.0 mm (5/16 inch)
- ③ ½" NPT conduit entrance (optional M20 adapter available)

3.3 Mounting



Dimensions in mm (inch)

① ½" NPT conduit entrance (optional M20 adapter available)

3.3 Mounting

The input shaft on the WS300 is coupled to the rotating shaft on a belt driven pulley and is not externally supported. The units arresting rod stops it from rotating with the pulley shaft and can be fitted with a spring to soften sudden speed changes.

Proper attachment of the arresting rod

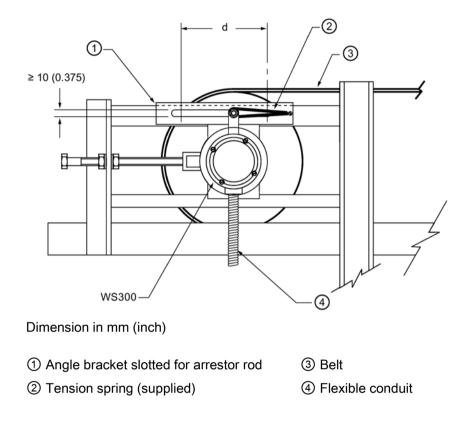
The arresting rod should only be solidly attached to the WS300. Fixing the rod at both ends will apply binding forces and cause the unit's bearings to wear prematurely.

When mounting, make sure the unit and the pulley shaft are concentric to avoid stresses on the units bearings.

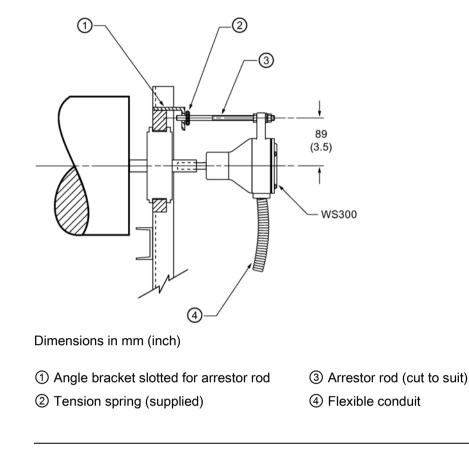
For preferred mounting locations, refer to the associated belt scale or weigh feeder instruction manual.

For shafts that do not have enough material protruding to use a set screw, or that cannot be removed for modification, a threaded shaft coupling can be used.

3.4 Mounting to a tail pulley



3.4 Mounting to a tail pulley

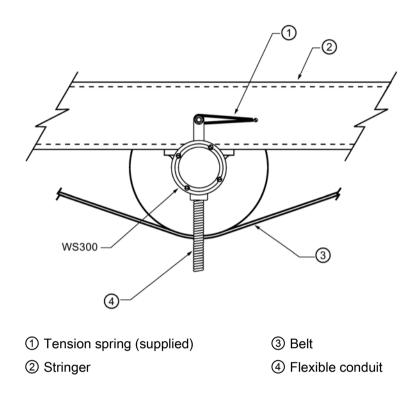


Note

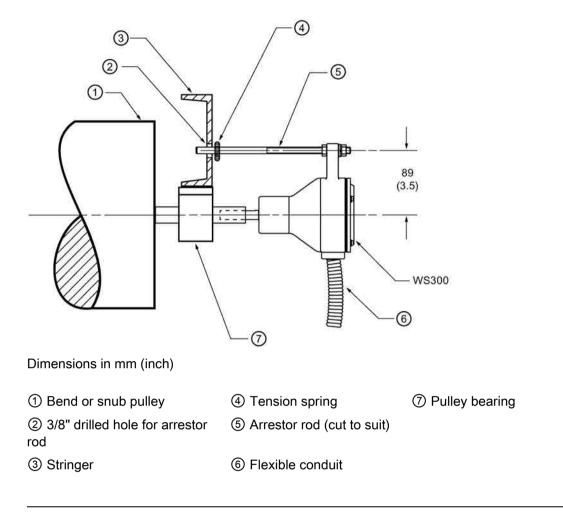
- Distance (d) is the take up travel on the tail pulley.
- When adjusting the belt take up, ensure there is play on the arrestor rod. If the arrestor rod is pushed against the end of its travel slot, premature wear may result on the bearing.

3.5 Mounting to a bend or snub pulley

3.5 Mounting to a bend or snub pulley



3.5 Mounting to a bend or snub pulley

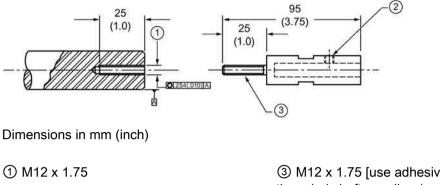


Note

When mounting to a bend or snub pulley only a 3/8 inch (10 mm) drilled hole is required for the arrestor rod.

3.6 Mounting using optional threaded shaft coupling

3.6 Mounting using optional threaded shaft coupling



② Set screw

③ M12 x 1.75 [use adhesive when installing threaded shaft coupling (e.g. Loctite)]

Note

All other installation instructions apply. See General installation steps (Page 16).

3.7 General installation steps

3.7 General installation steps

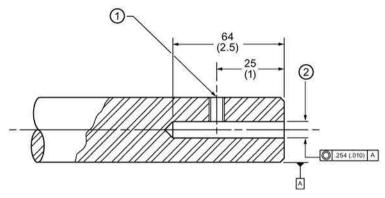
1. Drill out pulley shaft to a depth of 64 mm (2.5 inch) concentric to its centerline.

WARNING

Remain within specified tolerances

Exercise caution and remain within specified tolerances.

2. Drill out and thread the set screw hole.



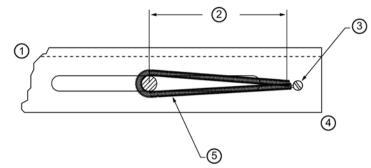
Dimensions in mm (inch)

① M8 x 1.25 (5/16-18 UNC) set screw (by customer)

2 16.00 mm (0.630 inch) dia., 16.07 mm (0.633 inch)

- 3. Attach angle iron bracket to work with the arrestor rod (if mounting on a tail pulley).
- 4. Cut the arrestor rod to a suitable length.

5. Insert the WS300 shaft into the pulley shaft and lock with set screw on flat of shaft.



Dimensions in mm (inch)

① Example slot for arrestor rod when mounted to tail pulley - use drilled hole for snub or bend pulley.

- ② 127 mm (5 inch) approx.
- ③ Secure with bolt or post
- ④ Angle iron bracket or conveyor stringer web
- ⑤ Tension spring
- 6. Attach spring to arresting rod and frame.
- 7. Encase wiring in flexible conduit to allow unit to float.
- 8. Wire the WS300 to the integrator. See Terminal Connections to Siemens Milltronics Integrators (Page 23), or Terminal Connections to SIWAREX FTC Integrator (Page 23).

Proper attachment of the arresting rod

The arresting rod should only be solidly attached to the WS300. Fixing the rod at both ends will apply binding forces and cause the unit's bearings to wear prematurely.

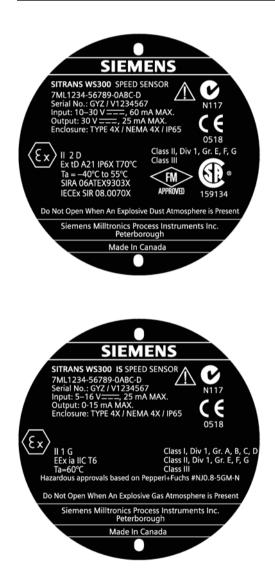
3.8 Hazardous area installations

3.8 Hazardous area installations

3.8.1 Product nameplates

Note

The nameplate shown is a typical example. Please check the nameplate on your device for your specific device configuration.



3.8 Hazardous area installations



3.8.2 Instructions specific to hazardous area installation

(Reference European ATEX Directive 94/9/EC, Annex II, 1/0/6)

Note

The enclosure shall be grounded to provide a discharge path for any electrostatic charges. The equipment shall be installed as per the installation drawing A5E03436733. This assessment does not cover any additional mechanical parts (e.g. conveyor belt etc.) that are added during installation. Proper maintenance is required to ensure that no dust shall accumulate on the surface of the WS300 (I.S). The maximum speed of the sensor shaft shall not exceed 1000 RPM (0785 m/sec). Regular inspection of the shaft seal and cover gasket is required. The seals must maintain a rating of IP6X.

The following instructions apply to equipment covered by certificate numbers Sira 06ATEX9303X, Sira 17ATEX2267X, IECEx CSA 170026X:

- 1. For use and assembly, refer to the main instructions.
- 2. The equipment is certified for use as Category 2D equipment and may be used in hazardous zones 21 and 22 with dusts.
- This equipment has a maximum surface temperature of T70°C (in a +55 °C ambient). Refer to the applicable code of practice for selection of this equipment with respect to specific dust ignition temperatures.
- 4. The equipment is certified for use in an ambient temperature range of -40 to +55 °C.
- 5. Any cable or conduit entries must meet the requirements of European Directive 94/9/EC for Group II, Category 2D.
- Cable should be selected in accordance with the applicable code of practice and such that its insulation can withstand the maximum surface temperature of the enclosure (T70 °C).
- 7. The equipment has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).

3.8 Hazardous area installations

- 8. Installation and inspection of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.
- 9. Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.
- 10.Components to be incorporated into or used as replacements in the equipment shall be fitted by suitably trained personnel in accordance with the manufacturer's documentation.
- 11.If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.
 - Aggressive substances: for example, acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.
 - Suitable precautions: for example, regular checks as part of routine inspections or establishing from the materials data sheet that it is resistant to specific chemicals.
- 12.Product marking shall include the warning: Do not open when an explosive dust atmosphere is present.

Special Conditions for Safe Use

The 'X' suffix to the certificate number relates to the following special condition(s) for safe use:

• Cable or conduit entries shall comply with the requirements of the European Directive 94/9/EC for Group II, Category 2D and maintain the overall IP rating of the enclosure.

Connecting

4.1 Interconnection

Note

Installation shall be performed only by qualified personnel and in accordance with local governing regulations.

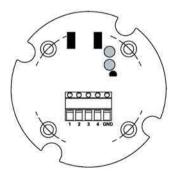
Interconnection between the standard WS300 unit and the integrator should be made with three-wire shielded, 0.82 mm² (18 AWG) cable. To connect the WS300 IS unit to the switch isolator, use two-wire shielded 0.324 mm² (22 AWG) cable. Use the same cable to connect the switch isolator to the integrator.

For both units, ground the shield at the integrator end ONLY. Connect shield to appropriate terminal at the integrator.

Note

- Flexible conduit is recommended so that excess stress is not applied to the shaft bearings. Use appropriate conduit and conduit fittings or cable glands to maintain NEMA or IP rating.
- Use appropriate conduit and conduit fittings or cable glands to maintain NEMA or IP rating.

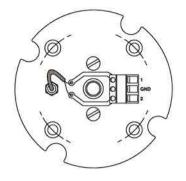
Standard Version



Connecting

4.2 Terminals (standard version)

Intrinsically Safe Version



4.2 Terminals (standard version)

1 - +V DC

The positive power supply from the integrator connection.

2 - Clockwise Speed Out

The positive output connection of the measurement loop. This output is only used when the sensor is rotating clockwise.

3 - Counter-Clockwise Speed Out

The positive output connection of the measurement loop. This output is only used when the sensor is rotating counter-clockwise.

4 - Common

The common connection used as a reference point with the integrator.

GND - Ground

A ground connection. Do not use this ground for the cable shield.

Note

- Ground the cable shield at the integrator end only!
- For optimal performance the housing of the Speed Sensor must be connected to a reliable earthed ground.

4.2 Terminals (standard version)

4.2.1 Terminal connections to Siemens Milltronics integrators

WS300 (standard)	1 +V	2 CW	3 CCW	4 Cmn	GND
Milltronics BW100	8	7	7	6	N/C
Milltronics BW500	19	16	16	17	N/C

4.2.2 Terminal connections to SIWAREX FTC integrator

WS300 (standard)	1 +V	2 CW	3 CCW	4 Cmn	GND
SIWAREX FTC	1L+	CI-	CI-	1M	N/C

Connect 1L+ to CI+

Note

N/C indicates the terminal is not normally connected.

4.2.3 Terminal connections to WL241

WS300 (standard)	1	2	3	4	GND
WP241	1L+	DI.0	DI.0	1M	N/C

Connect 1M to 2M

Determine the pulley shaft rotation on the end of the pulley shaft to which the WS300 is attached.

If the pulley shaft rotates clockwise, connect the appropriate wire to terminal 2.

If the pulley shaft rotates counter-clockwise, connect the appropriate wire to terminal 3.

Terminal connections

Do not connect terminals two and three at the same time.

4.3 Terminals (IS version)

1 - +V DC

The positive power supply from the integrator connection.

2 - Speed Out

The positive output connection of the measurement loop.

GND - Ground

A ground connection. Do not use this ground for the cable shield.

Note

- Ground the cable shield at the integrator end only!
- For optimal performance the housing of the Speed Sensor must be connected to a reliable earthed ground.

4.3.1 Terminal connections to Siemens Milltronics integrators

WS300 IS	IS Switch Isolator Terminal	Integrator
1	1	
2	3	
	7	speed signal input
	8	- excitation

4.3.2 Terminal connections to SIWAREX FTC integrator

WS300 IS	IS Switch Isolator Terminal	FTC
1	1	
2	3	
	7	CI+
	8	- excitation

Connect CI- to Common.

4.3.3 Terminal connections to WP241

WS300 IS	IS Switch Isolator Terminal	WP241
1	1	
2	3	
	7	DI.0
	8	- excitation

Connecting

4.3 Terminals (IS version)

Service and maintenance

5.1 Inspection

Periodically the cover should be removed and the enclosure and circuit board should be cleaned for dust and grime buildup. If cleaning is required, disconnect the power and use a vacuum cleaner and a clean, dry paintbrush. While the cover is off, check all electrical contacts for corrosion and evidence of arcing.



Removing the cover

Do not remove cover when an explosive dust atmosphere is present. De-energize before opening.

Wear on the bearings is detected by excess play or sound. If the bearings exhibit excess play or produce an unreasonably loud sound, the speed sensor should be returned to Siemens for repair.

Ensure that the lid screws are tightened to maintain the IP rating by compressing the lock washers flat.

5.2 Recommended spare parts

- WS300 circuit card (based on Resolution and Connections)
- Pepperl+Fuchs IS switch isolator (if required)

Note

Bearings and shaft seal are to be inspected for wear every 3 to 4 months to ensure proper sealing to enclosure and to reduce the potential for ignition from heat buildup due to friction.

5.2 Recommended spare parts

Technical data

6.1 Power

- Standard: 10 ... 30 V DC, 60 mA max.
- IS: 5 ... 16 V DC, 25 mA max. (from IS Switch Isolator)

6.2 Ambient temperature

- Standard: -40 ... +55 °C (-40 ... +131 °F)
- IS: -25 ... +55 °C (-13 ... +131 °F)

6.3 Inputs

• Shaft rotation 0.5 ... 2 000 rpm, bi-directional, resolution dependent¹⁾

6.4 Outputs

- Uni-directional open collector sinking output
- Standard: 10 ... 30 V DC, 25 mA max.
- IS: load current, 0 ... 15 mA
- 32, 256, 1 000, or 2 000 pulses per revolution (PPR)

PPR	Max. RPM	Hz
32	2 0001)	1 066
256	2 0001)	8 530
1 000	900	15 000
2 000	450	15 000

¹⁾ Max. RPM limited to 1000 for use in Intrinsically safe/mining applications.

6.5 Construction

6.5 Construction

Enclosure

- Aluminum, rated NEMA 4X/Type 4X/IP65
- Stainless steel (optional), rated NEMA 4X/Type 4X/IP65

Cable (recommended)

- Standard: 3-wire shielded, 0.82 mm² (18 AWG)
- IS: 2-wire shielded 0.324 mm² (22 AWG)
- Maximum cable run 305 m (1 000 ft)

Weight

- 1.22 kg (2.68 lb) aluminum
- 2.41 kg (5.3 lb) stainless steel

6.6 Approvals

Note

The device nameplate lists the approvals that apply to your device.

Standard version		
General	CE, RCM	
Hazardous	CSA/FM Class II, Div. 1, Groups E, F, G; Class III ATEX II 2D Ex tD A21 IP65 T70 °C IECEx Ex tD A21 IP65 T70 °C	

IS version/Mining (with stainless steel en- closure only)	IECEx CSA 17.0026X	Ex ia I Ma Ex ia IIC T4 Ga Ex ia IIIC T135 °C Da Ta = -40 °C +55 °C	IEC 60079-0:2011, 6th Edition, IEC 60079-11:2011, 6th Edition
	Sira 17ATEX2267X	O518 O518 IM1 II 1 GD Ex ia I Ma Ex ia IIC T4 Ga Ex ia IIIC T135 °C Da Ex h I Ma Ex h IIC T4 Ga Ex h I Ma Ex h IIC T4 Ga Ex h IIC T4 Ga	EN 60079-0:2012/A11:2013 EN 60079-11:2012 EN ISO 80079-36:2016 EN ISO 80079-37:2016 -

Note

Non-electrical protection is provided by type of protection constructional safety "c". The primary ignition hazards identified are hot surfaces, mechanically generated sparks, and electrostatic hazard which are mitigated by the construction, proper installation, inspection, regular maintenance, and adherence to conditions of safe use (or equivalent).

6.6 Approvals

Switch and Isolator Approvals

Note

The Approval Ratings for the Proximity Switch and the IS Switch Isolator are the property of Pepperl + Fuchs. Copies of these Approval Certificates may be obtained from our website www.siemens.com/continuous-weighing (www.siemens.com/continuous-weighing). Click on Support, then Approvals / Certificates, to find the appropriate certificate.

Proximity Switch Approval Ratings (Pepperl + Fuchs #NJ0.8-5GM-N)

- ATEX: II 2G, EEx ia IIC T6 (with suitable IS Switch Isolator)²⁾
- CSA/FM (with suitable IS Switch Isolator or Switch Amplifier):
 - Class I, Div. 1, Groups A, B, C, D
 - Class II, Div. 1, Groups E, F, G system approval

IS Switch Isolator (Pepperl + Fuchs #KFA5-SOT2-Ex2 or #KFA6-SOT2-Ex2)

- ATEX: II (1) G, [EEx ia] IIC
- CSA/FM:
 - Class I, Div. 1, Groups A, B, C, D
 - Class II, Div. 1, Groups E, F, G

²⁾ Based on the ATEX rating of the NAMUR sensor and CSA/FM system approvals.

Certificates and support

A.1 Certificates

You can find certificates on the Internet at Siemens Industry Online Support (https://support.industry.siemens.com/cs/?lc=en-WW) or on an included DVD.

A.2 Technical support

Technical Support

If this documentation does not provide complete answers to any technical questions you may have, contact Technical Support at:

- More information about our Technical Support is available at Support request (http://www.siemens.com/automation/support-request)
- More information about our Technical Support is available at Technical support (<u>http://www.siemens.com/automation/csi/service</u>)

Internet Service & Support

In addition to our documentation, Siemens provides a comprehensive support solution at:

Service & support (<u>http://www.siemens.com/automation/service&support</u>)

Personal contact

If you have additional questions about the device, please contact your Siemens personal contact at:

Partner (<u>http://www.automation.siemens.com/partner</u>)

To find the personal contact for your product, go to "All Products and Branches" and select "Products & Services > Industrial Automation > Process Instrumentation".

Documentation

You can find documentation on various products and systems at: Instructions and manuals (http://www.siemens.com/processinstrumentation/documentation) Certificates and support

A.2 Technical support