

Speed Sensors

SITRANS WS300

Operating Instructions · 05/2010



SITRANS

SIEMENS

Safety Guidelines: Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel: This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Unit Repair and Excluded Liability:

- The user is responsible for all changes and repairs made to the device by the user or the user's agent.
- All new components are to be provided by Siemens Milltronics Process Instruments Inc.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Warning: Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Note: Always use product in accordance with specifications.

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Disclaimer of Liability

While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. Please check the website shown below for the latest manual revisions. We welcome all suggestions for improvement.

Technical data subject to change.

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- For a selection of Siemens Milltronics level measurement manuals, go to: **www.siemens.com/level**. Choose **Support**, and then **Manuals / Operating Instructions**.
- For a selection of Siemens Milltronics weighing manuals, go to: **www.siemens.com/weighing**. Choose **Support**, and then **Manuals / Operating Instructions**.

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Safety Notes

Special attention must be paid to warnings and notes highlighted from the rest of the text by grey boxes.



WARNING: relates to a caution symbol on the product, and means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.





WARNING¹: means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

CAUTION: means that failure to observe the necessary precautions can result in considerable material damage.

Note: means important information about the product or that part of the operating manual.

Safety Marking Symbols

| In manual: | On product: | Description |
|---|---|--|
|  |  | WARNING: refer to accompanying documents (manual) for details. |

¹. This symbol is used when there is no corresponding symbol on the product.

The Manual

Note: This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

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

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.

Integrator and speed sensor instruction manuals are available for download from www.siemens.com/processautomation.

We always welcome suggestions and comments about manual content, design, and accessibility. Please direct your comments to techpubs.smpi@siemens.com.

Technical Support

Support is available 24 hours a day.

To find your local Siemens Automation Office address, phone or fax number go to:

www.siemens.com/automation/partner

- Click on the tab **Contacts by Product** and then find your product group (**+Process Automation > +Weighing Technology**).
- Select the team **Technical Support**. Click on **Next**.
- Click on the appropriate continent, then select the country followed by the city. Click on **Next**.

For on-line technical support go to:

www.siemens.com/automation/support-request

- Enter the device name (WS300) or order number, then click on **Search**, and select the appropriate product type. Click on **Next**.
- You will be prompted to enter a keyword describing your issue. Then either browse the relevant documentation, or click on **Next** to email a detailed description of your issue to Siemens Technical Support staff.

Siemens A&D Technical Support Center: phone +49 180 50 50 222
fax +49 180 50 50 223+

SITRANS WS300 Speed Sensor

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 IIA
- Compu-M
- Compuscale II
- Compuscale III

For further information about Siemens products, go to www.siemens.com/processautomation.

Specifications

Power

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

Ambient Temperature

- standard: -40 to +55 °C (-40 to +131 °F)
- IS: -25 to +60 °C (-13 to +140 °F)

Input

- shaft rotation 0.5 to 2000 rpm, bi-directional, resolution dependent

Output

- uni-directional open collector sinking output
- standard: +10 to +30 V DC, 25 mA max.
- IS: load current, 0 to 15 mA
- 32, 256, 1000, or 2000 pulses per revolution (PPR)

| PPR | Max. RPM | Hz |
|------|----------|-------|
| 32 | 2000 | 1066 |
| 256 | 2000 | 8530 |
| 1000 | 900 | 15000 |
| 2000 | 450 | 15000 |

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 (1000 ft)

Weight

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

Approvals

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

- standard version:
 - General CE, C-TICK
 - 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:
 - General CE, C-TICK
 - Hazardous Intrinsically Safe (IS) rating based on **Switch and Isolator Approvals** (see below)

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. 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)¹
- 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)

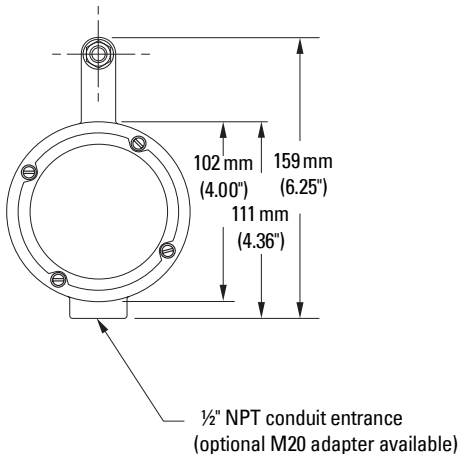
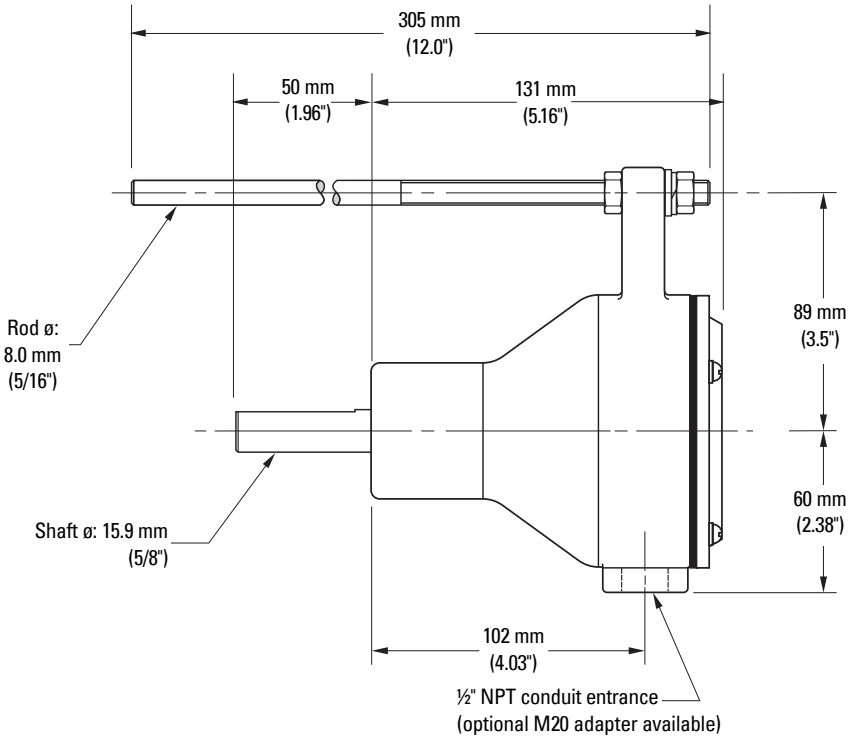
- ATEX: II (1) G, [EEx ia] IIC
- CSA/FM:
 - Class I, Div. 1, Groups A, B, C, D
 - Class II, Div. 1, Groups E, F, G

¹ Based on the ATEX rating of the NAMUR sensor and CSA/FM system approvals.

Installation

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

Dimensions



Mounting

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

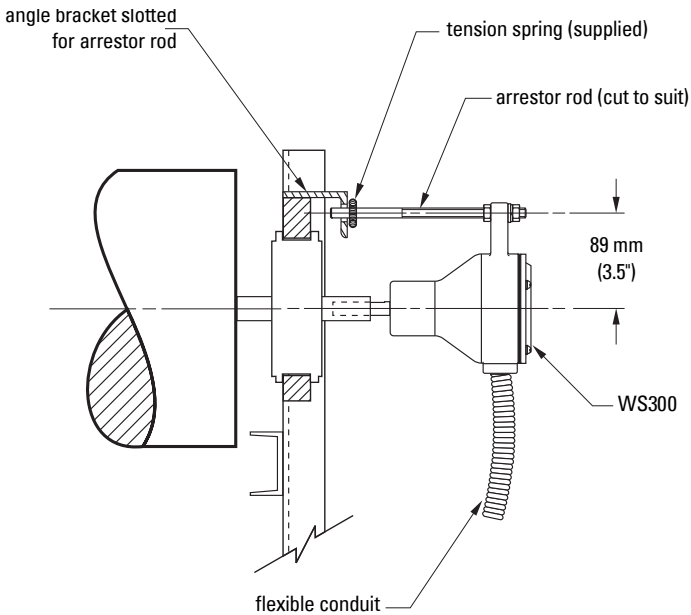
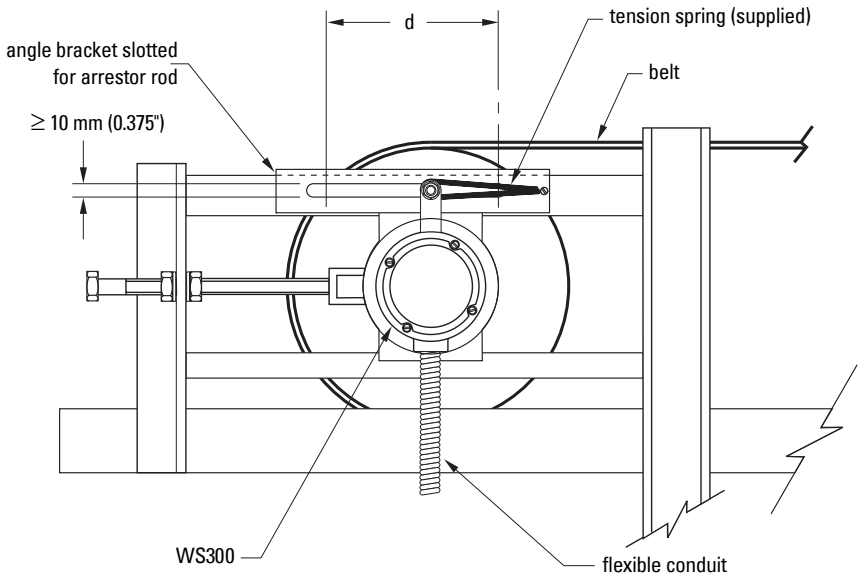
CAUTION: The arresting rod should only be solidly attached to the WS300. Fixing the rod at both ends will apply binding forces and cause the unit's bearings to wear prematurely.

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

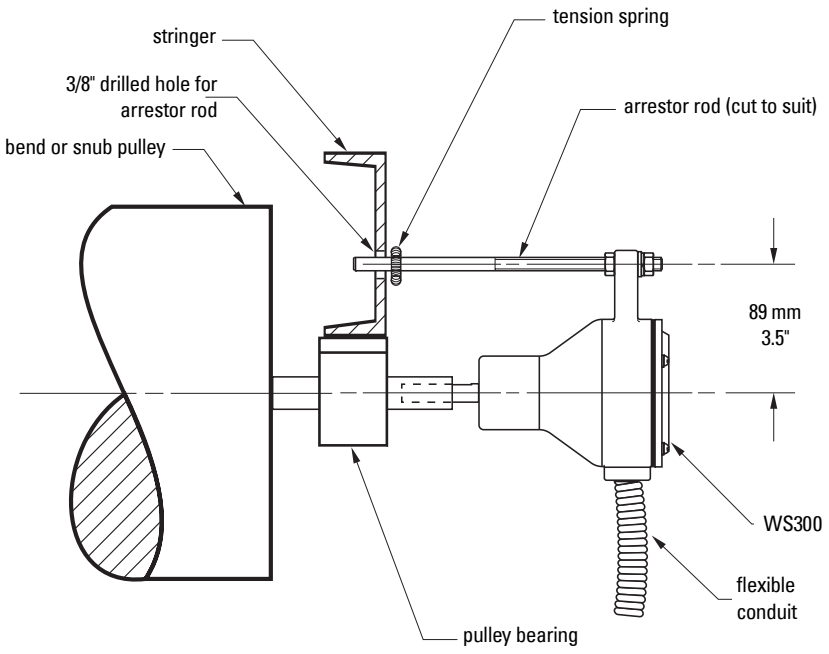
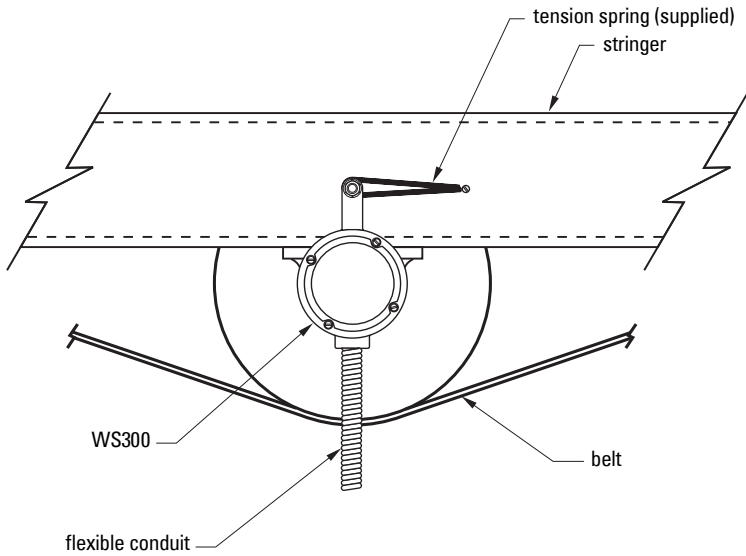
Mounting to a Tail Pulley



Notes:

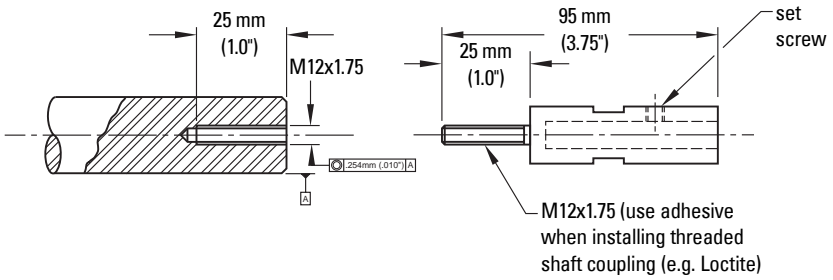
- Distance (**d**) is the take up travel on the tail pulley
- When adjusting the belt take up, ensure there is play on the arrestor rod. If the arrestor rod is pushed against the end of its travel slot, premature wear may result on the bearing.

Mounting to a Bend or Snub Pulley



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

Mounting using Optional Threaded Shaft Coupling



Note: All other installation instructions apply. See "General Installation Steps" on page 11.

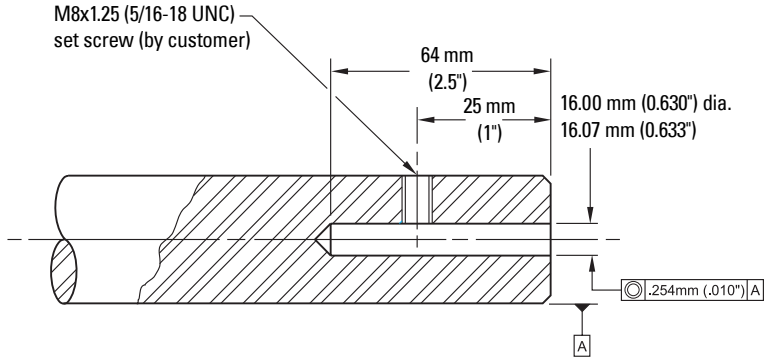
General Installation Steps

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



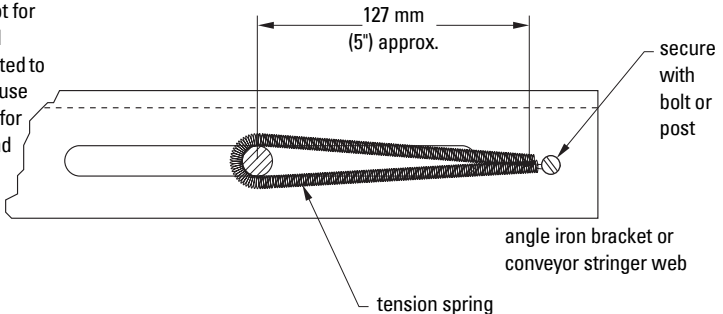
WARNING: Exercise caution and remain within specified tolerances.

2. Drill out and thread the set screw hole.



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.

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



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, or Terminal Connections to SIWAREX FTC Integrator on page 13.



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

Interconnection

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

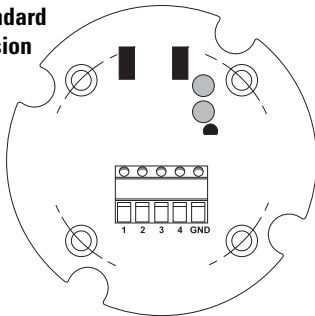
Interconnection between the standard WS300 unit and the integrator should be made with three-wire shielded, 0.82 mm² (18 AWG) cable. To connect the WS300 IS unit to the switch isolator, use two-wire shielded 0.324 mm² (22 AWG) cable. Use the same cable to connect the switch isolator to the integrator.

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

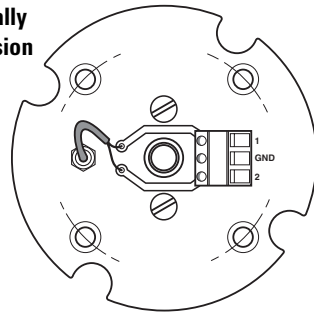
Notes:

- 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.

Standard Version



Intrinsically Safe Version



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.

Notes:

- 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.

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 |

Terminal Connections to SIWAREX FTC Integrator

| WS300 (standard) | 1 +V | 2 CW | 3 CCW | 4 Cmn | GND |
|---------------------|----------------------------|---------------|---------------|------------------------------|-----|
| SIWAREX FTC | 24 V (backplane bus) | X1.9 (CI+) | X1.9 (CI+) | X1.10 (CI- and Common) | N/C |

Note:

- N/C indicates the terminal is not normally connected.

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.



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

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.

Notes:

- 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.

Terminal Connections to Siemens Milltronics Integrators

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

Terminal Connections to SIWAREX FTC Integrator

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

Connect CI- to Common.

Maintenance

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.



WARNING: Do not remove cover when an explosive dust atmosphere is present.

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.

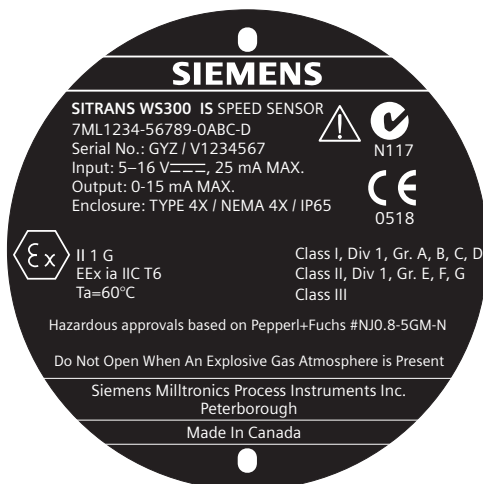
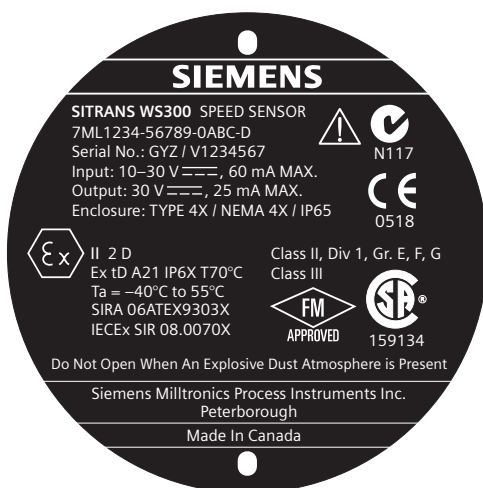
Recommended spare parts

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

Hazardous Area Installations

Product Nameplates

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



Instructions Specific to Hazardous Area Installations

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

The following instructions apply to equipment covered by certificate number
Sira 06ATEX9303X:

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.
3. 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.
6. 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).
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 material's 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.

Notes

For more information

www.siemens.com/level

www.siemens.com/continuous-weighing

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