

# Speed Sensors

SITRANS WS100

Operating Instructions · 06/2011



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.
- 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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- For a selection of Siemens Milltronics weighing manuals, go to: **[www.siemens.com/processautomation](http://www.siemens.com/processautomation)**. Under Weighing Technology, select *Continuous Weighing Systems* and then go to the manual archive listed under the product family.

# SIEMENS

## SITRANS

### Speed Sensors SITRANS WS100

#### Operating Instructions

Introduction

1

Installing/mounting

2

Connection

3

Service and maintenance

4

Technical data

5

## 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.

<b>⚠ DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.

<b>⚠ WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.

<b>⚠ CAUTION</b>
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

<b>CAUTION</b>
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

<b>NOTICE</b>
indicates that an unintended result or situation can occur if the relevant information is not taken into account.

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:

<b>⚠ WARNING</b>
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

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### 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

<b>1</b>	<b>Introduction.....</b>	<b>5</b>
1.1	SITRANS WS100 Speed Sensor.....	5
<b>2</b>	<b>Installing/mounting.....</b>	<b>7</b>
2.1	Dimensions .....	7
2.2	Mounting .....	8
2.3	General Installation Steps.....	11
<b>3</b>	<b>Connection .....</b>	<b>13</b>
3.1	Interconnection.....	13
3.2	Terminal connections to Siemens Integrators .....	14
3.3	Terminal connections to SIWAREX FTC Integrator.....	15
<b>4</b>	<b>Service and maintenance .....</b>	<b>17</b>
4.1	Maintenance.....	17
4.2	Technical support.....	17
<b>5</b>	<b>Technical data .....</b>	<b>19</b>



# Introduction

**NOTICE****For industrial use only**

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**

The Siemens speed sensor is to be used only in the manner outlined in this manual, otherwise protection provided by equipment may be impaired.

This manual covers only speed sensor installation, operation, and maintenance procedures. It is your responsibility to read this manual, and any manual for a product used in conjunction with the SITRANS WS100 (such as a belt scale integrator), before installing and operating any component of the weighing system to which the speed sensor will be applied.

Integrator and speed sensor instruction manuals are available for download from our website (<http://www.siemens.com/weighing>)

Follow these operating instructions for quick, trouble-free installation, and maximum accuracy and reliability of your weighing system.

We always welcome suggestions and comments about manual content, design, and accessibility. Please direct your comments to:

Technical publications (<mailto:techpubs.smpi@siemens.com>)

## 1.1 SITRANS WS100 Speed Sensor

SITRANS WS100 speed sensor is a compact, medium-resolution pulley shaft-driven belt speed sensor with magnetic mounting. It is ideal for aggregate and mineral processing industries.

This small, light-weight speed sensor features:

- Good resolution for accurate measurement, suitable for varying shaft speeds
- Long bearing life

Eight pulses are generated for each rotation of the SITRANS WS100 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.

*1.1 SITRANS WS100 Speed Sensor*

The SITRANS WS100 IS (Intrinsically Safe) speed sensor contains a Pepperl + Fuchs, NAMUR rated, inductive proximity switch, model number: NCN4-12GM-35-N0. The proximity switch detects the pulses, and transmits a signal to the integrator via the associated Switch Isolator.

The SITRANS WS100 works with the following Siemens integrators:

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

SITRANS WS100 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 our website (<http://www.siemens.com/weighing>).

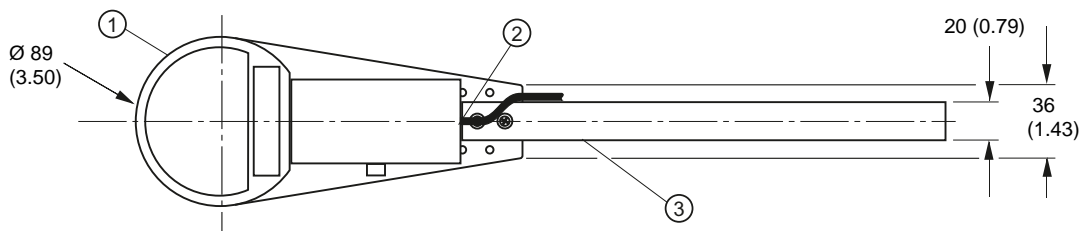


## Installing/mounting

### 2.1 Dimensions

**Note**

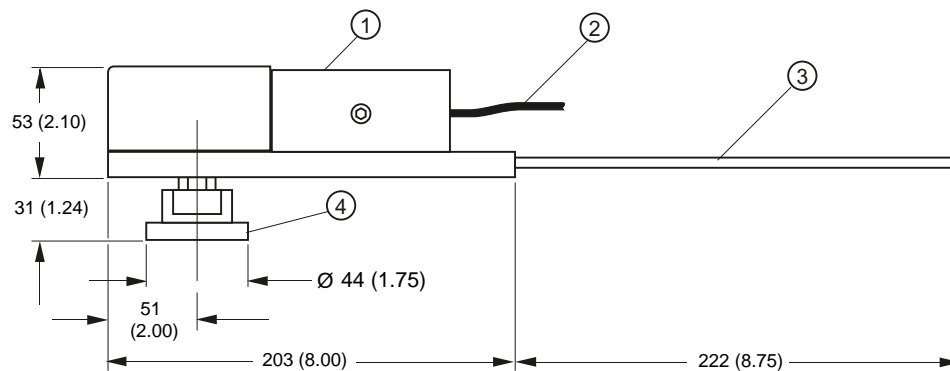
Installation shall be performed only by qualified personnel in accordance with local governing regulations.



- ① Polypropylene sealed housing for ferrous targets
- ② M20 (½" NPT) diameter hole for conduit adaptor (use flexible conduit)
- ③ Arrestor strap

Figure 2-1 SITRANS WS100, dimensions in mm (in)

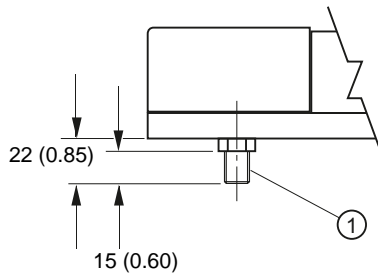
### Magnetic shaft connector option



- ① Stainless steel sensor cover
- ② Cable
- ③ Arrestor strap
- ④ Magnetic shaft connector

Figure 2-2 Magnetic shaft connector, dimensions in mm (in)

### Male shaft connector option



① M12 x 1.75 male shaft connector

Figure 2-3 Male shaft connector, dimensions in mm (in)

## 2.2 Mounting

The input shaft on the SITRANS WS100 is coupled to the rotating shaft on a belt-driven pulley with a tapped hole, and is externally supported. The arresting strap prevents the unit rotating with the shaft, and can be attached to any rigid support member close to the sensor.

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

For mounting using the magnetic connector, ensure the face of the rotating shaft on the belt-driven pulley is flat, and has no burrs or damage that may prevent flush mounting of the magnetic connector. Attach the SITRANS WS100 speed sensor to the shaft: the magnetic connector will center itself as the belt-driven pulley rotates.

### WARNING

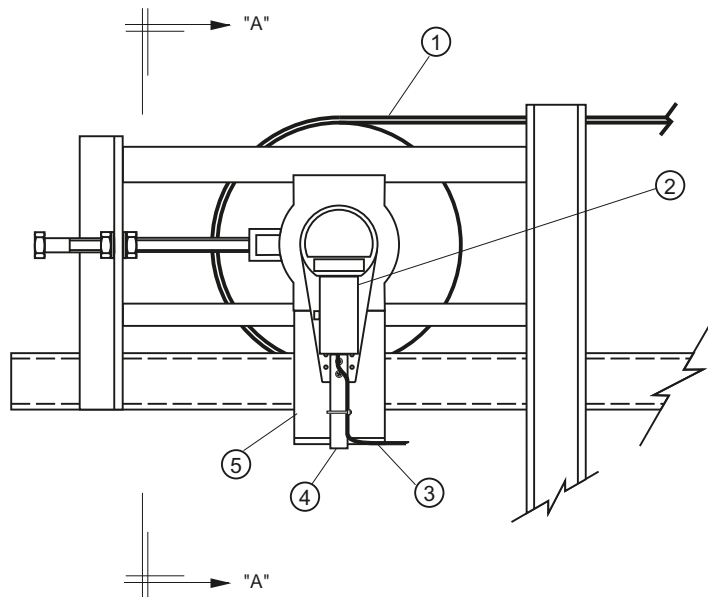
The magnetic connector has over 68 kg (150 lbs) of pulling force. Ensure no objects are placed between the magnetic connector and the shaft to avoid personal injury.

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

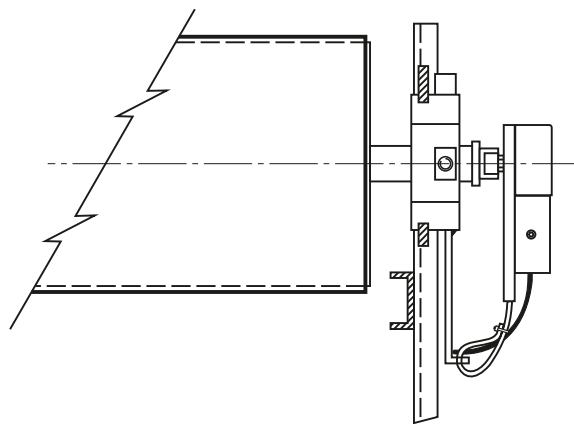
### Mounting to a tail pulley

**Note**

When adjusting the belt take-up, ensure that the WS100 travels with the tail pulley bearing.



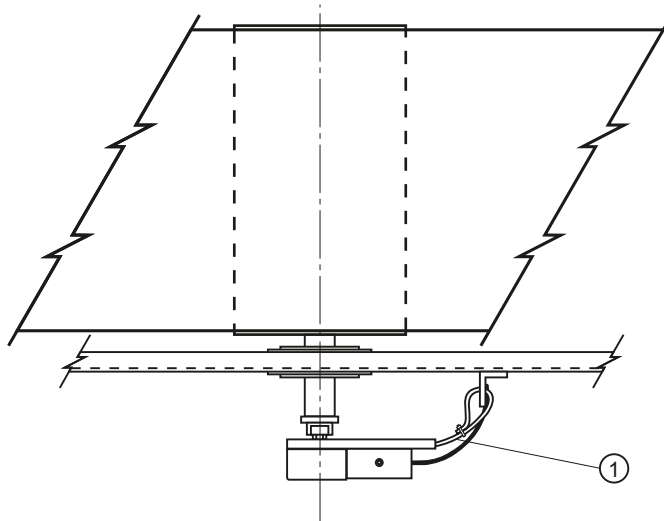
**View "A - A"**



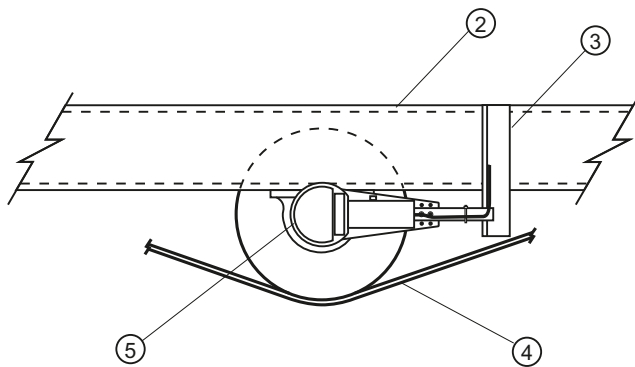
- ① Belt
- ② Sitrans WS100
- ③ Cable
- ④ Arrestor strap (mounted to restraining bracket)
- ⑤ Restraining bracket (mounted off bearing)

Mounting to a bend or snub pulley

Top view



Front view



- ① Arrestor strap
- ② Conveyor stringer
- ③ Conveyor structure for arrestor strap
- ④ SITRANS WS100
- ⑤ Belt

## 2.3 General Installation Steps

**⚠ WARNING**

Exercise caution when completing step 1, and remain within specified tolerances.

1. Drill and tap out pulley shaft to a depth of 25 mm (1") concentric to its centerline, and tap M12x1.75. If using magnetic connector, mount to shaft face, and go to step 3.

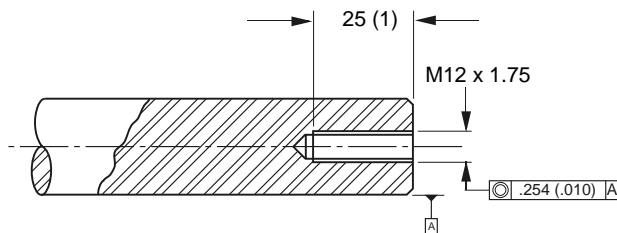
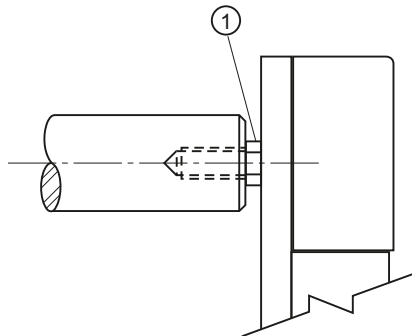


Figure 2-4 Pulley shaft detail, dimensions in mm (in)

2. Thread the SITRANS WS100 onto the machine shaft using 16 mm or 5/8" open-ended wrench and releasable thread-locking adhesive (Loctite or similar).



① Lock against shaft

3. Attach arrestor strap to an existing support member or add a rigid support if necessary.
4. Encase wiring in flexible conduit to allow unit to move freely (without tension on the wires).
5. Wire the SITRANS WS100 to the integrator. For terminal post connections, see also Terminal connections to Siemens Integrators (Page 14)



## Connection

### 3.1 Interconnection

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#### Note

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

Connection between the SITRANS WS100 standard unit and the integrator should be made with three-wire shielded, 0.324 mm<sup>2</sup> (22 AWG) cable.

To connect the SITRANS WS100 IS unit to the switch isolator, use two-wire shielded 0.324 mm<sup>2</sup> (22 AWG) cable. Use the same cable to connect the switch isolator to the integrator. Ground the shield at the integrator end ONLY.

#### Connection

WS100 standard	Integrator
Red	Speed excitation
White	Speed signal
Black	Speed common

WS100 IS	IS Switch Isolator Terminal	Integrator
Brown	1	
Blue	3	
	7	Speed signal
	8	Speed common

## Wiring

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### Note

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

### WS100 Standard:

- **Red:** +V DC (the positive power supply from the integrator connection).
- **White:** Speed Out (the positive output connection of the measurement loop).
- **Black:** 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.

### WS100 IS

- **Brown:** +V DC (the positive power supply from the integrator connection).
- **Blue:** Speed Out (the positive output connection of the measurement loop).
- **GND:** Ground (a ground connection). Do not use this ground for the cable shield.

## 3.2 Terminal connections to Siemens Integrators

### Terminal connections to Siemens Integrators

SITRANS WS100	Red +V DC	White Speed	Black COM	GND
Milltronics BW100	8	7	6	N/C
Milltronics BW500	19	16	17	N/C
SIWAREX FTC	24 V (backplane bus)	X1.9 (CI+)	X1:10 (CI-)	N/C

### See also

Installing/mounting (Page 7)



### 3.3 Terminal connections to SIWAREX FTC Integrator

#### Terminal connection to SIWAREX FTC Integrator

SITRANS WS100 IS	Brown		Blue		GND
Isolation barrier	1	7	3	8	N/C
Milltronics BW100		7		17	N/C
Milltronics BW500		16		14	N/C
SIWAREX FTC		Cl+		1L+	N/C

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**Note**

- N/C indicates the terminal is not normally connected.
  - For terminal connections to older model Siemens integrators consult your local Siemens representative.
-



## Service and maintenance

### 4.1 Maintenance

#### Inspection

Periodically the cover should be removed and the sensor should be cleaned for dust and grime buildup. If cleaning is required, disconnect the power and use a vacuum cleaner and a clean, dry paint brush.

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

- Magnetic coupling
- Proximity Sensor

### 4.2 Technical support

If you have any technical questions about the device described in these Operating Instructions and do not find the right answers, you can contact Customer Support:

- Via the Internet using the **Support Request**:

Support request (<http://www.siemens.com/automation/support-request>)

- Via Phone:

- Europe: +49 (0)911 895 7222
- America: +1 423 262 5710
- Asia-Pacific: +86 10 6475 7575

Further information about our technical support is available on the Internet at

Technical support (<http://support.automation.siemens.com/WW/view/en/16604318>)

### **Service & Support on the Internet**

In addition to our documentation, we offer a comprehensive knowledge base online on the Internet at:

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

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- You can find your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under "Services."

### **Additional Support**

Please contact your local Siemens representative and offices if you have additional questions about the device

Find your contact partner at:

Local contact person (<http://www.siemens.com/automation/partner>)

## Technical data

### Power

WS100 standard:	4.5 to 28 V DC, 16 mA
WS100 IS (Intrinsically Safe):	16 V DC (Ui), 52 mA (Ii), 169 mW (Pi), from IS Switch Isolator

### Ambient Temperature

WS100 standard:	-40 to +110 °C (-40 to +230 °F)
WS100 IS (Intrinsically Safe):	-25 to +100 °C (-14 to +212 °F)

### Input

Shaft rotation; 15 to 1500 rpm	bi-directional
Shaft rotation; 15 to 300 rpm	bi-directional with magnetic connector

### Output

8 pulses per revolution;	0 to 200 Hz; 0 to 40 Hz with magnetic connection
WS100 standard:	Open collector sinking output, 25 mA
WS100 IS (Intrinsically Safe):	Load current, 0 to 15 mA;

### Enclosure

Polypropylene base and target enclosure with 304 (1.4301) stainless steel access cover
304 (1.4301) stainless steel shaft, bearings, and hardware
Degree of protection: IP67

### Cable (recommended)

WS100 standard:	3 m (10 ft), 3 conductor 22 AWG (0.324 mm <sup>2</sup> ), PVC shielded cable, 300 m (1000 ft) maximum cable run
WS100 IS (Intrinsically Safe):	2 m (6.5 ft), 2 conductor 26 AWG (0.129 mm <sup>2</sup> ), PVC covered cable, 300 m (1000 ft) maximum cable run to IS switch isolator, 300 m (1000 ft) maximum cable run to IS switch isolator and integrator

### Weight

122 kg (2.68 lb)
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### Approvals

WS100 standard:	CE, C-TICK
WS100 IS (Intrinsically Safe):	Uses approved Pepperl +Fuchs Proximity Switch and IS switch isolator (see Switch approvals on next page)

### Switch and Isolator Approvals

#### Note

The approval ratings for the Proximity Switch and the IS Switch Isolator are the property of Pepperl+Fuchs. For current approvals go to: <http://www.am.pepperl-fuchs.com>.

### Proximity Switch Approval Ratings (Pepperl+Fuchs #NCN4-12GM-35-N0)

Hazardous:	ATEX II 1D Ex iaD 20 T108 °C, ATEX II 1G EEx ia IIC T6
General purpose:	CE , C-TICK, CSA/FM

### IS (Intrinsic Safety Switch Isolator Approval Ratings (Pepperl+Fuchs #KFA6-SOT2-Ex2))

Hazardous:	ATEX II 1D Ex iaD ATEX II 1G EEx ia IIC
	CSA: Class I, Div. 1, Groups A, B, C, and D, Class II, Div. 1, Groups E, F, and G, Class III
General purpose:	CE, C-TICK , FM







## For more information

[www.siemens.com/level](http://www.siemens.com/level)

[www.siemens.com/weighing](http://www.siemens.com/weighing)

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7ML19985LU02 Rev. 2.0

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Printed in Canada

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