# **SIEMENS**

SITRANS

Process protection SITRANS WM100

**Operating Instructions** 

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7MH7158 (SITRANS WM100)

### 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.

### **DANGER**

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.

### **A**CAUTION

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:

### **▲**WARNING

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.

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SITRANS WM100 Motion Sensing Switch

# 1.1 Description

SITRANS WM100 motion sensing switch is a heavy-duty zero speed alarm. It is used to detect the absence or presence of motion of rotating, reciprocating, or conveying equipment. The WM100 has a circuit card and a magnetic assembly potted in the probe body. The WM100 is powered from the line voltage and provides a set of dry relay contacts to indicate motion when the ferrous targets of the machinery being monitored pass in front of the probe.

Safety notes 2

### 2.1 Precondition for use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

### Safety marking symbols

In manual	On Product	Description
$\triangle$	lack	Caution: refer to accompanying documents (manual) for details.
		Protective Conductor Terminal

Introduction

This instruction manual covers the installation, operation and maintenance of the SITRANS WM100. It is essential that this manual be referred to for proper installation and operation of your unit. Adhering to the installation and operating procedures will ensure a quick, trouble free installation and allow for the maximum accuracy and reliability of your motion sensing probe.

Installing/mounting

# **A**WARNING

The probe face is magnetic. Keep it away from magnetosensitive materials such as computer discs and audio or video tapes.

# **A**WARNING

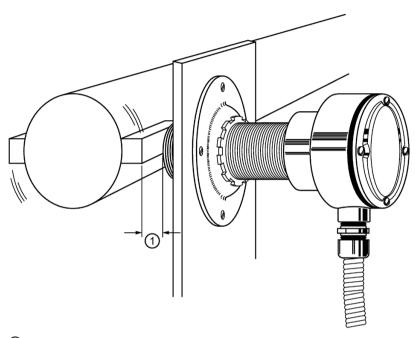
All field wiring must have insulation suitable for at least 250 V and the maximum ambient temperature of +60°C (+140 °F).

#### Note

- The Protective Earth Terminal indicated by ( ) must be connected to reliable ground.
- All wiring must be done by qualified personnel in accordance with all governing regulations.
- The equipment must be protected by a 15 A fuse or circuit breaker in the building installation.
- A circuit breaker or switch in the building installation, marked as a disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.
- Relay contact terminals are for use with equipment which has no accessible live parts and wiring which has insulation suitable for at least 250 V.

#### **Environment**

The WM100 must be mounted in an area that is non-hazardous, within the ambient temperature range and non-corrosive to the materials of construction. Refer to Dimensions (Page 17) for materials of construction.



① Up to 100 mm (4") maximum gap

The probe should be mounted using the supplied mounting flange, onto a vibration free structure. The gap between the probe and the target should be sufficient such that there is no danger of the target damaging the probe. The maximum allowable gap ranges from 20 mm to over 100 mm from the face of the target to the face of the probe. The range is dependent on the target type and range of speed expected. See typical performance graphs (Page 13) for examples.

The WM100 is sensitive to lateral disturbances to its magnetic field. If the WM100 is responding to motion from an interfering target, move the WM100 or install a ferrous plate (steel) as a shield between the WM100 and the interfering target.

Where possible, the probe should be mounted so the conduit entry is pointing down to avoid accumulation of condensation in the casing. Connection of the probe should be made via flexible conduit for easier removal or adjustment of the probe.

### Note

In climates where direct sunlight may cause the SITRANS WM100 temperature to rise above the specified limit, shade the unit by installing a sun shield.

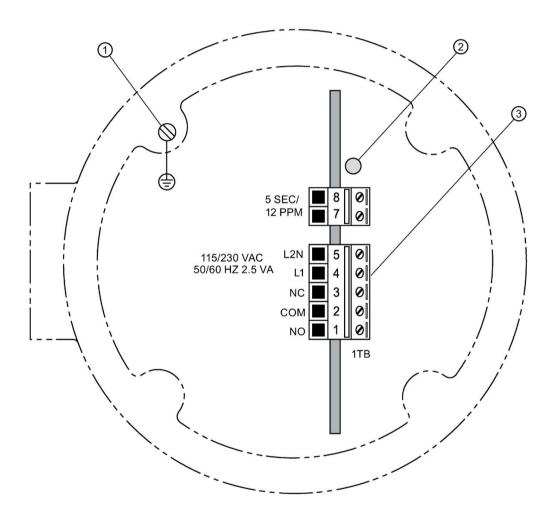
Connecting 5

### 5.1 WM100 Circuit Card



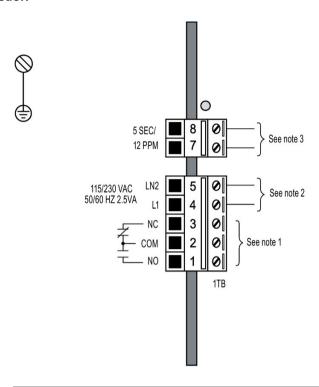
Disconnect power before opening top cover.

Note: Check nameplate for proper operation voltage (115 V AC or 230 V AC).



- ① Ground terminal for customer connection
- ② Detection indicator LED
- 3 Terminal block for customer connection

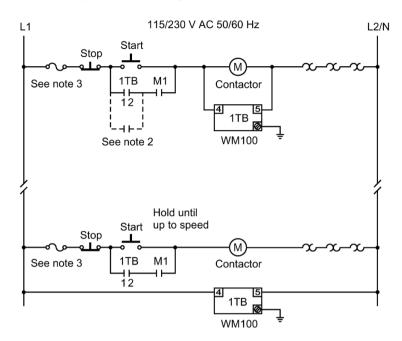
### WM100 Connection



#### Note

- 1. Dry contacts shown in de-energized (alarm or shelf) state.
- WM100 is manufactured for either 115 or 230 V AC operation. Check WM100 nameplate
  for applicable voltage. Correct voltage must be supplied. Voltages lower than specified
  will result in an inoperative condition. Voltages higher than specified will severely damage
  unit.
- 3. For 5 second time delay and minimum 12 ppm range, connect jumper across terminals 7 and 8. Without a jumper, the default is 10 second time delay and minimum 6 ppm range.

# 5.2 WM100 Typical Wiring



Should the time delay feature on start up not be required, power should be applied continuously from a separate source. Typically this would be desirable for automatic upstream start up of conveying devices after down stream drive has reached its operation speed.

### Note

- 1. Interlocks and safety pull switches are not shown.
- 2. If 'START' is initiated by programmable logic controller, closure time may be of insufficient duration to allow WM100 contact to latch. In such a case, program a timer contact into circuit.
- 3. CSA requires a 3 A or less fuse to protect contacts. For 240 V AC, protect contacts with a 1500 VA transformer as well.

Operating 6

When power is initially applied to the WM100, the alarm relay is energized and held artificially by the timing circuit. This will simulate the normal operation of the WM100 for a start up delay of > 10 seconds (or > 5 seconds if a jumper is wired across terminals 7 and 8).

As a ferromagnetic object passes through the probe's permanent magnet field, the distortion of the flux is sensed by the magnetic detection circuit. If the distortion is of suitable magnitude, a short pulse is generated to reset the timing circuit, visible to the user by the LED shown in the lid window. This action keeps the alarm relay energized providing fail-safe operation of the contacts.

If no change in flux (target motion) is sensed for a period of 10 seconds (or 5 seconds if a jumper is wired across terminals 7 and 8), the timing circuit will not be reset. This will cause the alarm relay to de-energize and the contacts to change state.

Thus the WM100 cannot detect the motion of uniform ferromagnetic masses such as a rotating pulley or a keyless shaft.

When adjusting the WM100 mounting position, it may take up to 10 seconds for the detection circuit to adjust to the new ambient magnetic environment. During this adjustment period, the LED may fail to flash for an otherwise normally detectable moving target.

## 6.1 Typical Performance

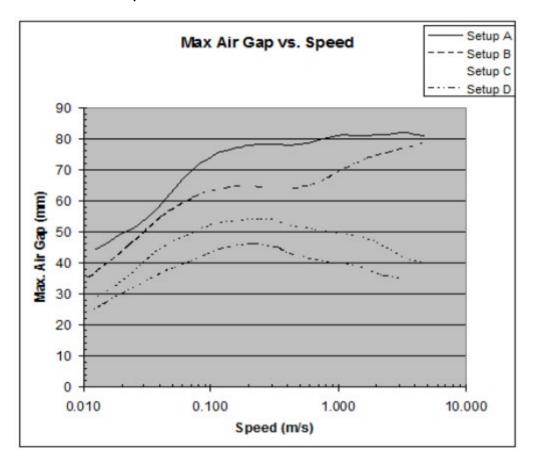
The maximum air gap for which the WM100 will reliably detect the moving ferrous target varies according to the target's size, shape, orientation and direction of motion, as well as the material to which the target is attached.

An example shown below compares typical results from steel blocks used as targets on a wheel (either ferrous or non-ferrous). As shown, a larger detection range can typically be achieved when there is a ferrous object behind the target. The WM100 provides excellent detection of a relatively small target, such as a 3/16" (~5 mm) shaft key installed in a 5/8" (~16 mm) motor shaft with < 0.125" (~3 mm) of the key protruding beyond the shaft envelope.

To ensure proper operation in any setup, use the LED indicator to confirm consistent detection of the target over the full range of expected operational speeds. Note that detection range may vary slightly with voltage supply and temperature, so it is recommended to use the minimum air gap that is physically safe to implement.

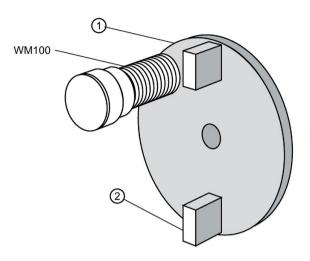
# 6.2 Performance Examples

### Wheel Driven Examples



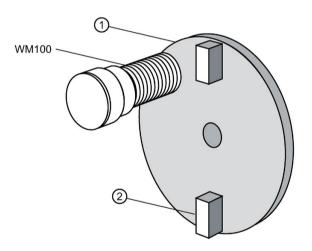
### 6.2 Performance Examples

Setup A: WM100 with two 1"x2"x2" steel targets mounted on steel wheel



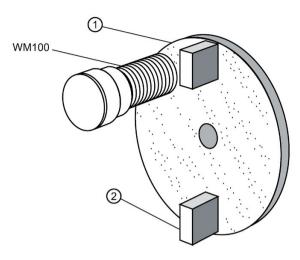
- 1 Steel wheel
- 2 1"W x 2"H x 2"D steel block

Setup B: WM100 with two 1"x2"x1" steel targets mounted on steel wheel



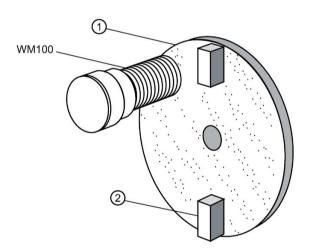
- 1 Steel Wheel
- 2 1"W x 2"H x 1"D steel block

Setup C: WM100 with two 1"x2"x2" steel targets mounted on non-ferrous wheel



- 1 Non-ferrous wheel
- 2 1"W x 2"H x 2"D steel block

Setup D: WM100 with two 1"x2"x1" steel targets mounted on non-ferrous wheel



- 1 Non-ferrous wheel
- 2 1"W x 2"H x 1"D steel block

# **Shaft Driven Example**

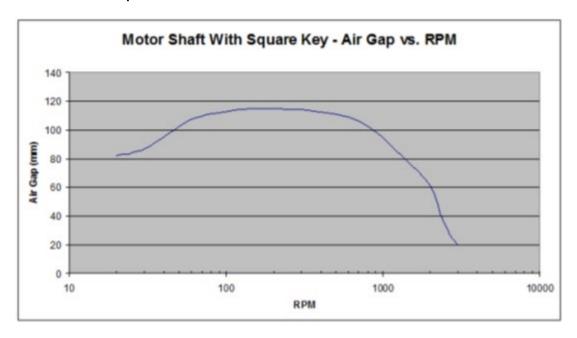
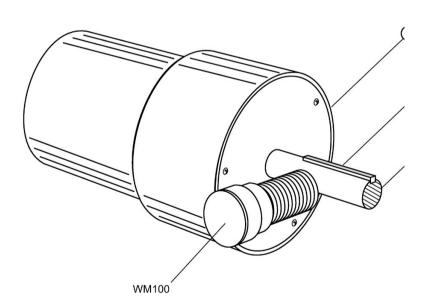


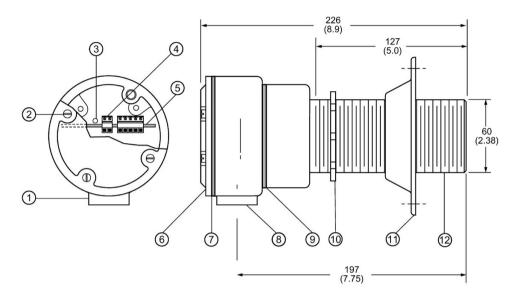
Figure 6-1 Note: 1 m/s ~ 200 ft/min; 25 mm ~ 1.0"

Setup E: DC motor with 5/8" drive shaft and 3/16" square key

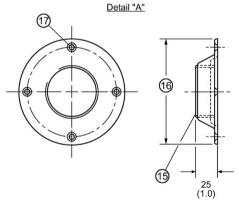


- ① DC motor
- ② 3/16" sq.key
- ③ 5/8" shaft

Dimension drawings

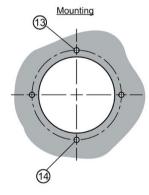








- 2 10-32 screw (4 places)
- 3 LED
- 4 Terminal Blocks
- ⑤ Circuit Board
- 6 Cap (aluminum)
- O Cap gasket (neoprene)
- 8 Casing (aluminum)



- ① Locknut (plated)
- 1 Mounting flange (see detail A)
- 2" NPSL probe body (aluminum)
- 95 mm (3.75") Ø probe clearance hole
- 4 6 mm (0.25")  $\varnothing$  hole for 1/4-20 bolt or drill and tap on 114 mm (4.5") BCD (4 places)
- (5) 2" NPSL
- 133 mm O.D. (5.25")
- 6 mm (0.25") dia. hole for 1/4-20 bolt on 115 mm (4.5") BCD (4 places)

Service and maintenance

The WM100 can be cleaned by wiping the enclosure exterior with a damp cloth. No further maintenance is required for the device.

Technical data

#### **Power**

• 115 V AC, 50/60 Hz, 7 VA

or

- 230 V AC, 50/60 Hz, 7 VA
- ±10% of rated voltage

### **Output**

- 1 form C (SPDT) dry relay contacts, rated 5 A at 250 V AC non-inductive, fail-safe operation
- time delay:
  - start up: 10 to 14 seconds (or 5 to 7 seconds with 5 sec/12 PPM jumper installed)
  - zero speed: 5 seconds ±1 (minimum speed 10 to 15 ppm)¹ or 10 seconds ±2 (minimum speed 5 to 7.5 ppm)¹
  - LED indicates detection of changes in magnetic field (resets zero speed timer)
- <sup>1</sup> Selected via a common jumper. Refer to Operating (Page 12)

### **Operating Temperature**

• -40 to +60 °C (-40 to +140 °F)

#### **Environmental**

- location: indoor/outdoor
- altitude: 2000 m (6562 ft.) max.
- ambient temperature: -40 to +60 °C (-40 to +140 °F)
- relative humidity: suitable for outdoor (Type 4 / NEMA 4, Type 4X / NEMA 4X, Type 6 / NEMA 6, IP67)
- installation category: II
- pollution degree: 4

### **Dynamic Range**

- minimum 6 or 12 pulses per minute<sup>1</sup>
- maximum 3000 pulses per minute
- <sup>1</sup> Selected via a common jumper. Refer to Operating (Page 12)

### **Shipping Weight**

• 2 kg (4.4 lbs)

### **Approvals**

• CSA<sub>US/C</sub>, CE, C-TICK

Support

## A.1 Technical support

### **Technical Support**

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

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

### Internet Service & Support

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

Services & Support (http://www.siemens.com/automation/service&support)

#### Personal contact

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

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

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)

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