

Motion Sensors

SITRANS WM100

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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SITRANS WM100 Motion Sensing Switch

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

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
		Caution: refer to accompanying documents (manual) for details.
		Protective Conductor Terminal

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

The Manual

Notes:

- The SITRANS WM100 product is to be used only in the manner outlined in this instruction manual.
- 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 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.

If you have any questions, comments, or suggestions about the manual contents, please email us at techpubs.smpi@siemens.com.

For the complete library of Siemens manuals, go to www.siemens.com/processautomation.

Specifications

Power

- 115 V AC, 50/60 Hz, 7 VA
or
- 230 V AC, 50/60 Hz, 7 VA
- $\pm 10\%$ 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)

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 minute¹
- maximum 3000 pulses per minute

Shipping Weight

- 2 kg (4.4 lbs)

Approvals

- CSA_{US/CA}, CE, C-TICK

¹. Selected via a common jumper. Refer to Operation.

Installation



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



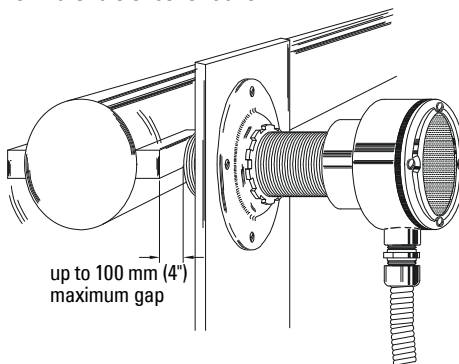
WARNING: All field wiring must have insulation suitable for at least 250 V and the maximum ambient temperature of +60°C (+140 °F).

Notes:

- 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 for materials of construction.



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 probe to the face of the target. The range is dependent on the target type and range of speed expected. See typical performance graphs on page 9 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.

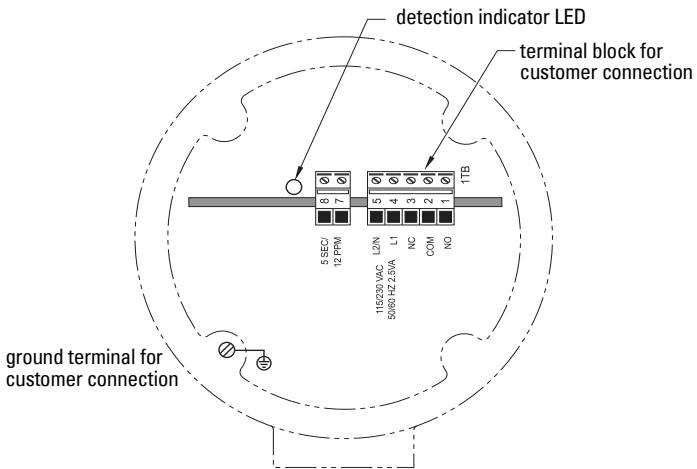
Note: In climates where direct sunlight may cause the SITRANS WM100 temperature to rise above the specified limit, shade the unit by installing a sun shield.

WM100 Circuit Card

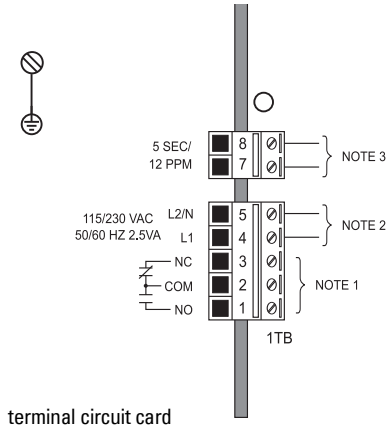


WARNING: Disconnect power before opening top cover.

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



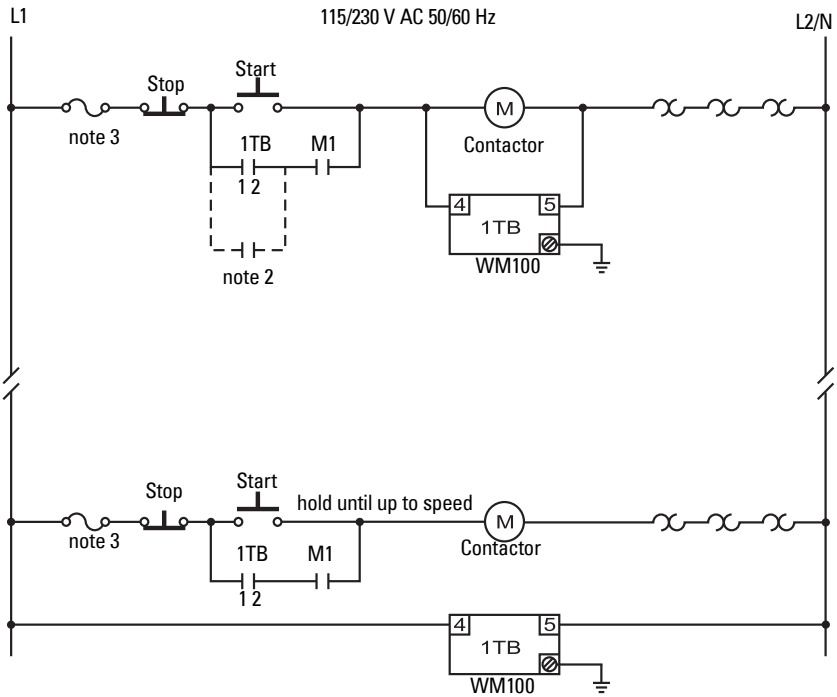
WM100 Connection



Notes:

1. Dry contacts shown in de-energized (alarm or shelf) state.
2. 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.

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 up-stream start up of conveying devices after down stream drive has reached its operation speed.

Notes:

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.

Operation

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.

Typical Performance

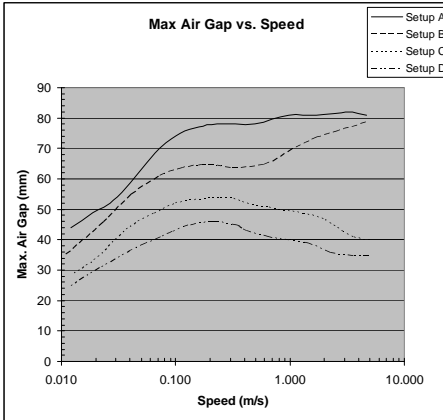
The maximum air gap for which the WM100 will reliably detect the moving ferrous target varies according to the target's size, shape, orientation and direction of motion, as well as the material to which the target is attached.

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.

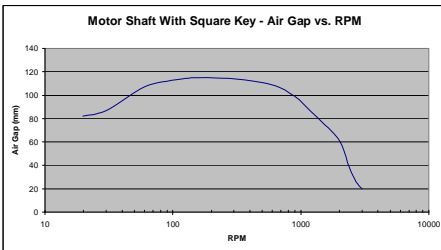
To ensure proper operation in any setup, use the LED indicator to confirm consistent detection of the target over the full range of expected operational speeds. Note that detection range may vary slightly with voltage supply and temperature, so it is recommended to use the minimum air gap that is physically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

Performance Examples

Wheel Driven Examples

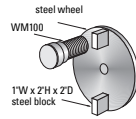


Shaft Driven Example

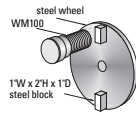


Note: 1 m/s ~ 200 ft/min; 25 mm ~ 1.0"

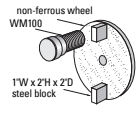
Setup A: WM100 with two 1"x2"x2" steel targets mounted on steel wheel



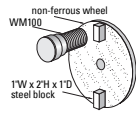
Setup B: WM100 with two 1"x2"x1" steel targets mounted on steel wheel



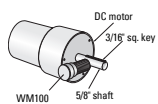
Setup C: WM100 with two 1"x2"x2" steel targets mounted on non-ferrous wheel



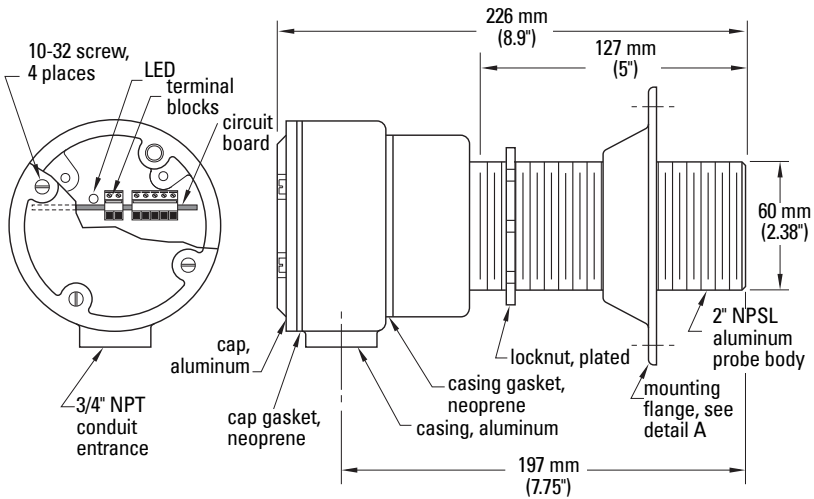
Setup D: WM100 with two 1"x2"x1" steel targets mounted on non-ferrous wheel



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

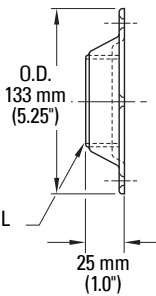
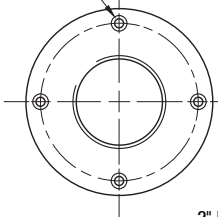


Dimensions



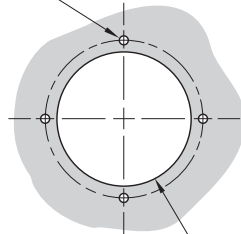
6 mm (0.25) dia. hole for 1/4 - 20 bolt on 114 mm (4.5") BDC, 4 places

Detail A



95 mm (3.75") dia. probe clearance hole

Mounting



6 mm (0.25") dia. hole for 1/4 - 20 bolt or drill and tap on 114 mm (4.5") BDC, 4 places

Maintenance

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

For more information

www.siemens.com/level

www.siemens.com/continuous-weighing

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