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: 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.

<table>
<thead>
<tr>
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<td>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. We welcome all suggestions for improvement.</td>
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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**: means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

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

### Safety marking symbols

<table>
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<th>On product</th>
<th>Description</th>
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<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td>Protective Conductor Terminal</td>
</tr>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
<td>Both direct and alternating current</td>
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### The Manual

**Notes:**
- Please follow the installation and operating procedures for a quick, trouble-free installation and to ensure the maximum accuracy and reliability of your Millpulse 600.
- 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 manual will help you set up your Millpulse 600 for optimum performance. We always welcome suggestions and comments about manual content, design, and accessibility. Please direct your comments to techpubs.smpi@siemens.com.

For other Siemens Miltronics process protection manuals, go to: www.siemens.com/processprotection.

**WARNING**: Millpulse 600 is to be used only in the manner outlined in this manual, otherwise protection provided by the equipment may be impaired.

---

1. This warning symbol is used when there is no corresponding caution symbol on the product.
Milltronics Millpulse 600

Milltronics Millpulse 600 is a heavy-duty 2-wire motion sensor that provides a solid state switch output to a PLC\(^1\). It is used primarily for monitoring the speed of rotating, reciprocating, or conveying equipment.

Milltronics Millpulse 600 has a circuit card and magnet assembly potted in the probe body and comes complete with mounting flange and locknut. Milltronics Millpulse 600 is connected in series with the PLC input (or other load) and acts as a switch, opening and closing as the ferrous targets of the machinery being monitored pass in front of the probe.

\[\text{References:} \quad 1. \text{ Milltronics Millpulse 600 is designed to work with Programmable Logic Controllers (PLC) with input characteristics compatible with the electrical portion of the CENELEC 50040/36/37/38 standards for two wire proximity sensors.}\]
Specifications

Switching Capability

- **voltage:** 18 to 48 V AC/DC +/-10%, 50/60 Hz (Jumper In)
  60 to 135 V AC/DC +/-10%, 50/60 Hz (Jumper Out)
- **current**
  5 to 400 mA continuous
  2 A surge for 20 msec at 1 operation per second

Voltage Drop

- **8 V**

Residual Current

- **1.5 mA**

Fuse

- **1A, 250 V, SLO-BLO, 4.5 x 14.5 mm** (not operator replaceable)

Switch Duration

- **on:** 50 msec minimum
- **off:** 50 msec minimum

Operating Limit

- **600 pulses per minute maximum**

Operating Temperature

- **-45 to 60 °C (-45 to 140 °F)**

Display

- **red LED for switch status**

Construction

- **probe body:** aluminum
- **process mounting:** 2” NPSL
- **connection box:** aluminum
  3/4” NPT conduit entrance
  4 screw terminals for maximum 12 AWG wire size
- **gasketing:** neoprene
Environmental

- location: indoor/outdoor
- altitude: 2000 m (6,562 ft) max.
- ambient temperature: -45 to 60 °C (-45 to 140 °F)
- max. relative humidity: 80%
- enclosure rating: Type 4/NEMA 4, Type 4X/NEMA 4X, Type 6/NEMA 6, IP67
- installation category: II
- pollution degree: 4

Note:
- The use of approved watertight conduit hubs/glands is required for Type 4/NEMA 4, Type 4X/NEMA 4X, Type 6/NEMA 6, IP67 (outdoor applications).

Weight

- 2 kg (4.4 lbs.)

Approvals

- CE, CSA (C/US)
- EMC performance available upon request
Installation

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

Environment

Milltronics Millpulse 600 should be mounted in an area that is within the temperature range specified and that is suitable to the housing rating and materials. The cap should be accessible to allow for wiring and viewing if the status display LED is used.

Milltronics Millpulse 600 should be mounted using the supplied mounting flange, onto a vibration-free structure. The gap between the face of the Milltronics Millpulse 600 and the target should be sufficient so there is no danger of the target damaging the unit. Refer to the chart in the Operation section (page 8) for the maximum allowable gap with respect to target velocity.

**Note:** In climates where direct sunlight may cause the Milltronics Millpulse 600 temperature to rise above the specified limit, shade the unit by installing a sun shield.

Wiring

**Note:** All wiring must be done by qualified personnel in accordance with all governing regulations.

Where possible, the probe should be mounted such that the conduit entry is pointing down to avoid accumulation of condensation in the casing. Where wiring must be run in conduit, the use of flexible conduit is suggested for easier removal or adjustment of the probe.

It is advisable to keep the Milltronics Millpulse 600 away from high voltage or current runs, contactors and SCR drives.

**WARNING:** Do not connect Milltronics Millpulse 600 directly to supply.

Ensure that the switching current of the PLC input is above the residual current of the Milltronics Millpulse 600 and that the load resistance presented by the PLC input is low enough to ensure that the minimum operating current of the Milltronics Millpulse 600 is exceeded (see Loading graph). If your PLC does not meet the requirements, a resistor across the PLC inputs can be used to increase the switching current.

**Note:**
- The protective earth terminal indicated by must be connected to reliable ground.
Interconnection

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 the disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.

WARNING: All field wiring must have insulation suitable for at least 135 V.
**Operation**

Milltronics MillPulse 600 works on the principle of Faraday's Laws of Electromagnetic Induction. When a ferromagnetic object (target) enters the probe's permanent magnetic field, it distorts the flux causing it to cut the coil windings, thereby generating a voltage. This voltage is proportional to the speed at which the ferrous target passes through the flux and is inversely proportional to the square of the distance between the target and the probe.

Square profile targets work better than round because they present a sharper transition in ferrous mass. Minimizing the gap is more effective than an increase in target size beyond 5 cm x 5 cm x 2.5 cm (2" x 2" x 1"), except at very low velocities.

The voltage generated from the probe coil is fed to a processing circuit. The processing circuit controls a semiconductor switch that opens and closes in response to the incoming pulses. The switch is normally open (LED off) and closes when a pulse is generated (LED on). The switch duration times are held to a minimum of 50 msec to give the PLC sufficient time to read the switch states.

The amplifier has been tuned for a response typical to the range of speed encountered in industrial applications. This response governs the relationship between target speed and probe to target gap, as demonstrated in the following chart. The resultant curves indicate the maximum velocity is about 33 cm/sec. (65 ft/min), and with a velocity of 1 cm/sec. (2 ft/min), a maximum gap of 3.1 cm (1.25") is possible.

This graph was plotted from tests using four ferrous blocks set equidistant on a 41 cm (16") diameter circle on a non-ferrous disc.
Dimensions

10-32 screw, 4 places. Tighten screws to 1.1 to 1.7 N·m (10 to 15 in-lb) of torque

Note: Install safety shields where required.
Application

Bucket Elevators

Note: Install safety shields where required.
Install a non-ferrous window for screw conveyors with troughing over 3 mm (0.125") thick or for high temperature applications. The dimensions shown for the plate, window, and bracket are the minimum recommended. Use series 300 stainless steel, brass, or aluminum. Milltronics Millpulse 600 must not touch the plate if temperatures are in excess of 60 °C (140 °F).
Cleaning and Maintenance

Millpulse 600 can be cleaned by wiping the enclosure exterior with a damp cloth. No other maintenance is required for this device.