PPI MAGNETIC SPEED SWITCH
FREQUENTLY ASKED QUESTIONS

How does the Magnetic Speed Switch operate?
The Magnetic Speed Switch housing has an internal rotor that is coupled to the magnet. As the magnet turns with the rotating shaft of the conveyor or other equipment, the rotor passes across a proximity sensor that is enclosed in the housing body. The proximity sensor will detect the rotor as it passes and pass through a momentary high voltage pulse.

MOUNTING

What kind of equipment will the Magnetic Speed Switch work on?
Typically, any equipment that has a turning steel shaft of 1" or larger diameter. Conveyor belts are a good example wherein the tail pulley has a rotating shaft that is mounted on pillow block or take-up bearings.

What kind and size of shaft can be attached?
Any ferromagnetic steel (does not include most stainless steel) shaft down to 1" diameter.

How is the Magnetic Speed Switch mounted?
Attach the Magnetic Speed Switch to the end of the shaft. The magnet will hold the complete unit in place. It is advisable to mount the unit so that the flexible conduit hangs straight down. A wire tie attaching the conduit to any support on the equipment keeps the unit from spinning when the shaft turns.

Is there a maximum operating speed for the Magnetic Speed Switch?
This varies by model. All Magnetic Speed Switch models are rated to at least 250 RPM. See Magnetic Speed Switch Operation & Maintenace Manual for more details.

Is there a minimum operating speed for the Magnetic Speed Switch?
Magnetic Speed Switch (non-stop switch models): There is no lower speed limit. At low speeds, PPI suggests using models with more pulses in order to improve response time.

Magnetic Speed Switch (stop switch models): The stop switch models have a 4 second time-out in which they need to detect a pulse to remain "on". At low speeds, PPI suggests using models with more pulses in order to improve response time and reduce the minimum speed.

POWER AND WIRING

What voltage is required for the Magnetic Speed Switch? Does it run on AC or DC power?
Voltage ranges vary by model. Most models will run on both AC and DC power. The "Stop Switch" version only runs on AC. 12 pulse models only run on DC power. See the Magnetic Speed Switch Operation & Maintenance Manual for details.

How are the Magnetic Speed Switch wires connected?
The Magnetic Speed Switch has 2 or 3 wires, depending on the model. See the Magnetic Speed Switch Operation & Maintenance Manual for wiring instructions.

Are there limits to the wiring distance?
In most cases, distance will not be a problem, however take precautions. If the signal cable is extended a long distance, especially in the vicinity of a high voltage power wire, a shielded cable should be considered. This will usually prevent interference from affecting the signal. The proper electrical codes must be followed.

ENVIRONMENT

Will the Magnetic Speed Switch work in any temperature environment?
The proximity sensor in the Magnetic Speed Switch is rated for -25° to 70° C (-13° to 158° F). Neodymium magnets will loose their holding power under extreme heat. If the shaft (not ambient temperature) being monitored is over 200° F, the magnet will lose strength.

Will moisture or dirt affect the operation of the Magnetic Speed Switch proximity switch or internal components?
No. The proximity sensor and bearings are sealed.

Is the Magnetic Speed Switch suitable for hazardous locations?
No. PPI does not currently offer a speed switch rated for hazardous locations.

SIGNAL

The Magnetic Speed Switch does not ever switch off as the shaft rotates. It seems like the "contacts are stuck closed." Is the Magnetic Speed Switch defective?

It is likely that the Magnetic Speed Switch is not defective. Since the unit uses a 2-wire sensor, a small amount of current will pass through it even in the "off" state. If the Magnetic Speed Switch is connected to a device with high internal impedance (volt meters and some PLCs), that small amount of leakage current can cause a high voltage even in the "off" state. PPI can help remedy this type of situation if necessary.

When the Magnetic Speed Switch is rotated by the shaft, what kind of signal does it send?

The Magnetic Speed Switch does not generate any voltage on its own. It simply allows the voltage that is applied to the input wire to pass through. It should be noted that a small amount of current will be allowed to pass through the switch even in the "off" state. The switch will not operate without a voltage applied to it.

Magnetic Speed Switch (non-stop switch models): During each revolution, the switch will cycle "on" and "off" (the switch closes and opens). A single pulse switch will cycle once per revolution and a two pulse switch will cycle twice per revolution. 1, 2, 4, and 12 pulse options are available.

Magnetic Speed Switch (stop switch models): The stop switch models do not output pulses, but generate a constant "on" or "off" signal. After the sensor detects the first pulse, the switch turns "on" (the switch closes). The switch remains "on" as long as another pulse is detected within 4 seconds. Once 4 seconds pass with no pulse detected, the switch turns "off" (the switch opens). 1, 2, and 4 pulse options are available, which affects the minimum speed and the response time of the unit.

Can the Magnetic Speed Switch be used in conjunction with a PLC and how would the logic be written?

The Magnetic Speed Switch is capable of operating with a wide range of voltage, both AC and DC. Since the Magnetic Speed Switch does not provide any voltage of its own, a power supply that is compatible with the PLC input must be connected to the Magnetic Speed Switch. The output of the Magnetic Speed Switch is then connected to an input on the PLC.

Magnetic Speed Switch (non-stop switch models): The logic of the PLC must be written so the PLC will be satisfied when a pulse is received from the Magnetic Speed Switch. After some period of time without a pulse, a fault is indicated. It should be noted that the monitoring of the pulses must be based on a change of state from "on" to "off" or "off" to "on" because the shaft could stop with the switch in either the "on" or "off" state.

Magnetic Speed Switch (stop switch models): The stop switch will output a constant "on" or "off" (closed or open) signal. The logic of the PLC can be written to monitor the input for a fault, indicated by low voltage.

Example: A MS1 (single pulse switch) is monitoring a conveyor shaft that turns at 60 rpm. At this speed, the MS1 will be sending one pulse per second. Therefore, it can be assumed that if a pulse was not received by the PLC for 5 seconds, then the conveyor has been not running for 5 seconds and a fault is indicated.

Can the Magnetic Speed Switch be used in a motor control circuit without a PLC to shut down a drive if a shaft stops rotating?

Magnetic Speed Switch (non-stop switch models): A timer relay will be needed in addition to the Magnetic Speed Switch to accomplish this. Without the timer relay, the control circuit would continuously cycle on and off as the unit rotates. PPI offers a Watch Dog timer relay for this purpose. The relay has a normally open and normally closed internal contact that energizes when it receives pulses from the Magnetic Speed Switch. The relay also has an adjustable timer that can be set for the maximum allowable time desired between pulses received from the Magnetic Speed Switch before the relay de-energizes.

Magnetic Speed Switch (stop switch models): These models can be connected to a motor control circuit without an additional timer relay. The 4 second delay timer is not adjustable.

Example: A MS1 (single pulse switch) is monitoring a screw conveyor which turns at 10 RPM. At this speed, the MS1 will send one pulse every six seconds. Once the wiring is complete, set the timer on the relay to a number greater than six. If the timer is set to eight and a pulse is received before eight seconds, the relay assumes that the screw conveyor is turning and the relay stays energized as long as another pulse is received within 8 seconds. In its energized or "screw conveyor is running" state, the relay will have energized its normally open contact so that it remains closed. The motor control circuit is connected to the normally open side of the contact. When the screw conveyor is running and the relay receives pulses every eight seconds or less, the normally open contact remains closed and the control circuit is energized. If eight seconds pass without receiving a pulse from the MS1, the normally open contact reopens and the control circuit is de-energized.