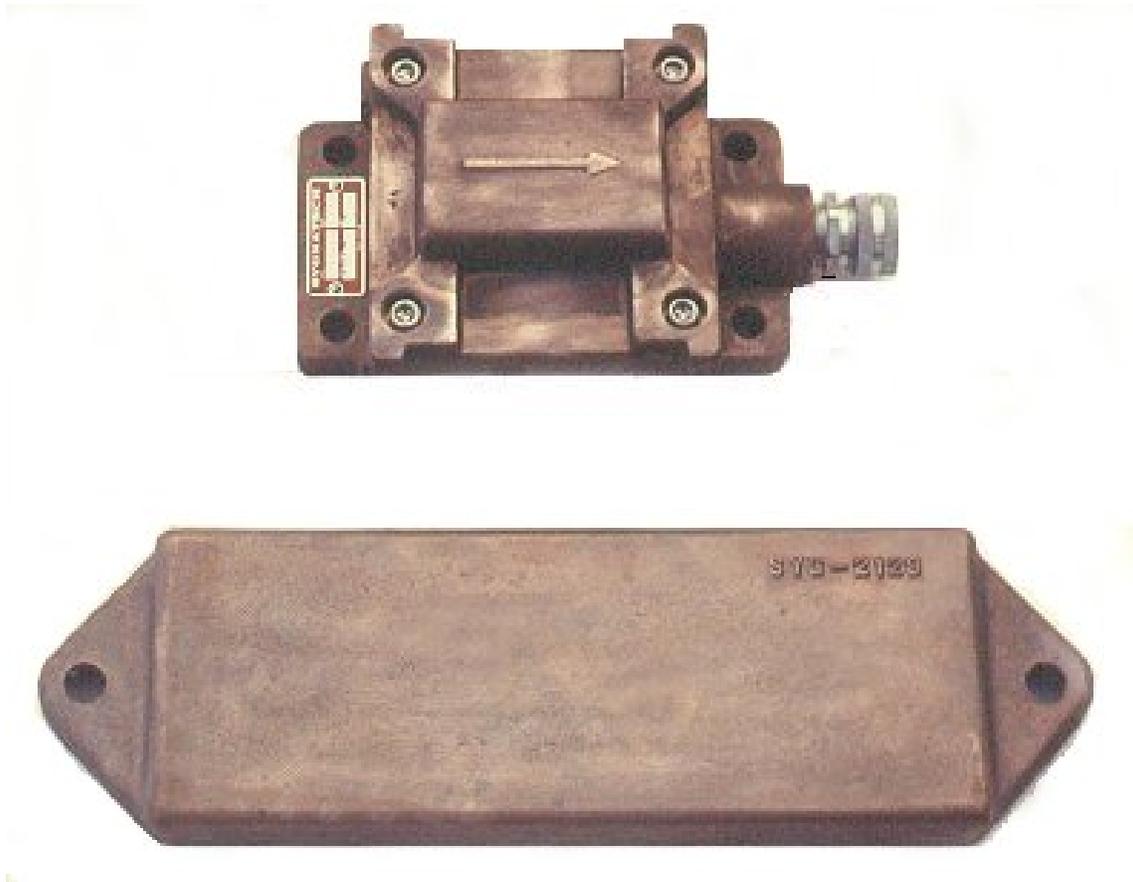


# **SYGNATECH, INC.**

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## **Magnetic Proximity Switch MSW-P (Pulse Type)**



## GENERAL DESCRIPTION

Magnetic proximity switches are used to detect the position of a moving object without mechanical actuation. The MSW switches have been specially designed for mine hoist applications.

The distinct feature of MSW switches is their high sensitivity, allowing them to be activated from a relatively long distance from the actuating magnet, and the ability to withstand heavy electrical loads. The switch also has a heavy duty, water tight, corrosion resistant red brass enclosure to ensure reliability against the harsh conditions normally present in mining applications.

- Switches **MSW-L** are “latching” type. They will stay either open or closed after being subjected to a magnetic field. Their state (open/closed) is maintained even after power supply failure. These are ideal for detecting the position of a mine hoist conveyance in the shaft.
- Switches **MSW-P** are “pulse” type. They will close when subjected to a magnetic field and open when the field is gone.

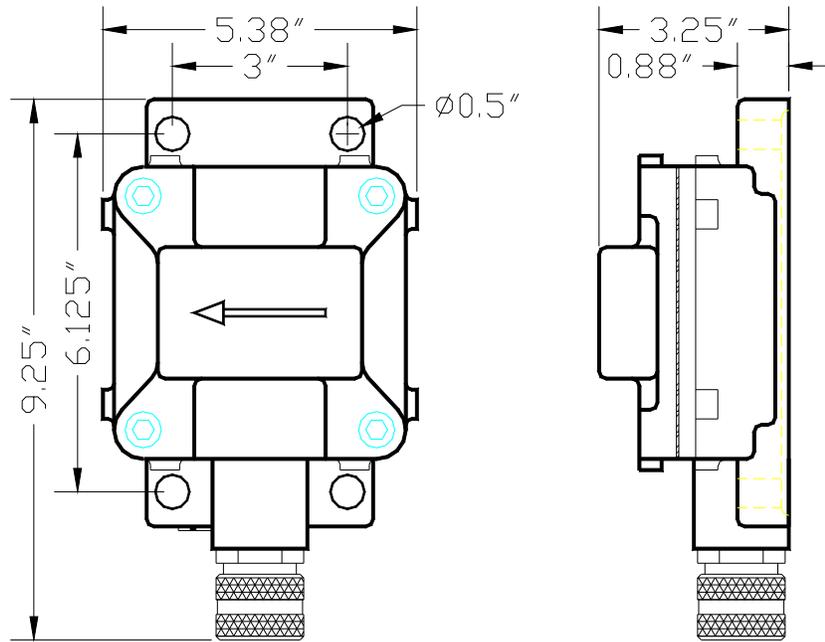
On special request, MSW switches are available in a supersensitive version (greater actuating distance) and they are designated with the suffix “**S**”. Caution should be taken when installing these switches as due to their sensitivity they may be affected by magnetized steel parts or power cables being in the vicinity of the switch.

The output circuit of the standard MSW switches incorporates a triac, making them suitable for AC circuits only. On special request, they can also be delivered for DC circuit application, but this will limit the electrical load to 15 W (resistive load) with maximum switching current of 0.5A and maximum switching voltage of 250 V.

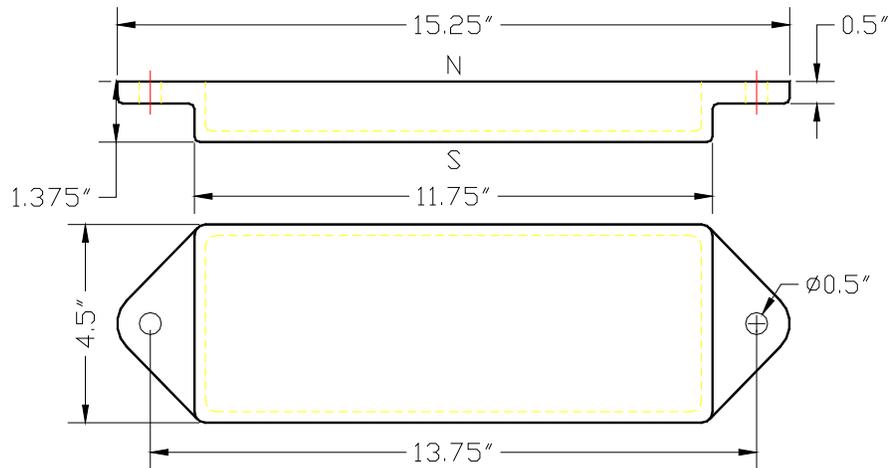
The MSW switches can operate with different types of actuating magnets. For mine hoist applications, we recommend Sygnatech MM-1 magnets. They are flat, relatively thin, and easy to mount on the side of the conveyance. The standard version is type MM-1-S, which has the South pole facing the switch.

The subject of this manual is pulse switch type MSW-P. Similar manual is available for the latching switch type MSW-L.

**DIMENSION DRAWINGS**



**SWITCH MSW-P**



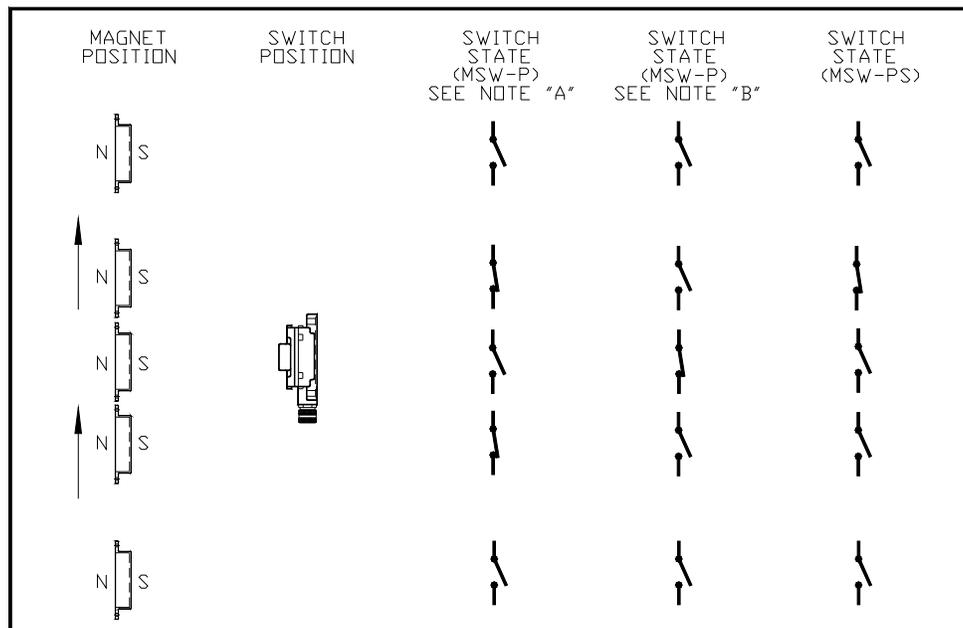
**MAGNET MM-1-S**

Note: The same magnet is available with magnetic North pole on the operating side. Its designation is MM-1-N

## PRINCIPLE OF OPERATION

- The switch closes when the magnetic field is positioned along the direction of the arrow marked on the switch cover. The switch cover can be mounted in 4 positions, 90 degrees apart. This allows matching the existing position of the switch to the position of the magnet.
- Switch MSW-P is not sensitive to the polarity of the magnet and the direction of the movement (it closes when the magnetic field along the arrow has certain magnitude, independent of its direction).
- Switch MSW-PS (supersensitive) is very sensitive only in one direction of the magnetic field (polarity of the magnet). Apart from it's high sensitivity, this switch also eliminates the second pulse when the magnet passes the switch (second pulse in the standard configuration may occur when the passing magnet creates a change in the magnetic field from one direction to the other - see drawing below).
- Unlike the latching switch, the pulse type may operate in various mounting configurations of the switch and magnet. Also, the type of magnet can be different (longitudinal or transverse polarity). Therefore it is advisable to perform a test of the particular configuration prior to final installation.

The drawing below shows 3 examples of pulse switch operation.



Note A: The switch is in line with the magnet and the switch cover is mounted with arrow in vertical position.

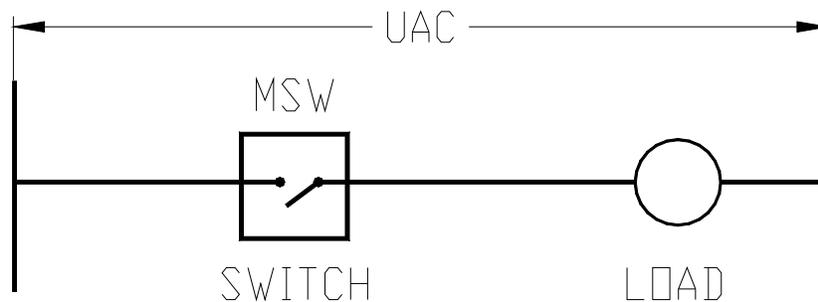
Note B: The switch is offset sideways from the magnet and the switch cover is mounted with arrow in horizontal position.

## TECHNICAL DATA

<b>Type of operation</b>	Pulse
<b>Operating distance with MM-1 magnet</b>	12 inch (305 mm)
<b>Output contact</b>	Triac
<b>Number of connecting wires</b>	2
<b>Max. size of connecting wires</b>	12 AWG (3.3 mm <sup>2</sup> )
<b>Rated voltage</b>	48-140 VAC
<b>Rated continuous current at 104 deg F (40deg C)</b>	3 A
<b>Maximum continuous current at 170 deg F ((76 deg C)</b>	1.5 A
<b>Peak current during 0.1 sec</b>	40 A
<b>Leakage current (open contact) with 110VAC supply</b>	2 mA
<b>Ambient temperature operating range</b>	-40 to +170 deg F (-40 to +76 deg C)
<b>Max. magnet speed</b>	4000 FPM (20.3 m/sec)
<b>Weight (approx)</b>	14.8 lbs (6.7 kg)
<b>Dimensions</b>	9.3x5.4x3.2 inch (235x137x83 mm)

## ELECTRICAL CONNECTIONS

### Basic Circuit Diagram



#### Remarks:

- The load can be in the form of relay, contactor, lamp, etc.
- Due to triac action, breaking of the current with inductive load takes place without any voltage spike induced across the load or the switch.
- There is a small leakage current when the switch is open (see technical data).

## INSTALLATION INSTRUCTION

### **Mechanical Installation.**

The switch should be mounted on using 4 mounting holes on its base. The surrounding of the switch, especially the area between the switch and the passing magnet should be free from the ferromagnetic material (steel, iron) which could attract the magnetic flux from the magnet thus deflecting it from the switch and reducing its sensitivity. Similarly, the magnet should not have any ferromagnetic material in front of it or on its side. However, if magnet MM-1 is used, it can be mounted on the steel base, because due to transverse polarity of magnetization, the conveyance or the magnet mounting plate amplifies the magnetic field, thus increasing the operating distance.

Unlike the latching switch, the pulse type may operate in various mounting configurations of the switch and magnet. Also, the type of magnet can be different (longitudinal or transverse polarity). Therefore it is advisable to perform a test of the particular configuration prior to final installation

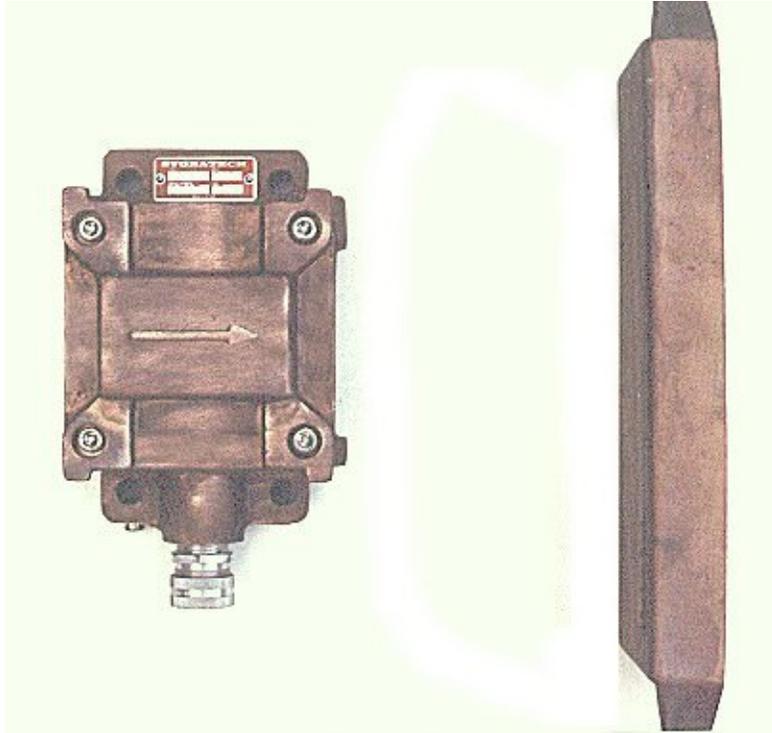
With the MM-1 magnet, the pulse switch has the best performance if the arrow on the switch cover points towards the magnet. In such configuration it is also possible to increase the actuating distance by using two MM-1 magnets placed parallel (side by side lengthwise). This increases the actuating distance of about 20 %.

If the pulse switch is to be placed with the arrow parallel to magnet MM-1, the best performance is when the magnet moves with its edge (not the middle part) along the switch (the magnet path should be offset relatively to the switch). However in that configuration the actuating distance is reduced to about 80% of the distance obtained when the switch is placed with the arrow pointing to the magnet.

For reliable operation the distance between the surface of the switch and the magnet should be about 50 to 80% of the maximum operating distance measured in a particular configuration.

## INSTALLATION INSTRUCTION

Below picture shows typical arrangement of the pulse switch MSW-P cooperating with MM-1 magnet.



The position of the switch base should be either vertical (with the cable entry from the bottom) or horizontal. The cover of the switch is fixed to the base with 4 mounting screws and can be mounted in 4 directions to match the path of the actuating magnet and required operation of the switch (opening or closing)

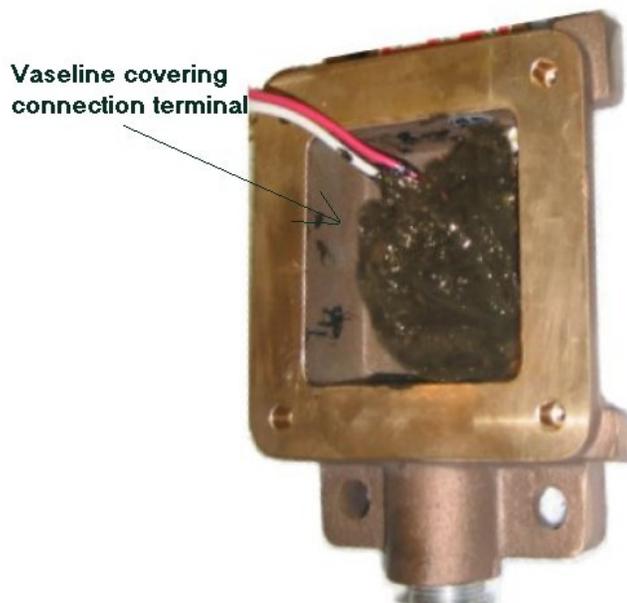
The MSW-P switches can operate with different types of actuating magnets. For mine hoist applications, however, we recommend using Sygnatech MM-1 magnets. They are flat, relatively thin, and easy to mount on the side of the conveyance. Due to transverse polarity of magnetization, the conveyance or the magnet mounting plate amplifies the magnetic field, increasing the operating distance.

In application where the switch can be subjected to falling rocks it is advisable to provide a protective shield for the switch and connecting cable in form of a steel rod or beam, mounted minimum 20 inches (500 mm) above the switch.

## INSTALLATION INSTRUCTION

### Electrical Installation:

1. The electrical installation should follow local electrical codes and regulations.
2. The switch connections are done by removing the switch cover and connecting the cable conductors to 2 switch wires using screw type terminals inside the switch. Maximum size of cable conductor - AWG12 (3.3 mm<sup>2</sup>). It is not important which wire of the switch is connected to the load. Ground connection should be done using grounding screw on the switch body, inside the switch.
3. After connecting the wires, the cover of the switch has to be remounted on the switch base. **Make sure connecting wires do not get between the cover and the flat surface of the switch base.**
4. The cover should be aligned with the arrow pointing the proper direction as described in Principal of Operation. The four mounting bolts should be tightened with a torque of about 3 ft-lbs (4 Nm).
5. In a wet environment, even though the switch is sealed, there is a possibility of a moisture development inside the switch. Adequate protection in such case is provided by covering the connecting points of switch wires and cable conductors with Vaseline see picture below.



## **MAINTENANCE INSTRUCTION**

The switch is basically maintenance free. Periodical visual inspections have to be done in order to check the integrity of the switch (integrity of connecting cable, integrity of the enclosure, integrity of the actuating magnet). The frequency of these checks depends on the local condition the switch operates in.