



# SYNCHRONIZATION PROBE

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## User's Manual



## Safety Information

The following manual contains information and warnings. They must be followed in order to keep the instrument in a working condition and ensure safe operation.

### Safety Symbols

|  |  |
|--|--|
|  | <b>Warning - Danger</b> - Identifies conditions or practices that could cause physical harm or death.  |
|  | <b>Caution</b> - Identifies conditions or practices that could result in a permanent loss of data or damage the measuring chain and/or other equipment to which it is connected. |
|  | <b>Important Information</b> - Identifies important information, hints, and tips that must be read and applied.  |

### Safety Precautions

#### **Warning - Danger** **Caution**

- To install and use the described product correctly and safely, read and follow all the safety instructions or warnings that appear throughout this manual.
- This product is intended to be used by qualified operators and maintenance personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury.
- Install and use this product only as specified in this manual or the protection provided by this product might be impaired.
- When in doubt that safety protection has been impaired, make the product inoperative and secure it against any unintended operation.
- Do not use this product in wet environments.

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This manual is provided solely for guidance. VibrosystM Inc. takes no responsibility or liability for any damage caused by accidents, improper installation or misuse. Liability is limited to the repair and/or replacement of defective products.

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## 1. SYNCHRONIZATION PROBE OVERVIEW

### 1.1 Description

The synchronization probe is an inductive proximity switch that detects a steel target glued on the shaft and emits a once-per-turn pulse. This signal is transmitted to an acquisition unit, and provides a precise reference for calculating the angular position of the rotor. The pulses from the synchronization probe serve as a reference to correlate measurements obtained from all the sensors installed on the monitoring unit, and can be used to trigger a measurement.

With a 4 mm measuring range, the synchronization probe is usually installed at a 2 mm distance of its target, which is a small piece of steel glued on the shaft.

To operate, the synchronization probe requires a 10 to 30 Vdc source. The output circuit is an NPN open-collector transistor. The maximum switching frequency is 2 kHz, with a minimum target passage duration of 500  $\mu$ s.

An amber LED on the back of the probe flashes to confirm each pulse emission.

### ! Important information

A VibroSystemM technician should be present during installation and commissioning.

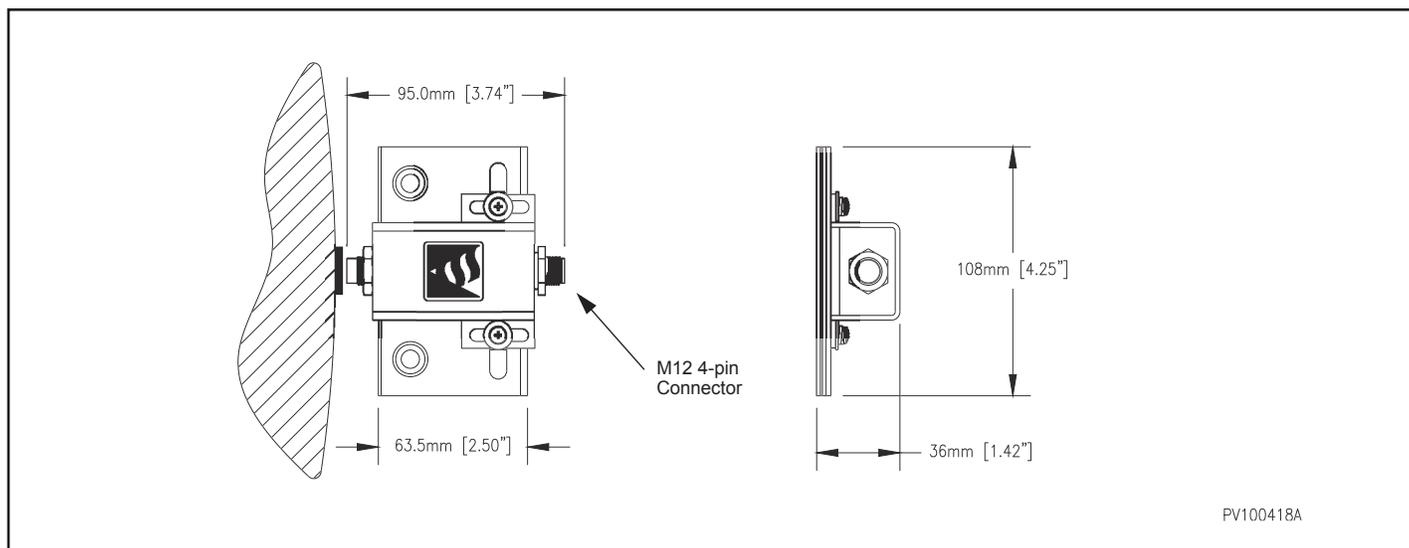


Figure 1 : Synchronization Probe Dimensions

### 1.2 Main Unit Interventions

- Probe holder must be bolted or welded at appropriate location.
- Epoxy resins will be used inside the unit.
- Signal cable must be routed and protected from the probe all the way to the acquisition unit.



## 2. PROBE OPERATION

### 2.1 Synchronization probe pin assignment

The following table shows the pin assignment for the A-coded, M12 male connector on the synchronization probe.

Table 1 : Synchronization Probe Connector - Pin Assignment

| Connector Position | Designation  | Standard Color | Specifications  |
|--------------------|--------------|----------------|---|
| 1                  | Power Supply | Brown          | 10 to 30 VDC Power Input  |
| 2                  | (not used)   | White          | (not used)  |
| 3                  | Common       | Blue           | 0 V   |
| 4                  | Signal       | Black          | NPN Open Collector Transistor   |
| n.a.               | Shield *     | n.a.           | The shield of the signal cable must be grounded. It is important to ground the shield on the acquisition unit end only to avoid creating a ground loop. |

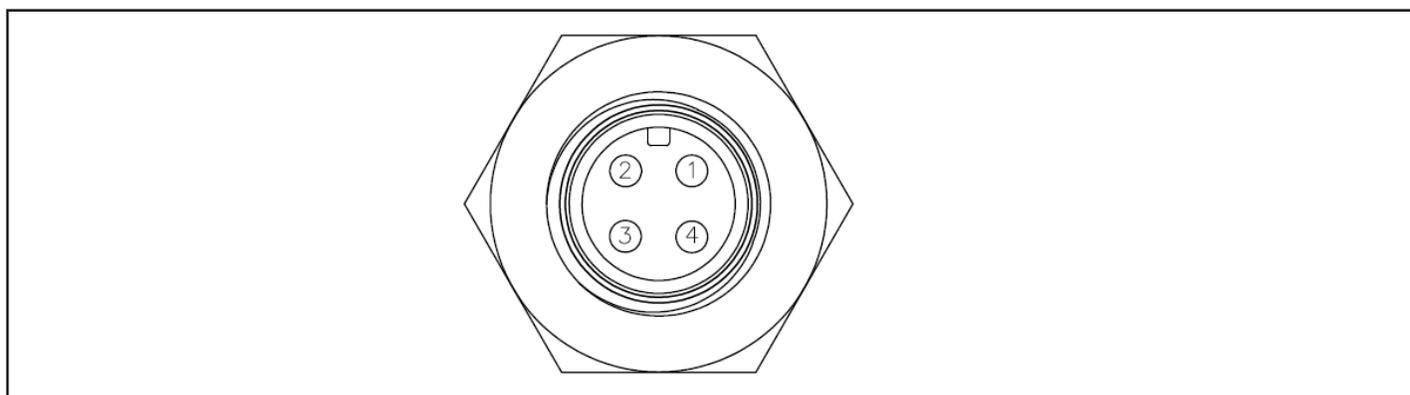


Figure 2: Synchronization Probe Connector- Front View

To connect the synchronization probe to the acquisition unit, the measuring chain must be completed with either:

- one sensor cable with M12 connector, or
- one M12 4-pin female connector and a sufficient length of shielded signal cable (22 AWG)



### 3. SYNCHRONIZATION PROBE INSTALLATION

Mounting the synchronization probe and target requires precision, because the target must be detected at the precise moment the middle of the interpole between the first and last poles faces upstream. Once installed, small tangential and/or radial adjustments of the synchronization probe are still possible by moving the probe on its lockable slide plate.

The synchronization probe is installed close to the shaft. When installing the target on the shaft, the rotor should preferably be moved in the 0° upstream position. If the rotor cannot be moved, the relative distance (*d*) between the target and the synchronization probe has to be calculated.

On units that rotate in a single direction, a single synchronization probe and target need to be installed. On reversible pump/storage units, two (2) synchronization probes and two (2) targets are needed. The two probes can be mounted on the same mounting bracket, each with its own target.

#### 3.1 Installation of the synchronization cable

The synchronization cable connects the synchronization probe to one of the acquisition units located around the generator. When installing the synchronization cable from the probe to the acquisition unit, precautions must be taken:

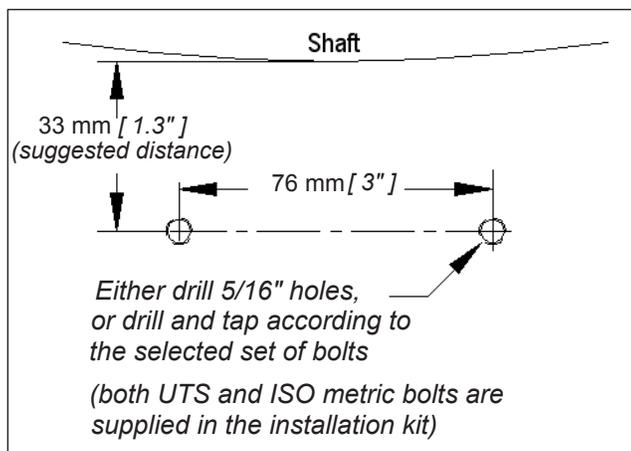
- route away from electrical cable, power sources, electric motors or other electrical fixture;
- mechanically protect the cable by using conduits and strapping to minimize cable movement;
- properly ground the shield on the acquisition unit end only to avoid creating a ground loop.

The synchronization cable is not calibrated and can be cut to length.

#### 3.2 Installation of the synchronization probe

The sensing face of the probe must be installed at a distance of 2.0 mm ±0.5 mm [80 mils ±20 mils] from the target, or 5.0 mm ±0.5 mm [200 mils ±20 mils] from the shaft (see Figure 6 : "Adjustment of the synchronization probe").

A custom-made mounting bracket may have to be machined to install the synchronization probe at the prescribed distance. Refer to the following figure for preparation of the mounting surface:



Use of a thread lock compound is recommended.

Figure 3 : Mounting holes for the synchronization probe



## 3.3 Installation of the target

### 3.3.1 Determining location of the target

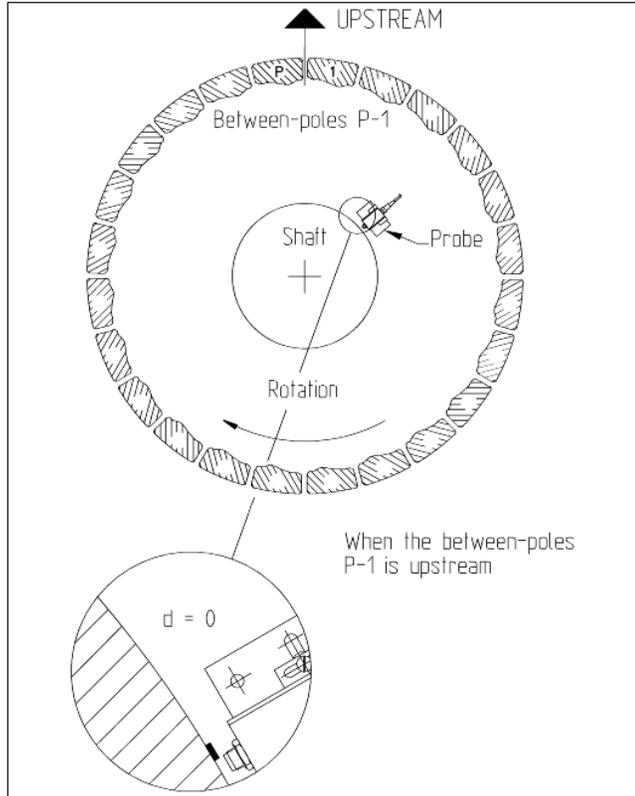


Figure 4 : P-1 position on rotor is facing upstream

Mounting the synchronization probe requires precision, as the target must be detected at the exact moment the middle of the interpole between the first and last poles (called P-1) faces upstream.

To ensure precise position of the target, it is advisable to move the rotor so that the middle of the P-1 interpole is facing upstream. As shown on the left, when the P-1 interpole is facing upstream, the target is glued to the shaft next to the tip of the synchronization probe.

**Clockwise rotation:** place the target to the right of the synchronization probe

**Counterclockwise rotation:** place the target to the left of the synchronization probe

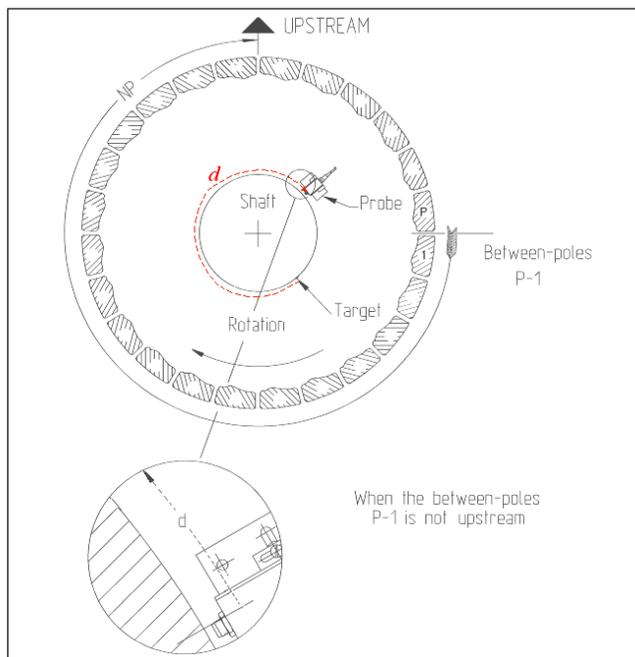


Figure 5 : P-1 position on rotor is not facing upstream

If the P-1 interpole cannot be placed to face upstream, the position of the target must be calculated in relation to the synchronization probe.



### 3.3.2 Gluing the target

#### ! Important information

- VibroSystM recommends using the same adhesive used for the installation of air gap sensors.
- To be detected, the target must remain in front of the sensor during at least 500  $\mu$ sec.
- If tangential speed is too high to allow detection of the target, then glue a second target next to the first one.

1. Clean the area where the target will be glued with a dry cloth.
2. Move the synchronization probe so that it touches the shaft. Mark the edge of the synchronization probe on the shaft: right of synchronization probe if the unit turns clockwise, or left, if the unit turns counterclockwise. If the first interpole (P-1) is not facing upstream, add the distance **d**.
3. Spread a thin layer of glue on the target and apply the catalyst.
4. Position the target, straighten it up, and secure it firmly in this position while the glue is drying. Refer to the instructions included with the glue for detailed information on use and drying time.
5. Use a filler gauge to adjust the distance between the sensing face and the shaft to  $5.0 \text{ mm} \pm 0.5 \text{ mm}$  [ $200 \text{ mils} \pm 20 \text{ mils}$ ], which leaves a gap of  $2.0 \text{ mm} \pm 0.5 \text{ mm}$  [ $80 \text{ mils} \pm 20 \text{ mils}$ ] between the target and the sensing face.
6. Tighten the adjustment screws to lock the adjustable slide plate and set the probe in this position.

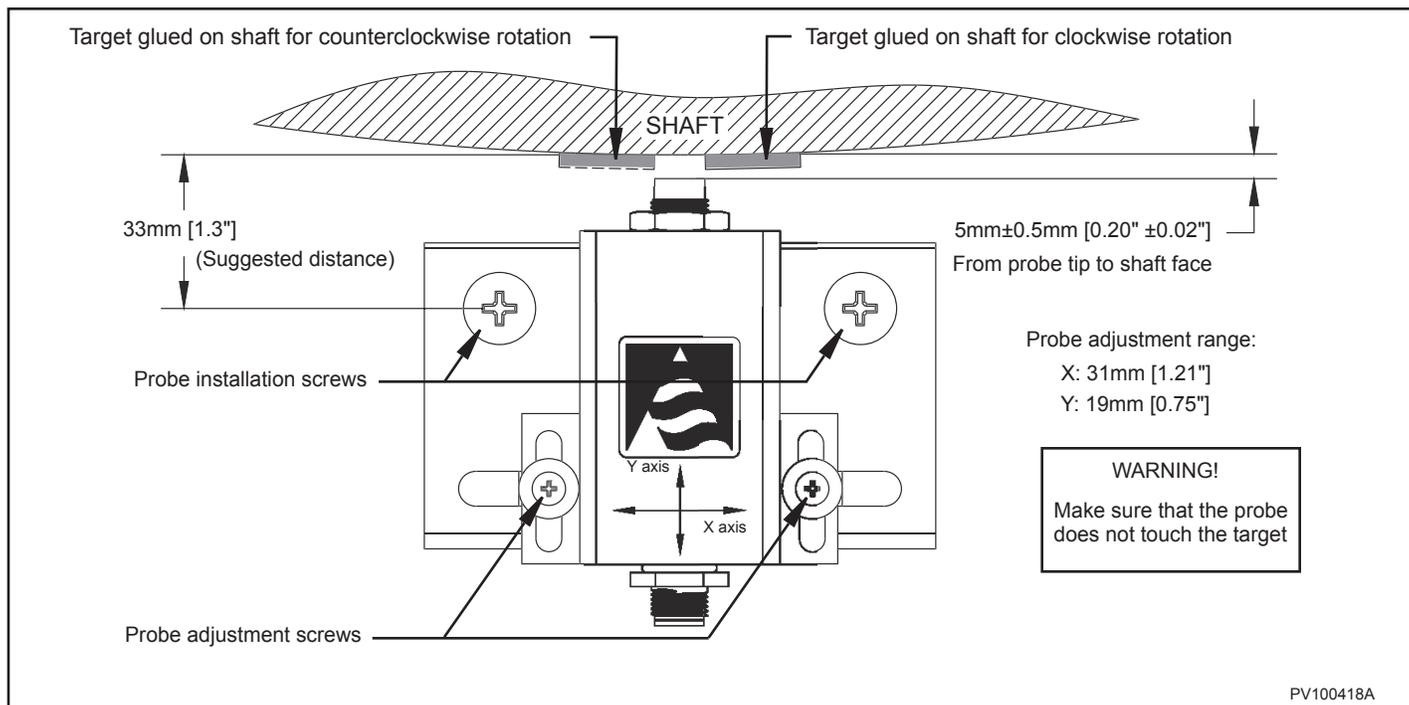


Figure 6 : Adjustment of the synchronization probe

