



# SYNCHRONIZATION PROBE

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## User 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.

A red LED placed directly on the back of the probe flashes to confirm each pulse emission.

#### ! Important information

VibroSystM technician should be present during installation and commissioning.

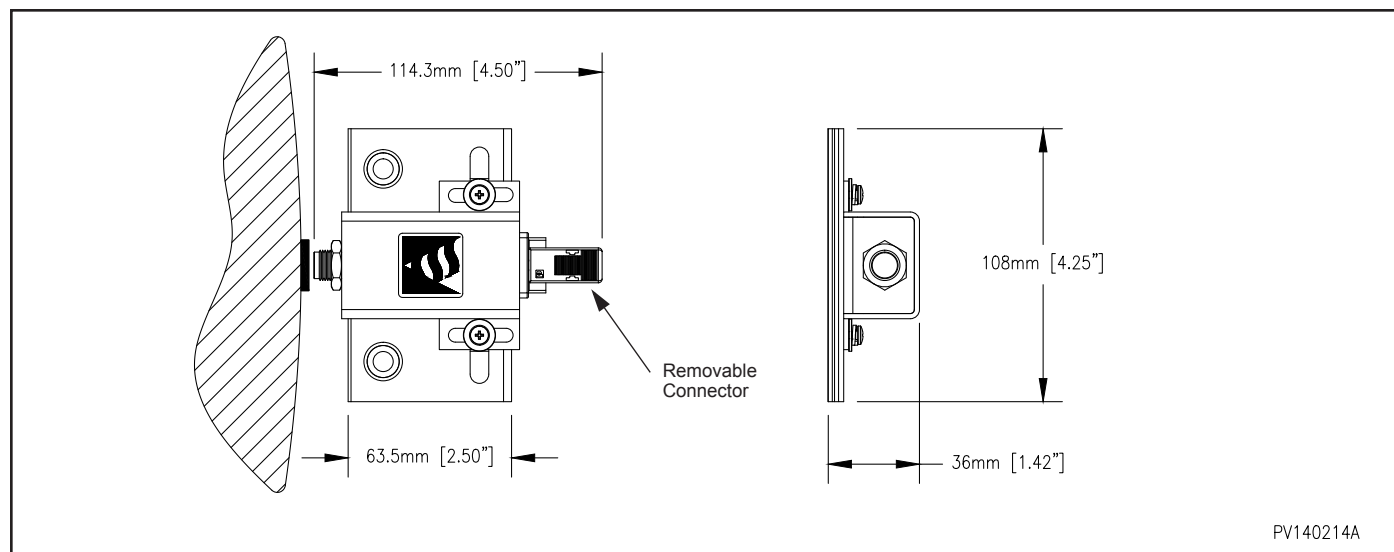


Figure 1 : Synchronization Probe Dimensions

### 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 Connecting the synchronization probe

The signal cable provided by VibroSystM may be replaced by any cable having similar characteristics. The table below shows the color codes, designations, and specification for the signal cable provided by VibroSystM.

Connector Position	Corresponding Color Code	Designation	Specifications
1	Blue	Common	0 V
2	Brown	Power Supply	10 to 30 VDC Power Input
3	White	Signal	NPN Open Collector Transistor
(not used)	Black	(n.a.)	(n.a.)

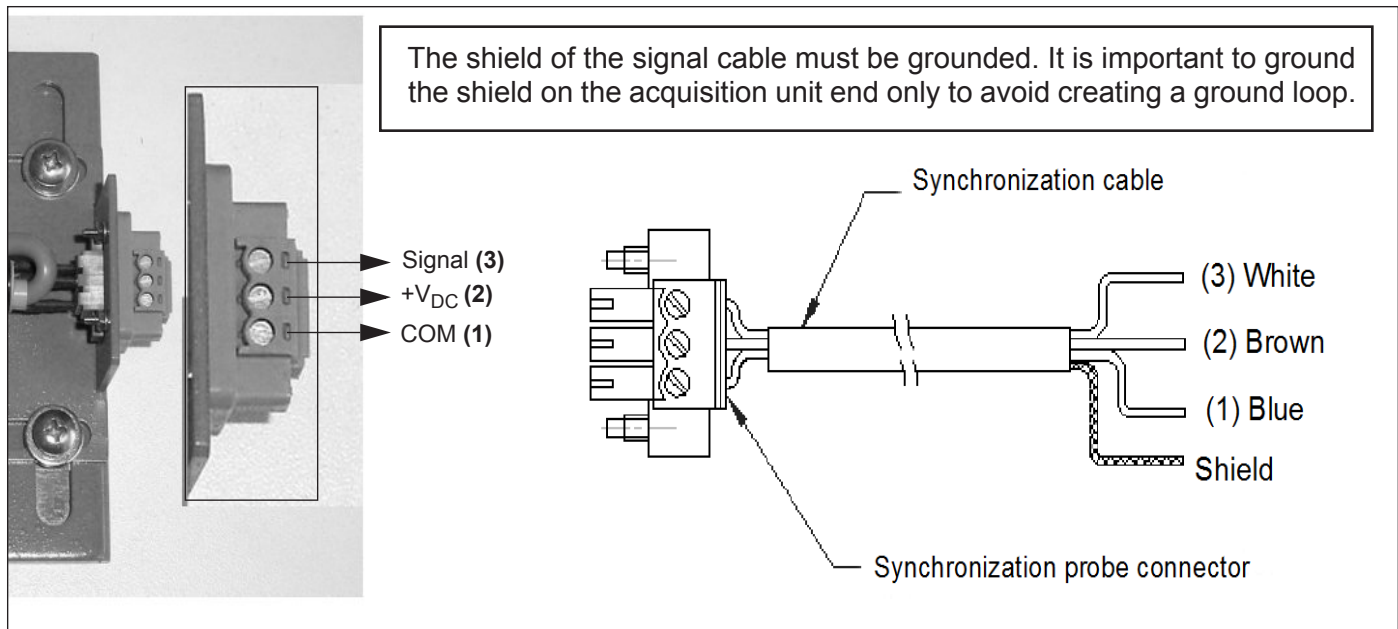


Figure 2 : Synchronization probe connection detail



### 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 adjustment of the synchronization probe is 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.

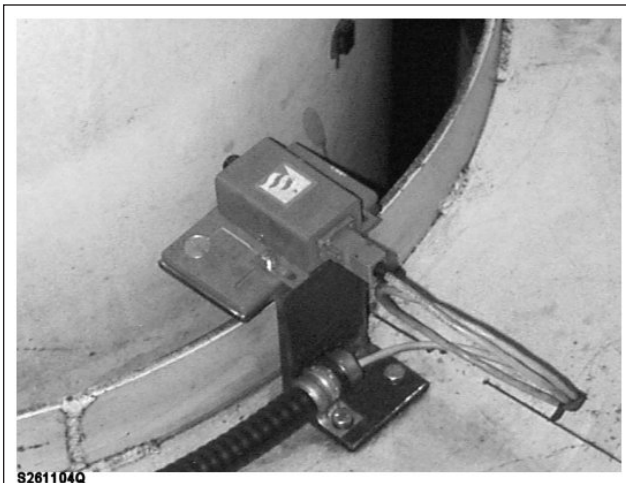


Figure 3 : Single synchronization probe installed

#### Generators

On units that rotate in a single direction, a single synchronization probe and target need to be installed.

#### Reversible pump/storage units

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.

To run the synchronization cable, proceed as follows:

1. Determine the location of the synchronization probe and the acquisition unit enclosure to which the synchronization probe will be connected.
2. Determine the path that the cable must follow and cut it to length.



### 3.2 Installation of the synchronization probe

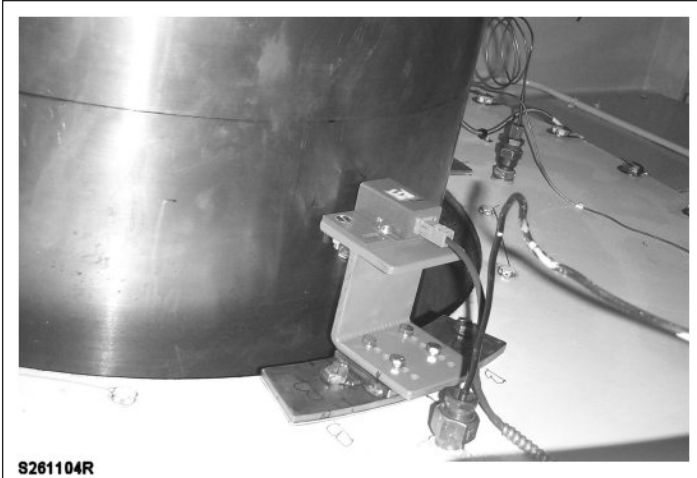


Figure 4 : Probe installed on a custom mounting bracket

The sensing face of the probe must be installed at a distance of 2.0 mm  $\pm$ 0.5 mm [80 mils  $\pm$ 20 mils] from the target, or 5.0 mm  $\pm$ 0.5 mm [200 mils  $\pm$ 20 mils] from the shaft.

A custom-made mounting bracket may have to be machined, as shown in the adjoining picture, to install the synchronization probe at the prescribed distance.

#### 3.2.1 Installation on a mounting bracket (already installed)

1. Drill two 5/16" holes in the mounting bracket at the correct distance from the shaft (refer to Figure 5 : "Mounting holes for the synchronization probe").
2. Fasten the probe with the supplied 5/16-18 X 1-1/4" bolts, 5/16" lock washers, and 5/16-18 nuts.

#### 3.2.2 Installation directly on a solid surface

1. Select either 5/16-18 x 1-1/4", or M8x1.25x30mm bolts. Drill and tap two holes for the selected thread in the mounting surface at the correct distance from the shaft (refer to Figure 5 : "Mounting holes for the synchronization probe").
2. Fasten the probe with the selected bolts. Use of a thread lock compound is recommended.

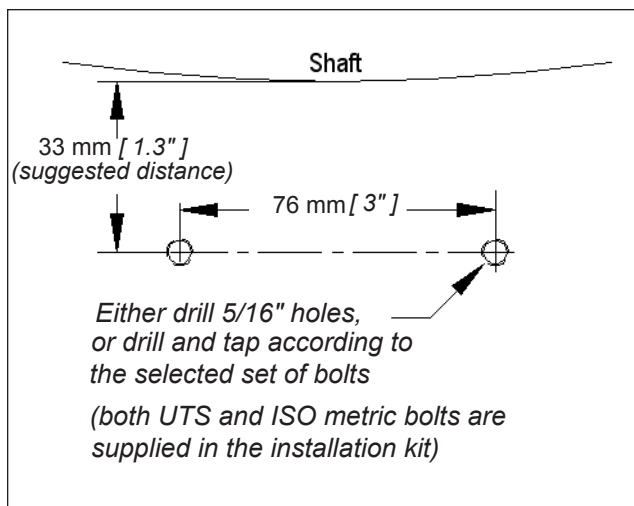


Figure 5 : Mounting holes for the synchronization probe





## 3.3 Installation of the target

### 3.3.1 Determining location of the target

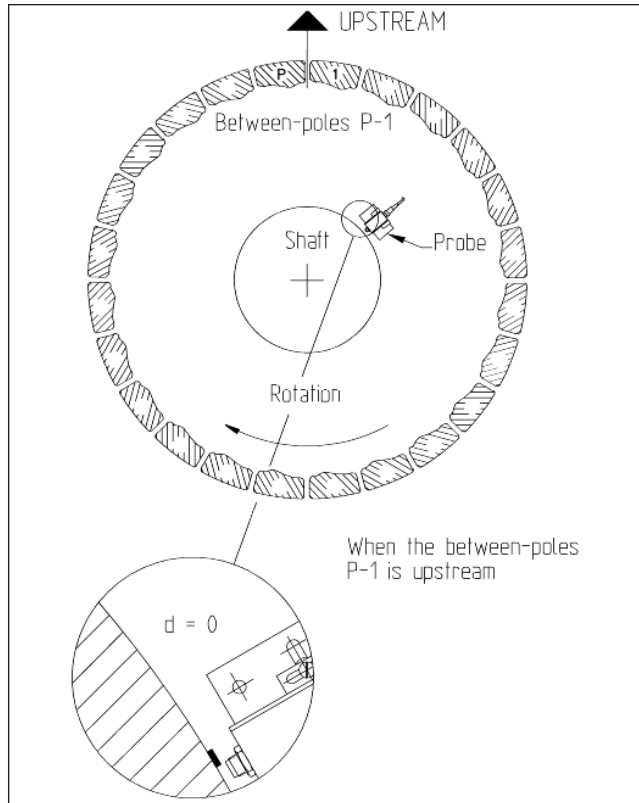


Figure 6 : P-1 position on rotor is facing upstream

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

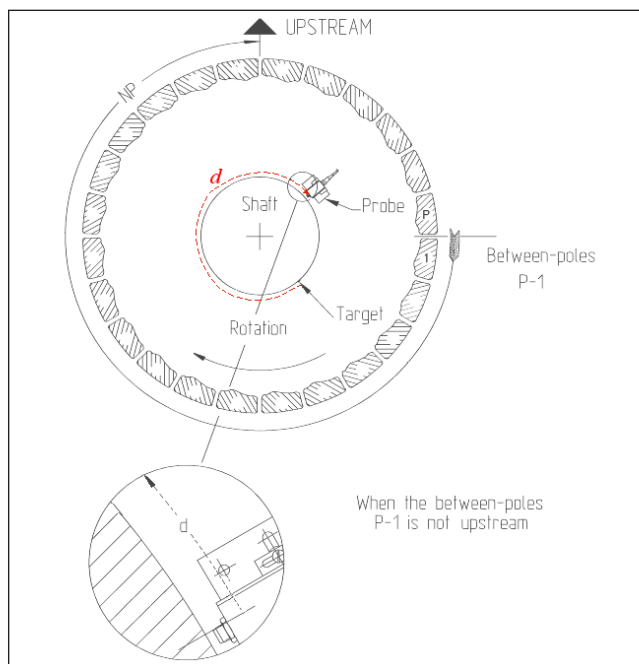


Figure 7 : P-1 position on rotor is not facing upstream

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 Glueing the target

#### ! Important information

- **VibroSystem 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 counter-clockwise.  
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.

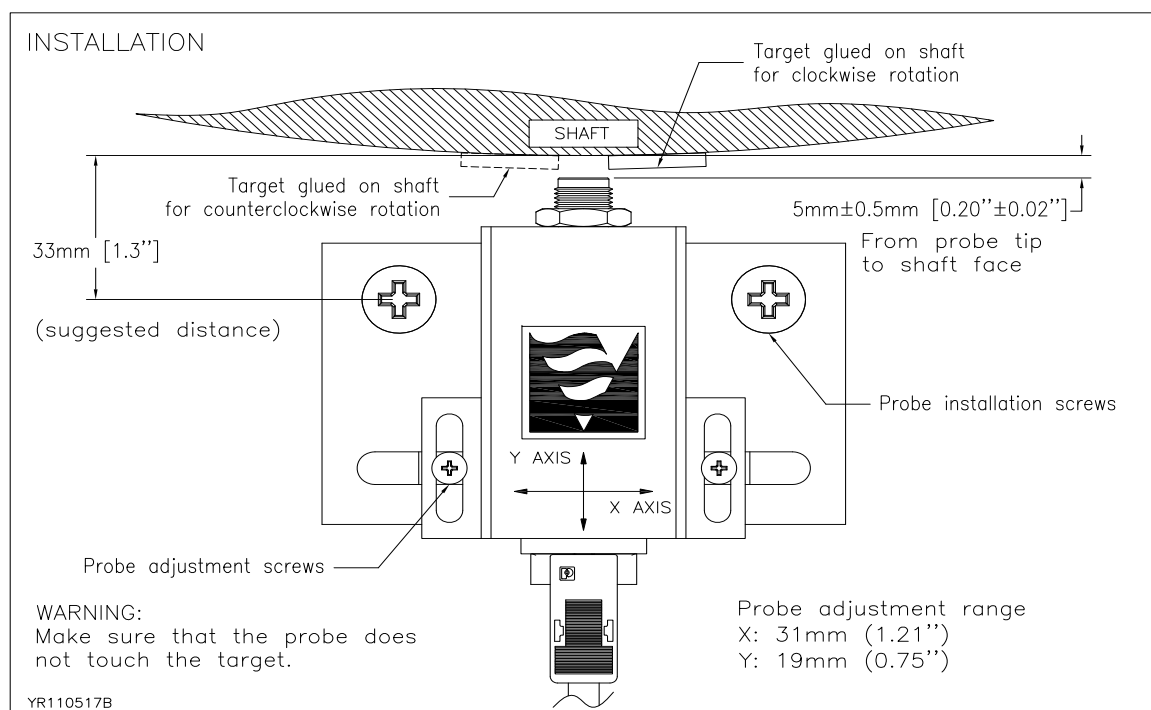


Figure 8 : Adjustment of the synchronization probe