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Features and Software

Overview



Figure 1: TwinProx dual channel proximity probe module.

Proximity probes are used to monitor large industrial machines such as centrifugal compressors, motors, pumps, steam turbines, hydro turbines, generators, gearboxes, fans, and reciprocating compressors. Case-mounted accelerometers are unsuitable for monitoring these machines due to the large difference in the ratio between the small rotor mass and the much larger stator mass. The same vibration measured by a case-mounted accelerometer would be insufficient to alert the user to the onset of catastrophic damage.

Machine Saver's TwinProx delivers two probe drivers in one smart device, digital delivery of data, peer-to-peer communications and advanced customization features tuned to our customers' specific applications.

Compatible with existing API670 style proximity probe systems such as 3300XL® and NSV®, TwinProx is designed for larger critical machines and balance of plant machines with oil-lubricated journal bearings and is helping many plants monitor shaft vibration relative to the sleeve bearing. The TwinProx innovative electrical and mechanical runout compensation system makes it the idea solution for retrofits to machines where there is no pre-machines probe track.

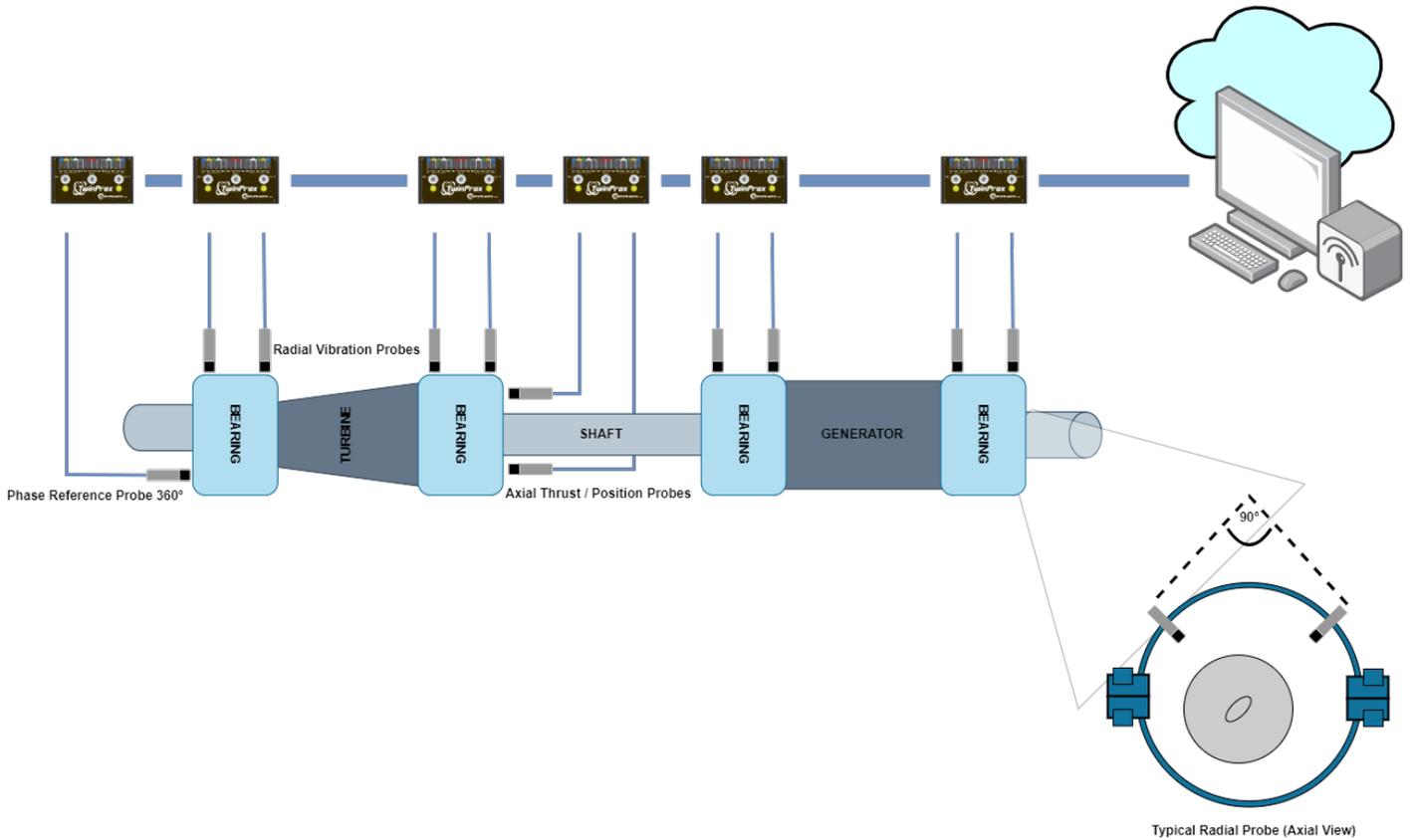


Figure 2: Typical TwinProx installation on large machine train.

Applications

Centrifugal Compressors

Reciprocating Compressors

Large Motors

Large Pumps

Large Fans

Large Gearboxes

Blowers

Steam Turbines

Hydro Turbines

Gas Turbines

Features and Benefits

TwinProx is a dual channel proximity probe driver that is easy to install.

TwinProx units have peer-to-peer communications to provide phase-synchronized vibration data across a cluster of sensors and a phase reference probe.

Quality life expectancy from manufacturer of 10 years.

CSA, UL, IECEX, CE, ATEX certified (pending approval).

Suitable mounting options and approvals for hazardous locations.

Designed and manufactured in the United States of America.

Designed specifically for customers' machine applications.

Ability to digitally accommodate a variety of target materials.

Simplified probe gap adjustment using multi-color LEDs.

Compatible to other API670 style proximity probe systems such as ¹ 3300XL® and NSV®.

Electrical and mechanical runout elimination.

Color-coded wire terminals and cables.

Series wiring with up to 20 modules per RS485 bus line.

Built-in alarm logic for paired channels allowing customers more informed decision making.

Rod drop and rod position detection in reciprocating compressors.

Reverse rotation detection in pumps.

Reverse mount probe housing and DINrail mounting options.

Modbus RTU interface directly to plant PLC, DCS and other data acquisition systems.

Each TwinProx comes ready to set up for Radial vibration (Figure 3: Proximity Probe #2), axial thrust position (Figure 3: Proximity Probe #3), speed or 360° phase reference (Figure 3: Proximity Probe #1), using the Machine Saver user interface software.

The information from the different functions, such as vibration and axial thrust position, are paired

at the monitor so Machine Saver's unique dual channel driver offers many advantages and advanced capabilities, for example allowing AND/OR alarm logic.

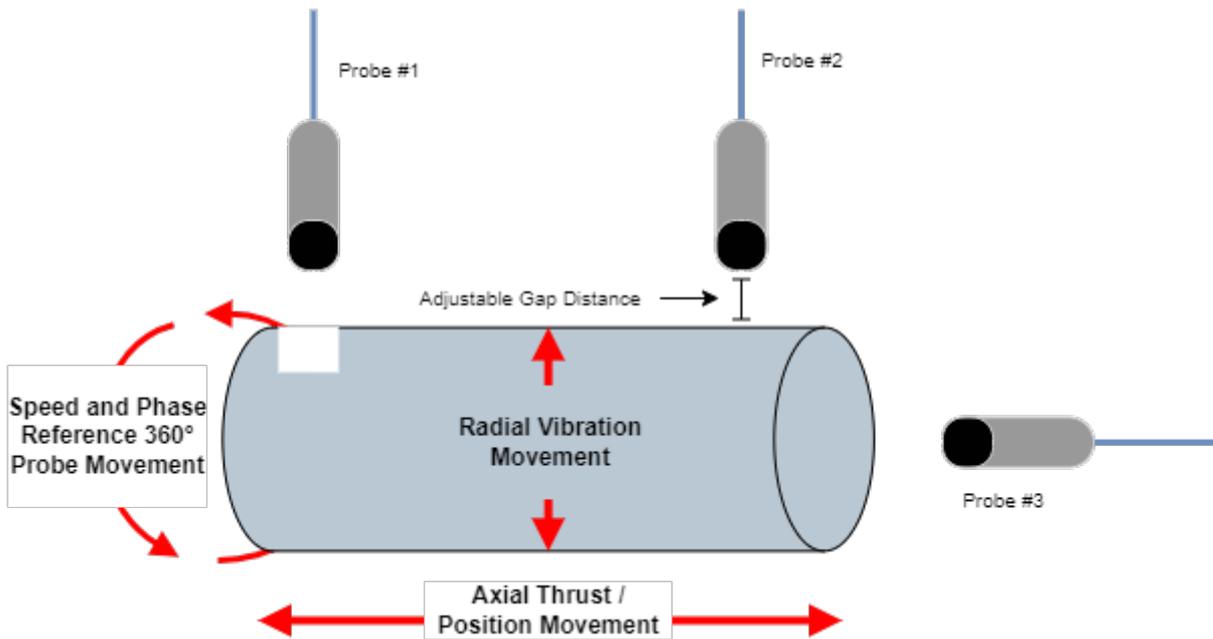


Figure 3: TwinProx application motion reference.

Analysis Software

Machine Saver Cloud solutions, using an edge device to get data to a secure cloud database, allow users to see trends of vibration, axial thrust position and speed in real time.

Time waveform, spectrum (FFT) and XY orbit screens are also available in the software.

The system provides an internal programmable alarm for machine protection.

The system captures the dynamic, analysis data, time waveform, spectrum, FFT, and orbits simultaneously from all TwinProx modules associated with a particular machine and a 360° phase reference probe.

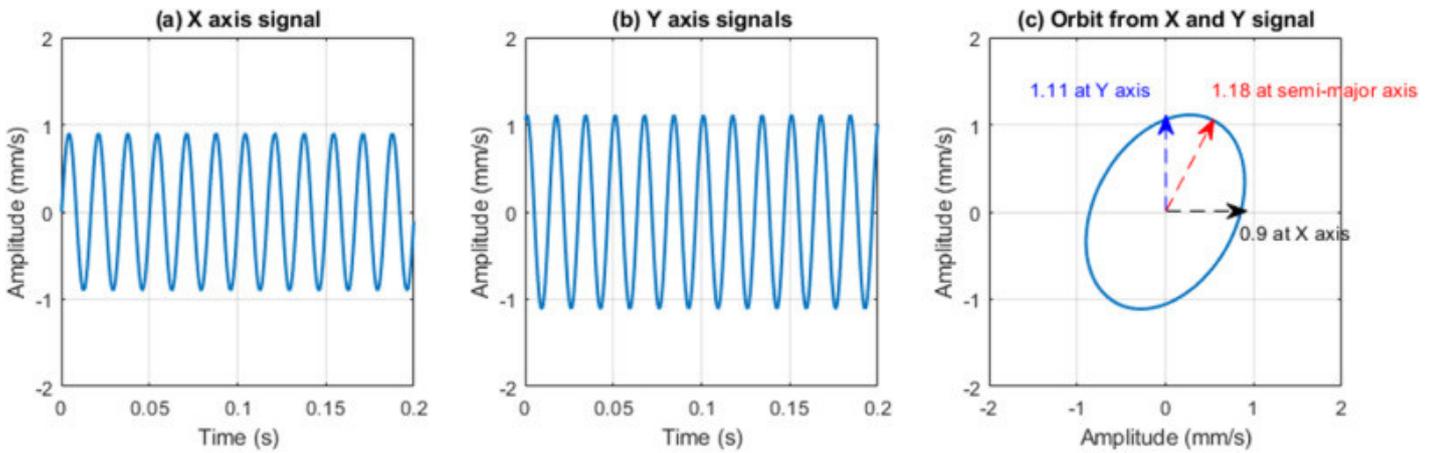


Figure 4: TwinProx dynamic data orbit, time waveform.

Field Customization Options

TwinProx configuration software is made for our customers that require advanced configurations. The simple and intuitive user interface allows:

- Connecting to TwinProx modules
- Configuring TwinProx modules
- Configuring each channel (A and B) for a particular application
- Linearization
- Application settings
- Probe gap settings

Field Linearization

TwinProx is typically used with ANSI 4140 shaft material but may also be linearized in the field for other ferrous metal alloys like stainless steel, K-MONEL, INCOLOY and other. This allows technicians to react to uncommon target materials should they find them during an installation.

This technique is available to do either manually, using a traditional static calibrator, or it can be done automatically, using Machine Saver's Probulator (a high precision target driving device).

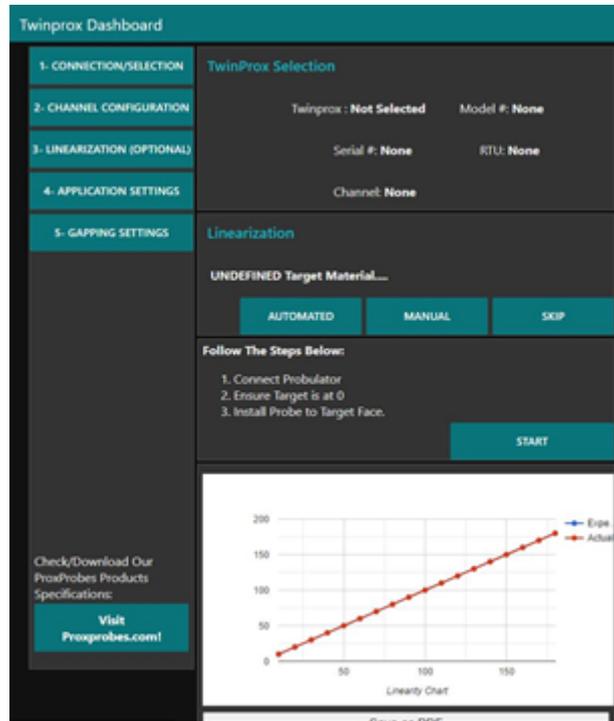


Figure 5: The TwinProx software features a simple, intuitive user interface that makes it easy to configure TwinProx in the field.

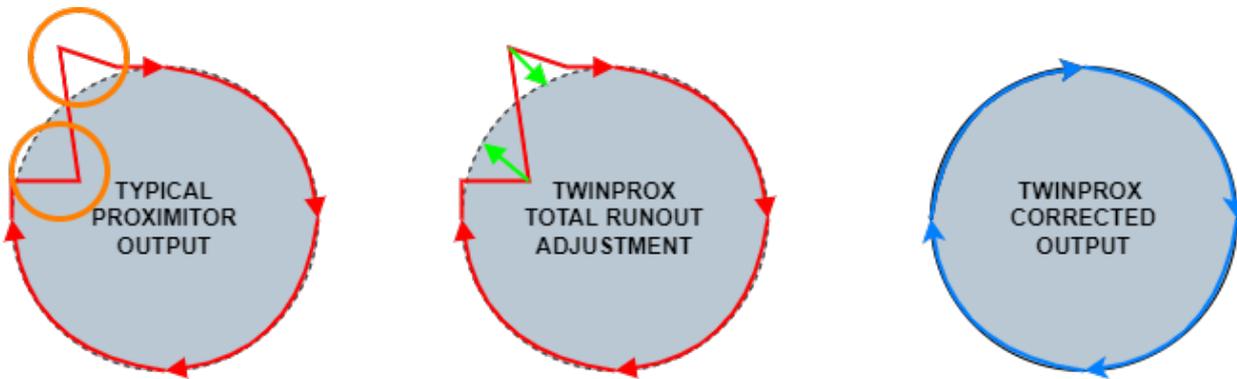
Total Runout Compensation (**TRO**)

Machine Saver's unique technology eliminates electrical runout (**ERO**) and mechanical runout (**MRO**) by digitally accounting for mechanical inconsistencies and electrical variances in the shaft. This feature insures the highest quality vibration data, free from the effects of electrical and mechanical runout. This also drastically reduces the cost and time needed to prepare a shaft during installation.

Electrical and mechanical runout are recorded automatically by the TwinProx every time the machine coasts to a stop. Last rotations are the ideal time to measure electrical and mechanical runout, as there is little to no centrifugal energy present. Changes in ERO and MRO could be caused by corrosion, rust, electrical, magnetic or physical damage to the shaft. The overall ERO and MRO data is captured, recorded and compared to the previously stored ERO/MRO data. If there is a change detected, the user is notified and may take action.



Figure 6: The TwinProx software shows a traditional approach to proximity (Left) and the true vibration (Right) of the shaft, when the electrical and mechanical runout are eliminated.



Electrical Runout (ERO): Stresses or variations in the magnetic properties of the shaft which often are created during shaft production.

Mechanical Runout (MRO): Defects in the physical properties of the shaft such as scratches or machining imperfections.

Total Runout (TRO): The measurement error that results from the combined problems of electrical runout and mechanical runout.

Figure 7: TwinProx Total Runout (TRO) Compensation Adjustment

Probe Gap Distance

Each TwinProx channel has an adjustable, user-defined probe gap distance. When installing the proximity probe in the bearing housing, the TwinProx multi-color LED associated with that channel will flash to indicate that the probe is installed the correct distance from the shaft as shown on Figure 8.

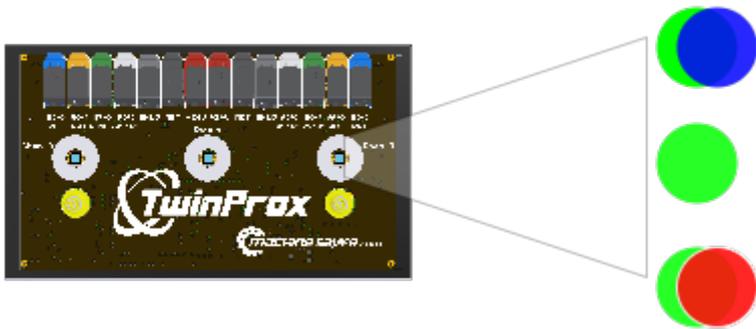


Figure 8: Multi-color LED Instructions for Gap setting on Channel B

LED Status	Definition	Remedy
Flashing Green / Blue	Probe gap is larger than the customer defined distance.	Screw the probe so that the tip moves toward the shaft until the LED becomes solid green.
Solid Green	Probe gap is equal to the customer defined distance.	None, this is the goal of gapping the probe.
Flashing Green / Red	Probe gap is smaller than the customer defined distance.	Unscrew the probe so that the tip moves away from the shaft until the LED becomes solid green.

Functions

Radial Vibration

Measures the movement of a machine's shaft using AC and DC components of the transducer signal. Available outputs:

- Dynamic data for analysis
- Displacement overall

Provides an alarm system to help prevent unplanned shutdowns and machine catastrophes.

Alarm system functions:

- High alarm
- High High alarm
- Low alarm

- Low Low alarm

Available filters to specify the monitoring frequency range:

- High pass
- Low pass
- Band pass
- Notch filter

Compensation algorithm for Mechanical and Electrical runouts adjustment.

Configuration software can be configured with different options:

- Overall displacement vibration monitoring
- Setpoint alarm and shutdown
- Time waveform capture
- Frequency spectrum (FFT) capture
- Frequency filtering
- Start-up setpoint multiplier
- Machine ON / OFF functions

Axial Thrust Position

Position measurements utilize the DC component of the transducer signal, the measurement unit is Mils or Microns.

Alarm system functions:

- (+) High alarm
- (-) High alarm
- (+) High High alarm
- (-) High High alarm

*Default logic for alarms is "AND", if channel A AND channel B exceed value trigger an alarm.
To use this logic both channels must be configured as axial thrust position.

Configuration software can be configured with multiple options:

- Axial thrust position monitoring
- Setpoint alarm and shutdown
- Active shoe float adjustment
- Zero position float adjustment

Speed

Measures the machine speed in revolutions per minute (rpm), cycles per minute (cpm) or Hertz (Hz).

Alarm system functions:

- High alarm
- High High alarm
- Low alarm
- Low Low alarm

Configuration software can be configured with four different functions:

- Speed monitoring
- Speed setpoint alarming
- Zero speed
- Reverse rotation

360° Phase Reference

Syncs vibration analysis data to the zero degree position.

Presents live data feed of vibration data as the key or key way passes the phase reference probe.

How to Order

Product Code	Channel A Application	Channel B Application	Probe Series and Tip Diameter	System Length	Special Application
2PRX	AA	BB	C	D	EE

***2PRX refers to TwinProx model prefix.**

Channel A and B

AA	Application for Channel A	00 = Vibration (Default) 01 = Phase Reference Probe 02 - 255 = Speed (Number of Gear Teeth or Notches) ZZ = Axial Thrust Position
BB	Application for Channel B	00 = Vibration (Default) 01 = Phase Reference Probe 02 - 255 = Speed (Number of Gear Teeth or Notches) ZZ = Axial Thrust Position

Probe Series and Tip Diameter

C	0 = 3300 8mm (Default) 1 = 3300 11mm 2 = 3309 5mm Focus View
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System Length

D	5 = 5 Meter (Default) 1 = 1 Meter 7 = 7 Meters 9 = 9 Meters
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Special Application

E	00 = No Special (Default)
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Accessories

- Static Calibrator (Manual Calibration Tool)
- Probulator (Automated Calibration Tool)
- ProxBox (Reverse Mount Probe Housing)
- TwinProx Enclosure
- Proximity Probes
- Extension Cables
- Probe Brackets

Manuals and Software

The latest versions of Machine Saver TwinProx configuration software and user instructions can be downloaded from Machine Saver's Library: <https://library.machinesaver.com/books/twinprox-modbus>