Connection Technology Center, Inc.
Vibration Analysis Hardware

DD1590 Series
Proximity Probe Driver

Product Manual
MNX10016, 3/2/06
1. Description

The DD1590 is a Proximity Probe Driver that converts the distance to a target, sensed by an eddy-current proximity probe, to a voltage output. The DD1590 is designed to work with a Proximity Probe Assembly. The driver is a 3-wire device with connections for power, ground/common, and signal output. The driver is intended for use with a negative power supply. The DD1590 is available in two versions. The DD1590(X) version is the standard unit and used in most cases. The DD1591(Y) version is used for the second probe when two probes are mounted in close proximity to each other, typically 90° apart on a shaft for vibration monitoring. The “X” and “Y” versions operate at different excitation frequencies, to avoid interfering with each other’s sensing operation.

2. Installation

Mounting

For most applications, the driver should be mounted in a protective housing, which may be watertight, oil-tight, or explosion proof, whatever is appropriate. More than one driver may share a single housing to simplify installation. Locate drivers in a place where easy access can be obtained.

NOTE: Guard against oil and dirt getting into the connectors.

Probe Cable Connections

The cable connected to the driver may be an integral part of the probe, a separate cable that connects to the probe, or an extension cable attached to a probe’s pigtail (short integrated cable). The cable typically connects to the driver via an SMA coaxial connector. Only CTC Prox Probe Cables should be used. Substitute cables from other sources should not be used, as they may not be electrically compatible and may seriously affect system accuracy. The probe cable length influences the calibration of the unit, so it is important that the correct length be used. Deviation from the calibrated total cable length (including extensions) of 2 feet can produce a deviation from calibrated output of about 3%. Excess probe cable length can be coiled up inside the housing, if necessary. The CTC Prox system allows the cables to be any desired length, typically from 3 to 50 feet, so excess cable can be avoided. Connections should be tight. Snug the connector screw collar with a 5/16” (8 mm) open-end wrench, applying about 5 inch-lbs (0.6 N-m) of torque.

IMPORTANT NOTE

Do not over tighten the probe cable connection. Do not exceed a torque of 8 inch-lbs (0.9 N-m). Too much torque can damage the connector’s insulator, break the epoxy bond, or twist the internal cable shield connections, compromising the driver’s seal or electrical connections.
IMPORTANT NOTE

Probe connectors must not touch any machine metal parts.

The system should be grounded at the central system only. Where extension cables and/or armored probe cables are used, connector bodies may come into close proximity with machine parts. Probe connectors must not touch any machine metal parts, as the connector shell is an electrical conductor and cannot be connected to the driver signal ground or system ground. The connectors must be insulated by wrapping with Teflon tape or other reliable covering.

Terminal Strip Connections

Strain relief for the cable connections should be provided by means of compression glands or conduit fittings. For shielded cables, the shield should be connected at the central system only, and not at the driver. At the driver end, cut off the shield at the cable outer jacket. If it has an aluminum/polyester shield, also cut off the drain wire. Insulate the jacket termination with suitable electrical tape.

Connections for the Typical -24Vdc Systems

The driver has three terminal connections: -24V, COM, and SIG. A 24Vdc supply should be connected to the -24V and COM terminals. The supply can be a +24Vdc supply, as long as the -/common/return line is not connected to ground. (Most supplies would not do so, as the case ground is not likely to be used as a signal ground.) If using a “+24Vdc” supply, connect the +/plus/output terminal to the COM terminal of the driver and the -/common/return to the -24V terminal of the driver.

The COM (signal common or signal ground) terminal is isolated from the driver case. COM is not directly connected to the probe cable connectors.

The SIG terminal is the output signal connection, and is a negative voltage output, with the voltage going more negative (higher in magnitude) as the gap increases.
Connections for a +24Vdc System
CTC Prox Probe Drivers can be used in +24Vdc systems. Connect the power supply in the same manner as for a -24Vdc system, but in this case connect the -24V terminal to the common/signal ground of the system. Now the SIG output will be positive with respect to common (which is the -24V terminal). In this configuration, the SIG output voltage will decrease in magnitude as the gap increases.

IMPORTANT NOTE
For the purpose of vibration monitoring, where the AC component is of primary interest, either configuration will work just as well, except that in +24 systems, any ripple on the supply voltage will be seen as a vibration signal. Check the output under static conditions with all drivers connected to be sure the ripple magnitude is not an issue.

Power Reversal
An internal diode protects the driver against accidental polarity reversal on the power supply terminals.
Target Surfaces

The target material directly affects the output from the system. Drivers are calibrated for a specified material. If the target material is different from that specified and used for calibration, the output may be significantly inaccurate.

For vibration monitoring of rotating shafts, the observed surface must have a roughness not to exceed 50 microinches (1.3 microns) and must be concentric. If the surface is rough or has discontinuities, or there is excessive mechanical run-out, false vibration readings will result. To insure measurement accuracy, the target area should be at the circumference of a shaft and perpendicular to the probe tip. For best accuracy with shafts less that 6 inches in diameter, be sure that the factory has calibrated the driver with an appropriately sized target.

If the shaft diameter is relatively small, and the driver has not been calibrated with a representative target, the probe may have to be positioned closer to the shaft. For example, when the shaft diameter is 1.25" the probe gap needs to be about 0.005" less than specified to obtain the same gap voltage as for a flat target.

CTC calibrates drivers to specified shaft diameters or special targets, upon request. Keyways, oil slingers, and increases/decreases in shaft diameter should not enter into the target area.

Proper clearance around the probe tip must be provided. Refer to Figure 1. There should be no metal, other than the target, within a specified radius from the probe tip centerline over a distance from target back to the mounting surface. A metallic surface "X" inches away from the probe tip has much less effect than placing the probe tip in a hole whose radius is "X" inches.

![Figure 1](image_url)

Setup and Adjustment

When all connections to the driver have been made, and the probe is in place, apply power.

For applications where the only the information of interest is vibration level or marker location, (where measuring the gap is not important), the voltage at the SIG (signal output) terminal, relative to the COM (common) terminal should be -10.0 ± 0.5 volts for a mid range gap. Adjust the probe until this reading is obtained.

For applications where the actual gap needs to be measured, adjust the probe until a reading is obtained that reflects the desired initial gap setting.
Operation

A CTC Probe Assembly operates in combination with a CTC Probe Driver. The driver outputs a signal that is proportional to the gap between the probe tip and the target. The average gap corresponds to the DC component of the output. Vibration is measured by monitoring the AC component of the signal.

All drivers have the same 20 volt output span. The output sensitivity of the driver is 200mV/mil for the most widely used 5mm 1/4-28 or 8mm 3/8-24 probes. This is based upon the 20V span divided by the nominal 100 mil range.

Other probes are available for measuring larger gaps. Please contact the Factory for more information.

Specifications

Proximity Sensor

<table>
<thead>
<tr>
<th>Model</th>
<th>DS1811/DS1711 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Eddy-Current Probe</td>
</tr>
<tr>
<td>Standard Versions</td>
<td>5 and 8mm diameter</td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>200 kHz, nominal</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>0.04% per ºC deviation from 25ºC</td>
</tr>
</tbody>
</table>

5mm and 8mm Probes

| Full Gap Range         | 100 mils             |
| Usable Gap Range       | 15 to 95 mils        |
| Sensitivity            | 200 mV/mil           |

11mm Probe

| Full Gap Range         | 200 mils             |
| Usable Gap Range       | 20 to 180 mils       |
| Sensitivity            | 100 mV/mil           |

Probe Connector (when mounted on the probe – no pigtail or cable)

| Type                   | Coaxial              |
| Connector              | 1/4” SMA Female      |

Integrated Probe Cable

| Type                   | Coaxial              |
| Maximum Length         | 50 Feet              |
| Connector              | 1/4” SMA Male        |

Probe Cables and Extension Cables

| Model                  | DSCB1000-XXX-C200 (xxx denotes cable length in meters) |
| Type                   | Coaxial              |
| Maximum Length         | 50 Feet              |
| Standard Connectors    | 1/4” SMA             |
**Driver Output**

Maximum Range -0.7 to -21.5 Vdc (depends on target material)

Linear Range 3 to 19 Vdc

Accuracy ±1% at the linear range end points

Linearity ±1% in linear range

Frequency Response dc to 10 KHz (-10%)

Temperature Coefficient 0.03% per °C deviation from 25°C

Rated Load Current 1.0 mA

Source Resistance 300 ohms

Allowed Short Circuit Duration Unlimited

Accuracy and linearity specifications apply at 25°C and -24 ±0.2 Vdc supply voltage

**Output On Error**

Output <3 Vdc

Error Condition <15 mil gap

Connector body contacting signal ground

Probe cable shield contacting signal ground

Output >19 Vdc

Error Condition >95 mil gap

**Calibration Factors**

Probe Version Tip size/type

Cable Length 3 to 50 feet

Target Material Various

Target Shape Flat, various diameters

**Interface Connectors**

Standard Probe Connector 1/4” SMA Female

Optional Probe Connector 1/8” Microdot Female

Loop Connection 2 #6 Phillips Head Screw Terminals

Auxiliary Connection 2 #6 Phillips Head Screw Terminals

**Operating Power**

Voltage -24 Vdc nominal

Normal Operating Range -22.5 to -32 Vdc

Absolute Maximum Voltage -36 Vdc

Maximum Reverse Voltage +50 Vdc

Power Consumption 200 mw, typical
**Isolation**

- **Case Isolation**: Isolated from all connections
- **Voltage Withstand**: 350 Vac, 500 Vdc

**Mechanical**

- **Enclosure**: Formed steel, 5 sides
- **Potting Material**: Back side is potting material
- **Black RTV**
- **Dimensions**: 2.5” L x 3.0” W x 1.95” H
  (64mm x 76mm x 50mm)
- **Mounting Hole Spacing**: 2.69” (68mm)

**Environmental**

- **Ambient Operation Temperature**: -40°F to 185°F (-40°C to 85°C)
- **Humidity**: 0 to 100% RH, non-condensing
- **Transportation Vibration**: IAW Commercial Handling/Shipping

---

**Technical Support**

If you have any questions or need help,
call CTC
800-999-5290 Toll Free in the US.
585-924-5900 International.
585-924-4600 Fax.

The Technical Support staff will be happy to assist you.