VibraLINK® switchable junction boxes

Installation and operating guide

VLT series

Caution: This guide should be read carefully before installation

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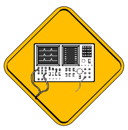
Safety section

VibraLINK® switchboxes can be safely installed when the instructions in this manual are carefully followed. This section summarizes the safety considerations. Reminders in the form described below, will appear in the detailed instructions to assure operator awareness of these safety considerations. Qualified personnel should install the VibraLINK® enclosure only after becoming thoroughly familiar with this manual.



CAUTION: This symbol is used when caution is needed to prevent damage to equipment. It is used where careful attention to certain procedures described in the instruction manual is needed. This symbol is also used to emphasize procedures other than normal operating procedures.

Safety summary

1. The VibraLINK® switchboxes covered by this installation guide do not require any special precautions, protective devices or equipment.
2. Because the junction boxes are designed to be installed in an industrial environment, personnel involved with the installation should be familiar with all plant safety requirements before beginning installation.
3. There are no user serviceable parts.
4. Use common sense and avoid haste during installation and operation.

Contents

1.0 Introduction

This guide is designed to assist the user in the physical installation and wiring of VibraLINK® switchable junction boxes. A section is included explaining proper operation of this series of enclosures.

2.0 Description

The VibraLINK® VLT series of switchboxes handle 6 channels and are NEMA 4X/IP66 rated for harsh environments.They provide a central collection point for safe and convenient triaxial sensor inputs to portable data collection and analysis equipment. The VLT series support triaxial vibration input sensors only.

3.0 Applicable models

See the table below for a list of available VibraLINK® (VLT) junction boxes.

Channels	Size	Material	Output connector	Part number
6	10x8x4	Fiberglass	M12	VLT6FM12
			Cable grip	VLT6FG
		Stainless steel	M12	VLT6M12
			Cable grip	VLT6SFG

4.0 Mounting

Securely mount the enclosure using the holes provided in the box flanges. Do not drill holes in the enclosure since this may cause moisture entry. Always mount the enclosure with the cable entry ports on the bottom to prevent moisture ingression. Pole mounting is possible, contact Wilcoxon Sensing Technologies for more information.

5.0 Electrical installation

5.1 Installation of sensor cables

When opening the enclosure, the circuit board will be visible as shown in figure 2.

Two versions of the VLT6 switchbox are available. The VLT6M12 (pictured) pre-wires external M12 connectors mounted on the bottom of the enclosure. This enables permanent accelerometers to be wired using pre-built cable assemblies between the accelerometer and the enclosure. Connections from the M12 connector are pre-wired at the factory to the appropriate internal terminal block. The individual triaxial accelerometer outputs are then available at the 'output' M12 located next to the selector switch.

The VLTSFG switchbox comes provided with pre-drilled holes fitted with a 6 position cable grip. This enables the user to feed multi-conductor cables through the grip connect with each appropriate terminal block. As with the 'M12' version, the user accesses the individual triaxial sensor channels through the 5-pin 'M12 'output connector.

While the sensor cable can be run directly to the VibraLINK® transducer input connectors, sometimes the sensor's cables terminate at an intermediate terminal block located near the machine being monitored. When this occurs it is recommended that the cable going between the VibraLINK® and the terminal block be identified with cable identification markers at both ends of the cable.

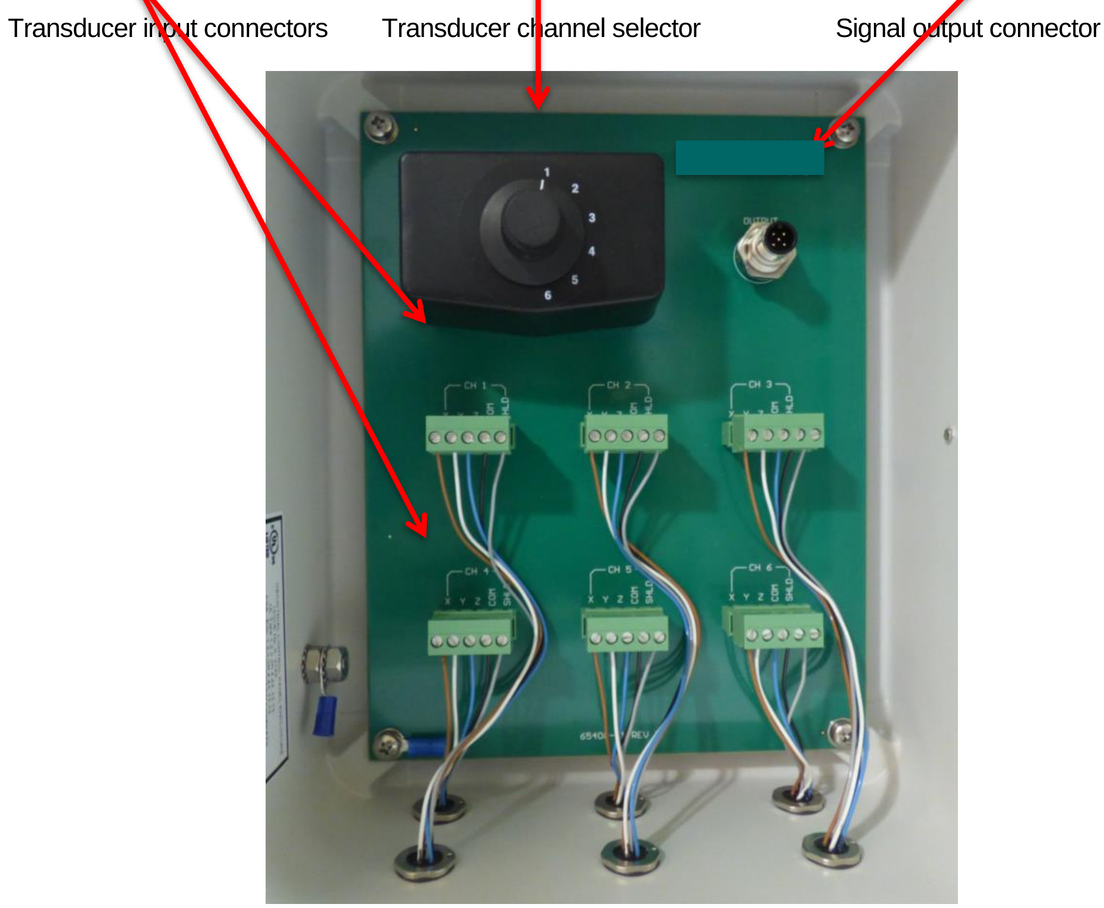


Figure 2: Interior view showing the circuit board of VLT6FM12

5.2 Cable entry

Steps for wiring non-MIL connector switchboxes

1. Feed blunt cut cables through the cable entry.
2. Strip 1 ¼" of insulation off of the outer cable jacket.
3. Separate the internal wires from the shield and twist the shield.
4. Strip ½" of insulation off of each of the wires.
5. Locate the appropriate plug, identified by channel number, remove the plug and install the wires using a small screwdriver.
6. Insert plug into the appropriate PC board connector and double check to ensure that the cable is going to the correct channel.

Five connections per sensor plug are provided. The table below shows typical connections when using Wilcoxon J9T4A cable with a 993B-7-M12 accelerometer. Be sure to verify these connections with Wilcoxon depending on what actual cable assembly is being used.

Signal, x	Green
Signal, y	Red
Signal, z	White
COM	Black
SHLD	Shield

VibraLINK® switchboxes are provided with pre-drilled ports to accommodate either cable grips or M12 connectors. Once the cables are installed the Buna-N insert holds each in place.

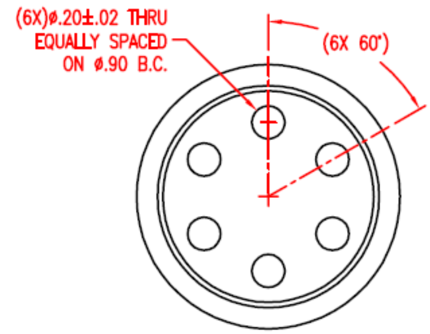


Figure 3: Cable feeds of cable grip option

- Units selected with "M12" output connectors are equipped with 6x 5-socket M12 connectors.
- Units selected with cable grip ("G") will include a grip which can accommodate up to 6 cables, entry where the cable diameter is no greater than 0.190" diameter.

J9T4A four conductor shielded cable is recommended. This cable features Teflon® insulation with a temperature range of -112 to +392° F (-80 to +200° C).

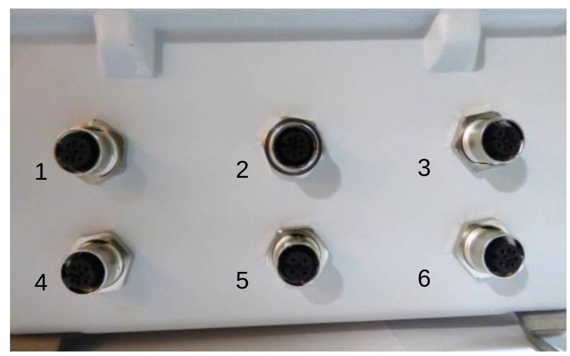


Figure 4: Bottom view with M12 connectors

6.0 Post-installation testing

It is recommended that post installation testing be performed with the same type of instrument that will be used when taking routine measurements.

One method to determine proper operation and the correct measurement location is to connect a data collector to the VibraLINK® output connector and have a second person at the measurement location.

1. With the data collector activated, select the desired channel and wait 5-7 seconds. Take a reading. If the data collector has spectrum capabilities, ensure that the data does not exhibit any ski-slope.
2. Have the person at the measurement location disconnect the accelerometer.
3. When the accelerometer is disconnected, take another reading and compare it with the initial reading. The second set of data should indicate measurement error or open circuit.
4. Reconnect the accelerometer and take another reading to verify a good connection,
5. Repeat the above steps for each measurement location to verify that the accelerometer locations are properly identified in the enclosure.

6.1 Common installation errors

- Cable not connected, or short circuited at the accelerometer
- Broken cable
- Water or other contamination in the connector

- Reversed wiring (+ and – leads reversed)
- BOV not reaching steady state

Each of these situations should be troubleshooted using the data collector's recommended procedures.

6.2 Operational verification using the ReferenceMate2500 vibration source

This is an optional test that can provide further confidence that the channel is operational and is properly calibrated. In this instance an actual signal will be produced to check the system.

Wilcoxon's REF2500 is ideal for performing the above test. The shaker generates a 1 g signal at a frequency selected by the user. For imperial measurements, use 61.4 Hz to produce 1 IPS velocity. The sensor to be tested is mounted on the shaker. When the 90° angle adaptor is used, each channel of the triaxial sensor is checked individually at 1 g. When the angled plate adaptor is used, each axis is excited at ~ 0.58 g at the selected frequency.

Figure 5: ReferenceMate portable shaker

7.0 Operating guide

The primary purpose of the VibraLINK® enclosure is to provide a central collection point for multiple triaxial sensors. This section will provide operating instructions and also cover some pitfalls that the operator may encounter.

The VibraLINK® enclosure **does not** contain a power supply thus all power is obtained from the data collector.

7.1 Steps for data collection

1. Plug the data collector into M12 output connector located on the upper right-hand side of the board.
2. Select the desired sensor using the rotary switch at the top of the board.
3. Wait 5-7 seconds to ensure BOV levels are stable.
4. Collect data using your data collector. Since all 3 channels are available at the M12 connector, simultaneous measurements are possible.
5. Switch to the next channel and repeat the above procedure.

Figure 6: M12 output connector

7.2 Use with zener safety barriers

Safety barriers are used to connect intrinsically safe circuits with non-intrinsically safe circuits. Their purpose is to protect circuits installed in explosive risk areas.

IEPE sensors have an output that is a combination of the DC bias output voltage (BOV) and the superimposed vibration signal. The BOV is controlled by the sensor design and exists as long as the current source provides adequate current. The sensor generally needs at least 2 mA of current. It is common to use current values of 2 to 4 mA for the constant-current source. When IEPE sensors are used in intrinsically safe circuits, the effects of the zener safety barrier must be considered in the sensor operating circuit when monitoring the BOV. It is possible to use a barrier that provides a safe circuit, but precludes the proper operation of the sensor.

Referring to figure 7, the zener barrier has four wiring connections. Terminals 1 and 2 are the connection points and are outside of the hazardous area. Terminals 3 and 4 are located within the hazardous area. An intrinsically safe rated accelerometer is connected to terminals 3 and 4.

The series resistance of 330 Ω causes a voltage drop proportional to the current applied. If the excitation voltage is 18 volts, 2 mA may cause the accelerometer to turn off. With a 4 mA current, the accelerometer will probably turn off. Using a higher excitation voltage would correct this problem. Most Wilcoxon accelerometers will operate from 18-30 VDC.

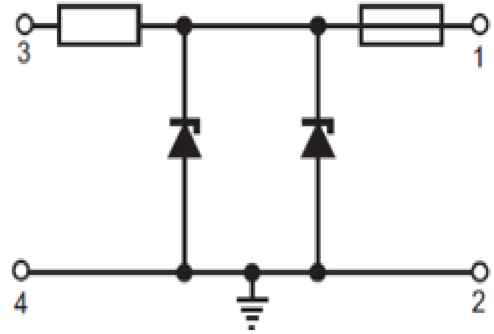


Figure 7: Typical zener safety barrier
The maximum end to end resistance (between 3 and 1) is 330 Ω

The safety barrier will also cause a change in the bias voltage, which can limit the dynamic range of the accelerometer.

As illustrated in figure 7, the accelerometer will be connected across terminals 3 and 4 in the circuit. Assume the manufacturing specification of the accelerometer calls for its BOV not to exceed 13.5 volts. If a Wilcoxon 7xx-IS accelerometer is powered using a constant-current diode value of 4 mA, then the resistance of the barrier will cause a voltage drop of 1.332 volts (333 x 0.004). The total voltage drop across the barrier and the accelerometer could then be as high as 14.83 volts (13.5 + 1.33) and will appear to be the BOV of the accelerometer as viewed across terminals 1 and 2 of the barrier. This is the effective maximum BOV that would be seen by an analyzer connected to this circuit and using a powering current of 4 mA.

Since the accelerometer should allow for a maximum voltage to be 2 volts less than the open-circuit supply voltage, a BOV of 14.83 volts means that the dynamic range of the sensor will be limited. Assuming a typical supply voltage of 24 volts, the signal can only go 7.17 volts from the zero reference before entering the non-linear section of the response curve, 2 volt zone of operation. That means the effective dynamic signal is limited to 71.7 g's (7.17 volts at 100 mV/g). If the accelerometer had its nominal BOV of 12 volts across its terminals, then the BOV seen at the output of the zener safety barrier would be about 13.33 volts and the entire dynamic range would be available.

If problems are encountered, it is suggested that an increase in the excitation current and excitation voltage be implemented, one at a time. Never exceed the maximum specified current and voltage ratings if the sensor in use. Try to keep the current as low as possible.

8.0 Technical assistance

For technical assistance, please contact our Applications Engineer at 301-330-8811 or email info@wilcoxon.com. Visit www.wilcoxon.com for technical papers that provide details on many applicable subjects.

9.0 Customer service

For all customer service inquiries, please call 301-330-8811 or email info@wilcoxon.com.