

## VibraLINK<sup>®</sup> switchable junction boxes

### Installation and operating guide VLL series





Caution: This guide should be read carefully before installation

## Safety section

VibraLINK<sup>®</sup> 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<sup>®</sup> Lite 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<sup>®</sup> Lite 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.



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## 1.0 Introduction

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

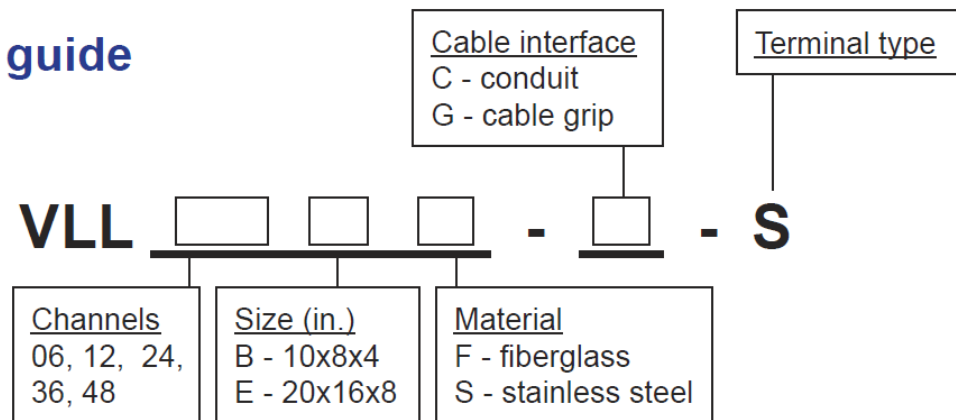
## 2.0 Description

The VibraLINK® Lite series of switchboxes handle from 6 to 48 channels and are offered in two sizes (depending on the number of channels ordered) that are NEMA 4X/IP66 rated for harsh environments. They provide a central collection point for safe and convenient sensor inputs to portable data collection and analysis equipment.

## 3.0 Applicable models

All versions of the VLL enclosures are covered by this manual. Below is a guide to determine the model number of the applicable VibraLINK® Lite junction box.

### Ordering guide



## 4.0 Mounting

Securely mount the enclosure using the holes provided in the box flanges. Do not drill holes in the enclosure as this may cause undesired moisture entry. Always mount the enclosure with the cable entry ports on the bottom to prevent moisture ingress. Pole mounts are available, 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.

Note that the sensor input connectors are arranged in the same order as the switch position channels and are also placed at an angle (see figure 2). This layout helps prevent wiring errors during the installation process while the terminal strip angle reduces strain on the wire connections.

The sensor cable can be run directly to the VibraLINK<sup>®</sup> transducer input connectors, or, the sensor's cables can be terminated at an intermediate terminal block located near the machine being monitored. The cable going between the VibraLINK<sup>®</sup> and the terminal block should be identified with cable identification markers at both ends of the cable.

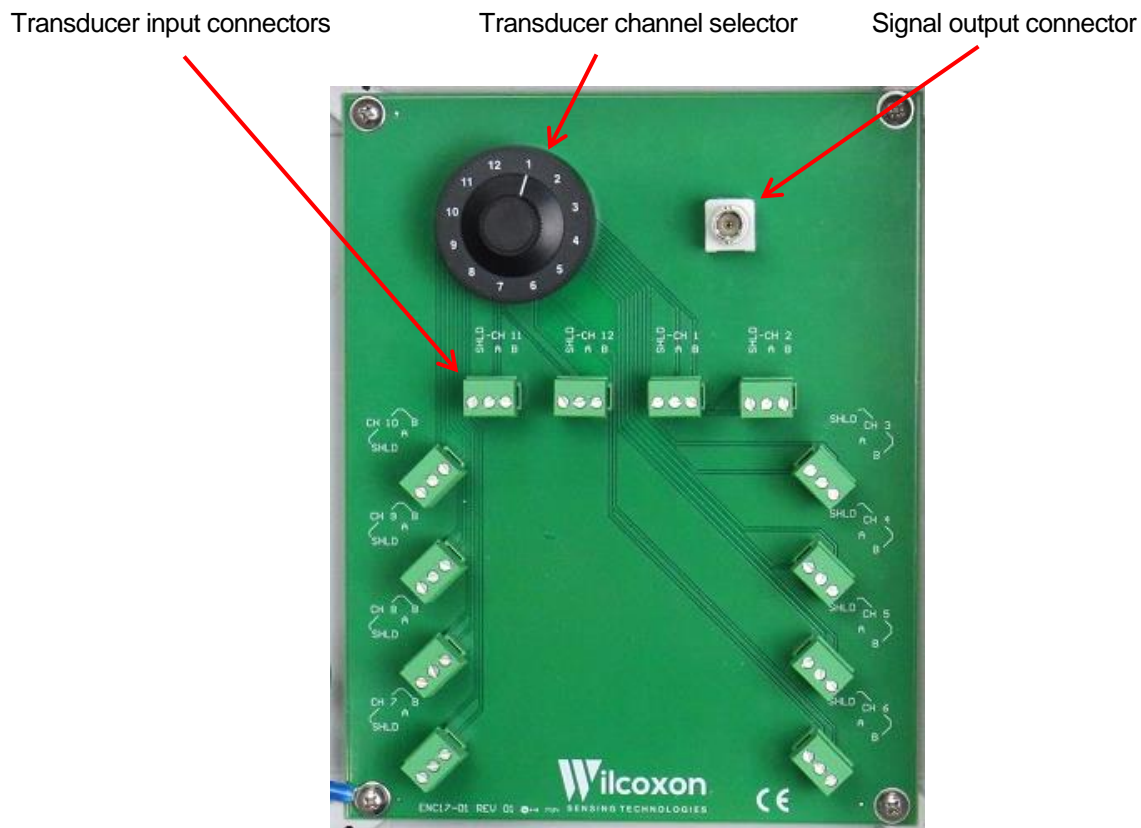


Figure 2: Interior view showing the circuit board

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 flathead screwdriver.



6. Insert plug into the appropriate PC board connector and double check to ensure that the cable is going to the correct channel.

Install wires as indicated (colors for Wilcoxon J9T2A cable):

Signal	Pin A, white
Common	Pin B, black
SHLD	shield

## 5.2 Cable entry

VibraLINK® Lite switchboxes are provided with pre-drilled ports to accommodate either conduit or exposed cables.

Holes are provided for each individual cable where the number of holes will equal the number of input channels ordered. Multiple cable entry holes will be provided for units with more than 12 channels. Once cables are installed, use the compression bridge to hold the cables in place.

For compatible, single output IEPE accelerometers, J9T2A two conductor shielded cable is recommended. This cable features Teflon® jacketing with a temperature range of -112 to +392° F (-80 to +200° C).

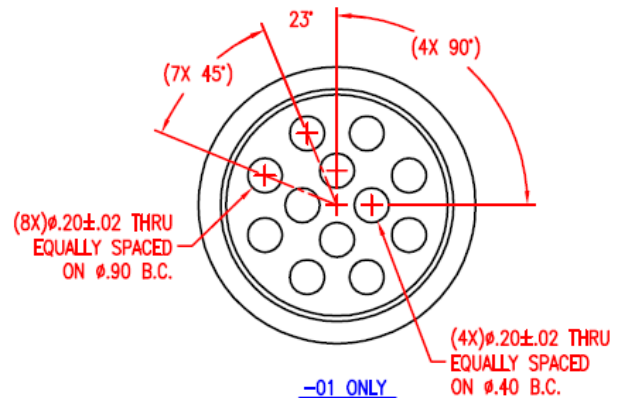


Figure 3: Cable feed through holes provided with cable grip option (12 hole)

## 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 enclosure operation and the correct measurement location is to have one person connect a data collector to the VibraLINK® Lite and have a second person at the measurement location with a known vibration source. The ReferenceMate REF2500, shown in Figure 4, is ideal for performing such a test. The shaker generates a 1 g signal at any of three frequencies selected by the user.

1. With the data collector activated, select the desired measurement channel in the VibraLink® enclosure.
2. Have the person at the measurement location inject a known signal into the sensor under test.
3. Have the person with the data collector take a reading for the channel in question and verify that the output is consistent with the injected signal.
4. Repeat the above steps for each measurement location to verify that the accelerometer locations are properly identified and operational in the enclosure.



Figure 4: ReferenceMate portable shaker



## 6.1 Common installation errors

If post-installation testing was performed and discrepancies were found, or, during normal operation a questionable reading was taken, some possible causes of error include:

- Cable not connected, or short circuited at the accelerometer or VibraLINK<sup>®</sup> end
- Broken cable
- Water or other contamination in the connector
- Reversed wiring (+ and – leads reversed)
- Bias Output Voltage (BOV) not reaching steady state (internal sensor issue)

## 7.0 Operating guide

The primary purpose of the VibraLINK<sup>®</sup> Lite enclosure is to provide a central collection point for multiple sensors.

### 7.1 Steps for data collection

1. Plug the data collector into either the BNC connector located on the upper right-hand side of the circuit board.
2. Select the desired sensor channel using the rotary switch at the top of the board.
3. Wait approximately 7 seconds for the sensor to power and the BOV to stabilize. If this step is not followed, the sensor could give “ski slope” data, rendering the data useless and requiring further time to be taken for a second reading.
4. Collect data and then rotate the switch to the next channel and repeat the above procedure.

### 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.

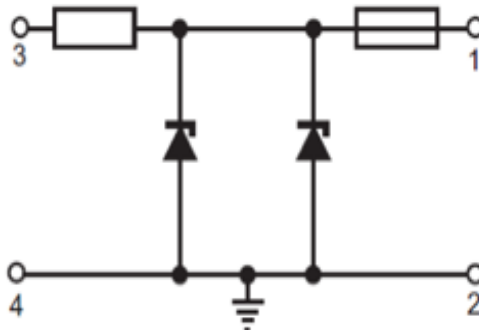


Figure 5: Typical zener safety barrier. The maximum end to end resistance (between 3 and 1) is 330  $\Omega$

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. It is possible to use a barrier that provides a safe circuit, but precludes the proper operation of the sensor.

Referring to figure 5, the zener barrier has four wiring connections. Terminals 1 and 2 are the connection points 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  $330\ \Omega$  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 on up to 30 VDC.

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 5, 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 793E 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 ( $333 \times 0.004$ ). 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 this "forbidden" 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 of 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](mailto:info@wilcoxon.com).

Visit [www.wilcoxon.com](http://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](mailto:info@wilcoxon.com).