



**VIBRATION ANALYSIS HARDWARE**



**TSB4000 Series Modular Switch Box  
12 Triaxial Sensor Inputs  
Product Manual**

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## INTRODUCTION

CTC modular switch box solutions allow for the monitoring of remotely-mounted vibration sensors, which would otherwise be restricted to human access due to safety considerations.

### **TSB4000 Series Modular Switch Box Overview: *Twelve switched triaxial sensor input module for a total of 36 channels, stainless steel enclosure***

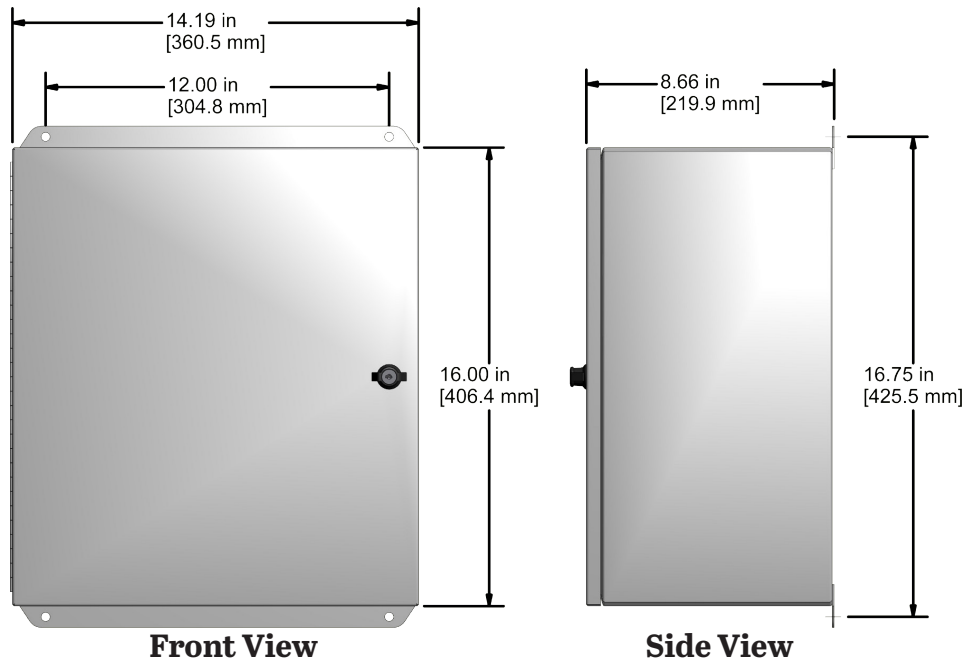
The TSB4000 Series stainless steel modular switch box is used to convert the four-conductor input wiring of up to 12 remotely-installed triaxial accelerometers to switched BNCs and a switched four-pin connector for 36 channels of measurement. Input wiring from each sensor is connected to the outputs via quick-connect or screw terminal blocks. Each terminal block includes inputs for signal/power on each axis, common and shield.

Additional switch box modules can be installed or removed after initial manufacturing and onsite installation, using the quick-release DIN rail clip. Each new module features a detachable plug for easy cable installation. If continuous output is desired, select the TSB4001 Series. On all continuous output modules, a quick disconnect T-plug is supplied to easily connect and disconnect the input wiring.

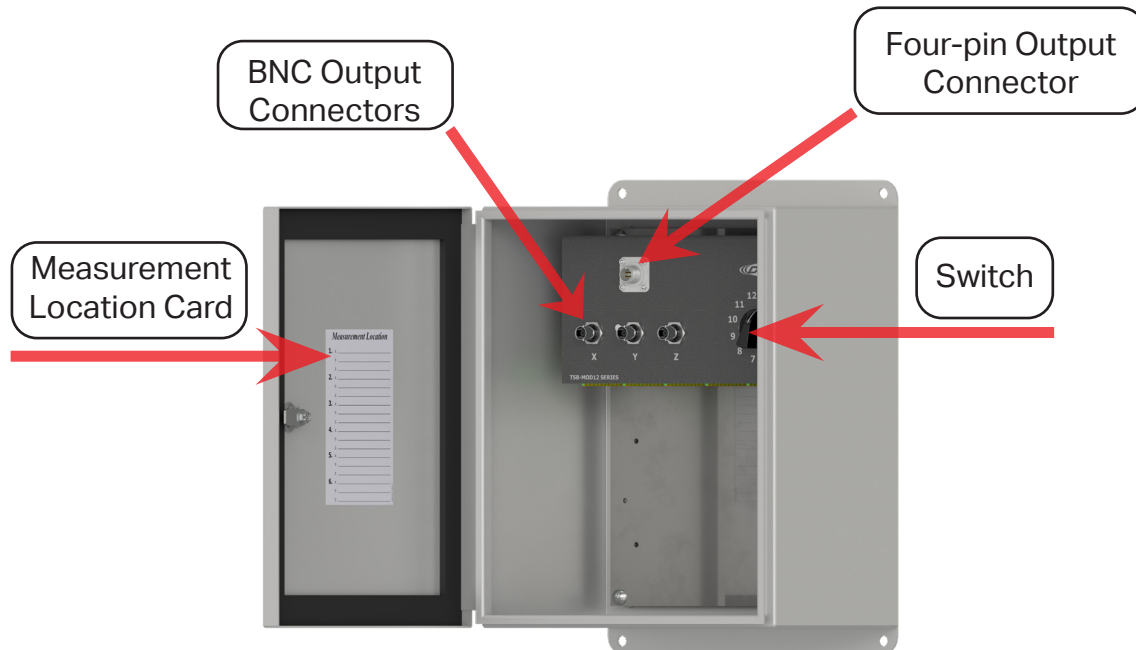
Rated for NEMA 4X (IP66), the TSB4000/TSB4001 Series can withstand harsh environments including temperatures ranging from -58°F to 180°F (-50°C to 82°C). The box is also resistant to hose-directed fluid and corrosion. A locking latch is installed on the door allowing the box to be sealed from the elements when not in use.



# PRODUCT DIMENSIONS



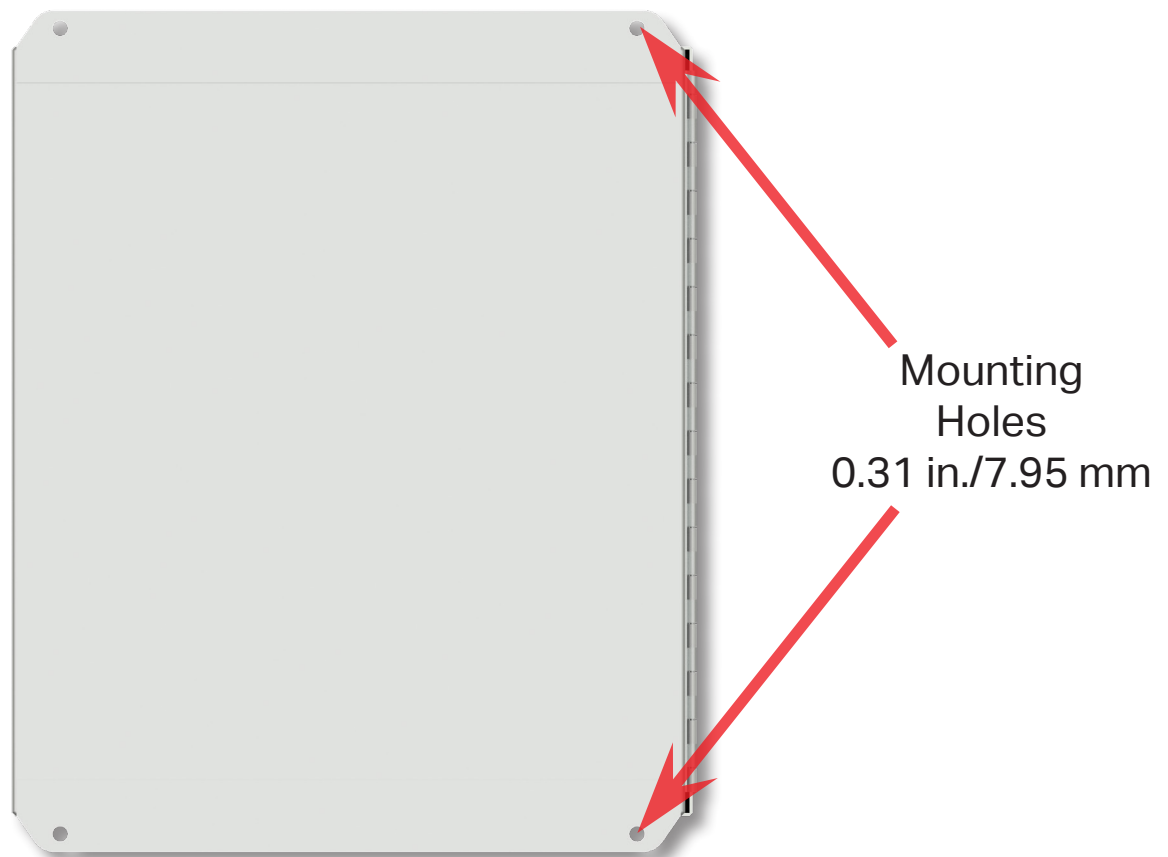
**Figure 1. Dimensions**



**Figure 2. Diagram**

## MOUNTING INSTRUCTIONS

**Note:** If you have purchased a modular switch box without cable entries provided, you should add your own entry prior to mounting the modular switch box. CTC does not recommend drilling holes in the top of the enclosure due to access and moisture concerns.



**Figure 3. Modular Switch Box Rear View**

## CONDUIT ENTRY

If you are running conduit to your enclosure, ensure the conduit cable entry is located at the bottom of the enclosure when mounted.

**Note:** To ensure moisture will not flow into the enclosure, a hole should be drilled at the lowest point in the conduit to provide drainage for any moisture.

**Correct**



**Incorrect**



Drill Drain  
Hole Here

**Figure 4. Conduit Entry for Modular Switch Box**

## GROUNDING

Ensure the shield ground wire on the TSB4000 Series modular switch box is grounded to earth ground.

### *A. Mounting to Earth Ground*

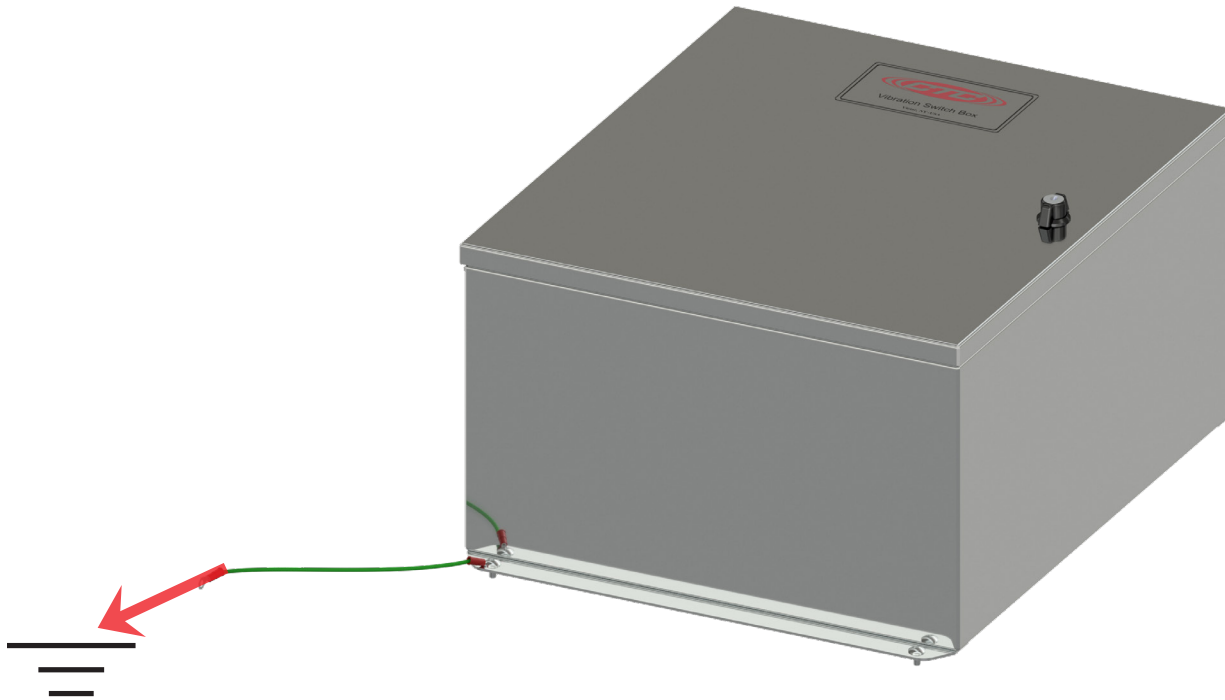
When mounting TSB4000 Series modular switch boxes to earth ground (such as an I-Beam), no additional steps are necessary, as the enclosure is grounded internally.



***Figure 5. Modular Switch Box (TSB4000) Earth Ground***

## B. Mounting to Non-Grounded Structure

When mounting the modular switch box to a non-grounded structure, ensure the shield ground wire or customer-supplied ground wire is tied to a source of earth ground.



**Figure 6. Ground Wire Placement**

## SENSOR INSTALLATION

### Installation of Sensors/Signal Input Cable

1. Feed blunt-cut end through the cable entry at the bottom of the enclosure.  
**Note:** It is recommended that cables are marked on both ends.

For cord grip cable entry, take off the cord grip cover with bushing and run cable into enclosure, hand-tighten cord grip cover to base to prevent damage of cord grip.



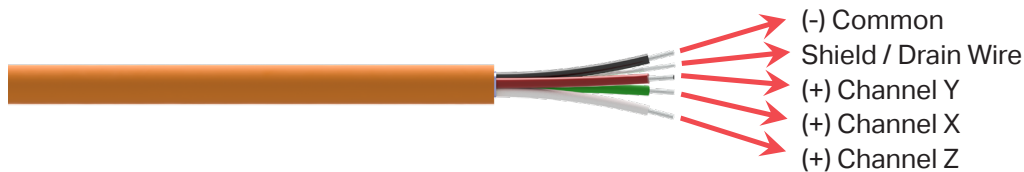


**Figure 7. Front View**



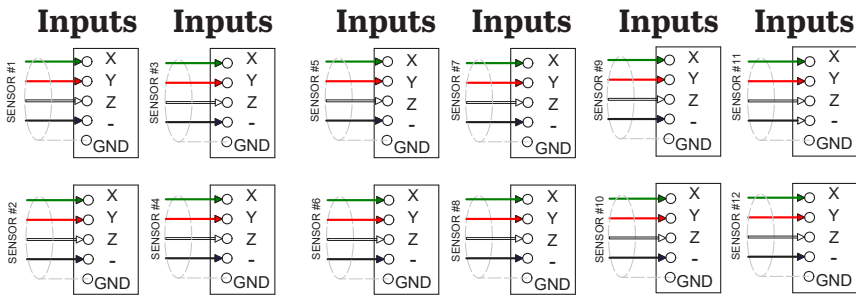
**Figure 8. Bottom View**

1. Strip outer jacket of cable back 1¼ in. and remove all of the shielding.
2. Separate the internal wires from the shield.
3. Strip red and black insulation back ¼ in.

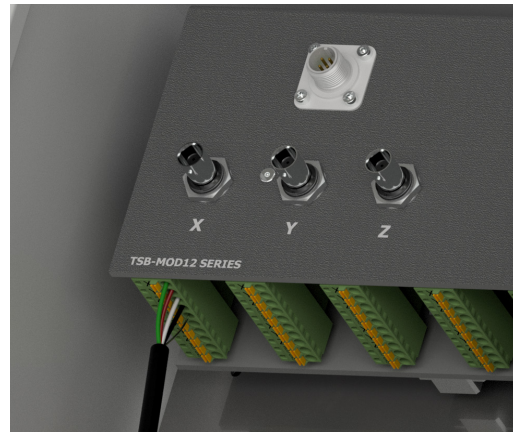


**Figure 9. Stripped Wire**

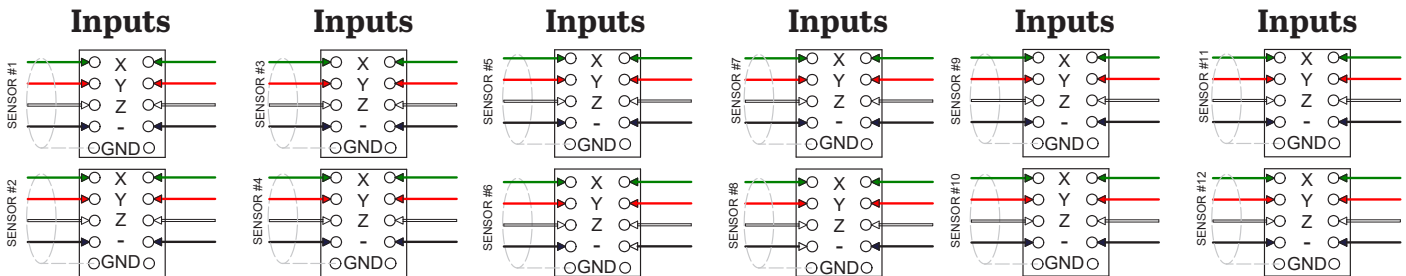
4. Locate the appropriate plug (identified by channel number), remove it, and install the wires using a small flathead screwdriver. Push plug back into location. Orientation is as follows:
  - a. Green insulated conductor wire is connected to Channel X.
  - b. Red insulated conductor wire is connected to Channel Y.
  - c. White insulated conductor wire is connected to Channel Z.
  - d. Black insulated conductor wire is connected to (-).
  - e. Shield drain wire is connected to ground (GND).



Sensor Inputs  
 Green = Signal/Power X Axis  
 Red = Signal/Power Y Axis  
 White = Signal/Power Z Axis  
 Black = Common  
 Grey = Shield (Ground)



**Figure 10. Connecting Cables to Modular Switch Box (TSB4000)**



Sensor Inputs  
 Green = Signal/Power X Axis  
 Red = Signal/Power Y Axis  
 White = Signal/Power Z Axis  
 Black = Common  
 Grey = Shield (Ground)

Sensor Outputs  
 Green = Signal/Power X Axis  
 Red = Signal/Power Y Axis  
 White = Signal/Power Z Axis  
 Black = Common

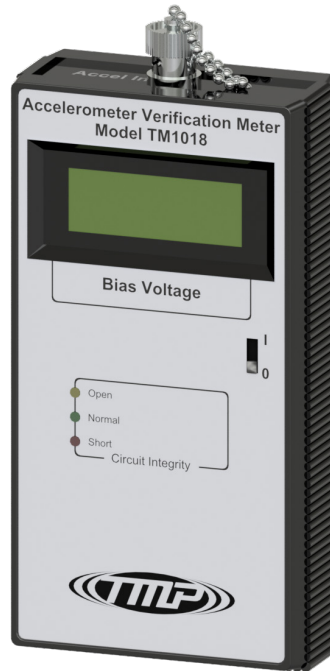


**Figure 11. Connecting Cables to Modular Switch Box (TSB4001)**

5. Insert plug into the appropriate PC board connector and double check to ensure that the cable is going to the correct channel.
6. Mark the Measurement Location Card located on the inside front cover with a description of each measurement location.

## POST INSTALLATION TESTING

The TM1018 Accelerometer Verification Meter can be used to verify cable conductivity, sensor location and proper wiring connections. The Verification Meter will indicate if the sensor, cable and/or junction box is in working condition. It will also confirm bias voltage of the accelerometer, which will inform you of the operation of the internal accelerometer amplifier.



**Figure 12. TM1018 Accelerometer Verification Meter**

### Testing Method:

1. Utilizing two personnel, Person A will be located at the modular switch box, while Person B will be located at the measurement location.
2. Once positioned, Person A will connect the TM1018 to the data collector output to the modular switch box and turn the Channel Selector to the channel that corresponds to the referenced measurement. Person A should observe a "NORMAL" LED reading.
3. Person B disconnects the cable from the accelerometer, and the TM1018 should respond with an "OPEN" LED. Reconnect the cable to the accelerometer, and the TM1018 should respond with a "NORMAL" LED.
4. Repeat for each measurement location to verify that accelerometer location is properly identified at the modular switch box.

The following LED Readout indicates the circuit integrity:

1. Green LED: Normal. Indicates proper connection and an output bias will be given, indicating the health of the sensor (4 – 16 V indicates a healthy accelerometer).
2. Yellow LED: Open Circuit. Indicates one of the following:
  - a. Cable connector is not connected to accelerometer.
  - b. Cable is open circuit (broken or not connected at one end).
  - c. Accelerometer is not functioning correctly.
3. Red LED: Short Circuit. Indicates one of the following:
  - a. Water or contamination in the connector.
  - b. Reverse wiring ((+) and (-) leads are reversed).
  - c. Wires in modular switch box or cable connector (+) & (-) are touching.



# WARRANTY & REFUND

## Warranty

All CTC products are backed by our unconditional lifetime warranty. If any CTC product should ever fail, we will repair or replace it at no charge.

## Refund

All stock products can be returned for a 25% restocking fee if returned in new condition within 90 days of shipment. Stock products qualify for free cancellation if your order is cancelled within 24 hours of purchase. Built-to-order products qualify for a 50% refund if returned in new condition within 90 days of shipment. Custom products are quoted and built specifically to the requirements of the customer, which may include completely custom product designs or private labeled versions of standard products for OEM customers. Custom products ordered are non-cancellable, non-returnable and non-refundable.

