

System Wiring

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TriVibe Field Cable Options

We highly recommend using one of the cables that have been vetted by Machine Saver's Engineering Team, if you use a cable that is not specified on our list and have communication issues we may be unable to help you resolve them.

If you still wish to select another cable manufacturer, it is critical to get the following specifications correct:

Power pair of conductors: 18 AWG, twisted pair

Digital Modbus pair of conductors: 22 AWG, twisted pair

The cable capacitance should be low 12pF / foot

The cable impedance should be as close to 120 ohms as possible

There should be a foil shield 100% with a drain wire (overall or surrounding the digital Modbus pair)

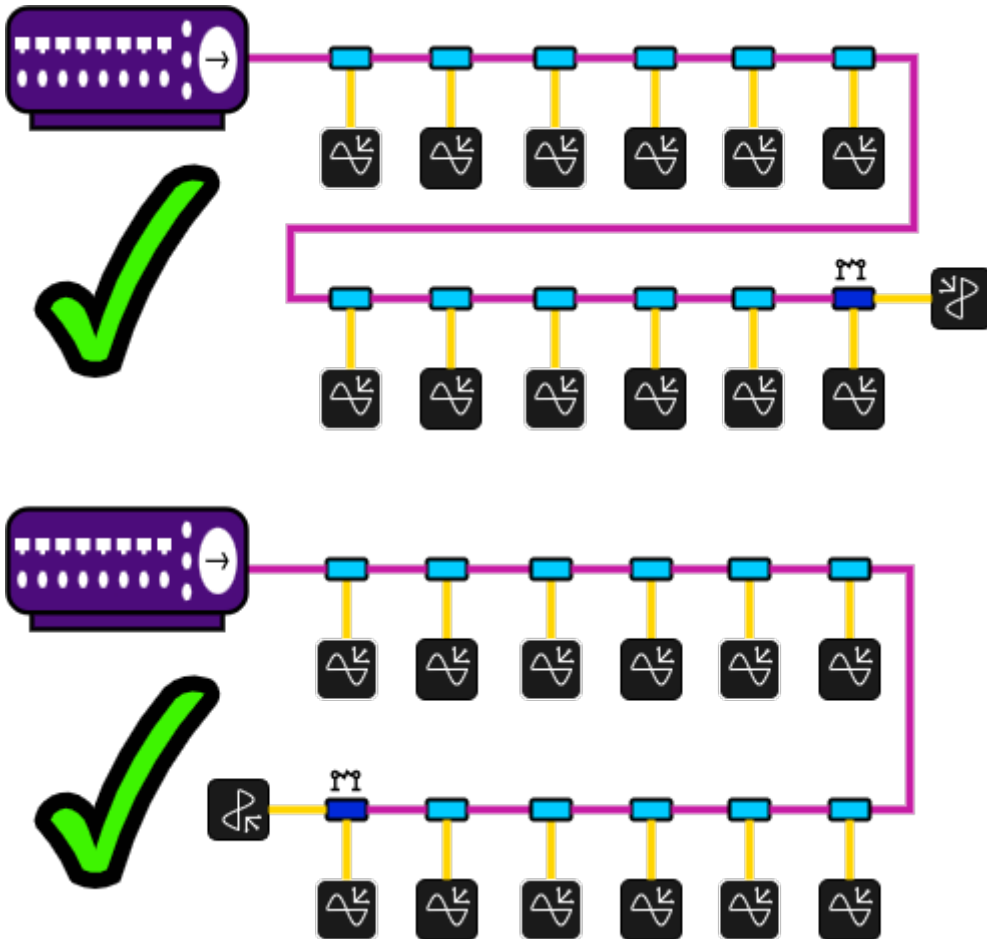
	VTB-CBL-10	VTB-CBL-40	VTB-CBL-50
Cable Capacitance (pF/ft)	11	11	11
Impedance (Ohms)	120	120	105
Temperature Rating (°C)	-80 to +200	-40 to +105	-20 to +80

Power Conductor Pair	18AWG Red + Black Twisted No Power Pair Shield	18AWG Red + Black Twisted 100% Foil Shield	18AWG Red + Black Twisted No Power Pair Shield
Weight (lbs/meter)	0.10	0.24	0.12
Data (Modbus) Conductor Pair	22AWG Green + White Twisted No Data Pair Shield	22AWG Green + White Twisted 100% Foil Shield	22AWG Blue + White Twisted 100% Foil Shield
Drain	24AWG	24AWG	24AWG
Overall Shield	100% Foil Shield	100% Foil Shield	No Overall Shield
Outer Jacket Material	FEP (Red or Black)	TPE (Black)	PVC (Black)
Outer Jacket Thickness (in)	0.012	0.050	0.040
Outer Jacket Dimensions (in)	0.209	0.365	0.275
Bend Radius (in)	2.09	3.15	2.75
TriVibe Sensor Load	(12) @ 1000 ft with a single power supply. (22) @ 1500 -2000 ft with 2 Power Supplies and Sensor Distribution Dependent.	(12) @ 1000 ft with a single power supply. (22) @ 1500 -2000 ft with 2 Power Supplies and Sensor Distribution Dependent.	(12) @ 1000 ft with a single power supply. (22) @ 1500 -2000 ft with 2 Power Supplies and Sensor Distribution Dependent.
Certifications	CL2, CMP	UL and CSA Class I Div 2	UL444, NEC725 & 800
Suitability	Sunlight Resistant, Direct Burial, Wet, Oil, Gas, Abrasion, Acid, Indoor	Sunlight Resistant, Direct Burial, Wet, Oil, Abrasion, High Stress Movement, Indoor, Outdoor	Sunlight Resistant, Direct Burial, Indoor, Outdoor
Cycles	N/A	5 Million	N/A
Cost	\$\$	\$\$\$	\$

System Layout Diagram (Simplified & Color-Coded)

Proper TriVibe Layout:

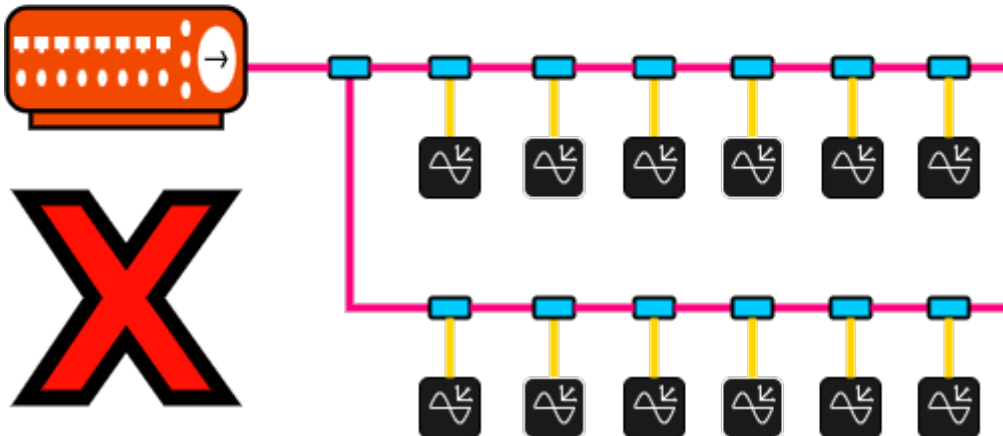
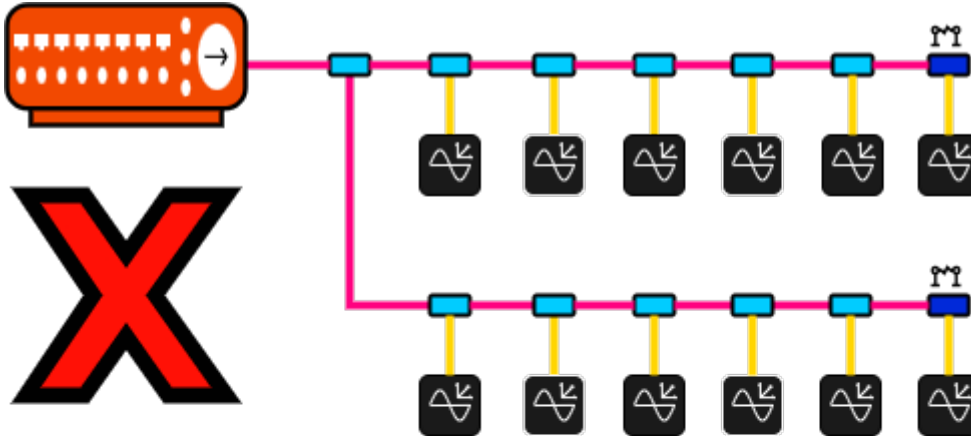
1. A **Modbus Master** which has properly designed RS-485 (TIA-485(-A)/EIA-485) ports with built-in pullup and pulldown resistors enabled to enforce the RS485 (TIA-485(-A)/EIA-485) electrical standard.
2. A single **field cable bus trunk** for each RS-485 (TIA-485(-A)/EIA-485) port available from the **Modbus Master**.
3. Each **T-Port** connection terminal allows a TriVibe Tri-Axial Vibration Sensor to drop off the **field cable bus trunk** by way of the **integral sensor cable**.
4. On each available RS485 (TIA-485(-A)/EIA-485) port, only the **last/furthest T-Port** connection terminal should have a jumper installed, thereby enabling the 120 Ω terminating resistor.
5. As long as you do not plan to expand with more TriVibe Tri-Axial Vibration Sensors on a particular **field cable bus trunk**, It is permissible to use the last set of terminals of the **last/furthest T-Port** to connect a TriVibe by way of the **integral sensor cable**.
6. **Field cable** which adheres to RS-485 (TIA-485(-A)/EIA-485) specification and Machine Saver's recommended characteristics.
7. Total length of **field cable bus trunk** should not exceed 2800 feet (855 meters) for **Modbus Masters** communicating at a baudrate of 115,200 bit/s.
8. 24 - 36 VDC should be verified available to power each TriVibe Tri-Axial Vibration Sensor at each **T-Port** connection terminal which includes the **T-Port which is furthest/last** on the **field cable bus trunk** from the **Modbus Master**.



Improper TriVibe Layout:

1. A **Modbus Master** which has IMPROPERLY designed RS-485 (TIA-485(-A)/EIA-485) ports. Missing (or disabled) built-in pullup and pulldown resistors leaving the bias-voltage at an unknown level.
2. A **field cable bus trunk** which uses a **T-Port** connection terminal to attempt to split the **field cable bus trunk**, thereby violating the RS-485 (TIA-485(-A)/EIA-485) electrical communication standard.
3. The above issue also results in **2 furthest T-Port** connection terminals to be identified, if you attempt this and see there are 2 possible places to install a jumper AND/OR if you have more than 1 jumper per RS-485 port re-evaluate your layout. The layout cannot remain in these conditions and function appropriately.
4. **Field cable** adheres to RS-485 (TIA-485(-A)/EIA-485) specification and Machine Saver's recommended field wire chart characteristics.

5. Total length of **field cable bus trunk** MUST NOT EXCEED 2800 feet (855 meters) for **Modbus Masters** communicating at a baudrate of 115,200 bit/s.
6. Allowing the voltage supplied to any TriVibe Tri-Axial Vibration Sensor at any **T-Port** connection terminal to drop below 24 - 36 VDC which includes the **furthest T-Port** from the **Modbus Master**.
7. Allowing the current supplied to any TriVibe Tri-Axial Vibration Sensor at any **T-Port** connection terminal to drop below 50 milliamps.



T-Port PCB

Tying TriVibe Sensors Together

What is it? This is the device to connect field cables and TriVibe sensors together with a Modbus master and maximize efficiency of space and communication.

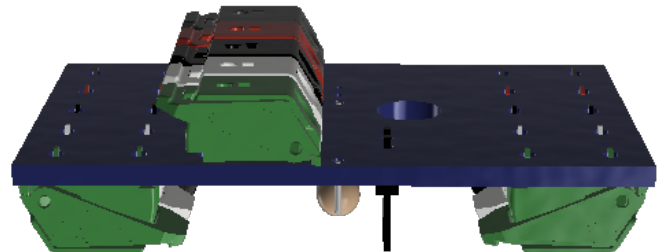
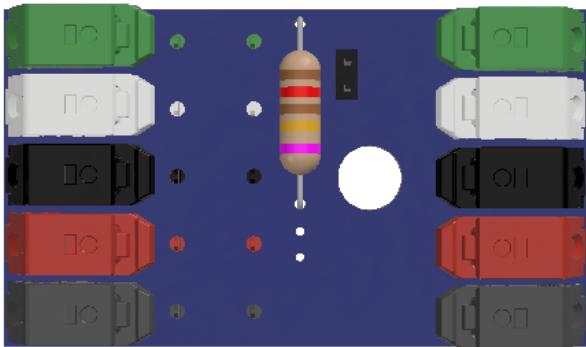
T-Port Enclosure Options

T-Port PCB

T-Port PCB is the connection interface for a bus line of TriVibe sensors.

These electrical connections allow TriVibe sensors to drop off the communication bus toward the machine.

The final T-Port in a bus (furthest from the Modbus Master, PLC, or Gateway) should have the jumper installed to enable the 120ohm resistor. Enabling this resistor is required by the RS485 standard to ensure proper communication.

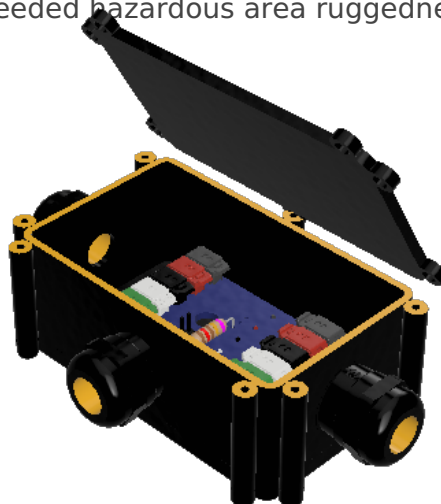


T-Port Enclosures

There are different forms of enclosures to protect the electrical connection, which runs through the T-Port PCBs, from harsh external environments.

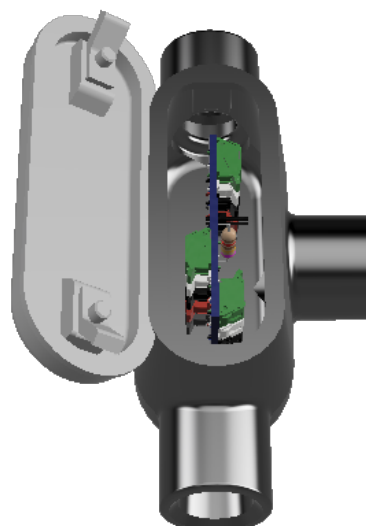
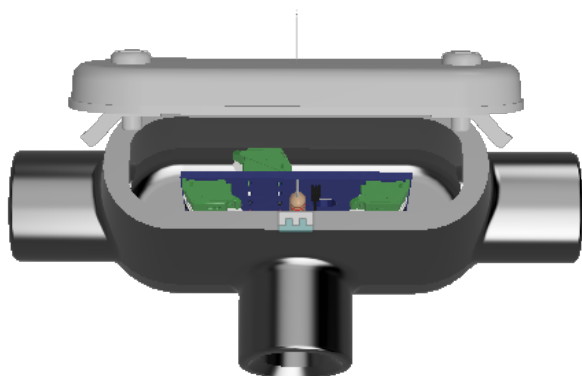
M-687

Suitable for food and beverage applications and those not needed hazardous area ruggedness.



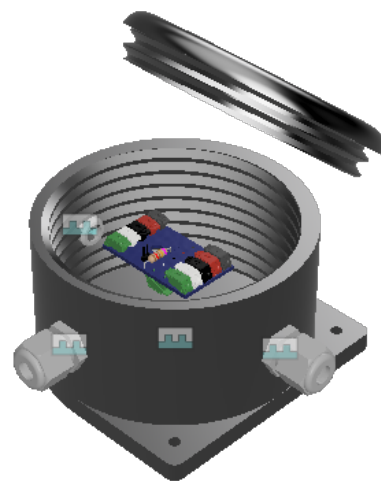
T-27

Suitable for hazardous environments.



UB-40

Suitable for mining and other harsh environments.



Conduit Recommendations

Option 1 (minimal cost):

The TriVibe black sensor cable is made for tough outdoor environments and is suitable for Class 1 Div. 2 areas.

You may add a $\frac{3}{4}$ NPT cable grip such as CD21NR-BXA at the T junction and use the sensor as is for outdoor locations.

(1) Sealcon [CD21NR-BXA](https://www.sealconusa.com/products/liquid-tight-strain-relief-fittings/nylon/bxa/npt/cd21nr-bxa/) (or similar) (Attaches to T PORT)

<https://www.sealconusa.com/products/liquid-tight-strain-relief-fittings/nylon/bxa/npt/cd21nr-bxa/>

Option 2 (higher protection):

(1 per sensor end attach to sensor) Galvanized Steel Pipe Coupling:
1/2" Fitting

MSC# 36995116

Mfr# 420S04 (or similar)

(1 per sensor attached to the T-PORT) Reducing Bushing: Steel, Zinc Plated, 1/2 in_3/4 in Trade Size, 3/4 in to 1/2 in Reduction Size

Item 52AW35 (Granger)
similar)

Mfr. Model 1142 (or

(2 per sensor) Thomas & Betts 1/2" Insulated Straight Liquid Tight Connector

Brand: [T&B](#)

SKU: 5332-TB (or similar)

(10 ft. per sensor) 1/2" Liquid Tight Type B Conduit ,PVC Gray (100' Coil)

Brand: [T&B](#)

SKU: LTC050GY (or similar)

(alternate 10 ft. per sensor) 1/2" Liquid Tight Flexible Metallic Conduit, LFMC General Purpose UL, Gray (100' Coil)

Brand: [T&B](#)

SKU: LTGUS02G-C (or similar)