![ROLFES @ Boone hot spot logo]

TM-16

Bearing & Alignment

Monitoring System

Manual and Installation Guide

READ THIS ENTIRE GUIDE BEFORE
PROCEEDING WITH THE INSTALLATION

Table of Contents

1.0 Introduction:

Thank you for purchasing the Rolfes@Boone Bearing & Belt Alignment Monitoring System. This manual is presented as a reference for the installation and operation of this system.

Rolfes@Boone offers a comprehensive line of bearing & belt alignment monitoring equipment. These complete product range and extensive systems experience allows us to offer effective solutions to a wide spectrum of your practical requirements. Our extensive background in temperature monitoring along with a constant program of innovation and technological development, allows us to offer cost-effective and user-orientated solutions.

Please read <u>all </u>instructions for this and any other system prior to installation to better understand its operation.

NOTE: Rolfes@Boone will not be responsible for damages caused by any hardware or equipment, which has not been supplied by Rolfes@Boone.

If you need assistance with any item in this manual, please call or write:

Boone Cable Works & Electronics
1773 – 219th Lane
P.O. Box 429 Boone, IA 50036
www.rolfesatboone.com

800-265-2010	*Toll Free*
515-432-2010	
515-432-5262	*FAX*

2.0 Overview:

The TM-16 Bearing & Belt Alignment Monitor detects bearing temperatures and misalignment of conveyors in bulk handling equipment.

The TM-16 monitor provides:

1. Continuous "On-Line" sensors, which react instantly in critical areas.

2. Lighted display panel to alert you and detect problems immediately.

3. Pre-set thermostat temperature ranges; 140°F, 160°F and 180°F.

4. NEMA 13 Enclosure.

5. Intrinsically safe.

6. Simple operation.

3.0 TM-16 Components:

The TM-16 is the main instrument in monitoring bearing and belt misalignment within your facility. Monitor up to sixteen "TM" sensors. Includes contact for auxiliary alarm and 85db alarm. 120VAC 50/60Hz - ETL Listed. Also available for 9V battery operated, 240V AC, and with ON/OFF switch for Alarm.

🌐*NOTE: All TM style sensors are normally closed thermostats that "open" when the temperature goes above a preset temperature point and are self-resetting.*

TMP Probe Sensor: This type of sensor is housed in a 4" long stainless steel thermowell. It includes a brass grease zerk fitting adapter with a 10' stainless steel over braided cable. Available in several different temperature ranges. This type of sensor is installed into bearing blocks or housings.

TMS Surface Mounted Sensor: Is designed to mount on most any surface with its mounting lug. Also available in several different temperature ranges. This sensor is mounted on the TMR Rub and can also be mounted in others areas, like motor bases

TMR Belt Alignment Sensor: Is the complete assembly of a TMS surface mount sensor, a 4" x 1" half round brass friction bar, Teflon insulator, mounting plate, and 10' of stainless steel over braided cabling. The customer has the preference of temperature set points, contact your sales rep for more info.

4.0 Installation:

The TM-16 shall only be installed or used in **non-hazardous** locations. Hazardous locations are defined by the National Electrical Code in Article 500, under special occupancies..

This instrument is mounted with three mounting holes using the following procedure.

👓 *Hint: At the bottom of the enclosure are conduit knockouts that are removed to run wires to the instrument. Plan ahead for any and all wiring and remove these prior to mounting the instrument.*

1. Located the area where the TM-16 will be mounted and draw a line across the top of the TM-16 on to the wall along with a centerline of the instrument.

2. Measure down 1.21" (30.7mm) from the line drawn across the top of the instrument and mark.

3. Drill a hole at that point and secure a mounting screw leaving approximately 3/16" between the head of the screw and the wall.

4. Remove the TM-16 instrument splice compartment cover (attached with two screws).

5. Mount and level the TM-16 using the mounting hole on the back of the instrument onto the screw previously installed.

6. With the TM-16 level secure it with the mounting holes at both ends of the splice compartment cover.

7. Continue with wiring instructions.
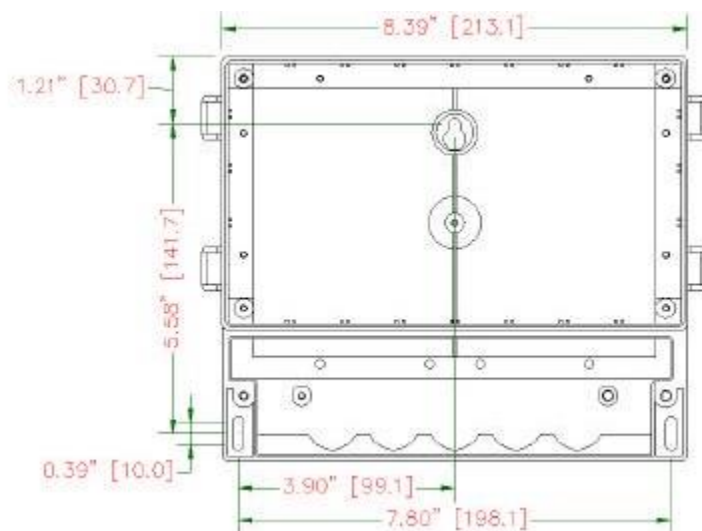
4.1 Sensor Wiring:

Inside the wiring compartment on the left side are two TM-9 conductor cables (w/black vinyl jackets). Both cables are marked; #1 for sensors 1 through 8 and #2 for sensors 9 through 16. These wires are intrinsically safe for Class 2 Group G locations. They are spliced color to color *at* the TM instrument with TM-9 conductor cables from the sensors.

> *IMPORTANT! Any sensor positions that are NOT used, tie them to that group's black wire coming from the instrument, e.g. if sensors #7 & 8 of cable #1 and #15 & 16 of cable #2 (see example on page 7) are not used, make a connection to each cable's black wire into the TM-16.*

NOTE: We recommend when making connections for these sensors, to start at the head of the equipment on the motor side and work clockwise around it, and then continue on to the next piece of the equipment if necessary. (See example below.)

NOTE: Run the sensor wires in a separate conduit from the other electrical wires to prevent interference / alarm malfunctions.

4.2 Line-In Wiring:

Located on the right side of the splice compartment are two terminal blocks. Attach the line-in power to the terminal block with an N for Neutral, L for Line and GND for Ground. (See below.)

🌐*NOTE: All electrical connections are to be made by a licensed electrician and in accordance with any local or regional electrical codes.*

Sensor Connections | Line-In Connections

Head Section

BLACK	Common	BLACK
WHITE	Sensor #1	BLUE
WHITE	Sensor #2	GREEN
WHITE	Sensor #3	RED
WHITE	Sensor #4	YELLOW
WHITE	Sensor #5	CLEAR
WHITE	Sensor #6	VIOLET
WHITE	Sensor #7	WHITE
WHITE	Sensor #8	BROWN

#1 – 9 Conductor Wire

BLACK	Common	BLACK
WHITE	Sensor #9	BLUE
WHITE	Sensor #10	GREEN
WHITE	Sensor #11	RED
WHITE	Sensor #12	YELLOW
WHITE	Sensor #13	CLEAR
WHITE	Sensor #14	VIOLET
WHITE	Sensor #15	WHITE
WHITE	Sensor #16	BROWN

Tail Section

#2 – 9 Conductor Wire

Probes

Rubs

4.3 TM-16 External Alarm Hookup:

Locate the external relay contacts in the wire and splice compartment on the unit. (See photo right.)

The terminal block on the right provides normally open (NO) and normally closed (NC) contacts that change state when the TM enters an alarm condition. For use with the ALRM-100, use the common and the Normally Open contacts.

If your system has other than an ALRM-100 alarm & siren, you can use the either common and Normally Open contact **_OR_** the common and Normally Closed, but **_NOT_** both. These contacts are rated at 125VAC at 1-amp, resistive load.
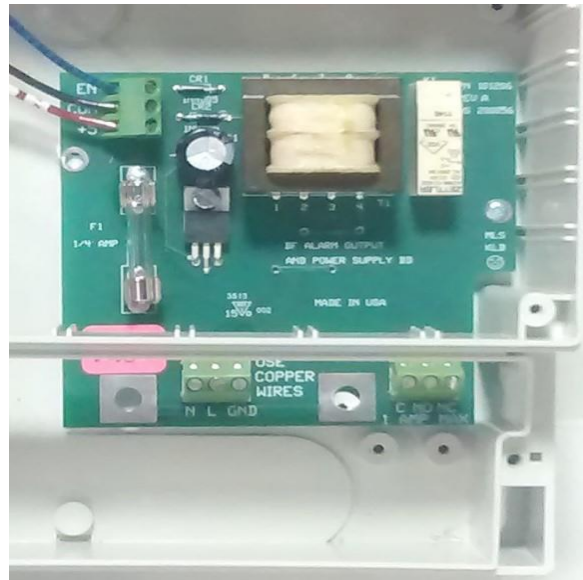
4.4 TMP Probe Sensor:

This sensor is designed to be inserted into the grease zerk hole of a bearing. (See drawing below.) Heat is transferred from the bearing race to the probe sensor. Follow the directions below for probe installation.

> ☞ ♫ CAUTION: Clean around the bearing and grease zerk fitting PRIOR to installing, to avoid getting any dirt into the bearing.

1. Remove the existing zerk fitting.

2. Install the brass tee and 1/4" compression connector assembly.

3. Reinstall the zerk fitting into the side of the brass tee, this will allow the bearing to receive grease for normal maintenance.

4. Insert the stainless-steel thermostat housing into the brass tee until it reaches the bearing race and pull it back approximately 1/8".

5. Tighten the compression-fitting nut.

6. Fill the grease zerk to check for leaks around the compression-fitting nut, tighten as necessary.

7. Run the probe sensor wire into a splice fitting and attach the sensor into the system.

> 🏕 WARNING: If the sensor is not attached properly and securely to the monitored piece of equipment, heat may fail to transfer to the sensor causing it to not operate properly. Check the sensors regularly to see if they are attached securely.

Connector ¼" ID

Bearing
Grease Zerk

Brass "Tee"

BEARING SENSOR DETAILS
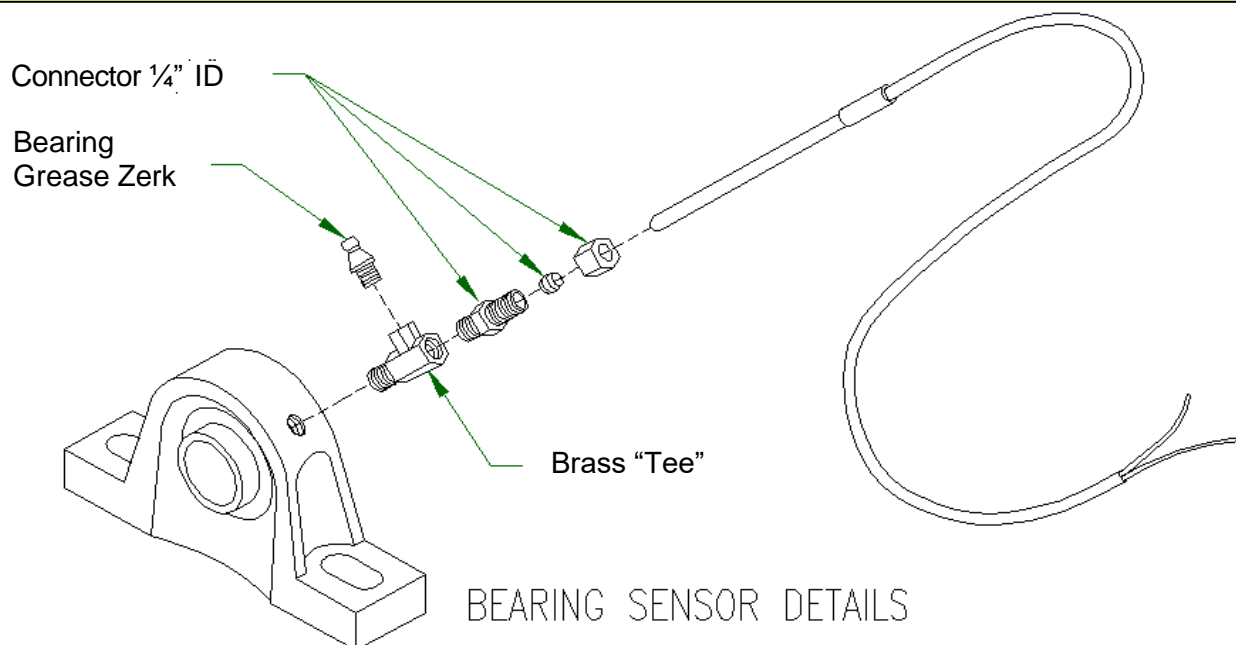
4.5 TMR Rubs:

The belt alignment rubs or sensors are mounted near the drums to pick up any misalignment of these belts. Proper positioning of these rubs will ensure early warning is achieved to prevent any further damage of your equipment.

The recommended placement of these rubs are as follows:

On the heads of the equipment monitored, mount the TMR in a manner perpendicular to the belt and to the drum on the up-travel side. Drill and cut an area the length of the brass rub and insulator out of the leg housing. Recommended cutting size is 2 ½" (63.5mm) x 5 ½" (139.7mm). Mount the TMR with appropriate hardware.
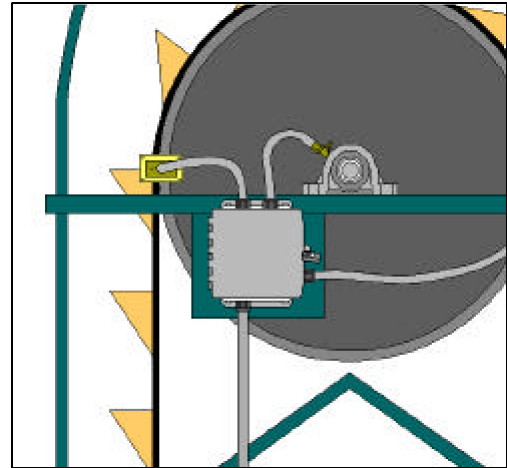
Run the sensors wires to the junction box and terminate, making a note to where each sensor is mounted. (See wiring diagram, page 6)

☞♂ *CAUTION: Do NOT cut into the belt or interfere with any of the structural supports of the equipment. Use good judgment when using any cutting device, "Measure Twice, Cut Once".*

4.5.1 Tail or Boot Rub Monitoring:

Mount the TMR rub in an area that will "pickup" the belt and drum WITH any future pulley adjustments. At the current state of the belt, measure its travel of the drum, u p and down. Mark and cut a hole between the two points (lowest and highest). Cut the recommended hole 2 ½" (63.5mm) x 5 ½" (139.7mm) perpendicular to the belt and secure the TMR. Any future adjustments will be made and the TMR should not have to be moved. Run the sensors wires to the junction box and terminate, making a note to where each sensor is mounted. (See wiring diagram, page 6)
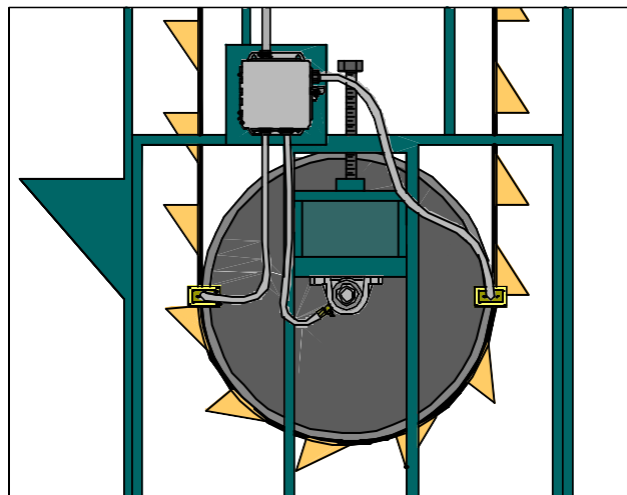
⚠ *WARNING: If the sensor is not attached properly and securely to the monitored piece of equipment, insure proper alignment of the rubs to the belt is achieved or any belt rubbing may fail to transfer to the sensor causing it to not operate properly. Check the sensors regularly to see if they are attached securely.*

5.0 Alarm & Siren:

The recommended alarm for the SYS-1 system is the ALARM-100. This ALARM-100 is easily installed and should be mounted near the SYS-1 with the SIREN mounted where it will be noticed or heard clearly by any operators.

Use good judgment when locating an area for the SIREN; you don't want it to be too close to your operators, OR too far away from your operators to hear it over the noise of the equipment.

DUAL TONE SIREN

Alarm 100 Connections to 12 VDC horn
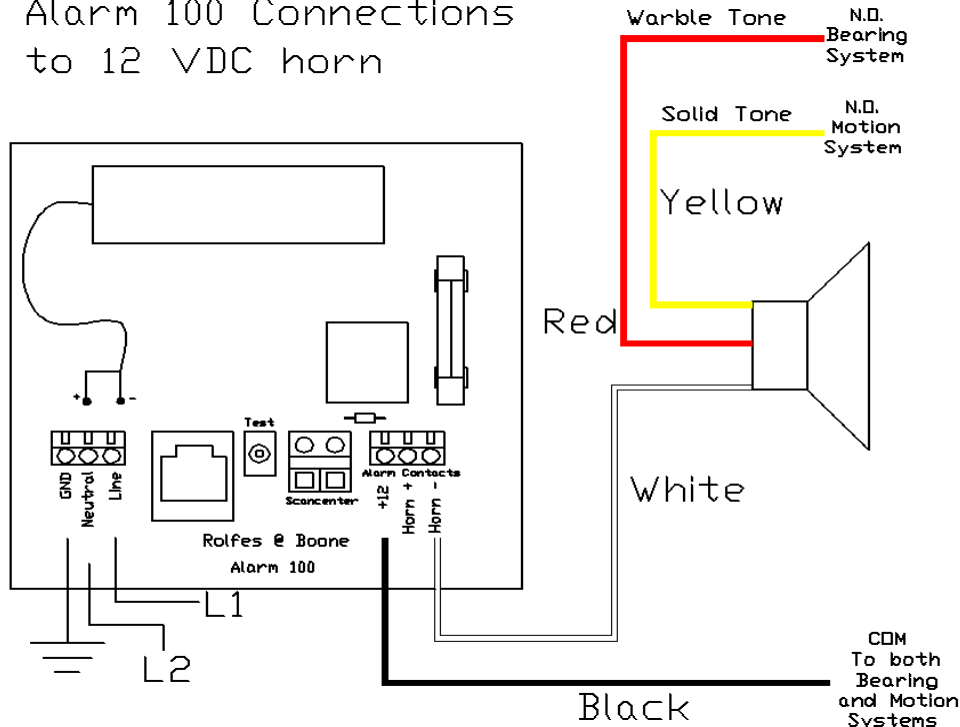
The diagram above shows two different monitoring systems and one ALARM-100 controller using the dual tone capability of the siren (i.e. Motion system & Bearing system).

If your facility has multiple systems using
The same ALRM-100, use this diagram.

Siren Tones	
Yellow	Solid
Red	Wave
White	Common

✍ **NOTE:**   If your facility has only one monitoring system, <u>OMIT</u> one of the System leads in the diagram above.

USE DRY CONTACTS ONLY (no voltage on lines going to or from these systems).

⚡ *WARNING: The ALRM-100 is rated at   120VAC ONLY.   If your facility requires 240VAC, install a 240VAC to 120VAC transformer / converter. Contact your sales representative if you require a transformer / converter.*

6.0 TM-16 Instrumentation & Operations:

The TM-16 uses a series of Light Emitting Diodes (LED) that illuminate when the sensor has reached its indicated temperature. The sensors are normally closed thermostats that "open" when the temperature goes above this preset point. This "opens" the circuit between the sensor and the TM-16 and will cause the unit to alarm & alert the operator of a problem. The wiring to and from the thermostats is also tested in this manner. The TM-16 is a failsafe system, meaning if the 9-conductor wiring is broken it will also cause an alarm on the sensor with damaged wire.

This instrument is housed in a NEMA 13 enclosure, which offers protection against dust, spraying of water and oil in an indoor environment. It features a hinged clear polycarbonate cover for easy viewing and accessibility. Two locking screws are provided on the cover to secure it in place.

6.1 Operation

The TM-16 Bearing and Belt Alignment Instruments have an on/off switch, test button, alarm horn and 16 monitor sensor LED's. To operate the system, place the on/off switch in the on position.   Once the instrument is turned on, the test button activates all LED's   and alarms.

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The monitor sensor LED's are for each sensor or zone. They are normally off but light up for an alarm condition.

The alarm buzzer supplied with the instrument is an 85-decibel buzzer that activates for an alarm condition.

The alarm contacts for a remote alarm are supplied with the 120VAC unit. They can switch a resistive load of 1A at 125VAC. These contacts are activated in an alarm condition. (See previous page for alarm hook-ups.)

7.0 Sensor Point Identification:

For proper detection of the points within your system, it is recommended that you verify the sensor point location. This will require an extra helper. To do this, physically go to each point monitored and temporarily disconnect one sensor at a time and verify the corresponding LED illuminates and the alarm sounds. Make any changes to the system if the sensor LED and the sensor disconnected are NOT the same point.

NOTE: Make a list of each sensor and its location and post the list near the TM-16.

8.0 Testing:

Testing the instrument should be accomplished right after installation to ensure proper functioning of the TM-16 Hazard Monitor.

To accomplish this, the TM-16 Monitoring unit has test button on the right side of the control panel. Press this button to illuminate all 16 positions and sound the alarm. This will simulate a "break" the circuits and cause an alarm condition and verify its operation.

NOTE: Every sensor is tested prior to leaving the factory; IF additional or field testing of the actual sensor is required, <u>do this prior to installing the sensor</u> and in a non-hazard area with a heat source such an oven or other device, which has an adjustable temperature range to the indicated temperature on the sensor.

WARNING: DO NOT USE an open or direct flame to test. These sensors are designed to open at the preset temperature and will remain open until a few degrees below the preset. A direct flame has no limits on temperature and may damage the sensor if too much heat is applied.

WARNING: DO NOT USE a flame or spark-producing device in a hazard area.

TM-16 Sensor Configuration & Locations

SENSOR LOCATION DESCRIPTION	SENSOR #	TM-9 Cable	Ops Check	NUMBER
	1	Blue		
	2	Green		
	3	Red		
	4	Yellow		
	5	Clear		
	6	Violet		
	7	White		
	8	Brown		
	9	Blue		
	10	Green		
	11	Red		
	12	Yellow		
	13	Clear		
	14	Violet		
	15	White		
	16	Brown		

NOTES:

TM & BF BEARING TEMPERATURE – PROBE SENSORS

TMP-180-SS

BFP-180-SS

BFP-180-BLU

TMP-CON-180-SS

BFP-CON-180-SS

BFP-CON-180-BLU
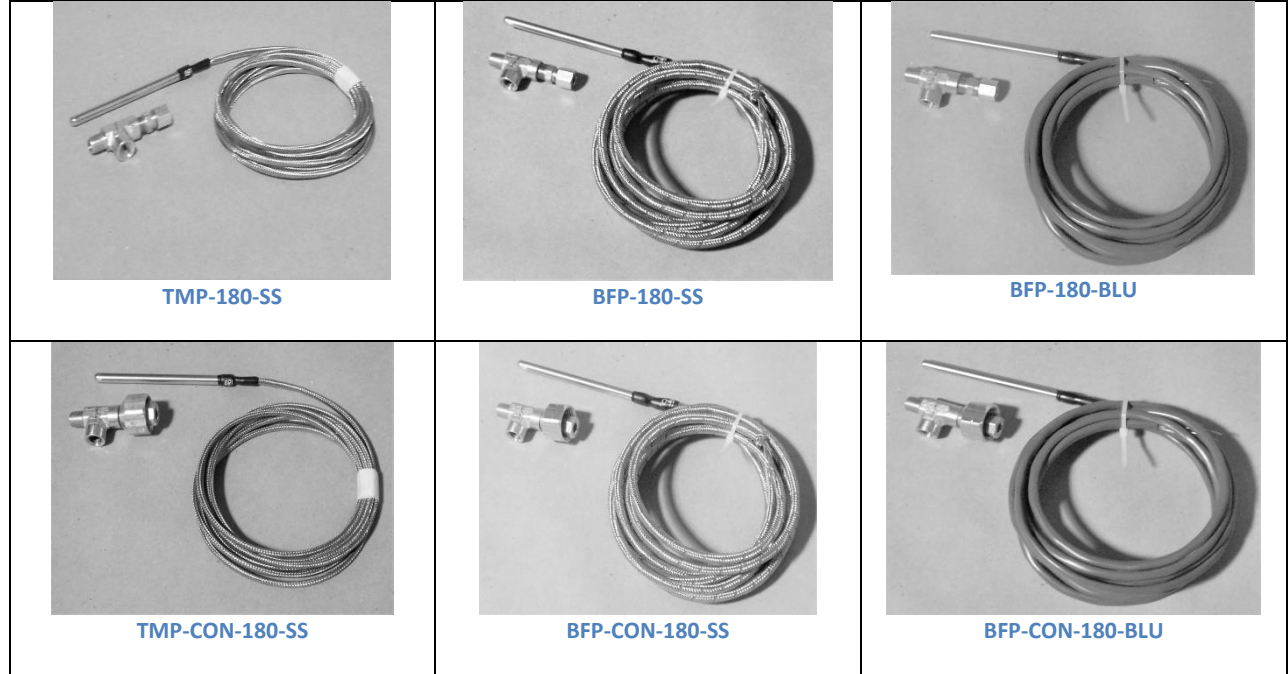
TM & BF DRILL & TAP TEMPERATURE SENSORS

TMD&T-180-SS

BFD&T-180-SS

BFD&T-180-BLU
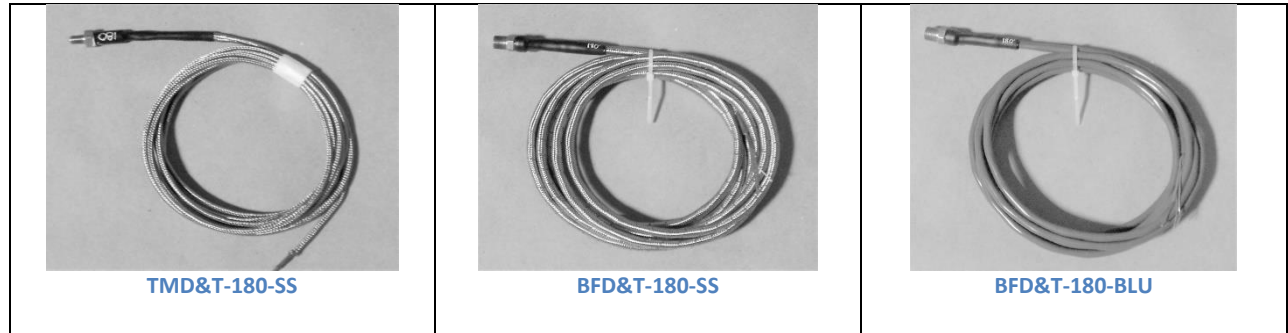
TM & BF SURFACE TEMPERATURE SENSORS

TMS-180-SS

BFS-180-SS

BFS-180-BLU

TM & BF BELT ALIGNMENT - HALF-MOON SENSORS

| TMR-6-180-SS | BFR-6-180-SS | BFR-6-180-BLU |
| TMR-6-CON-180-SS | BFR-6-CON-180-SS | BFR-6-CON-BLU |

TM & BF BELT ALIGNMENT - ROUND SENSOR

| TMR-2-180-SS | TMR-2.5-180-SS | TMR-2.5-CON-180-SS |
| OLD STYLE TMR-2-180-SS | BFR-2.5-180-SS | BFR-2.5-180-BLU |

NOTE: All sensors pictured are 180°F but are available in 140°F and 160°F as well.

NOTE: All bearing temperature probes come standard with a 4" stainless steel probe length. Longer lengths up to 18" are available by special order.

NOTE: All sensors come with a standard 10' length of pigtail attached. Longer lengths are available by special order.

TM & BF SENSOR - ACCESSORIES AND PARTS

TMP-HDW-T&CC

½"CON-RDY-ADAPTOR

½"NPT-LIQUITIGHT

3"x8"-SS-PLATE-SLOTTED

3"x8"-SS-PLATE-FLAT

3"x8"-SS-PLATE-CON RDY

2"x5"x1/4"-UHMW

4"x4"-SS-PLATE-FLAT

4"x4"-SS-PLATE-CON RDY

2.5"RND-QI-ADAPT

1/2MOON-1/4"-28-BRASS

1/2MOON-1/8"NPT-BRASS

2"RND-1/4"-28-BRASS

2.5"RND-1/4"-28-BRASS

2.5"RND-1/8"NPT-BRASS

TM-16 Temperature Probes & Alignment Sensors

Description & Features		
Model #	**Temperature Sensors "Bearing Probe"**	
TMP-180-SS TMP-160-SS TMP-140-SS	<u>Sensor Style:</u> NC Thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Length:</u> Standard TMP probe sensors are imbedded in a 4"x 1/4" stainless sheath and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes and has stainless steel braided armor on the full length of the pigtail. (Pigtail has 24 AWG stranded conductors) <u>Included Hardware:</u> Each probe comes with a durable steel 1/8" NPT Street T and a 1/8" NPT x ¼" brass compression connector.	Picture on page # 15
TMP-CON-180-SS TMP-CON-160-SS TMP-CON-140-SS	<u>Sensor Style:</u> NC Thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Length:</u> Standard TMP-CON probe sensors are imbedded in a 4"x 1/4" stainless sheath and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes – provided with a ½" NPT brass conduit-ready adaptor and has stainless steel braided armor on the full length of the pigtail. (Pigtail has 24 AWG stranded conductors) <u>Included Hardware:</u> Each probe comes with a ½" NPT conduit-ready adaptor, durable steel 1/8" NPT Street T and a 1/8" NPT x ¼" brass compression connector.	Picture on page # 15
BFP-180-SS BFP-160-SS BFP-140-SS	<u>Sensor Style:</u> NC Thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Length:</u> Standard BFP-SS probe sensors are imbedded in a 4"x 1/4" stainless sheath and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes and has stainless steel braided armor on the full length of the pigtail. (Pigtail has 20 AWG solid conductors) <u>Included Hardware:</u> Each probe comes with a durable steel 1/8" NPT Street T and a 1/8" NPT x ¼" brass compression connector.	Picture on page # 15
BFP-CON-180-SS BFP-CON-160-SS BFP-CON-140-SS	<u>Sensor Style:</u> NC Thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Length:</u> Standard BFP-CON-SS probe sensors are imbedded in a 4"x 1/4" stainless sheath and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes – provided with a ½" NPT brass conduit-ready adaptor and has stainless steel braided armor on the full length of the pigtail. (Pigtail has 20 AWG solid conductors) <u>Included Hardware:</u> Each probe comes with a ½" NPT conduit-ready adaptor, durable steel 1/8" NPT Street T and a 1/8" NPT x ¼" brass compression connector.	Picture on page # 15
BFP-180-BLU BFP-160-BLU BFP-140-BLU	<u>Sensor Style:</u> NC Thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Length:</u> Standard BFP-BLU probe sensors are imbedded in a 4"x 1/4" stainless sheath and have a standard 10' long PVC jacketed pigtail. <u>Features:</u> Available in three thermostat sizes and has heavy blue PVC jacket on the full length of the pigtail. (Pigtail has 20 AWG solid conductors) <u>Included Hardware:</u> Each probe comes with a durable steel 1/8" NPT Street T and a 1/8" NPT x ¼" brass compression connector.	Picture on page # 15
BFP-CON-180-BLU BFP-CON-160-BLU BFP-CON-140-BLU	<u>Sensor Style:</u> NC Thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Length:</u> Standard BFP-CON-BLU probe sensors are imbedded in a 4"x 1/4" stainless sheath and have a standard 10' long, heavy blue PVC jacketed pigtail. <u>Features:</u> Available in three thermostat sizes – provided with a ½" NPT brass conduit-ready adaptor and has a heavy blue PVC jacket on the full length of the pigtail. (Pigtail has 20 AWG solid conductors) <u>Included Hardware:</u> Each probe comes with a ½" NPT conduit-ready adaptor, durable steel 1/8" NPT Street T and a 1/8" NPT x ¼" brass compression connector.	Picture on page # 15

TM-16 Temperature Probes & Alignment Sensors

Description & Features		
Model #	**Temperature Sensors "Surface"**	
TMS-180-SS TMS-160-SS TMS-140-SS	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Size:</u> Standard TMS-SS surface sensors are imbedded in a 1/2" wide lug with a ¼" mounting hole and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes and has a stainless steel armored jacket on the full length of the pigtail. (Pigtail has 24 AWG stranded conductors)	Picture on page # 15
BFS-180-SS BFS-160-SS BFS-140-SS	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Size:</u> Standard BFS-SS surface sensors are imbedded in a 7/8" wide lug with a 3/8" mounting hole and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes and has a stainless steel armored jacket on the full length of the pigtail. (Pigtail has 20 AWG solid conductors)	Picture on page # 15
BFS-180-BLU BFS-160-BLU BFS-140-BLU	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Size:</u> Standard BFS-BLU surface sensors are imbedded in a 7/8" wide lug with a 3/8" mounting hole and have a standard 10' long, heavy blue PVC jacketed pigtail. <u>Features:</u> Available in three thermostat sizes and has a heavy blue PVC jacket on the full length of the pigtail. (Pigtail has 20 AWG solid conductors)	Picture on page # 15
Model #	**Temperature Sensors "Drill & Tap"**	
TMD&T-180-SS TMD&T-160-SS TMD&T-140-SS	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Size:</u> Standard TMD&T-SS drill & tap sensors are imbedded in a S. S. 7/16" hex by ¼"-28 threaded drill & tap end and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes and has a stainless steel armored jacket on the full length of the pigtail. (Pigtail has 24 AWG stranded conductors)	Picture on page # 15
BFD&T-180-SS BFD&T-160-SS BFD&T-140-SS	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Size:</u> Standard BFD&T-SS sensors are encased in a brass 7/16" hex by 1/8" NPT threaded drill & tap end and have a standard 10' long, stainless steel armored pigtail. <u>Features:</u> Available in three thermostat sizes and has a stainless steel armored jacket on the full length of the pigtail. (Pigtail has 20 AWG solid conductors)	Picture on page # 15
BFD&T-180-BLU BFD&T-160-BLU BFD&T-140-BLU	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Size:</u> Standard BFD&T-BLU sensors are encased in a brass 7/16" hex by 1/8" NPT threaded drill & tap end and have a standard 10' long, heavy blue PVC pigtail. <u>Features:</u> Available in three thermostat sizes and has a heave blue PVC jacket on the full length of the pigtail. (Pigtail has 20 AWG solid conductors)	Picture on page # 15
Model #	**Temperature Sensor "Belt Alignment" (Half Moon)**	
TMR-6-180-SS TMR-6-160-SS TMR-6-140.SS	<u>Sensor Style:</u> NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. <u>Configuration:</u> Standard TMR-6-SS style alignment sensors, include a 1" x 5" x ½" half- moon shaped brass rub block mounted on a 3" x 8" stainless steel mounting plate and includes a 2" x 5" x ¼" UHMW spacer. The TMR-6-SS style assembly comes standard with a TMS-SS surface style sensor described above with a 10' long, stainless steel armored pigtail. <u>Features:</u> All TMR-6-SS belt alignment sensors come as a complete, assembly as described. (Pigtail has 24 AWG stranded conductors) <u>Included Hardware:</u> Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16

TM-16 Temperature Probes & Alignment Sensors

Description & Features		
Model #	**Temperature Sensor "Belt Alignment" (Half Moon)**	
TMR-6-CON-180-SS TMR-6-CON-160-SS TMR-6-CON-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard conduit-ready TMR-6-CON-SS style alignment sensors, include a 1" x 5" x ½" half- moon shaped brass rub block mounted on a 3" x 8" conduit-ready stainless-steel mounting plate and includes a 2" x 5" x ¼" UHMW spacer. The TMR-6-CON-SS style assembly comes standard with a TMD&T-SS style drill and tap sensor described above with a 10' long, stainless steel armored pigtail. Features: All TMR-6-CON-SS belt alignment sensors come as a complete, conduit-ready assembly as described. (Pigtail has 24 AWG stranded conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate. block to the mounting plate.	Picture on page # 16
BFR-6-180-SS BFR-6-160-SS BFR-6-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard BFR-6-SS style alignment sensors include a 1" x 5" x ½" half- moon shaped brass rub block mounted on a 3" x 8" stainless steel mounting plate. The BFR-6-SS style assembly comes standard with a BFD&T-SS style drill & tap sensor described above with a 10' long, stainless steel armored pigtail. Features: All BFR-6-SS belt alignment sensors come as a complete, assembly as described. (Pigtail has 20 AWG solid conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16
BFR-6-CON-180-SS BFR-6-CON-160-SS BFR-6-CON-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard conduit-ready BFR-6-CON-SS style alignment sensors include a 1" x 5" x ½" half- moon shaped brass rub block mounted on a 3" x 8" conduit-ready stainless-steel mounting plate. The BFR-6CON-SS style assembly comes standard with a BFD&T-SS style drill and tap sensor described above with a 10' long stainless steel armored pigtail. Features: All BFR-6-CON-SS belt alignment sensors come as a complete, conduit-ready assembly as described. (Pigtail has 20 AWG solid conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate. Block to the mounting plate.	Picture on page # 16
BFR-6-180-BLU BFR-6-160-BLU BFR-6-140.BLU	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard BFR-6-BLU style alignment sensors include a 1" x 5" x ½" half- moon shaped brass rub block mounted on a 3" x 8" stainless steel mounting plate. The BFR-6-BLU style assembly comes standard with a BFD&T-BLU style drill & tap sensor described above with a 10' long, heavy blue PVC pigtail. Features: All BFR-6-BLU belt alignment sensors come as a complete, assembly as described. (Pigtail has 20 AWG solid conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16
BFR-6-CON-180-BLU BFR-6-CON-160-BLU BFR-6-CON-140.BLU	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard conduit-ready BFR-6-CON-BLU style alignment sensors include a 1" x 5" x ½" half- moon shaped brass rub block mounted on a 3" x 8" conduit-ready stainless-steel mounting plate. The BFR-6-CON-BLU style assembly, comes standard with a BFD&T-BLU style drill and tap sensor described above with a 10' long, heavy blue PVC pigtail. Features: All BFR-6-CON-BLU belt alignment sensors come as a complete, conduit-ready assembly as described. (Pigtail has 20 AWG solid conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate. Block to the mounting plate.	Picture on page # 16

TM-16 Temperature Probes & Alignment Sensors

Description & Features		
Model #	**Temperature Sensor "Belt Alignment" (2" Round)**	
TMR-2-180-SS TMR-2-160-SS TMR-2-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard TMR-2-SS style alignment sensors include a 2" diameter by 1/2" thick round brass rub block mounted on a 4" x 4" stainless steel mounting plate. The TMR-2-SS style assembly comes standard with a TMD&T-SS style, drill & tap sensor described above with a 10' long, stainless steel armored pigtail. Features: All TMR-2-SS belt alignment sensors, come as a complete assembly, as described. (Pigtail has 24 AWG stranded conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16
Model #	**Temperature Sensor "Belt Alignment" (2.5" Round)**	
TMR-2.5-180-SS TMR-2.5-160-SS TMR-2.5-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard TMR-2.5-SS style alignment sensors include a 2.5" diameter by 5/8" thick round brass rub block mounted on a 4" x 4" stainless steel mounting plate. The TMR-2.5-SS style assembly comes standard with a TMD&T-SS style drill & tap sensor described above with a 10' long stainless steel armored pigtail. Features: All TMR-2.5-SS belt alignment sensors come as a complete, assembly as described. (Pigtail has 24 AWG stranded conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16
TMR-2.5-CON-180-SS TMR-2.5-CON-160-SS TMR-2.5-CON-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard conduit-ready TMR-2.5-CON-SS style alignment sensors include a 2.5" diameter by 5/8" thick round brass rub block mounted on a 4" x 4" conduit-ready stainless-steel mounting plate. The TMR-2.5-CON-SS style assembly comes standard with a TMD&T-SS style drill and tap sensor described above with a 10' long, stainless steel armored pigtail. Features: All TMR-2.5-CON-SS belt alignment sensors come as a complete, conduit-ready assembly as described. (Pigtail has 24 AWG stranded conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub	Picture on page # 16
BFR-2.5-180-SS BFR-2.5-160-SS BFR-2.5-140.SS	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard BFR-2.5-SS style alignment sensors include a 2.5" diameter by 5/8" thick round brass rub block mounted on a 4" x 4" stainless steel mounting plate. The BFR-2.5-SS style assembly comes standard with a BFD&T-SS style drill & tap sensor described above with a 10' long, stainless steel armored pigtail. Features: All BFR-2.5-SS belt alignment sensors come as a complete, assembly as described. (Pigtail has 20 AWG solid conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16
BFR-2.5-180-BLU BFR-2.5-160-BLU BFR-2.5-140.BLU	Sensor Style: NC thermostat sensor, opening at 180°F, 160°F or 140°F +/- 3°C. Sensor size must be specified when ordering. Configuration: Standard BFR-2.5-BLU style alignment sensors include a 2.5" diameter by 5/8" thick round brass rub block mounted on a 4" x 4" stainless steel mounting plate. The BFR-2.5-BLU style assembly comes standard with a BFD&T-BLU style drill & tap sensor described above with a 10' long, heavy blue PVC pigtail. Features: All BFR-2.5-BLU belt alignment sensors come as a complete, assembly as described. (Pigtail has 20 AWG solid conductors) Included Hardware: Each assembly comes with bolts and lock washers to mount the rub block to the mounting plate.	Picture on page # 16

TM-16 Temperature Probes & Alignment Sensors

Description & Features		
Model #	**Temperature Sensor "Parts, Accessories & Options"**	
TM-HDW-T&CC	Description: 1/8" NPT steel street T and 1/8" NPT x ¼" brass compression connector set. These are the standard hardware set for the bearing probe sensors.	Picture on page # 17
CON-RDY-ADAPTOR	Description: This is a ½" NPT brass adaptor used to convert a standard bearing probe into a conduit ready style.	Picture on page # 17
Probe length - option	Description: All stock probes come with a 4" SS tube. Optional lengths up to 18" are available by special order. Call 800-265-2010 for cost and lead times on special order items.	
Pigtail Length – option 24ga.Stranded w/ Braid 20ga Solid w/ Braid 20ga. Solid w/ Blue	Description: All stock sensors come with a standard 10' long pigtail. Optional lengths are available by special order. Call 800-265-2010 for cost and lead time on special order items.	
3"x8"-SS-PLATE-SLOTTED	Description: Stainless steel mounting plate for the "standard" half-moon style alignment sensors that use the lug style surface sensor.	Picture on page # 17
3"x8"-SS-PLATE-FLAT	Description: Stainless steel mounting plate for the "standard" half-moon style alignment sensors that use either the ¼"-28 or the 1/8" NPT style drill & tap sensors.	Picture on page # 17
3"x8"-SS-CON RDY	Description: Stainless steel mounting plate for the "conduit ready" half-moon style alignment sensors that use either the ¼"-28 or the 1/8" NPT style drill & tap sensors.	Picture on page # 17
4"x4"-SS-PLATE-FLAT	Description: Stainless steel mounting plate for the "standard" 2' or 2.5" round style alignment sensors with the 1.25" mounting bolt pattern.	Picture on page # 17
4"x4"-SS-CON RDY	Description: Stainless steel mounting plate for the "conduit ready" 2.5" round style alignment sensors with the 2" mounting bolt pattern.	Picture on page # 17
1/2Moon-1/4"-28-BRASS	Description: 1" wide by 5" long half-moon shaped, replacement brass rub disk with a ¼"-28 sensor mounting hole.	Picture on page # 17
1/2Moon-1/8" NPT-BRASS	Description: 1" wide by 5" long half-moon shaped, replacement brass rub disk with a 1/8" NPT sensor mounting hole.	Picture on page #000
2" RND-1/4"-28-BRASS	Description: 2" diameter by 1/2" thick, replacement brass rub disk with a ¼"-28 sensor mounting hole.	Picture on page # 17
2.5" RND-1/4"-28-BRASS	Description: 2.5" diameter by 5/8" thick, replacement brass rub disk with a ¼"-28 sensor mounting hole. This rub disk is available with two mounting patterns. The ¼" mounting holes are either 2" on center or 1.25" on center. Please specify the mounting pattern when ordering.	Picture on page # 17
2.5" RND-1/8" NPT-BRASS	Description: 2.5" diameter by 5/8" thick, replacement brass rub disk with a 1/8" NPT sensor mounting hole. This rub disk is only available with one mounting patterns. The ¼" mounting holes are 1.25" on center.	Picture on page # 17
2"x5"x1/4"-UHMW	Description: UHMW spacer for TMR-6 belt alignment sensors.	Picture on page # 17
2.5" RND-QI-ADAPT	Description: This option converts the standard, (TMR-2.5-CON-SS) conduit-ready 2.5" round style alignment sensor to a hinged "quick inspection" style." This allows for rapid inspection of the rub disk without tools.	Picture on page # 17
½" NPT-LIQUITIGHT	Description: Liquid tight connectors are available in three styles (Strait, 45 degree & 90 degrees). Please specify when ordering.	Picture on page # 17
Freeze Mist	12oz. Can	

Limited Warranty

ROLFES@BOONE warrants that the products furnished to the PURCHASER will, at the time of shipment, be free from all defects in material and workmanship under normal use and service for a period of twelve (12) months from date of original shipment or, if installed by ROLFES@BOONE personnel, twelve (12) months from date of placing product into service. ROLFES@BOONE'S sole obligation hereunder shall be limited to, at ROLFES@BOONE option, either replacing or repairing any product for which (i) prompt notice has been given to ROLFES@BOONE within the warranty period of the product under question; and (ii) after ROLFES@BOONE'S authorization, is returned to ROLFES@BOONE factory of origin, freight prepaid; and (iii) after examination it is disclosed, to ROLFES@BOONE'S satisfaction, the product is defective.

If the product was originally installed by ROLFES@BOONE personnel within the continental United States, an on-site examination by ROLFES@BOONE can be performed in lieu of parts (ii) and (iii) above and if the product is found defective, it will be repaired or replaced under warranty if all other conditions of this warranty are met. If on-site examination is requested and no defects are found within the scope of this warranty, PURCHASER will be subject to payment to ROLFES@BOONE for the on-site examination at ROLFES@BOONE'S standard hourly and travel rates.

Any repair or replacement shall not extend the period with which this warranty can be asserted. All replaced equipment or parts will become the property of ROLFES@BOONE. This warranty shall not apply to products which ROLFES@BOONE has determined have, by PURCHASER or another, been altered or modified by anyone other than ROLFES@BOONE; or has been subjected to misuse, neglect, accident, damage in transit, abuse or unusual or natural hazard; or has been installed improperly or used in violation of ROLFES@BOONE 'S standards and specifications.

THIS WARRANTY MAY BE ASSERTED BY PURCHASER ONLY AND NOT BY PURCHASER'S CUSTOMER AND IS EXPRESSED IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON ROLFES@BOONE 'S PART. ROLFES@BOONE NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR ROLFES@BOONE ANY OTHER LIABILITIES IN CONNECTION WITH THE SALE OF SAID PRODUCTS. IN NO EVENT SHALL ROLFES@BOONE BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES; LOSSES OR EXPENSES INCLUDING, BUT NOT LIMITED TO, LOSS OF USE, LOSS OF PROFITS OR LOSS OF DATA; OR FOR LOSS, DAMAGE, OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE FAILURE OF THE PRODUCT TO OPERATE PROPERLY OR THE INABILITY OF THE PURCHASER, PURCHASER'S CUSTOMER, OR ANY END USER TO USE THE PRODUCT EITHER SEPARATELY OR IN COMBINATION WITH ANY OTHER EQUIPMENT. In no event shall ROLFES@BOONE 'S liability for failure to deliver or breach of any provision of this warranty, including, without limitation ROLFES@BOONE'S obligation with respect to non-conforming items, exceed, with respect to the product, the purchase price of the relevant product.

ROLFES@BOONE reserves the right to incorporate improvements without notice and is not obligated to incorporate the same improvements in products previously manufactured.