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MAXIGARD™

Altra•gap™

MAXIGARD A6000
3 in 1 ELEVATOR MONITOR

Introduction

The Maxigard A6000 is a fail safe device designed to monitor the rotation of critical driven shafts for under/ over speed, bearings for over temperature, and belts for misalignment. The A6000 is precision built of quality materials and has been completely factory tested to insure trouble free operation.

Principle of Operation

Motion Switch:

The AM2000 speed switch is supplied with a non-contacting sensor and magnetic target. This switch is designed to detect under speed, over speed or stoppage of the monitored shaft. The AM2000 has two SPDT adjustable set point relays. The “LO” set point relay (K1) has a built in power up time delay of 7.5 seconds which allows machinery controlled through the motor starter circuit to reach the set point during start-up. The delay activates on power-up only. The set points are designed fail-safe and in the event of a power failure, loss of signal, component failure etc. the relays will de-energize and put the switch into an alarm condition. Both relays on the AM2000 speed switch are equipped with red LEDs, when lighted = relays energized.

Bearing Temperature:

The CT5000 temperature switches are supplied with a thermocouple assembly and temperature switch module for each monitored bearing. The bearing temperature switches are designed to detect and alarm at the over temperature of critical bearings. Each module has one adjustable set point relay. In the event the bearing temperature rises above set point, the indicating light on the Maxigard A6000 front panel will turn on, and the horn will sound. Each temperature switch module is interfaced with an auxiliary control relay. The auxiliary relay is SPDT and is available to interface with the motor control circuit or any other outside control circuit.

Belt Alignment Rub Blocks:

The CT5000 temperature switches are supplied with a rub block assembly and temperature switch module for each side of the monitored belt. The temperature switches are designed to detect and alarm at the misalignment of the monitored belt. Each module has one adjustable set point relay. In the event the belt contacts the rub block assembly, friction will cause the temperature to rise above set point, the indicating light on the Maxigard A6000 front panel will turn on, and the horn will sound. Each temperature switch module is interfaced with an auxiliary control relay. The auxiliary relay is SPDT and is available to interface with the motor control circuit or any other outside control circuit.

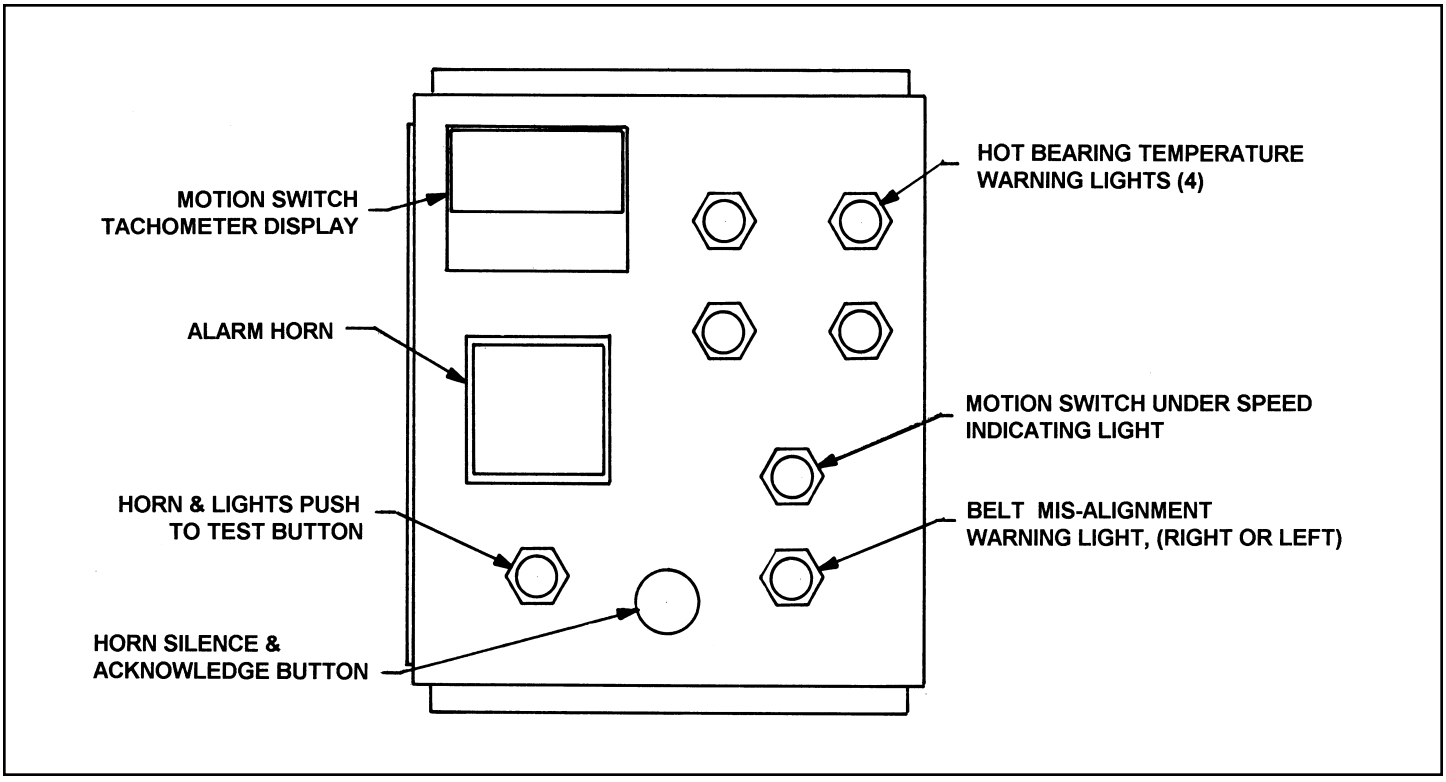
Alarm System:

The alarm system detects and indicates alarm conditions. An alarm condition turns on its corresponding light and sounds the alarm horn. An alarm acknowledge pushbutton shuts off the alarm horn and keeps the alarm point indicating light on until the alarm condition is corrected. A push to test function is provided for testing the lights and alarm horn.

The A6000 alarms automatically reset. When the alarm condition is corrected and the alarm point rises above the selected set point, the relay will energize and allow the machine or process to be restarted and operate as normal. In some cases it is desirable that the alarm display remains on, requiring a manual reset. An auxiliary latching relay is required to perform that function.

Components:

- (1) Magnet disc
- (1) Sensing head with 10' of cable and mounting bracket
- (4) Bearing temperature thermocouples with M/F connectors and grease fitting adapters
- (2) Belt alignment rub block assemblies with thermocouples and M/F connectors
- (1) Control panel with:
  - (1) AM2000 dual set point motion switch
  - (6) CT5000 temperature switch
  - (6) auxiliary relays for user interface
  - (6) indicating lights with name plates
  - (1) PLC for system control
  - (1) alarm horn
  - (1) analog display meter scaled 0-100%
  - (2) push buttons with name plates
  - All mounted and internally wired NEMA in a 12 enclosure.



SECTION 1 - MECHANICAL

1.0 Magnet Disc

1.1 The end of the shaft to be monitored should be square to prevent excessive disc wobble.

1.2 Center drill and tap the shaft end. (Suggested #21 drill and #10-32NF tap). Bolt the magnet disc to the end of the shaft. Use “Loc-tite” to keep the bolt and disc tight on the shaft.
(see figure 1A & 2, page 4).

2.0 Magnet Wrap (optional)

2.1 Separate the two halves of the magnet wrap by loosening the cap screws holding the two halves together.

2.2 Place both halves of the magnet wrap around the shaft. Re-insert and tighten the cap screws making sure the wrap is square to the shaft.
(see figure 1B & 2, page 4).

NOTE

There will be a slight gap between the two halves after tightening. This gap will not affect the generated signal.

3.0 Mounting the Sensing Head

3.1 Place the sensing head so the head pole piece is centered directly in front of the magnets in the disc or optional wrap.
(see figure 1A & 1B, page 4).

3.2 The gap setting between the pole piece and the magnets should be approximately 1/4” - 7/8”.

SENSING METHOD

SENSING HEAD AND DISC

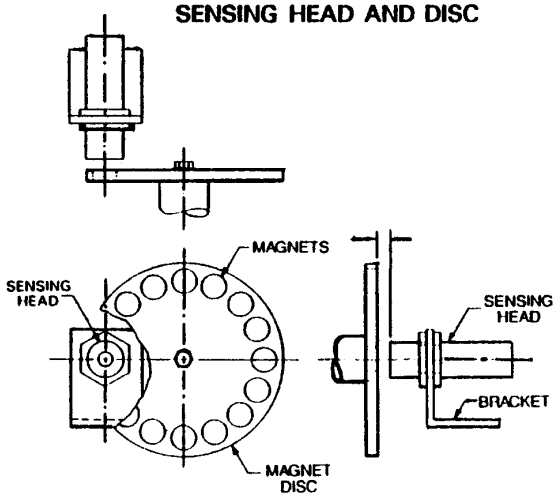


Figure 1A

SENSING HEAD WITH OPTIONAL WRAP

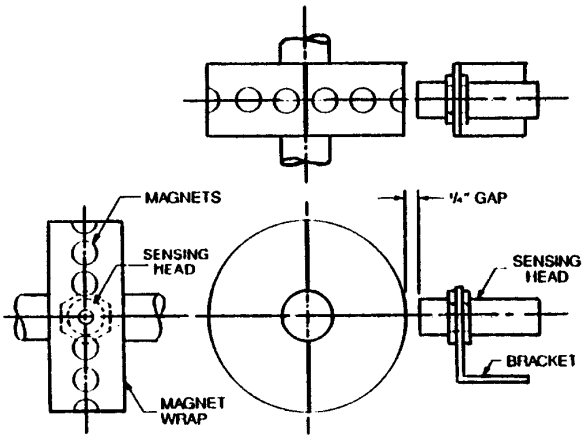


Figure 1B

DIMENSIONAL DATA

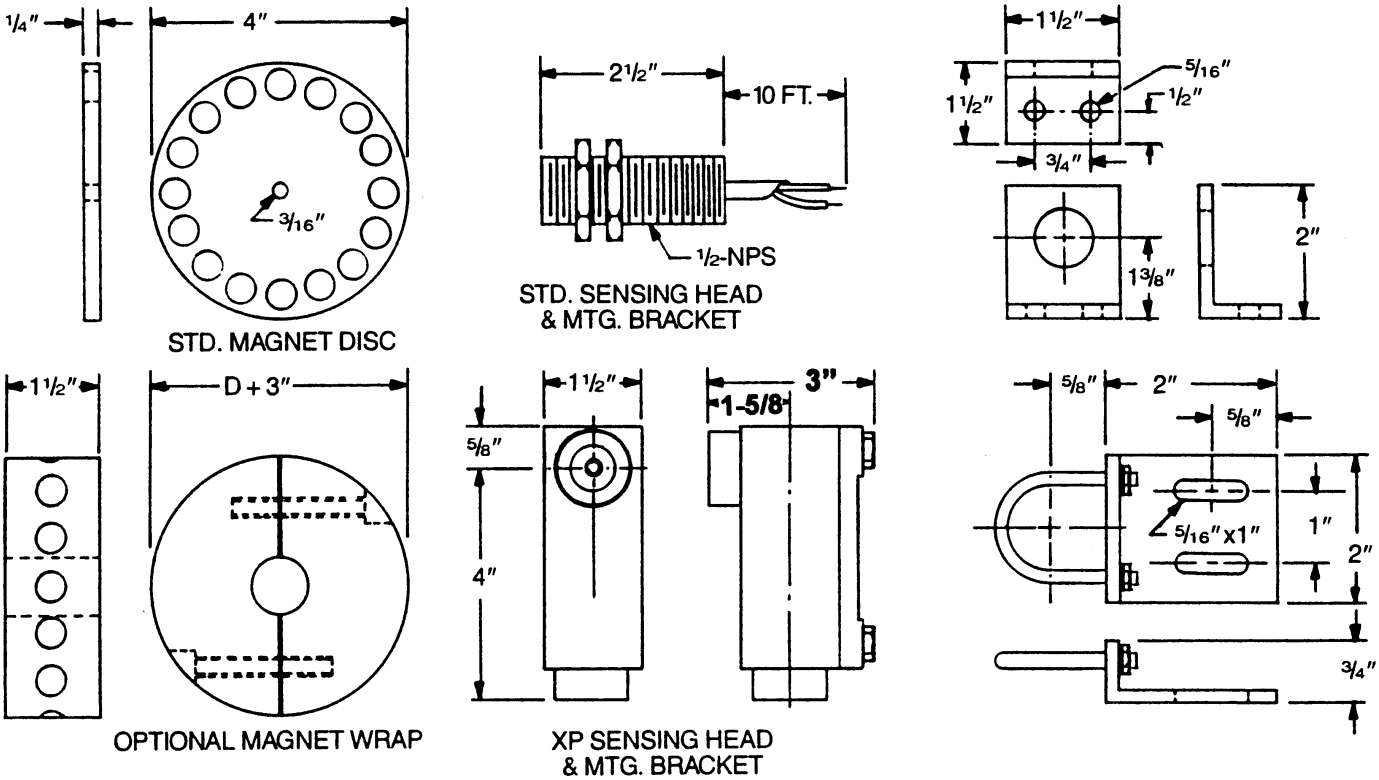


Figure 2

4.0 Bearing Temperature Thermocouple Installation

NOTE

Clean area around the bearing grease fitting before removing. Avoid any dirt contamination to the bearing during installation.

4.1 Remove the existing bearing grease fittings. Install the thermocouple probe assemblies into the four principle bearings.
(see figure 3A & 3B, page 6)

4.2 If existing fitting is larger than new fitting, an adapter bushing will be required.

4.3 Insert thermocouple probe until the tip of the probe touches the outer race of bearing.

4.4 Tighten compression nut to secure the probe and prevent grease leakage.

NOTE

If the bearing has an open race, the sensor probe must be positioned so it does not interfere with the retainer or moving parts.

4.5 Some bearings will require other methods of installing the sensor. Use care not to puncture or bend the probe, or break the sensor leads.

5.0 Rub Block Installation

5.1 Install the (2) rub blocks on the elevator leg. Note the the rub block assemblies are placed at right angles (90 degrees) to the conveyor belt.
(see figure 3A, page 5)

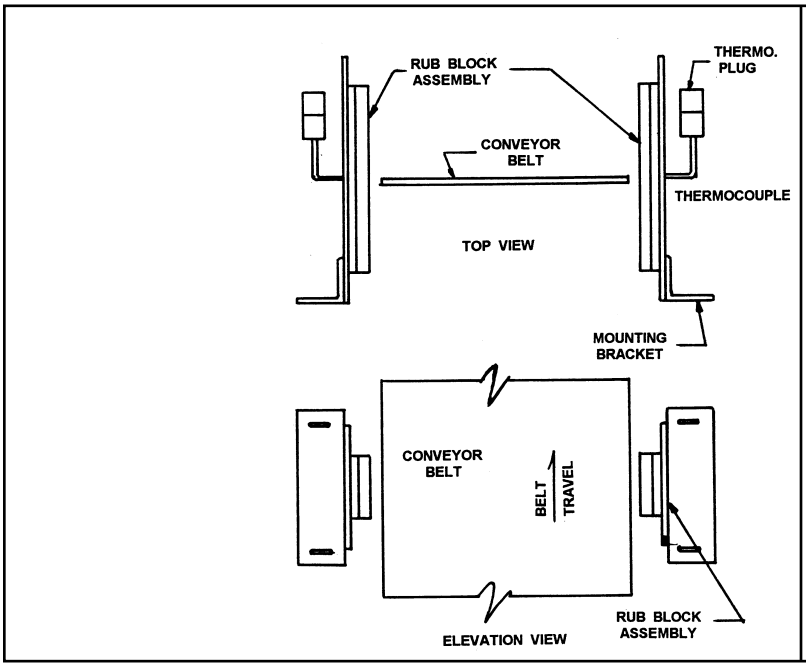


Figure 3A

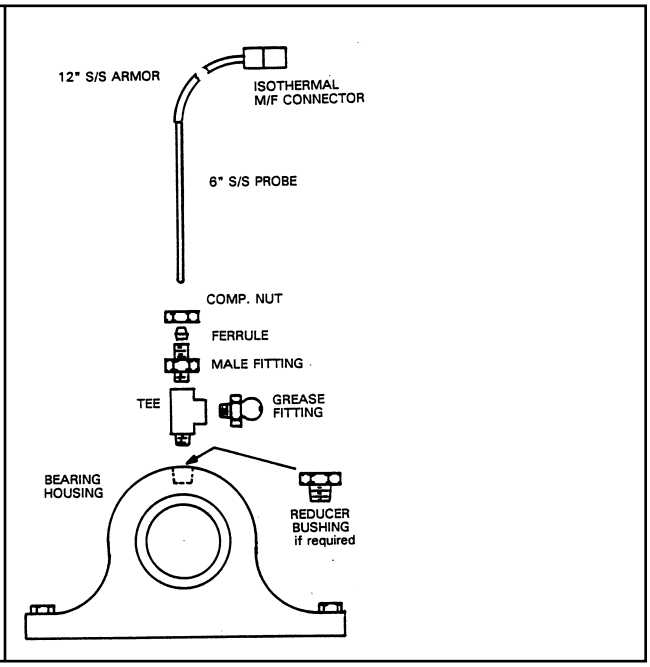


Figure 3B

6.0 Enclosure

6.1 The A6000 enclosure is rated NEMA 12 steel construction. (see figure 4, page 7)

CAUTION

Remove the entire back panel from the enclosure before punching or drilling conduit holes. Drill bit or punch could damage circuit boards. Remove all metal chips and fillings.

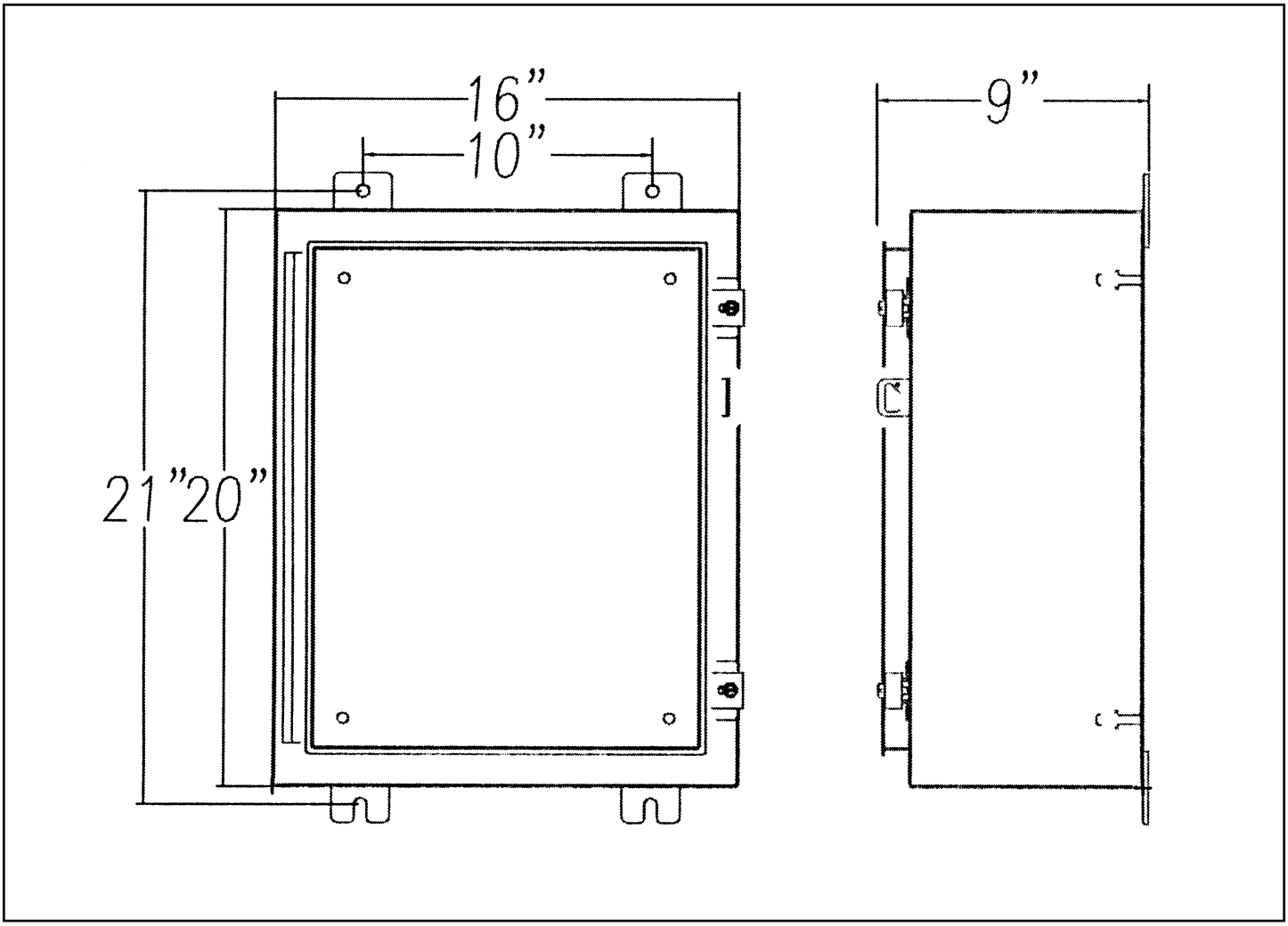


Figure 4

SECTION 2 - FIELD WIRING

7.0 Sensing Head Wiring

7.1 Connect the sensing head cable to screw terminals black, white, shield located on terminal block.
(see figure 7 & 8, page 8 & 9)

7.2 The sensing head is proved with 10' of cable. Additional cable can be added as required. Be sure to maintain continuity. Wrap splice with the foil shield and electrical tape.

SENSING HEAD CABLE

Use "Belden" #8761 or equal. Cable should not be run in same conduit as power wires. Maximum distance of cable run 10,000 ft. Make good splice connections and check continuity.

8.0 Wiring the AM2000 Motion Switch

WARNING

To avoid electrical shock disconnect all sources of power to the motor starter before wiring and observe voltage ratings of the motion switch.

8.1 Connections to the AM2000 motion switch are shown on figure 7 & 8, page 8 & 9. Also refer to figures 7 & 8 and drawing A6000-E2 for suggested wiring diagram.

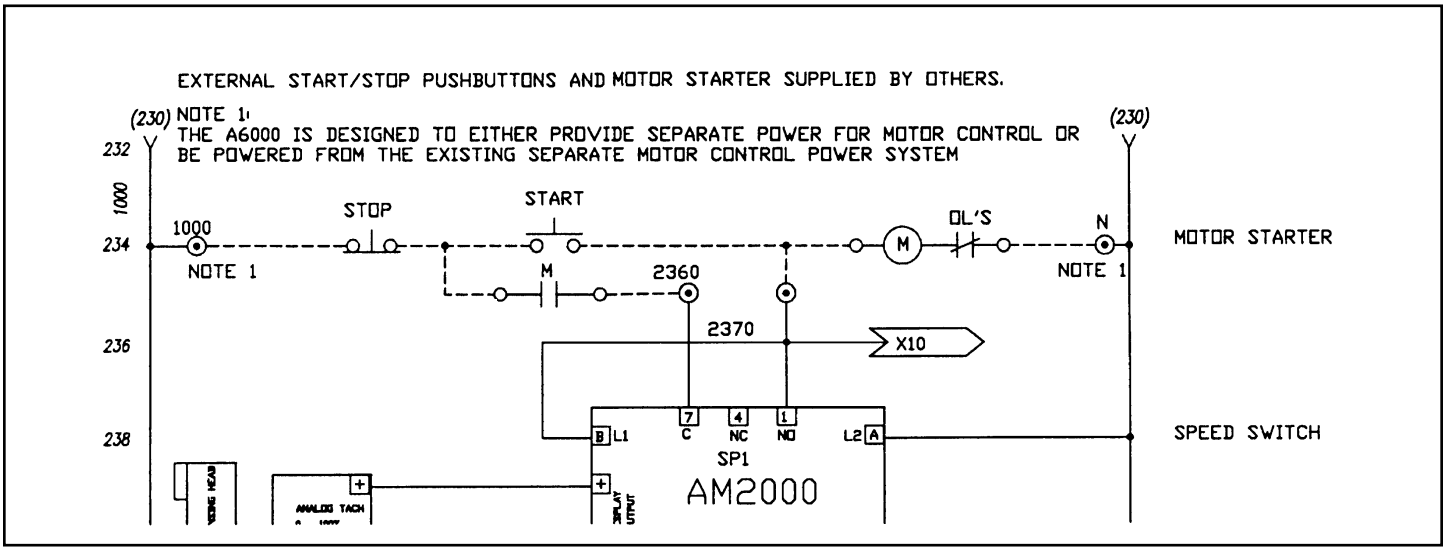


Figure 5

9.0 Bearing Thermocouple Wiring

9.1 Connect the blue thermocouple extension wire to the female half of the blue plug attached to the bearing thermocouple. Connect the red lead to (--) and the blue lead to (+).

9.2 Run type T thermocouple extension wire from each plug to the control panel. Connect the red (--) and blue (+) leads to terminal block TB1 of the designated control module. **Maintain continuity**. (see figure 7 & 11, page 8 & 12)

9.3 Use only type T thermocouple wire or thermocouple extension wire.

10.0 Rub Block Assembly Wiring

10.1 Connect the blue thermocouple extension wire to the female half of the blue plug attached to the rub block thermocouple. Connect the red lead to (--) and the blue lead to (+).

10.2 Run type T thermocouple extension wire from each plug to the control panel. Connect the red (--) and blue (+) leads to terminal block TB1 of the designated control module. **Maintain continuity.** (see figure 7 & 11, page 8 & 12)

10.3 Use only type T thermocouple wire or thermocouple extension wire.

Note: Thermocouple connections are made at the top of the temperature switch on terminal block TB1. To make the connections remove the temperature switch off of the DIN rail and tip the switch for access to TB1. If necessary TB2 can be unplugged to remove the switch. (see figure 11, page 12)

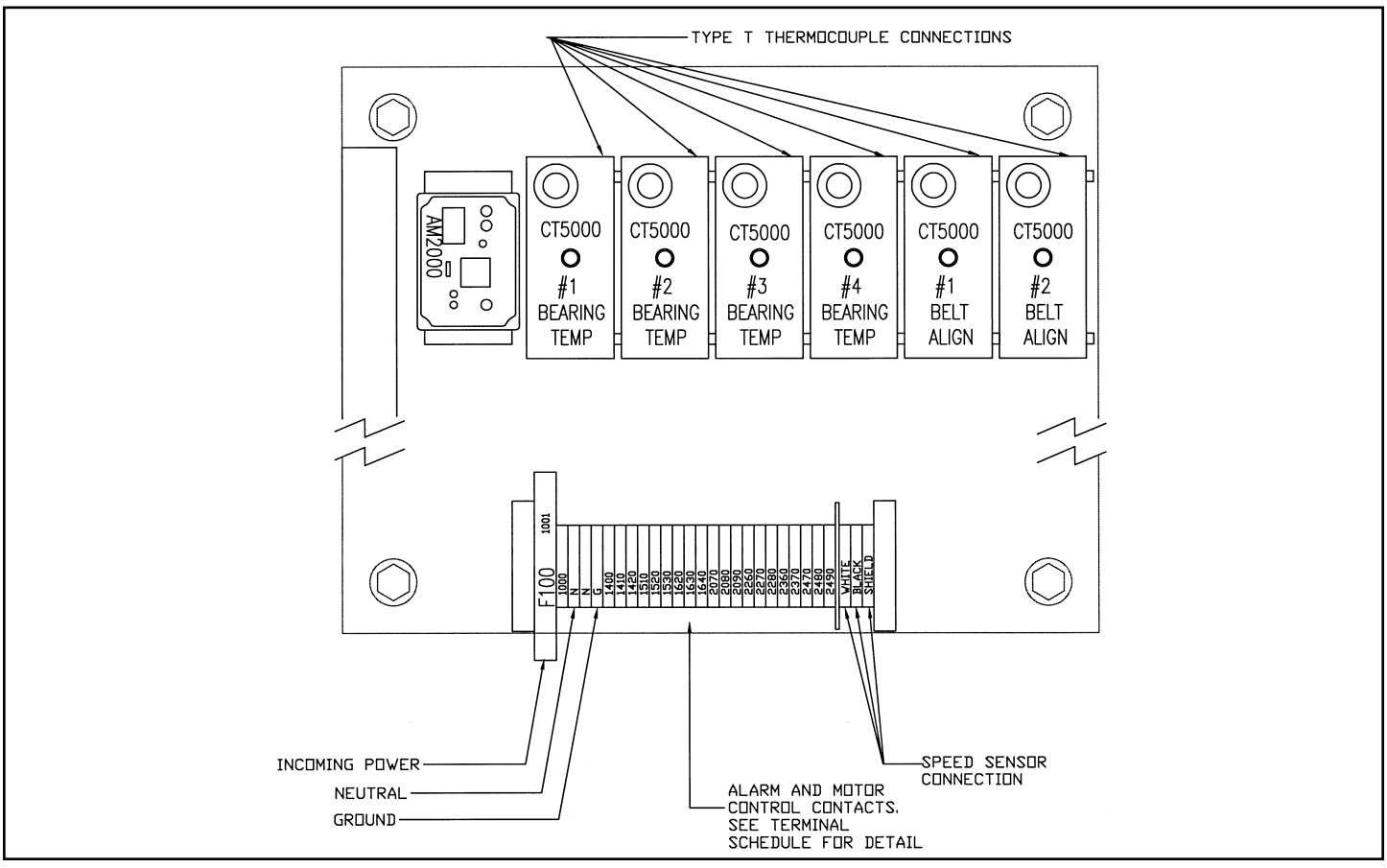


Figure 7

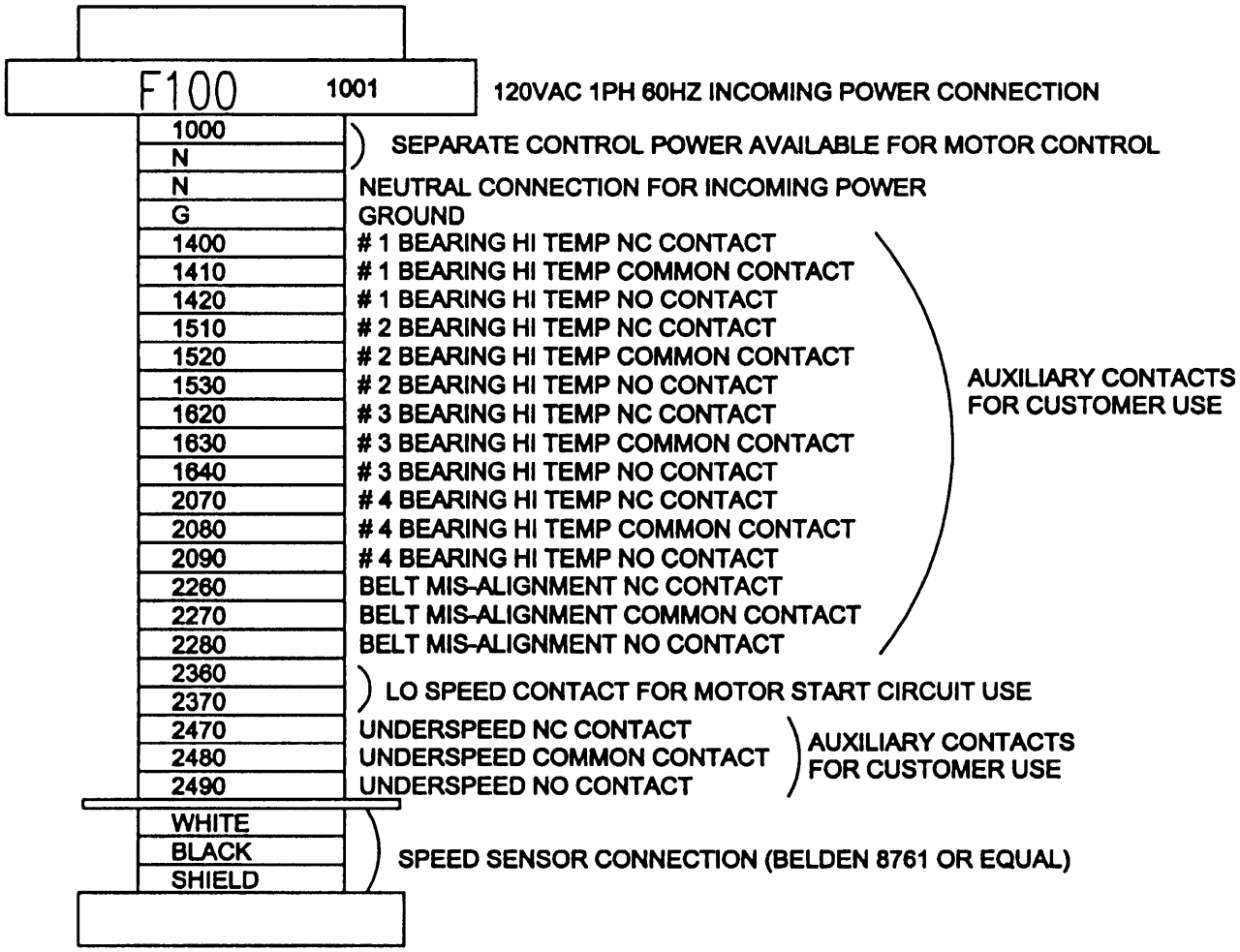

F100
1001
120VAC 1PH 60HZ INCOMING POWER CONNECTION
1000
N
SEPARATE CONTROL POWER AVAILABLE FOR MOTOR CONTROL
N
NEUTRAL CONNECTION FOR INCOMING POWER
G
GROUND
1400
1 BEARING HI TEMP NC CONTACT
1410
1 BEARING HI TEMP COMMON CONTACT
1420
1 BEARING HI TEMP NO CONTACT
1510
2 BEARING HI TEMP NC CONTACT
1520
2 BEARING HI TEMP COMMON CONTACT
1530
2 BEARING HI TEMP NO CONTACT
1620
3 BEARING HI TEMP NC CONTACT
1630
3 BEARING HI TEMP COMMON CONTACT
1640
3 BEARING HI TEMP NO CONTACT
2070
4 BEARING HI TEMP NC CONTACT
2080
4 BEARING HI TEMP COMMON CONTACT
2090
4 BEARING HI TEMP NO CONTACT
2260
BELT MIS-ALIGNMENT NC CONTACT
2270
BELT MIS-ALIGNMENT COMMON CONTACT
2280
BELT MIS-ALIGNMENT NO CONTACT
AUXILIARY CONTACTS FOR CUSTOMER USE
2360
2370
LO SPEED CONTACT FOR MOTOR START CIRCUIT USE
2470
UNDERSPEED NC CONTACT
2480
UNDERSPEED COMMON CONTACT
2490
UNDERSPEED NO CONTACT
AUXILIARY CONTACTS FOR CUSTOMER USE
WHITE
BLACK
SHIELD
SPEED SENSOR CONNECTION (BELDEN 8761 OR EQUAL)

Figure 8

SECTION 3 - CALIBRATION

11.0 AM2000 Speed Switch Calibration

11.1 Set the AM2000 dip switches (SW1) for the proper speed range based on the normal operating speed of the monitored shaft.
(see figure 9, page 10)

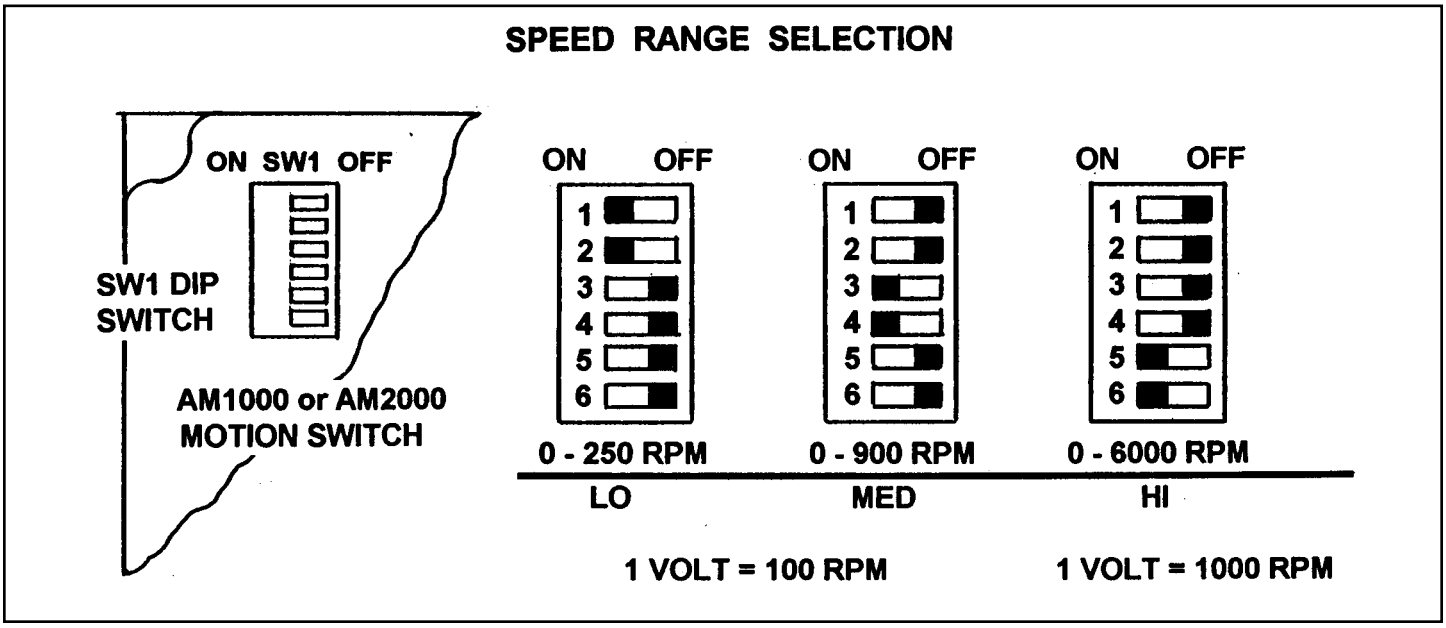


Figure 9

NOTE
For best results, calibrate motion switch while machine is operating under full load.

11.2 To calibrate the operating speed place slide witch SW2 in the operating speed position (OP). With the machine running at normal operating speed (preferably under full load) adjust potentiometer P3 until the display meter reads 100% (CW to increase/CCW to decrease).
(see figure 10, page 11)

11.3 To calibrate the high set point place slide switch SW2 in the high set point position (SP2). Adjust potentiometer P2 until you reach the desired set point on the display meter (CW to increase/CCW to decrease). The machine does not need to be running to make this adjustment. The red LED SP2 will be on when the operating speed is higher than the set point speed. This indicates that the relay is energized.
(see figure 10, page 11)

11.4 To calibrate the low set point place slide switch SW2 in the low set point position (SP1). Adjust potentiometer P1 until you reach the desired set point on the display meter (CW to increase/CCW to decrease). The machine does not need to be running to make this adjustment. The red LED SP1 will be on when the operating speed is higher than the set point speed. This indicates that the relay is energized. (see figure 10, page 11)

11.5 Return slide switch SW2 to the OP position. The meter will now display the operating speed. The set points will still function properly if the slide switch is in the SP2 or SP1 position.
(see figure 7, page 8)

11.6 AM2000 speed switch is now calibrated.

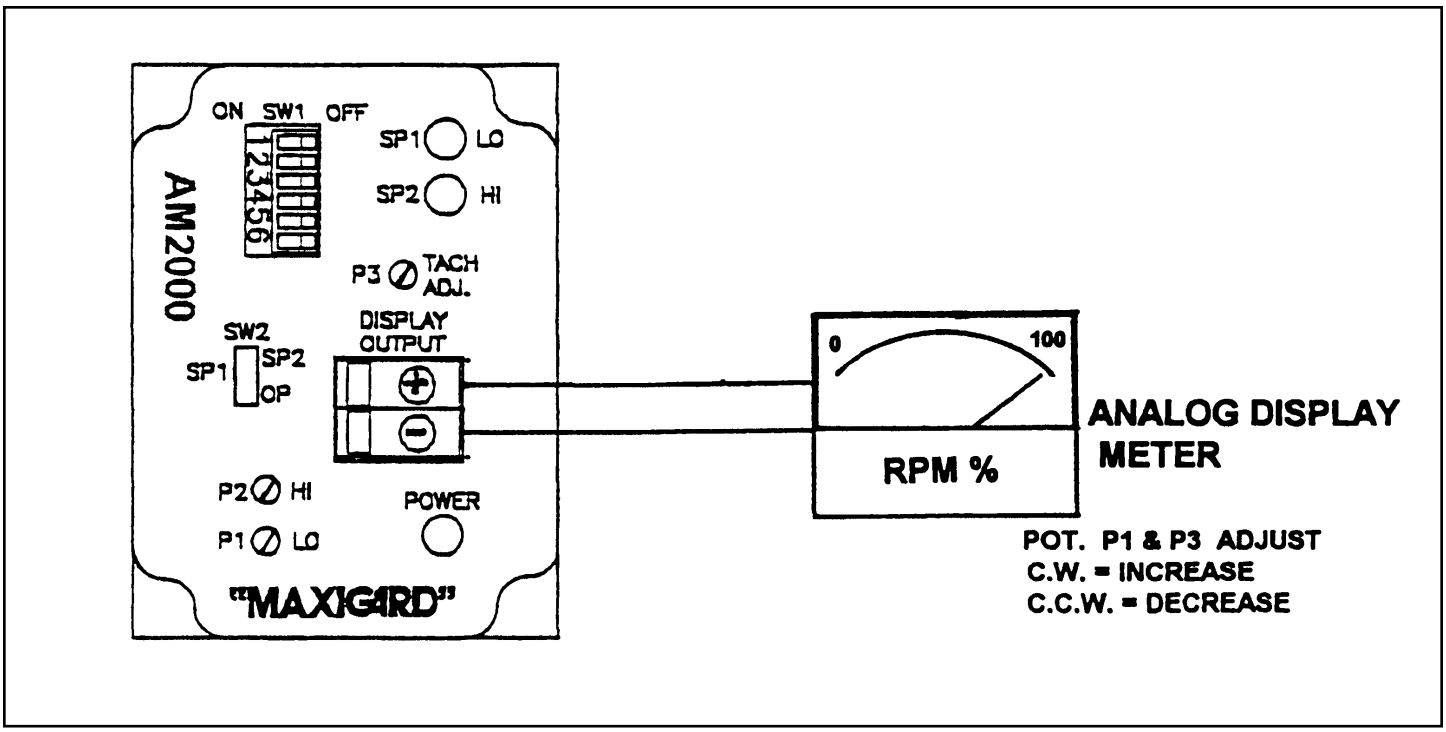


Figure 10

12.0 CT5000 Bearing Temperature switch calibration

12.1 Turn the temperature switch calibration dial to the desired alarm point for each monitored bearing. Each temperature switch can be calibrated to a different temperature if monitoring different types of bearings.
(see figure 11, page 12)

12.2 The red LED on the temperature switch will be off when the bearing operating temperature is below the calibrated alarm point indicating that the relay is de-energized.

13.0 CT5000 Rub Block Temperature Switch Calibration

13.1 Turn the temperature switch calibration dial to the desired alarm point for each monitored rub block. Alarm point should be higher than normal ambient temperature to avoid false alarms.
(see figure 11, page 12)

13.2 The red LED on the temperature switch will be off when the rub block operating temperature is below the calibrated alarm point indicating that the relay is de-energized.

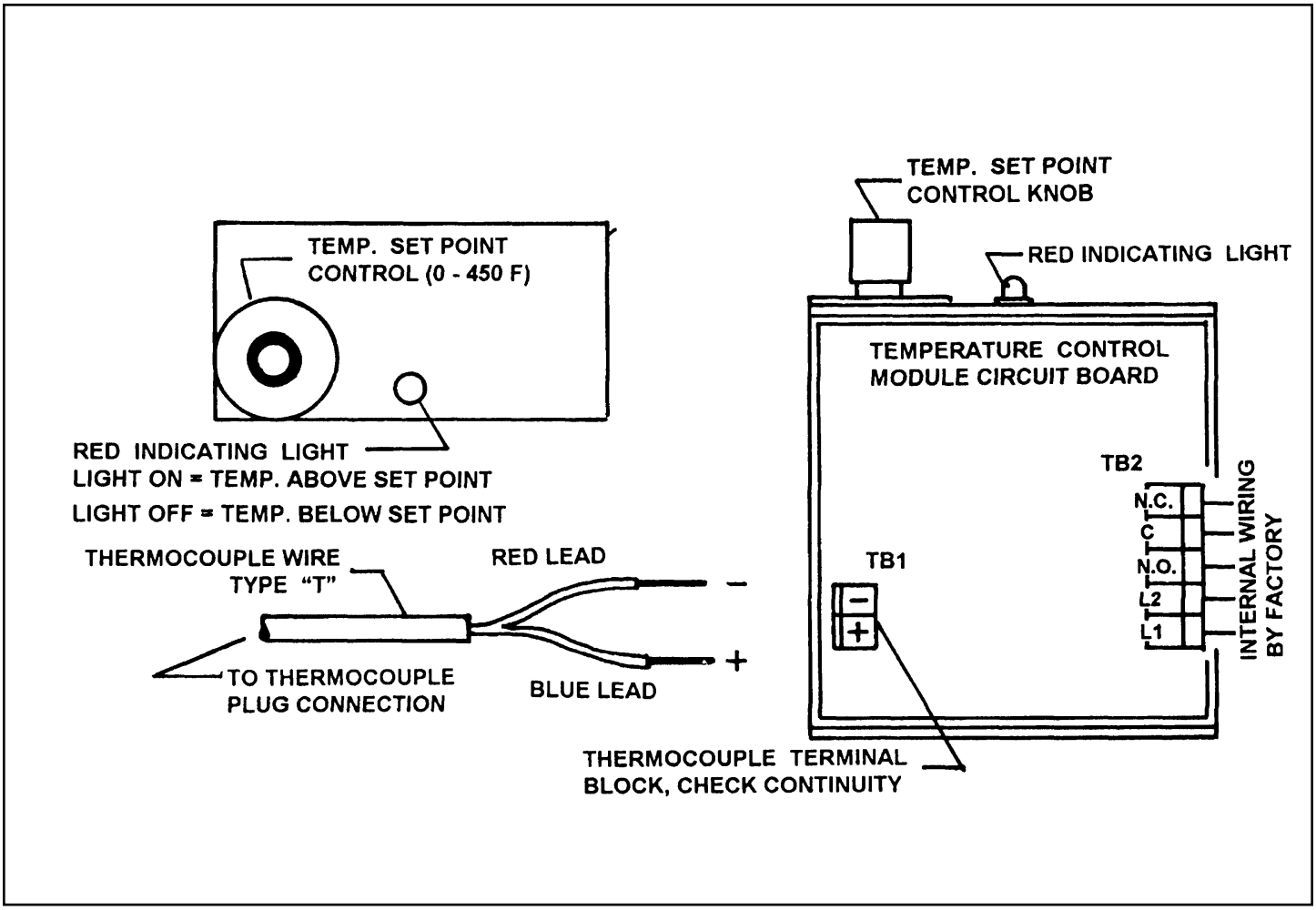


Figure 11

SPARE PARTS LIST

Part No.	Description
1657	AM2000 Module, Dual Set Point
1129	Sensing Head (STD) W/10’ of Cable
1130	Mounting Bracket With Jam Nuts
1132	Sensing Head (XP) W/10’ of Cable
1134	Mounting Bracket
1136	Magnetic Disc 4” Diameter
1178	Magnetic Disc 8” Diameter
1177	Meter, Tachometer, Analog
1324	Meter, Tachometer, Digital
1139	Sensing Head Cable

LIMITED WARRANTY

Process Control Systems, Inc. will repair or replace, at their option, F.O.B. factory, any part or unit which proves to be defective in material or workmanship within five years of purchase date, provided that part of the unit was installed and operated as recommended, to be established by examination of the part or unit at the factory. Goods returned under warranty must be shipped prepaid to the factory and accompanied by the serial number, description of defect, order number and date of purchase.

This warranty shall not apply to any Maxigard ™ product which shall have been repaired or altered outside of the Process Control Systems factory or has been subject to misuse, negligence or accident.

Process Control Systems, Inc. warrants its products, but not their application, and shall not be liable for any incidental or consequential damages incurred through the use or loss of use of a Process Control Systems product. No representatives or other person is authorized or permitted to make any warranty or assume for this company any liability not strictly in accordance with this guarantee.

There is no further warranty either expressed or implied beyond that set forth herein.