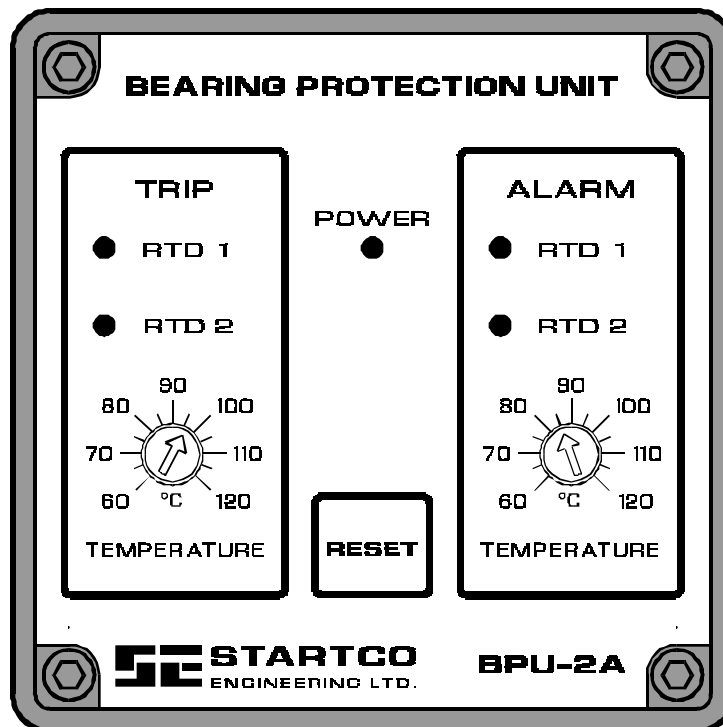


## **BPU-2A MANUAL**

### **BEARING PROTECTION UNIT**

MARCH 1994

REVISION 2



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## **BPU-2A BEARING PROTECTION UNIT**

### **1. GENERAL**

The BPU-2A is a microprocessor-based bearing protection unit. Trip-and-alarm set points and LED indication are provided for two bearing RTD's. The BPU-2A can be user configured for 100-ohm platinum (PT100), 100-ohm nickel (NI100), or 120-ohm nickel (NI120) RTD's. The BPU-2A can trip-and-alarm on bearing temperature and on the temperature differential between two bearings.

The BPU-2A was designed to add bearing-temperature protection to the MPU-16A motor protection unit; however, it can be used as a stand-alone unit to monitor two bearing RTD's. In the stand-alone configuration, two Form A output contacts can be user configured for fail-safe or non-fail-safe operation.

### **2. OPERATION**

When used with the MPU-16A, the BPU-2A accepts inputs from two bearing RTD's and one stator RTD as shown in Figure 1. The stator temperature signal is fed to the MPU-16A through the BPU-2A relay contacts and external jumper W1. If the bearing alarm temperature is exceeded, the stator signal is interrupted and 4AA0 is displayed on the MPU-16A. If the bearing trip temperature is exceeded, the BPU-2A introduces a trip resistance and 4FFF is displayed on the MPU-16A. When a bearing temperature trip or alarm occurs, MPU-16A hot-motor compensation is automatically disabled, MPU-16A pre-trip stator temperatures are not available, and bearing temperatures can be determined with the BPU-2A. A bearing temperature trip can be differentiated from a stator temperature trip by observing the pre-trip value in Mode C. If a bearing temperature trip occurs, the pre-trip value will be between 230°C and 240°C. If a stator temperature trip occurs, the pre-trip value will be equal to the temperature set point (Mode 4).

When used with the MPU-16A, jumper W1 must be installed between terminals 10 and 11 and the trip-and-alarm contacts cannot be used in external circuits. For stand-alone operation, jumper W1 must be removed so that the trip-and-alarm contacts can be used.

#### **--- CAUTION ---**

IN STAND-ALONE OPERATION, MAKE NO CONNECTIONS TO TERMINALS 7, 8, 9, 17, 18, and 19.

## 2.1 TRIP-AND-ALARM SET POINTS

Bearing temperature trip-and-alarm set points are adjustable from 60°C to 120°C. Typical set points are 70°C to 100°C for anti-friction bearings and 60°C to 75°C for journal bearings. Consult the motor manufacturer for recommended set points.

For differential temperature trip-and-alarm settings, see sections 2.3.2 and 2.3.3.

## 2.2 INDICATION AND RESET

Two red LED's indicate over-temperature trips and two yellow LED's indicate over-temperature alarms. A slowly flashing LED indicates the hottest RTD when a differential temperature trip-or-alarm occurs. A quickly flashing yellow LED indicates an open or shorted RTD.

Alarms are non-latching and trips can be selected as latching or non-latching. Install jumper W2 between terminals 5 and 6 for non-latching operation. With jumper W2 not installed, trips remain latched until RESET is pressed or until supply voltage is cycled.

When used with the MPU-16A, non-latching operation is usually selected so that only the MPU-16A requires a reset after a bearing-temperature trip.

## 2.3 CONFIGURATION

The rear panel must be removed to access configuration switch S1. Configuration jumpers W1 and W2 are external jumpers on the lower terminal block.

### 2.3.1 RELAY OPERATION (S1-1)

Switch S1-1 configures the BPU-2A for fail-safe or non-fail-safe relay operation. See Figure 2. In the fail-safe mode, output relays are energized when control power is on and the BPU-2A is not in a trip-or-alarm condition. The output relays are de-energized if control power is off or if a trip-or-alarm occurs. BPU-2A labelling shows the relays de-energized. In the non-fail-safe mode, output relays are energized only during a trip-or-alarm.

When used with MPU-16A, select the fail-safe mode.

Factory Selection ..... Fail Safe

### **2.3.2 TRIP DIFFERENTIAL (S1-2, S1-3)**

Switches S1-2 and S1-3 set the BPU-2A trip differential. Selections available are: Disabled, 10°, 15°, or 20°. See Figure 2.

Factory Selection ..... Disabled

### **2.3.3 ALARM DIFFERENTIAL (S1-4)**

Switch S1-4 sets the alarm differential if the trip differential is enabled. Selections available are: 50% or 80% of the trip differential. See Figure 2.

Factory Selection ..... 50% of Trip Differential

### **2.3.4 BEARING RTD's (S1-5, S1-6)**

Switches S1-5 and S1-6 configure the BPU-2A for the bearing-RTD type. Selections available are: 100-ohm platinum (PT100), 100-ohm nickel (NI100), or 120-ohm nickel (NI120). See Figure 2.

Factory Selection ..... PT100

### **2.3.5 MPU-16A SENSOR TYPE (S1-7, S1-8)**

Switches S1-7 and S1-8 configure the BPU-2A to match the MPU-16A sensor type. Selections available are: PT100, NI100, or NI120. See Figure 2.

Factory Selection ..... PT100

### **2.3.6 MPU-16A/STAND ALONE (W1)**

External jumper W1, between terminals 10 and 11, configures the BPU-2A for use with the MPU-16A or for stand-alone operation. Jumper W1 is installed for use with the MPU-16A and must be removed for stand-alone operation. See Figure 1.

Factory Selection ..... Installed (MPU-16A)

### **2.3.7 LATCHING/NON LATCHING (W2)**

External jumper W2, between terminals 5 and 6, configures the BPU-2A for latching or non-latching trips. Jumper W2 is installed for non-latching trips and must be removed for latching trips. See Figure 1.

Factory Selection ..... Installed (Non Latching)

## **2.4 BPU-2A/MPU-16A OPERATION WITHOUT A STATOR RTD**

If a stator RTD is not used, connect a 120-ohm resistor to the BPU-2A stator RTD terminals and enter the Mode-4 default values (trip 125°C, alarm 100°C) in the MPU-16A.

With no BPU-2A trips-or-alarms, the temperature display on the MPU-16A will indicate a temperature corresponding to the 120-ohm resistance.

## **3. INSTALLATION**

### **3.1 PANEL-MOUNT CONFIGURATION**

Outline dimensions and mounting details for the panel-mount BPU-2A are shown in Figure 3. The BPU-2A mounts in a 92-mm square cutout (1/4 DIN) and is secured to the panel by the panel-mount clamp. To mount the BPU-2A, insert it through the panel cutout and slip the panel-mount clamp over the BPU-2A body. Slide the clamp forward until the latch tabs snap into the mating holes. Lock the unit in place by tightening the four clamp screws against the mounting panel.

#### **--- CAUTION ---**

OVER TIGHTENING THE CLAMP SCREWS WILL DEFORM THE CLAMP AND CAUSE THE LATCH TABS TO RELEASE.

### **3.2 SURFACE-MOUNT CONFIGURATION**

Outline dimensions and mounting details for the surface-mount BPU-2A are shown in Figure 4. Mount the BPU-2A using M4 or #8 screws and external-tooth lockwashers.

### **3.3 TERMINAL BLOCKS**

Connections to the BPU-2A are made through two plug-in, wire-clamping terminal blocks. Each terminal will accept one #14 AWG conductor.

Terminal blocks are keyed so that supply voltage cannot be applied to the RTD inputs. The line-voltage terminal block has a keying pin blocking terminal 4.

### 3.4 RTD CONNECTIONS

The BPU-2A uses three-wire lead compensation which requires the three leads to a RTD to have equal resistance. This requirement can be met with shielded, three-conductor #18 AWG to #22 AWG cable. The RTD cable shields must be grounded at the BPU-2A only. The output cable to the MPU-16A must be grounded at the MPU-16A only.

### 3.5 POWER SUPPLY

The BPU-2A can be ordered for either 120- or 240-Vac operation. Connect supply voltage to terminals 2 and 3 (L1 & L2) as shown in Figure 1. In 120-Vac systems, L2 is usually designated as the neutral conductor. Ground terminal 1.

## 4. TECHNICAL SPECIFICATIONS

#### Supply:

120/240 Vac (+10%, -30%), 50/60 Hz, 5 VA

#### Environment:

Operating Temperature..... -40°C to 60°C

Storage Temperature ..... -55°C to 80°C

#### Output Relays:

Contact Rating..... 1 mA to 8 A Resistive,  
250 Vac or 30 Vdc.  
0.125 hp @ 120/240 Vac

Contact Configuration ..... Form A

Operating Mode..... Fail Safe or Non Fail Safe

#### Bearing-RTD Inputs:

RTD Type ..... 100-Ω Platinum (DIN43760),  
100-Ω Nickel, or  
120-Ω Nickel.

Lead Compensation ..... 25 Ω max.

Temperature Range..... 60°C to 120°C

Differential Range ..... 10° to 20°

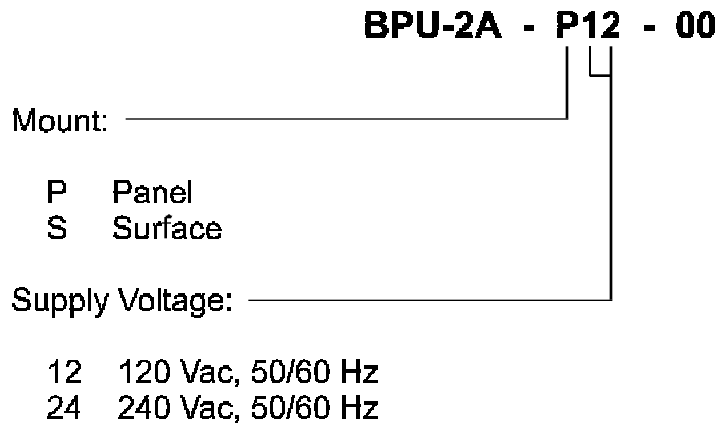
Accuracy ..... ±3°C

#### Stator-RTD Input:

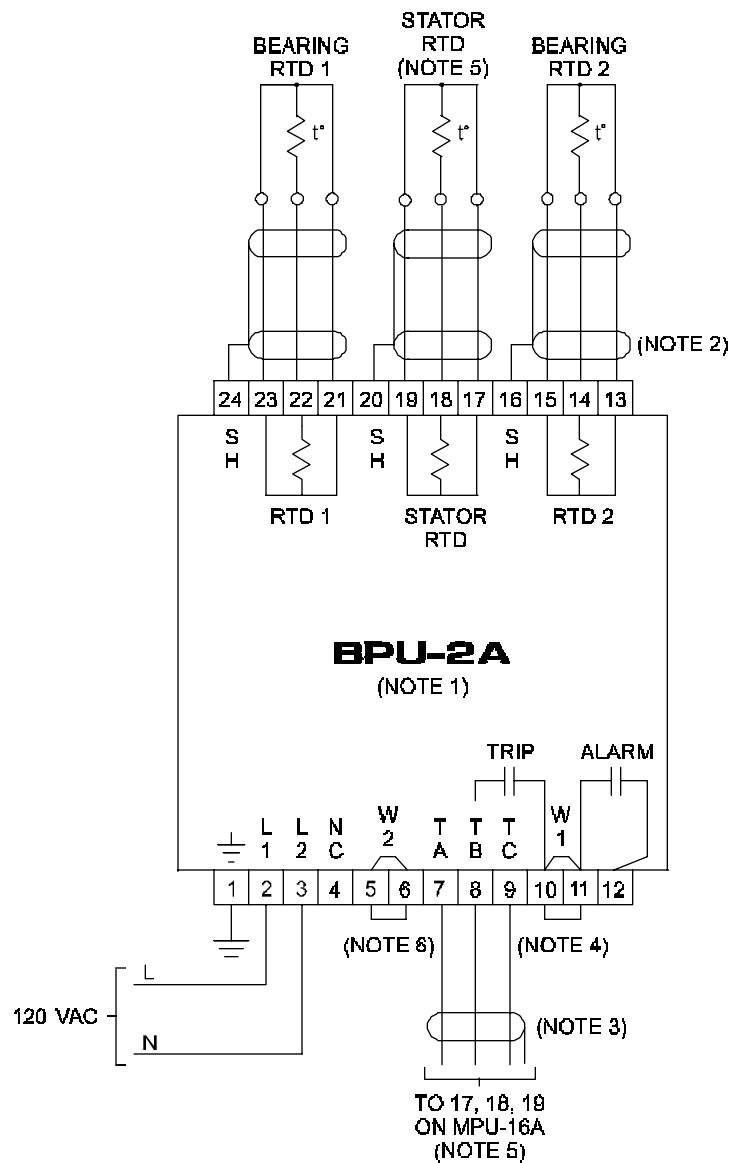
RTD Type ..... 100-Ω Platinum (DIN43760),  
100-Ω Nickel, or  
120-Ω Nickel.



## 5. ORDERING INFORMATION



Example: BPU-2A-P12-00 specifies a panel-mount BPU-2A Bearing Protection Unit with a 120-Vac supply.

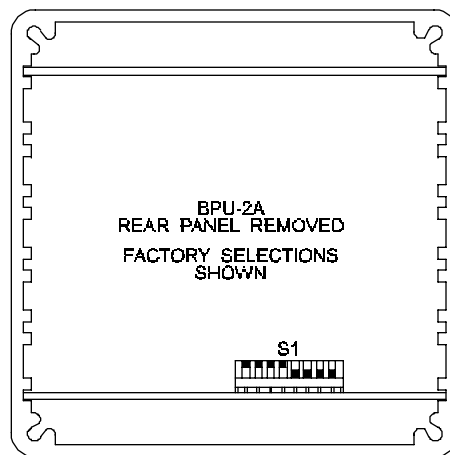
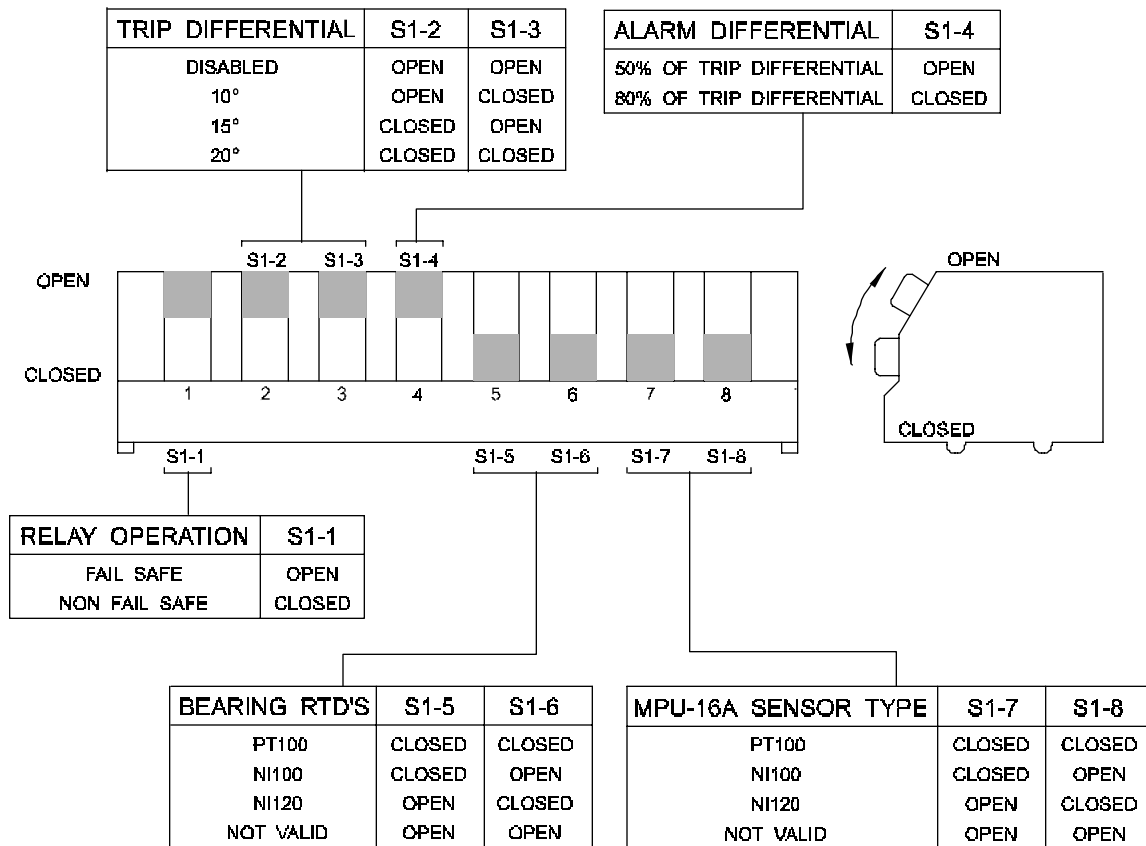


**NOTES:**

1. SURFACE-MOUNT CONFIGURATION SHOWN.
2. GROUND RTD CABLE SHIELDS AT BPU-2A ONLY.
3. GROUND CABLE SHIELD AT MPU-16A ONLY.
4. REMOVE W1 FOR STAND-ALONE OPERATION.
5. DO NOT CONNECT FOR STAND-ALONE OPERATION.
6. REMOVE W2 FOR LATCHING OPERATION.

**BPU-2A TYPICAL APPLICATION**

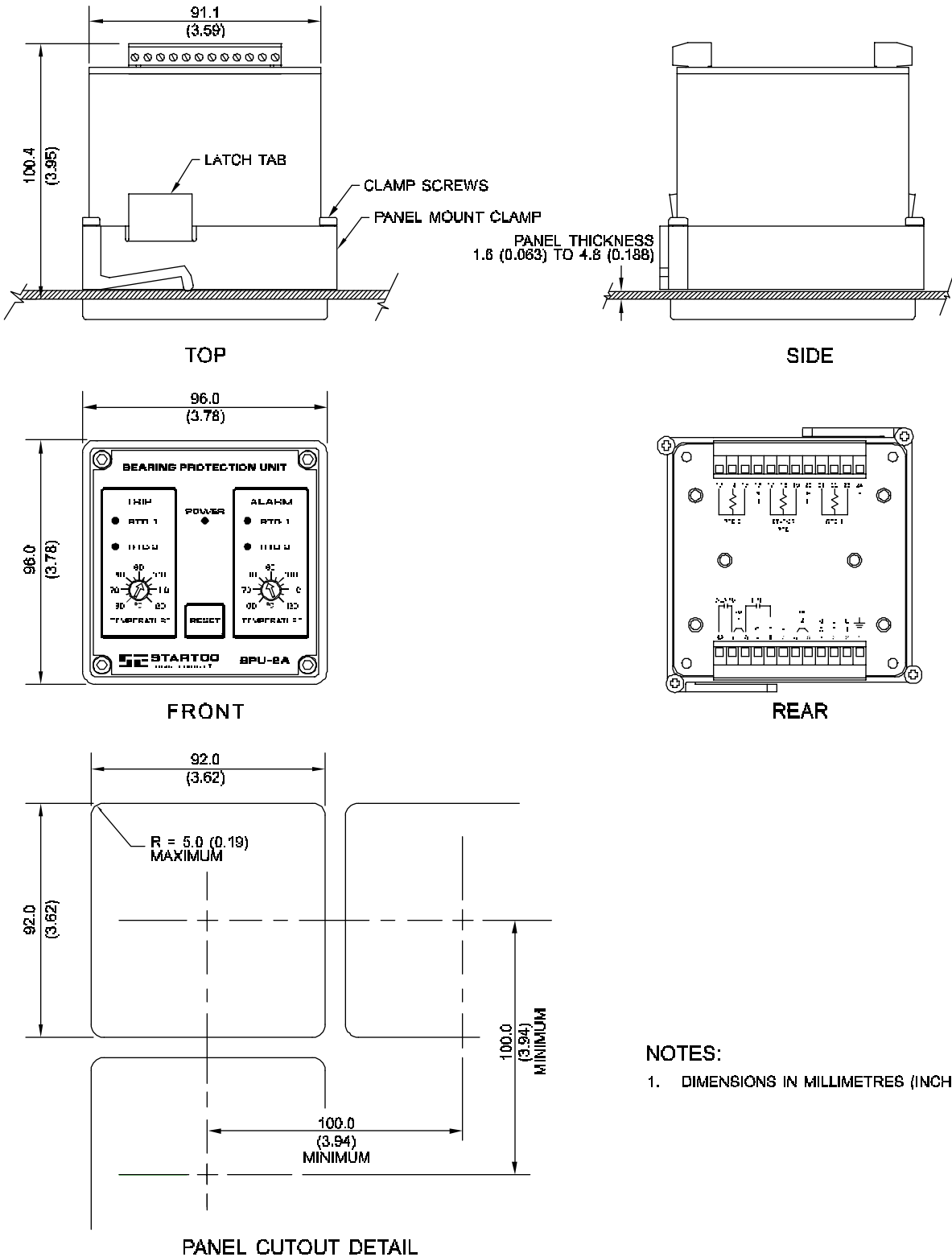
**FIGURE 1**



SWITCH LOCATION

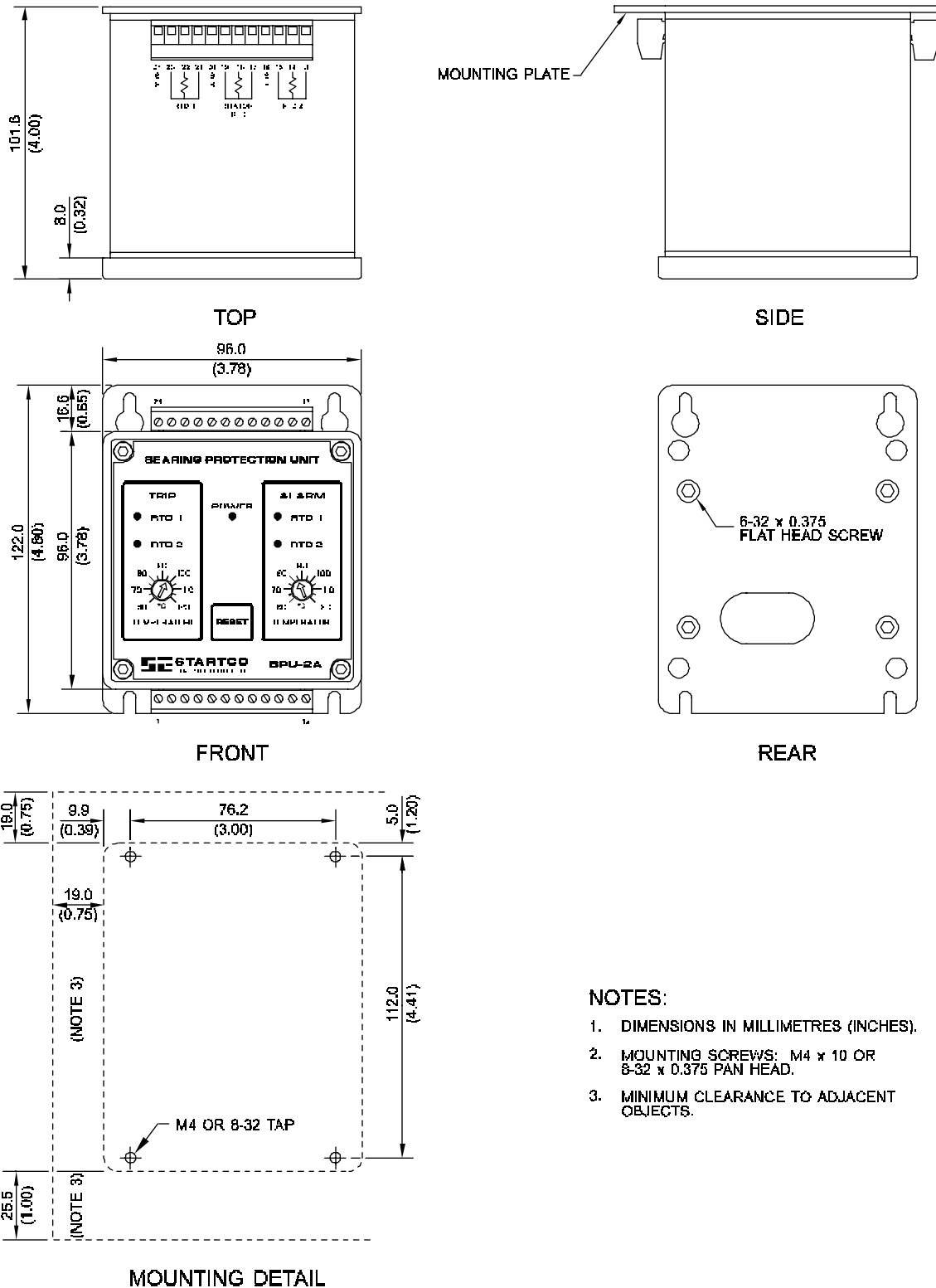
**BPU-2A CONFIGURATION**

**FIGURE 2**



**PANEL-MOUNT BPU-2A OUTLINE AND MOUNTING DETAILS**

**FIGURE 3**



- NOTES:**
1. DIMENSIONS IN MILLIMETRES (INCHES).
  2. MOUNTING SCREWS: M4 x 10 OR 8-32 x 0.375 PAN HEAD.
  3. MINIMUM CLEARANCE TO ADJACENT OBJECTS.

**SURFACE-MOUNT BPU-2A OUTLINE AND MOUNTING DETAILS**

**FIGURE 4**