BALDOR®
MOTORS AND DRIVES

SIGNAL ISOLATOR

Accessory for BC204 Regenerative Drive

Installation and Operating Manual

4/2000

MN1387

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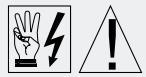
i.  SAFETY WARNING! Please read carefully:

Be sure to follow all instructions carefully. Fire and/or electrocution can result due to improper use of this product.

This product should be installed and serviced by a qualified technician, electrician, or electrical maintenance person familiar with its operation and the hazard involved. Proper installation, which includes wiring, mounting in proper enclosure, fusing or other over current protection and grounding, can reduce the chance of electric shocks, fires, or explosion in this product or products used with this product, such as electric motors, switches, coils, solenoids, and relays. Eye protection must be worn and insulated adjustment tools must be used when working with control under power. This product is constructed of materials (plastics, metals, carbon, silicon, etc.) Which may be a potential hazard. Proper shielding, grounding, and filtering of this product can reduce the emission of radio frequency interference (RFI) which may adversely affect sensitive electronic equipment. If information is required on this product, contact our factory. It is the responsibility of the equipment manufacturer and individual installer to supply this safety warning to the ultimate user of this product. (SW effective 11/92)

This control contains electronic start/stop and enable circuits that can be used to start and stop the control. However, these circuits are never to be used as safety disconnects since they are not fail-safe. Use only the AC line for this purpose.

CE This product complies with all CE directives pertinent at the time of manufacture. Contact factory for detailed installation instructions and Declaration of Conformity.

I. INTRODUCTION

Thank you for purchasing the BC215 Bipolar Signal Isolator. Baldor is committed to providing total customer satisfaction by producing quality products that are easy to install and operate. The BC215 is manufactured with surface mount components incorporating advanced circuitry and technology.

The BC215 provides input isolation and is used to isolate, amplify, and condition DC voltage signals from any external source (power supplies, motors, tachometer generators, transducers, and potentiometers). The isolated output voltage of the BC215 provides input signals to the BC204 Regenerative Drive. In also provides isolation for motor direction switching and an isolated power supply for transducer or potentiometer operation. The PWR LED provides indication that power is applied.

All input connections (+15, -15, SIG, COM, and EN) are made via a barrier terminal block and are isolated from AC line and motor wiring.

The BC215 is factory calibrated to accept a signal input voltage of -10V to +10V DC. OFFSET and MAX trimpots are provided in order to recalibrate the BC215 for specific applications.

FIGURE 1 – CONTROL LAYOUT

(Illustrates Factory Setting of Jumpers and Approximate Trimpot Settings)

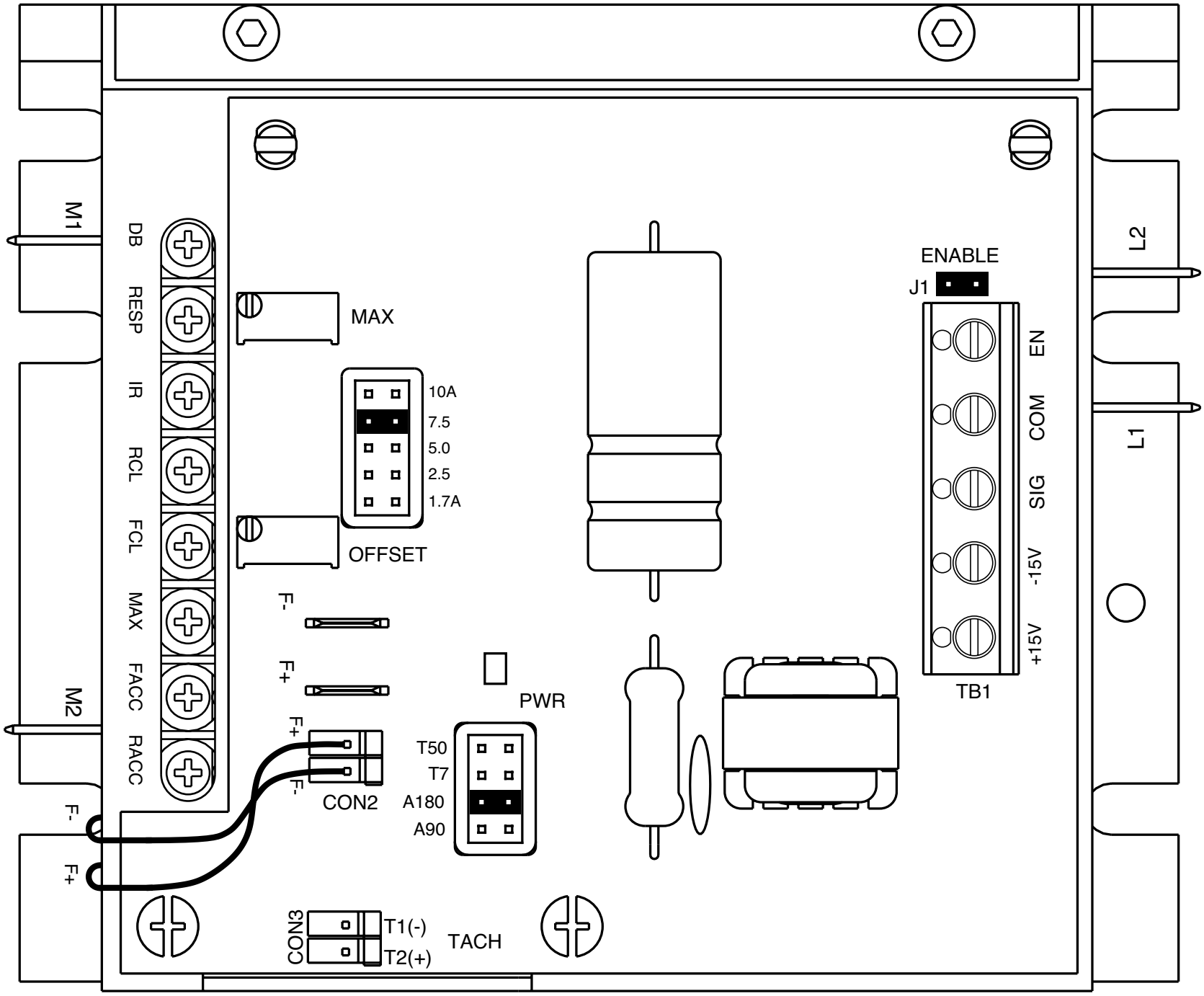


FIGURE 2A – MECHANICAL SPECIFICATIONS (INCHES / mm)
(Shown Mounted onto BC204)

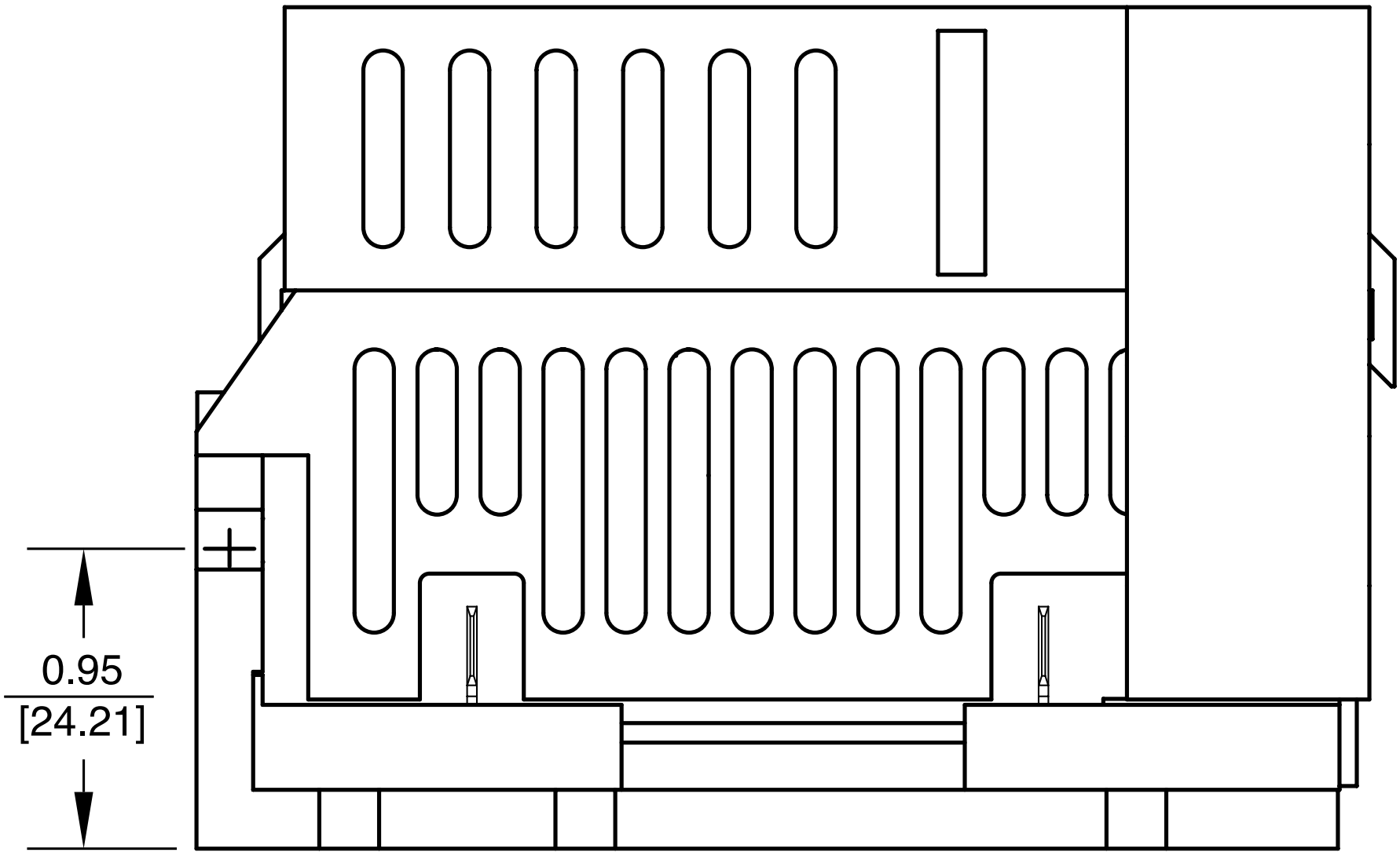


FIGURE 2B – MECHANICAL SPECIFICATIONS (INCHES / mm)

(Shown Mounted onto BC204)

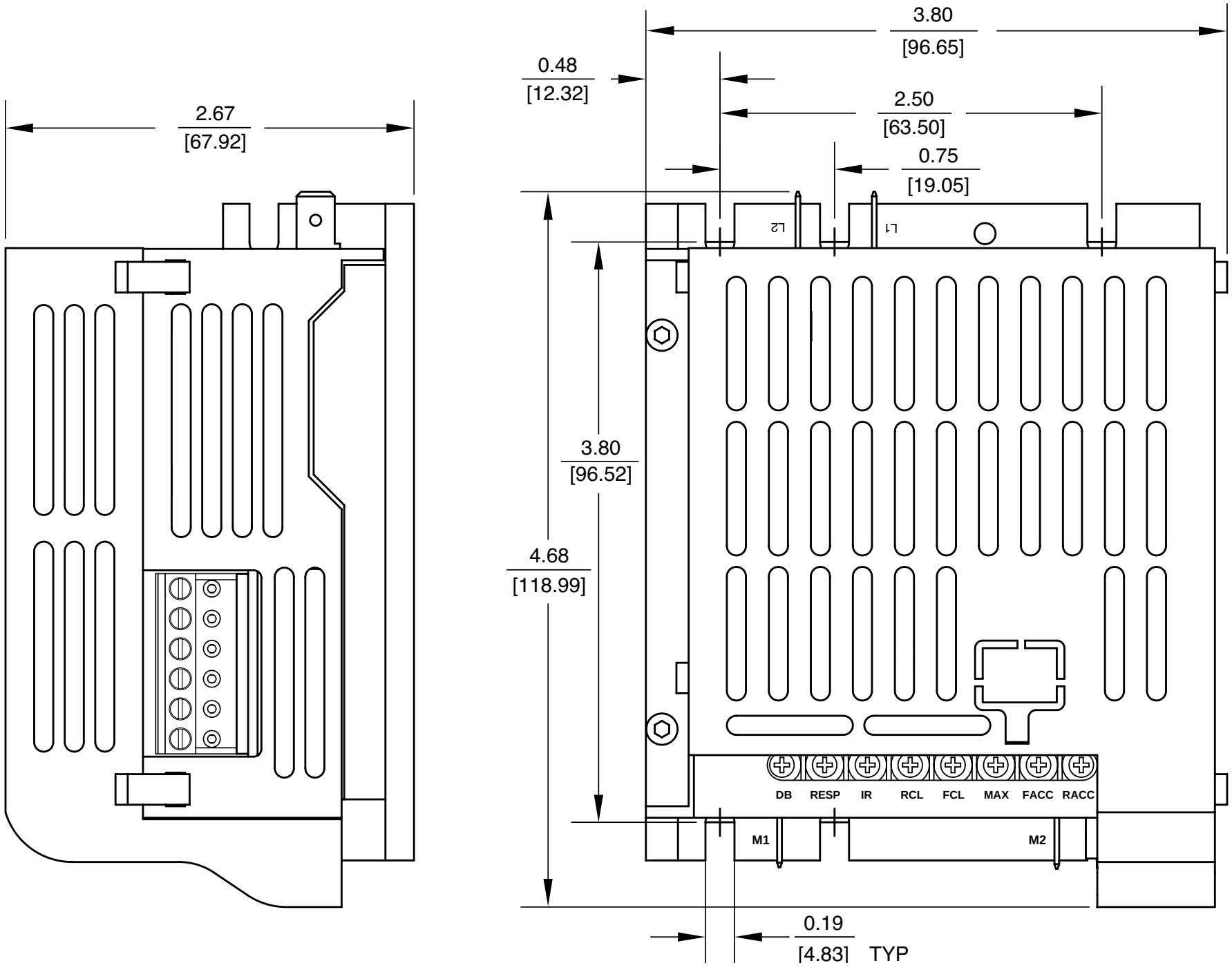
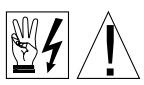


TABLE 1 – GENERAL PERFORMANCE SPECIFICATIONS

Parameter	Specification	Factory Setting
Voltage Following Input Range (V DC)	± 5 to ± 25	-10 to +10
Potentiometer Operation (kΩ)	5	—
OFFSET Trimpot Range (with 0V DC Input) (% Speed)	± 50	0
MAX Trimpot Range (with 10V DC Input) (% Speed)	0 – 110	100
+15V DC and -15V DC Power Supply Max. Current Rating (mA DC)	25	—
Forward, Reverse, and Enable Input Switch Types	Dry Contact or Open Collector	—
Input/Output Linearity (%)	0.1	—
Thermal Drift (mV/ ºC)	0.4	—
Ambient Operating Temperature Range (ºC)	0 – 50	—

II. INSTALLATION INSTRUCTIONS: Mounting the BC215 onto the BC204

See figure 3 on page 7. **Note:** This figure is also supplied as a separate drawing.



Warning! Make sure all power is disconnected from the BC204 before proceeding.

A. Removing the BC204 Finger-Safe Cover

If a finger-safe cover is not installed on the BC204, proceed to section IIC (Modifying the BC204 Finger-Safe cover). If a finger-safe cover is installed on the BC204, remove the two (2) socket head 5-40 X 5/16” screws located at the rear of the BC204 using the supplied 3/32” hex key. Also, remove the two (2) 6-32 X 1-3/4” screws located on either side of terminal block TB1. See figure 4 on page 8.

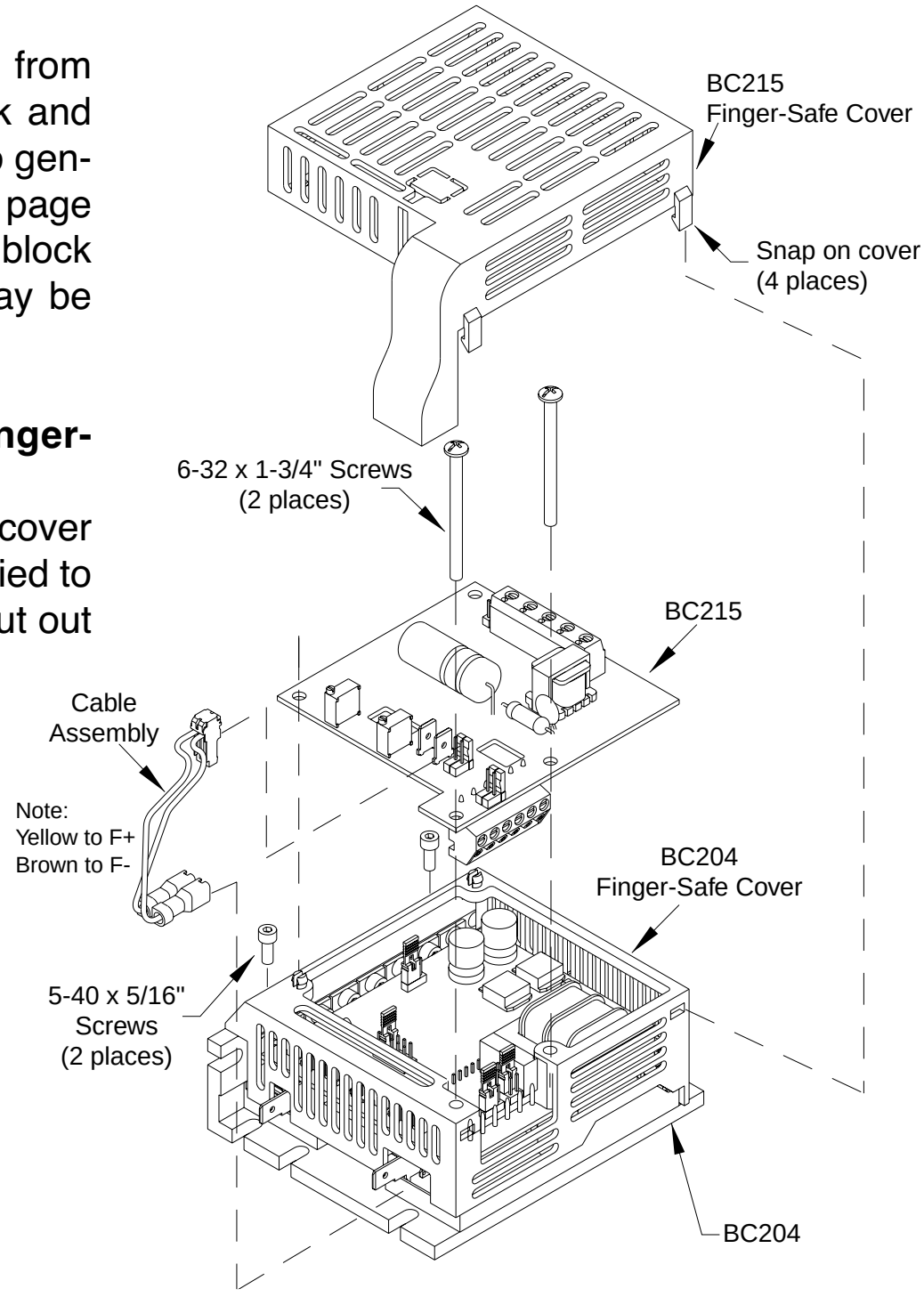
B. Removing Terminal Block TB1 from the BC204

Remove terminal block TB1 from the BC204 by rocking it back and forth or using a screwdriver to gently pry it off. See figure 5 on page 9. The removed terminal block TB1 will not be used and may be discarded.

C. Modifying the BC204 Finger-Safe Cover

Once the BC204 finger-safe cover is removed, it has to be modified to accommodate the BC215. Cut out the finger-safe cover panel at seven (7) places as shown in figure 6 on page 9. (Note: Some finger-safe covers may already have the panel removed.) To access the field terminals (F+ and F- on the BC204) cut out the field tab of the BC204 finger-safe cover at three (3) places as shown in figure 7 on page 9.

FIGURE 3 – BC204/BC215 ASSEMBLY DIAGRAM



D. Installing the BC204 Finger-Safe Cover

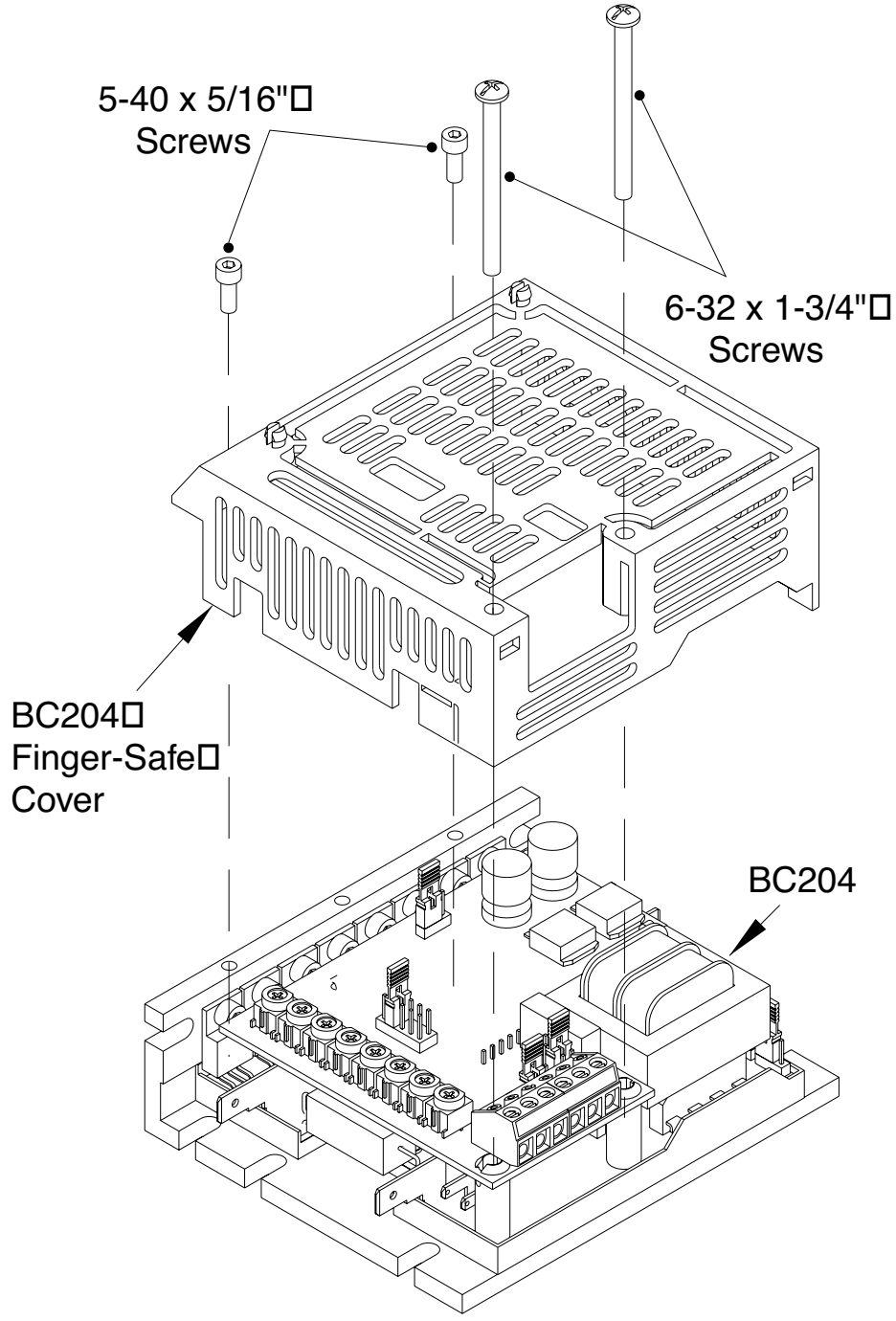
Once the BC204 finger-safe cover has been modified, it can be installed onto the BC204. Initially, use only the two (2) 5-40 X 5/16” socket head screws, using the supplied 3/32” hex key. Do not over tighten these screws or damage may result to the BC204 finger-safe cover.

Note: All jumpers on the BC204 must be set to their appropriate positions before installing the BC204 finger-safe cover.

E. Installing the BC215 onto the BC204

The terminal block located on the bottom of the BC215 plugs onto the six (6) header pins where TB1 was removed from the BC204. The two holes on the back of the BC215 snap onto the finger-safe cover.

FIGURE 4 – REMOVING THE BC204 FINGER-SAFE COVER



Use the two (2) 6-32 X 1-3/4" screws previously removed to secure the BC215 to the BC204. Do not over tighten these screws or damage may result to the BC215 and BC204. See figure 3 on page 7.

FIGURE 5 – REMOVING TERMINAL BLOCK TB1

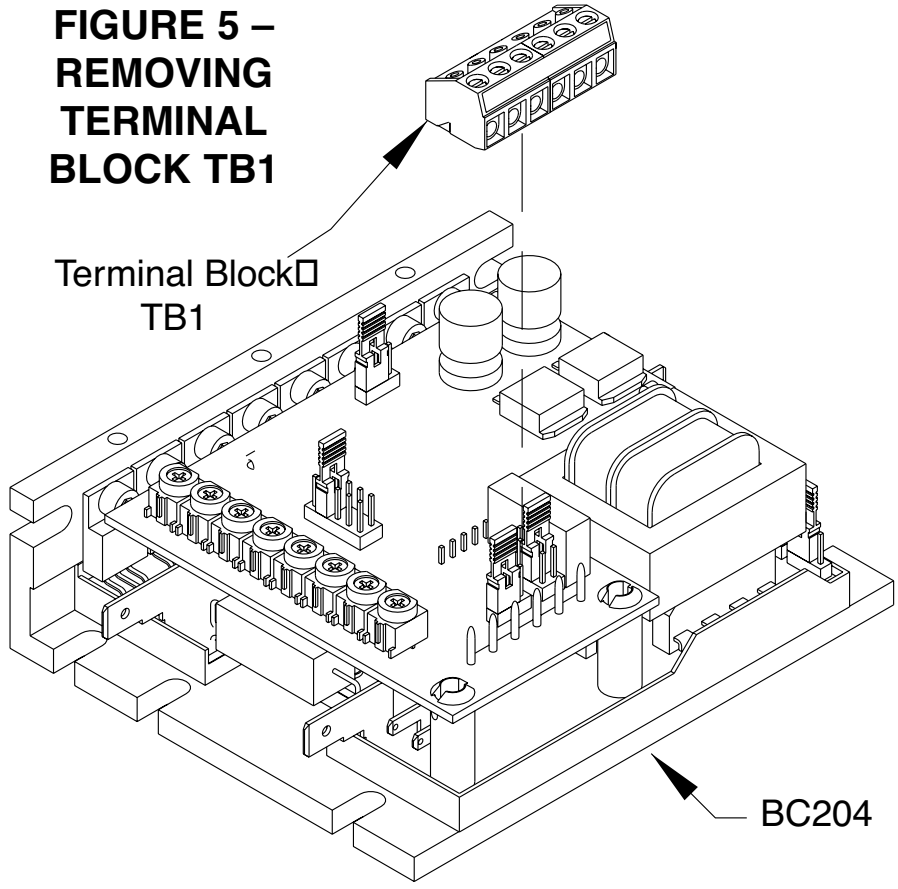
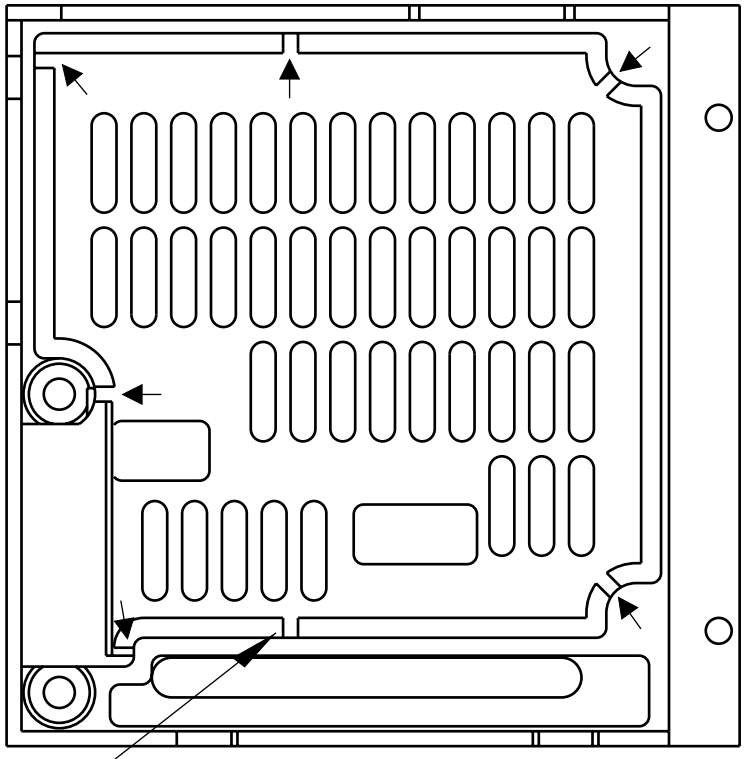
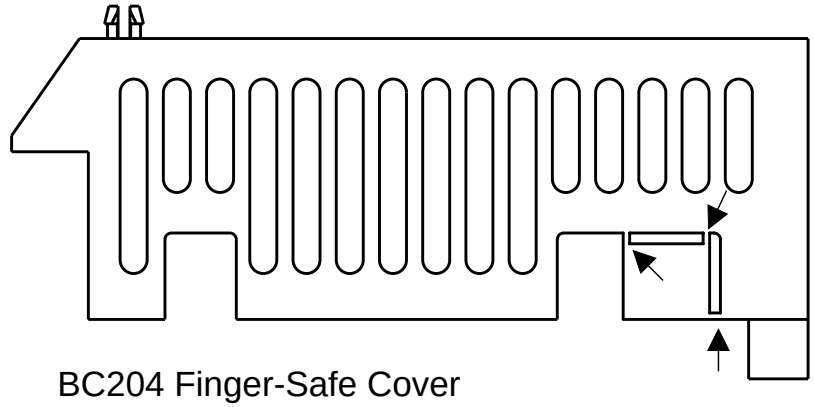


FIGURE 6 – REMOVING THE BC204 FINGER-SAFE COVER PANEL



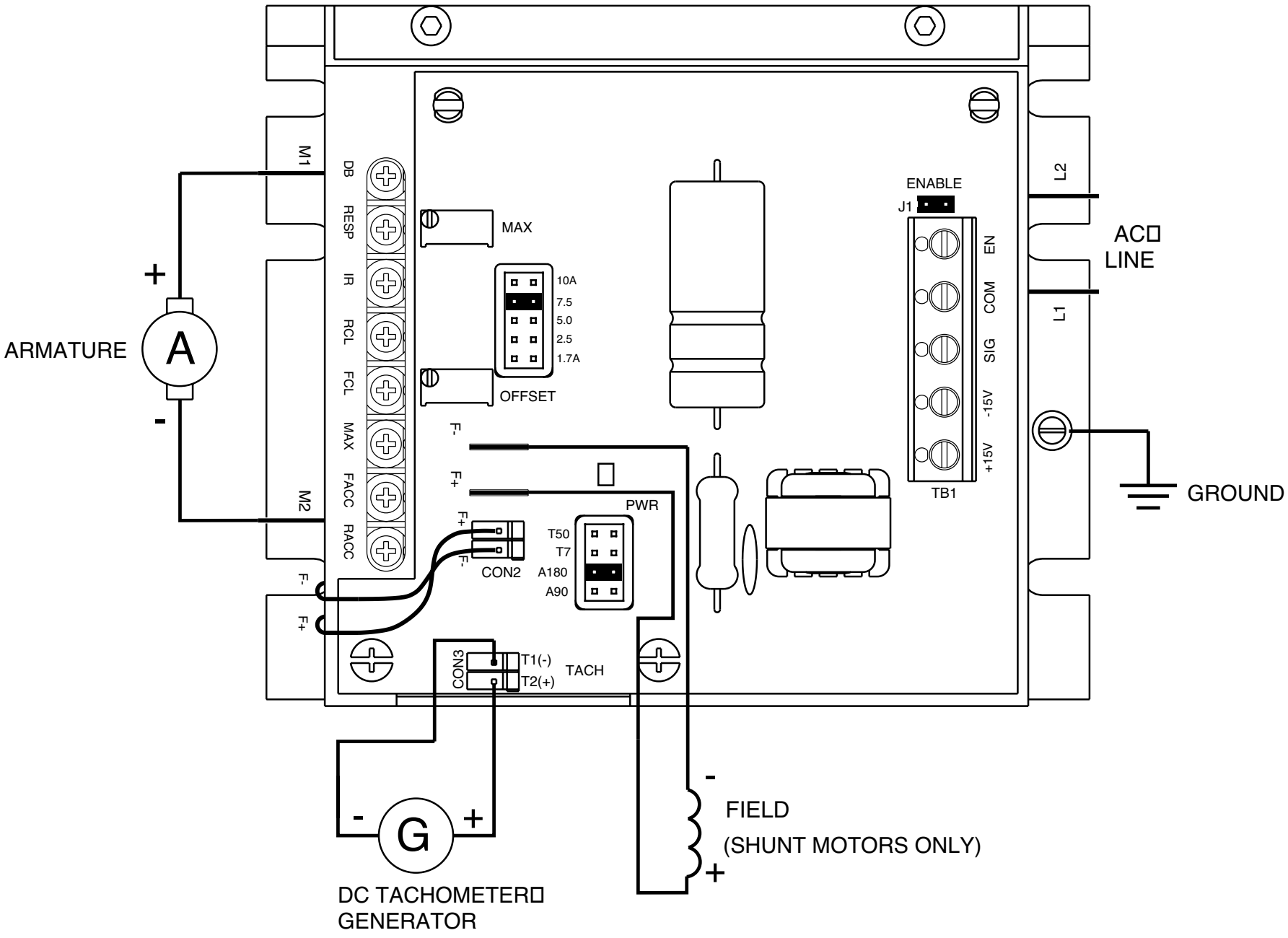
BC204 Finger-Safe Cover
Remove Panel (cut 7 places) to Install BC215.

FIGURE 7 – REMOVING THE BC204 FINGER-SAFE FIELD TAB



BC204 Finger-Safe Cover
Remove Tab (cut 3 places) to Access Field Terminals.

FIGURE 8 – CONNECTION DIAGRAM

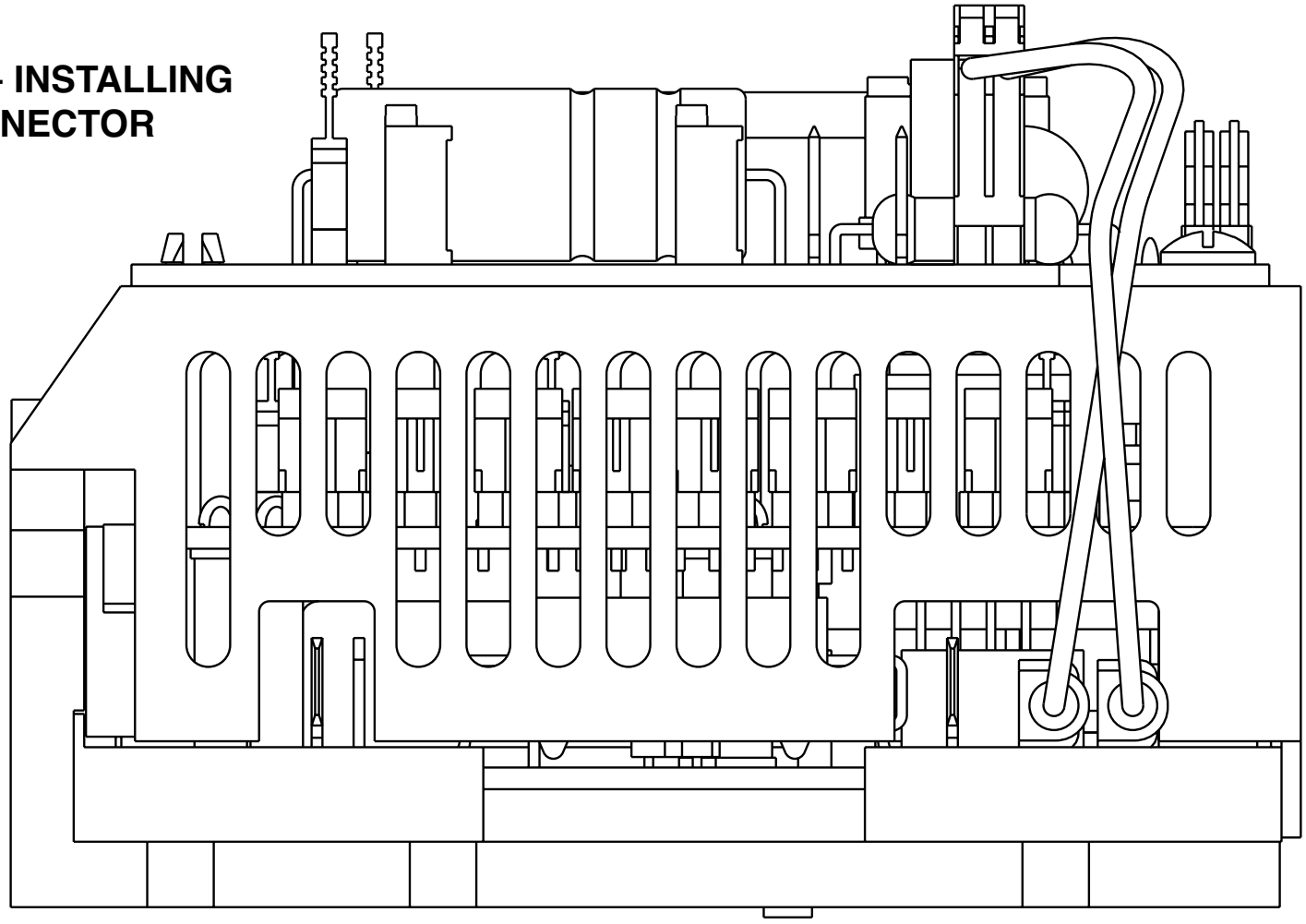


F. Wiring the BC215 to the BC204

See figure 8 on page 10.

The BC215 is powered from the BC204 with a connector that is installed from the BC215 CON2 to the BC204 F+ and F- terminals. The yellow wire connects to the BC204 F+ terminal and the brown wire connects to the BC204 F- terminal. When the field connector is properly installed the wires should cross over each other. See figure 9. If the connector is wired incorrectly, the BC215 PWR LED will not illuminate and the control will not operate. **Note:** It is recommended that these wires be twisted at least three (3) times to help reduce noise.

FIGURE 9 – INSTALLING FIELD CONNECTOR



III. Connections to the BC215

Safety Warning! Do not use FWD-STOP-REV contacts as a safety disconnect since they are not fail-safe. Use only the AC line for this purpose.

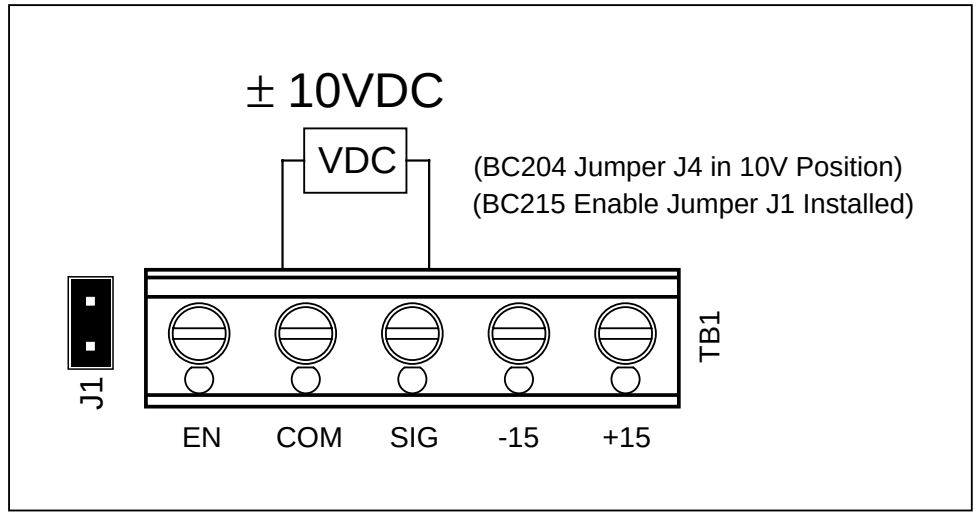
Note: BC215 Enable jumper J1 must be installed, or a connection must be made between EN and COM terminals of BC215 TB1 in order for the BC204 to operate.

TABLE 2 – TERMINAL BLOCK (TB1) WIRING INFORMATION

Connection Designation	Supply Wire Gauge (AWG – Cu)		Maximum Tightening Torque (in-lbs)
	Minimum	Maximum	
Logic Connections	24	14	3.5

A. Voltage Following – Uses a voltage source to vary motor speed. See figure 10. Connect the voltage source to TB1 terminals SIG and COM. When a 0V DC signal is applied, the control will operate at the minimum set speed (set by the OFFSET trimpot on the BC215). When a 10V DC signal is applied, the motor will operate at the maximum set speed (set by the MAX trimpot on the BC215).

FIGURE 10 – VOLTAGE FOLLOWING CONNECTION

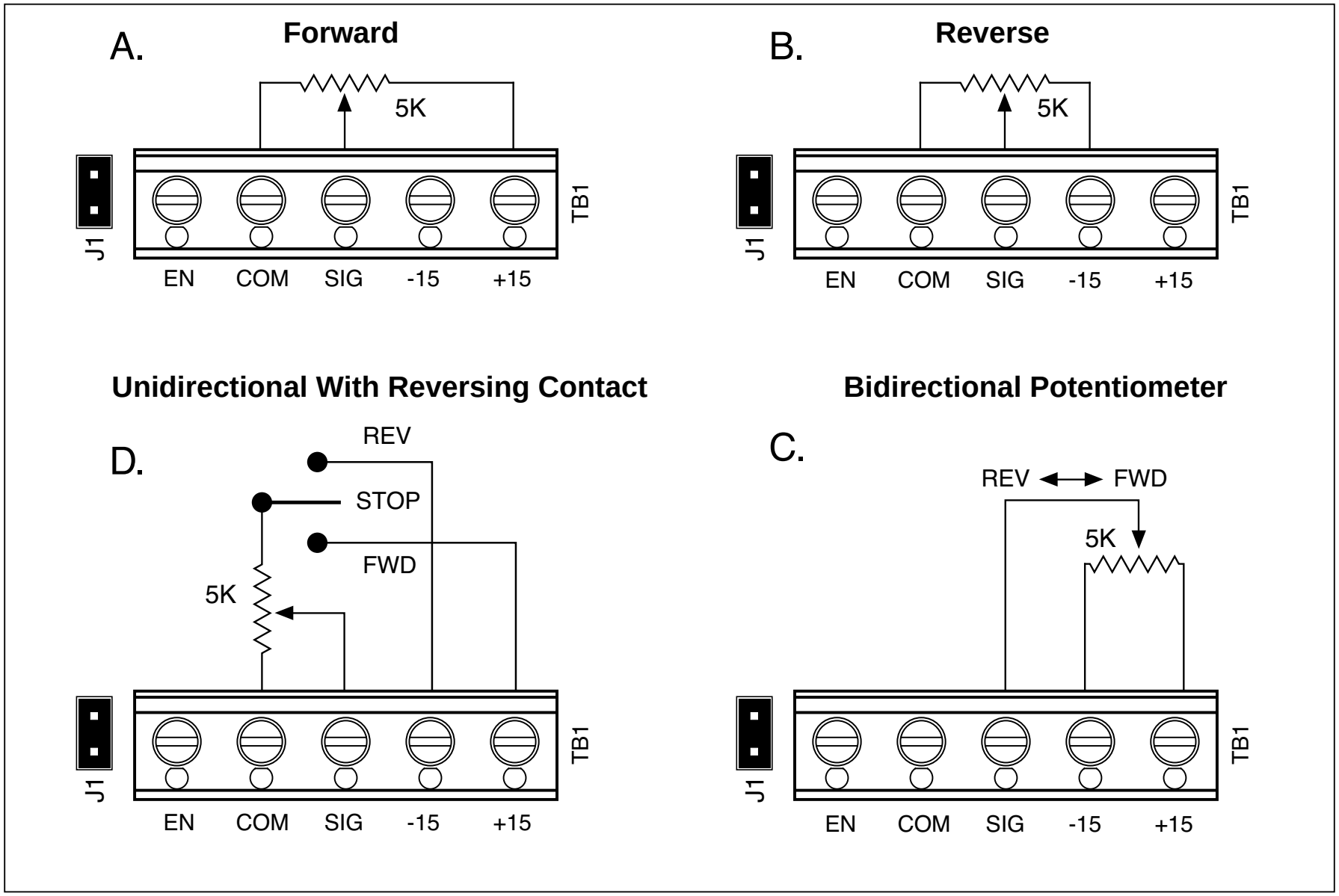


Applying a positive (+) signal to SIG terminal, with respect to COM terminal, will operate the motor in the forward direction.

Applying a negative (-) signal to SIG terminal, with respect to COM terminal, will operate the motor in the reverse direction.

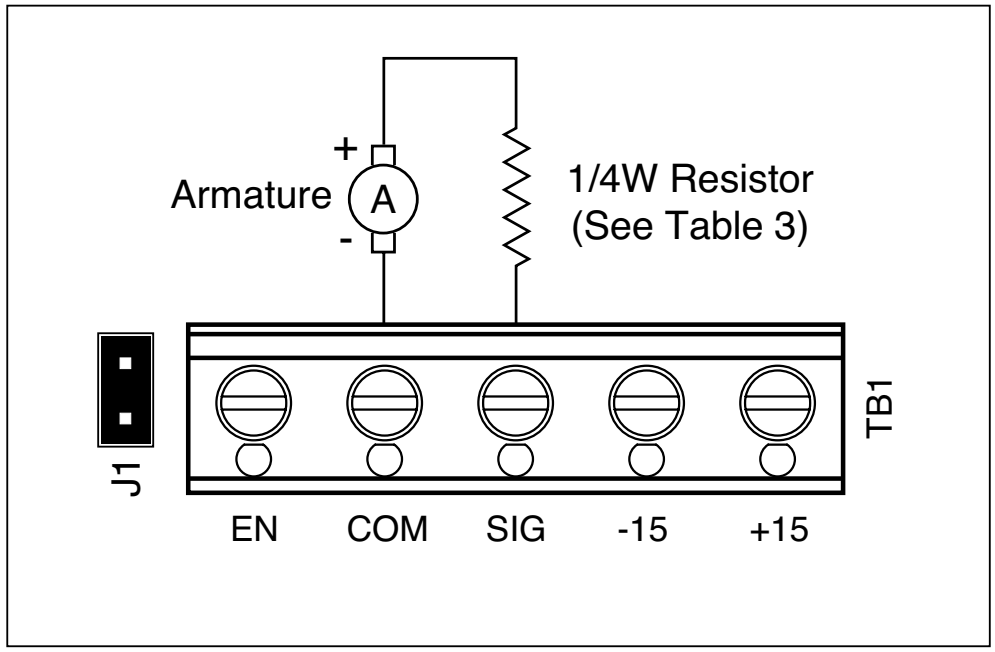
FIGURE 11 – MAIN SPEED POTENTIOMETER CONNECTIONS

(BC204 Jumper J4 in 15V Position, BC215 Enable Jumper J1 Installed)



B. Signal Following from Armature Voltage – Uses motor armature voltage as a signal input. If the signal input voltage applied to the BC215 is derived from a motor armature voltage output, it is necessary to install a 1/4W resistor in series with the signal lead into the BC215. For a 90V DC motor, install a 150K resistor. for a 180V DC motor, install a 330K resistor.

FIGURE 12 – SIGNAL FOLLOWING FROM ARMATURE VOLTAGE



C. Unidirectional Potentiometer Operation (Forward) – Uses a potentiometer to vary motor speed. See figure 11A on page 13. Connect the 5K potentiometer to TB1 terminals marked “SIG” (wiper of potentiometer), “+15V” (high side of potentiometer), and “COM” (low side of potentiometer). Use the potentiometer to vary motor speed. If the motor is not running in the desired direction, either reconnect the high side of the potentiometer to TB1 terminal marked “-15V” or reverse the motor leads.

TABLE 3 – RESISTOR FOR SIGNAL FOLLOWING FROM ARMATURE VOLTAGE

Armature Voltage Range (VDC)	1/4W Resistor (Ω)
0 – ± 90	150K
0 – ± 180	330K

D. Unidirectional Potentiometer Operation (Reverse) – Uses a potentiometer to vary motor speed. See figure 11B on page 13. Connect the 5K potentiometer to TB1 terminals marked “SIG” (wiper of potentiometer), “-15V” (high side of potentiometer), and “COM” (low side of potentiometer). Use the potentiometer to vary motor speed and the switching device to select motor direction. If the motor is not running in the desired direction, either reconnect the high side of the potentiometer to TB1 terminal marked “+15V” or reverse the motor leads.

E. Bidirectional Potentiometer Operation – Uses a potentiometer to vary motor speed and direction. See figure 11C on page 13. Connect the 5K potentiometer to TB1 terminals marked “SIG” (wiper of potentiometer), “+15V” (high side of potentiometer), and “-15V” (low side of potentiometer). Use the potentiometer to vary motor speed and direction.

When the potentiometer is in the center position, the control output can be set to zero, using the OFFSET trimpot. Rotating the trimpot clockwise will cause the motor to rotate in the forward direction. Rotating the potentiometer counterclockwise will cause the motor to rotate in the reverse direction.

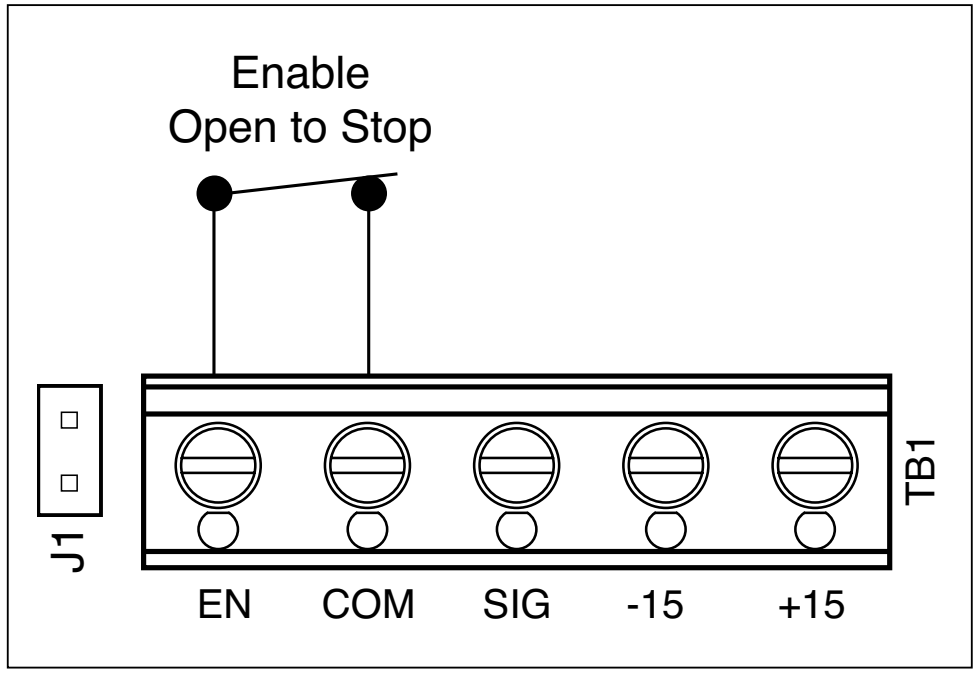
F. Unidirectional Potentiometer with Reversing Contacts – Uses a potentiometer to vary motor speed. See figure 11D on page 13. Connect the 5K potentiometer to TB1 terminals marked “SIG” (wiper of potentiometer), “+15V” (high side of potentiometer), and “COM” (low side of potentiometer). Use the potentiometer to vary motor speed and the switching device to select motor direction. When the potentiometer is set to 0% (fully counterclockwise), the motor will operate at the minimum set speed (set by the OFFSET trimpot on the BC215). When the potentiometer is set to 100% (fully clockwise) the motor will operate at full speed (set by the MAX trimpot on the BC215).

G. Enable Switch Connection

Safety Warning! Do not use Enable or Start/Stop contacts as a safety disconnect since they are not fail-safe. Use only the AC line for this purpose. See figure 13.

If a Start/Stop function is required, remove BC215 Enable jumper J1 and wire a switch to EN and COM terminals of BC215 TB1. When the switch is opened, the control will stop. When the switch is closed, the control will operate.

FIGURE 13 – ENABLE SWITCH CONNECTION
(BC215 Enable Jumper J1 Removed)



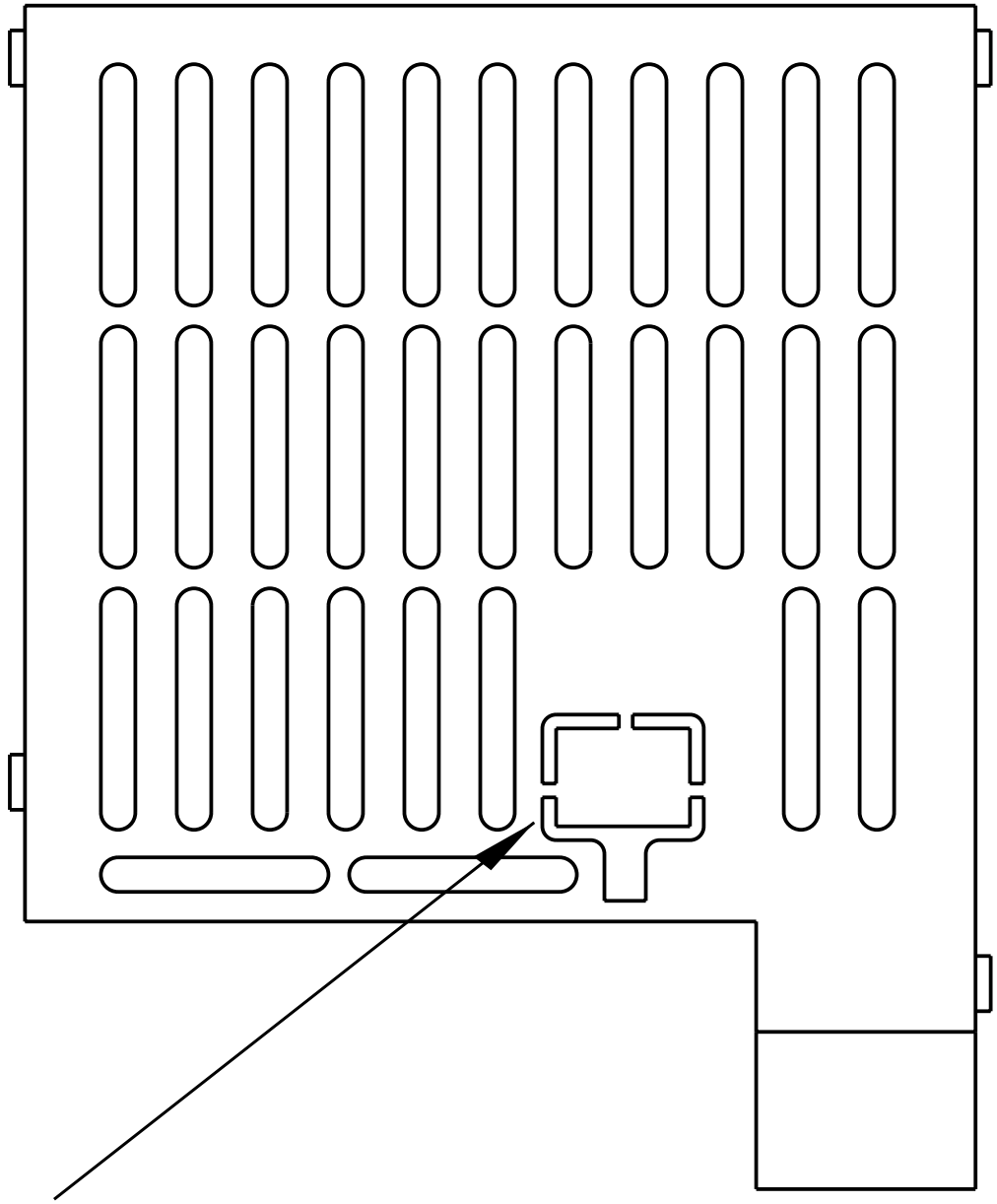
H. Tachometer Generator Connection

See figure 8 on page 10. To wire a 7V or 50V per 1000RPM tachometer generator to the BC215, connect the positive (+) side of the tachometer generator to terminal "T2" and the negative (-) side of the tachometer generator to terminal "T1" of the BC215. **Note:** If the positive (+) and negative (-) tachometer generator connections are not connected as described above, the motor will run at full speed only.

I. Motor Field Connection

If a shunt wound motor is used, the motor field wires connect to F+ and F- terminals on the BC215. To access these terminals, cut out the field tab of the BC215 finger-safe cover at three (3) places as shown in figure 14 on page 17.

FIGURE 14 – REMOVING THE BC215 FINGER-SAFE COVER FIELD TAB



BC215 Finger-Safe Cover
Cut Out Tab (3 Places) to Access Field Terminals.
(For Shunt Wound Motors Only.)

IV. CALIBRATION PROCEDURE

(See **Safety Warning, on page 1**)

The BC215 is factory calibrated, but readjustments to the OFFSET and MAX trimpots can be made to customize for a particular signal input requirement. It may be necessary to repeat the calibration steps to achieve accurate settings.

A. Unidirectional Voltage Following Calibration

See figure 10 on page 12.

1. Apply 0V DC input signal (or connect SIG and COM terminals).
2. Monitor the BC204 output and adjust the OFFSET trimpot on the BC215 for the desired minimum setting.
3. Apply the maximum voltage input signal.
4. Monitor the BC204 output voltage and adjust the MAX trimpot on the BC215 for the desired maximum setting.

B. Unidirectional Potentiometer Operation Calibration:

See figure 11A, B or C on page 13.

1. Set potentiometer to 0% rotation (fully counterclockwise).
2. Monitor the BC204 output and adjust the OFFSET trimpot on the BC215 for the desired minimum setting.
3. Set potentiometer to 100% rotation (fully clockwise).
4. Monitor the BC204 output voltage and adjust the MAX trimpot on the BC215 for the desired maximum setting.

V. INSTALLING the BC215 FINGER-SAFE COVER

After all adjustments and wiring have been completed on the BC204 and the BC215,

install the BC215 finger-safe cover onto the BC204 finger-safe cover by snapping the four (4) clips of the BC215 finger-safe cover into the four (4) slots of the BC204 finger-safe cover.

Note: Ensure that the yellow and brown field wires (from CON2 of the BC215 to F+ and F- terminals of the BC204) are within the shroud of the BC215 finger-safe cover. See figure 3 on page 7.

– NOTES –

– NOTES –

VI. LIMITED WARRANTY

For a period of 2 years from date of original purchase, BALDOR will repair or replace without charge controls which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. This warranty is in lieu of any other warranty or guarantee expressed or implied. BALDOR shall not be held responsible for any expense (including installation and removal), inconvenience, or consequential damage, including injury to any person, caused by items of our manufacture or sale. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply.) In any event, BALDOR's total liability, under all circumstances, shall not exceed the full purchase price of the control. Claims for purchase price refunds, repairs, or replacements must be referred to BALDOR with all pertinent data as to the defect, the date purchased, the task performed by the control, and the problem encountered. No liability is assumed for expendable items such as fuses.

Goods may be returned only with written notification including a BALDOR Return Authorization Number and any return shipments must be prepaid.

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MOTORS AND DRIVES

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