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# INSTRUCTION MANUAL

# TRAC-3™

## TENSION READOUT AND CONTROL

**For Control of Magnetic Particle Clutches & Brakes**

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850A136-1
1/03 REV. A

## 1. INTRODUCTION

The MAGPOWR TRAC-3 Tension Readout and Control is designed to measure and control the tension on any moving web. It may be used in unwind, rewind, or point-to-point tension control applications. A control system consists of a TRAC-3 controller, one or two MAGPOWR tension sensor(s), and a MAGPOWR 24 vdc or 90 vdc magnetic particle clutch or brake. The tension sensors can be located on any idler roll where the wrap angle of the web does not change.

## 2. INSTALLATION

Mount the TRAC-3 control in a protected enclosure with a temperature range of 0 to 40°C (32 to 104°F). See figure 3 for mounting dimensions.

## 3. CONNECTIONS

All control signal connections are made on terminal block TB1 per figure 4. Use shielded cable for all control signal connections. Separate all control signal wires from all AC wires. See appendix A for wiring guidelines.

Set switch SW1 for the appropriate AC voltage. Connect a single phase grounded AC power supply of either 115 or 230 vac, 50 / 60 Hz to terminals TB1.1 through TB1.3.

After installing the tension sensor(s) per the sensor instruction manual, connect the sensor cable(s) to the appropriate terminals, TB1.4 through TB1.7. For two sensor applications, wire the sensors in parallel (both green wires to TB1.6, both red wires to TB1.7, etc.).

Connect a 0 to 1 madc meter to terminals TB1.8 and TB1.9. After calibration, the meter will display the relative tension acting on the sensing roll.

Connect a 1 to 10 kohm Tension potentiometer to terminals TB1.10 through TB1.12, and connect a 1 to 10 kohm Manual Level potentiometer to terminals TB1.13 through TB1.15. The silkscreen arrows denote the direction of increasing Tension and Manual Level.

An internal control signal voltage source is provided for opto coupled inputs E-Stop, Run / Stop, Auto / Manual, and Tension On / Off. If you choose not to use the internal voltage source, and you want to electrically isolate the TRAC-3 from the control signal device, use an external 5 to 24 vdc voltage source. Set jumpers JP5 and JP6 to the appropriate positions.

The following inputs require a contact closure from the indicated terminal to the terminal TB1.20 marked COMMON. See wiring diagrams, figures 4 and 5.

| | |
|---|---|
| Run / Stop: | A Run / Stop switch must be connected to TB1.18 and TB1.20 for proper operation of the control. It activates the control's soft start and stop features. Open contact for Run, close contact for Stop. |
| Auto / Manual: | Open contact from TB1.17 to TB1.20 for Automatic operation, close contact for Manual operation |
| Tension On / Off: | Turns the clutch or brake "on" or "off". Open contact from TB1.16 to TB1.20 for Tension On, close contact for Tension Off. |
| E-Stop: | Commands full torque output at the initiation of an emergency stop. Open contact from TB1.19 to TB1.20 for E-Stop. |

For use of an external supply voltage and PLC interface, see interface wiring options in figure 5.

The clutch or brake connections are made on terminal block TB2 per figure 4.

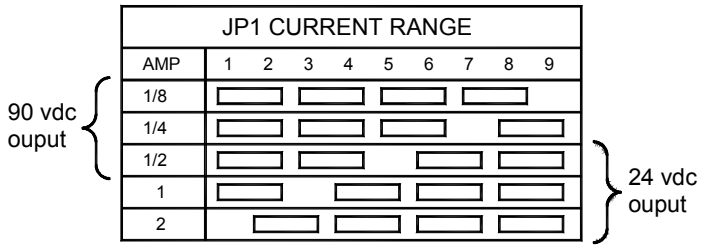
Set jumper JP3 to the appropriate voltage for the clutch or brake to be used, 24 vdc or 90 vdc. Refer to the clutch or brake nameplate for its voltage rating.

## 3. CONNECTIONS (Continued)

Connect a single phase AC power supply to TB2.101 and TB2.102 of the appropriate voltage, 28 to 36 vac for a 24 vdc clutch or brake, or 115 vac for a 90 vdc clutch or brake.

Connect the brake or clutch to terminals TB2.103 and TB2.104.

Set the jumpers on JP1 to the appropriate range for the clutch or brake to be used. Refer to the clutch or brake instruction manual or the catalog for the correct current range.




JP1 Jumper Settings
Figure 1

For applications which require a reverse acting output, set jumper JP2 to REV.

## 4. MANUAL OPERATION

An Auto / Manual switch may be used to select Automatic or Manual operating mode. In Manual mode the TRAC-3 is a current regulated power supply. CW (clockwise) rotation of the Manual level potentiometer increases output.

## 5. CALIBRATION

Tension Sensor calibration is accomplished by two potentiometer adjustments, SENSOR ZERO and SENSOR GAIN. These are 22-turn potentiometers with clutches, so they cannot be damaged by full CW or CCW (counterclockwise) rotation.

The SENSOR ZERO adjustment is used to cancel the weight of the sensing roll so that the meter reads “0" with zero tension. Remove the web from the sensing roll. Adjust the SENSOR ZERO potentiometer until the 0 to 1madc Tension meter slightly moves off zero. Negative readings will not be indicated by the Tension meter.

The SENSOR GAIN adjustment is made with a known load on the sensing roll. The known force should be applied using a dead weight as shown below in figure 2. A temporary web must be threaded in the normal web path to insure the proper wrap angle. Adjust the SENSOR GAIN potentiometer to an appropriate Tension meter reading for the applied load.

In wide web applications, the known force should be applied at the center of the sensing roll using a narrow web or rope.

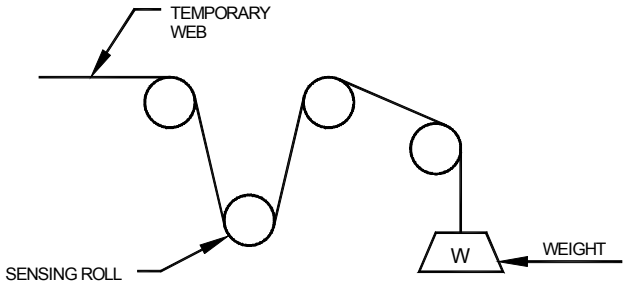



Figure 2: Temporary Calibration Web

## 6. STABILITY ADJUSTMENT

The stability control has been preset to its most stable position to insure that oscillations will not occur during the initial operation in Automatic mode. The TRAC-3 will therefore respond very slowly when the Automatic mode is first used.

For initial set-up, adjust:

| | | |
|---|---|---|
| STABILITY full CW | STOP TIME full CCW | STOP MULT full CCW |
| | START TIME full CCW | TAPER full CCW |

Operate the machine at a slow speed with the TRAC-3 in Manual mode using the Manual level potentiometer to obtain the desired web tension.

Set the Tension potentiometer to the setting that matches the Tension meter reading (1/4 rotation for 1/4 meter deflection, etc.).

Set the AUTO / MANUAL switch to AUTO.

The Tension level is now set by the Tension potentiometer. For rewinds using taper, the Tension potentiometer adjusts the core tension.

With the unwind / rewind near full roll, slowly rotate the STABILITY potentiometer CCW until oscillations occur, and then rotate CW until the oscillations stop. If oscillations do not occur with the potentiometer full CCW, leave it full CCW.

## 7. START / STOP ADJUSTMENTS

The Run / Stop switch initiates the soft start and stop features of the TRAC-3.

A signal indicating the beginning of a machine start must be provided to the TRAC-3 by opening the Run / Stop switch. The control will then provide a controlled soft start to prevent web breaks caused by slack in the web. The length of soft start time is adjusted using the START TIME potentiometer. CW adjustments increase the length of start time.

A signal indicating the beginning of a machine stop must be provided to the TRAC-3 by closing the Run / Stop switch. For unwind applications, the control may be adjusted to provide an inertia compensated increase in output to help stop the unwind roll. The level of increased output is adjusted using the stop multiplier, STOP MULT potentiometer. CW adjustment increases the level of stopping torque. This level is adjustable up to 5 times the normal operating level. The length of time the stop multiplier is applied is adjusted using the STOP TIME potentiometer. CW adjustment increases the length of time that the stopping torque is applied, which should be slightly longer than the actual machine stopping time.

After the STOP TIME has ended, the TRAC-3 output will change to the holding torque. CW adjustment of the HOLD TORQUE potentiometer increases the level of holding torque. In general, for unwind applications a holding torque level lower than the normal operating level is desirable, for rewind applications a holding torque level greater than the normal operating level is desirable, and for point-to-point applications a holding torque approximately equal to the normal operating level is desirable.

The HOLD light provides an indication of the TRAC-3 start / stop status:

| | | |
|---|---|---|
| HOLD light ON | indicates | TRAC-3 is in HOLD or MANUAL mode |
| HOLD light FLASHING | indicates | START or STOP function is operating |
| HOLD light FLASHING slowly. | indicates | EMERGENCY STOP is operating |
| HOLD light OFF | indicates | TRAC-3 is operating in AUTOMATIC mode |

## 8. OUTPUT OFFSET ADJUSTMENT (CORE OUTPUT ADJUSTMENT)

This control is adjusted at the factory for appropriate reverse current to minimize drag in the clutch or brake. OFFSET adjustment is not required or recommended.

When JP2 is set for Normal acting mode, OFFSET is adjusted by:
Set TENSION ON / OFF switch to OFF.
Adjust OFFSET potentiometer for desired minimum output at terminals TB2.103 and TB2.104.

When JP2 is set for Reverse acting mode, OFFSET is adjusted by:
Set AUTO / MANUAL switch to MANUAL.
Set TENSION ON / OFF switch to ON.
Set MANUAL potentiometer full CW.
Adjust OFFSET potentiometer for desired minimum output at terminals TB2.103 and TB2.104.

## 9. TAPER ADJUSTMENT (REWINDS ONLY)

Taper is used on rewinds to make the tension decrease as the roll diameter increases. Adjust TAPER potentiometer to get the required tension at full roll. A larger Taper % results in a larger decrease in tension. Taper % is increased by CW adjustment of the TAPER potentiometer.

## 10. SPECIFICATIONS

CONTROL:

| | |
|---|---|
| Input Power | 90 to 126 vac, or 180 to 252 vac, 50 / 60 Hz, 24 vac |
| Tension Sensor Excitation | 10 vdc |
| Sensor Input | 0 to 21 mvdc (one or two 350 ohm full bridges) |
| Tension Meter Output | 0 to 1 madc |
| Zero Adjust | 50% of sensor rating |
| Gain Adjust Range | 8 to 1 |
| Stop Time | 60 seconds maximum |
| Start Time | 60 seconds maximum |
| Stop Multiplier | 5:1 maximum |
| Taper | 0 to 100 % |

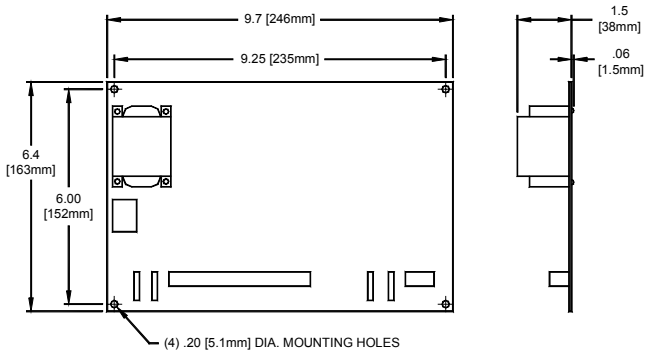
POWER AMP:

| | |
|---|---|
| Input Power | 115 vac ± 10%, 50/60 Hz, 0.5 amp for 90 vdc output<br>or 28 to36 vac, 50 / 60 Hz, 2 amp for 24 vdc output |
| Output | 90 vdc, 1/2 adc maximum<br>or 24 vdc, 2 adc maximum |

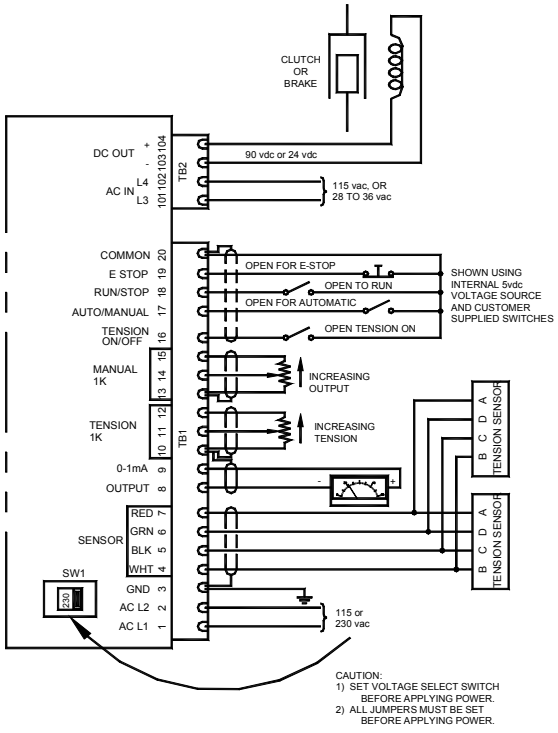
| | |
|---|---|
| Operating Temperature | 0°C to +40°C |
| Storage Temperature | -30°C to +65°C |

## 11. TRAC-3 ACCESSORY PARTS LIST

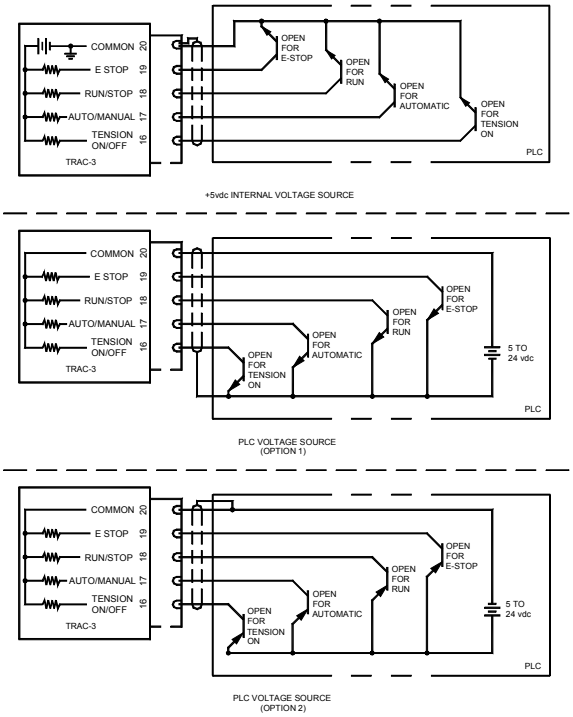
| MODEL NO. | DESCRIPTION |
|---|---|
| 9A22-1 | Meter, Analog (0-100% Tension), 4.5 in (114 mm) x 5.75 in (146 mm) face |
| 1KPOT | Potentiometer; Tension, Manual |
| SC-15 | Sensor Cable, 15 ft (4.572 m) |
| SC-20 | Sensor Cable, 20 ft (6.096 m) |
| 18B17-1 | Transformer, 100 / 115 / 200 / 230 vac input, 36 vac output |




TRAC-3 Outline Dimensions
Figure 3




TRAC-3 Wiring Diagram
Figure 4




PLC to TRAC-3 Interface
Figure 5

# APPENDIX A

## Wiring Guidelines

For wiring guidelines, refer to the IEEE Standard No. 518-1982, available from IEEE, Inc. 345 East 47th Street, New York, NY 10017 USA. All wiring must conform to local codes and practices.

Noise Sources

- Switches and relay contacts operating inductive loads such as motors, coils, solenoids, and relays, etc.
- Thyristors or other semiconductor devices which are not zero crossover-fired (randomly-fired or phase angle-fired devices).
- All welding machinery and heavy current carrying conductors.
- Fluorescent and neon lights.

Avoiding Noise Sensitivity

- Physical separation and wire routing must be given careful consideration in planning the installation. For example, ac power supply wires should be bundled together and must be kept physically separate from control signal wires, like sensor cables. A 12" (305 mm) minimum separation is usually effective. Cross all wires at 90□ angles whenever crossing wires is unavoidable.

- Identify and locate electrical noise sources such as solenoids, relay contacts, motors, etc. Route the wire bundles and cables as far away as possible from these noise sources. Do not mount relays or switching devices close to a microprocessor control. Do not install phase angle-fired devices in the same electrical enclosure or on the same power line with a microprocessor control.

- Shielded cables must be used for all controller signal wires to protect from electromagnetic noise. Also:
  - Run low level signal wires and shields unbroken from signal source to the control circuit.
  - Connect the shield to the control circuit common at one end only. The tension sensor cable shield must be grounded at the control. Minimize the length of wire unprotected by shield near the point of connection. Never leave the shield unconnected at both ends. Never connect both shield ends to a common or ground.
  - Do not use the shield as a signal return.

- Use twisted pair wire (1 twist per inch) any time control circuit signals must travel over two feet.

- Select the size or gauge of wire by calculating the maximum circuit current and choosing the gauge meeting that requirement. Using greatly larger wire sizes than required generally increases the likelihood of electrostatic (capacitance) coupling of noise, while using inadequately sized wire will introduce unwanted resistances or impedances.

- Use a direct line from the AC power source to each input requiring AC power. Do not daisy chain ac power (and return) lines, or output signal (and return) lines.

- A single point ground must be used for all equipment. Use separate 12-gauge (or heavier) insulated wire to ground each piece of equipment to the same ground point, normally a heavy bus bar. Multiple ground paths which create ground loops, must be avoided. Do not ground the control to the single point ground and to the machine frame.

- Do not confuse chassis grounds (safety ground) with control circuit commons or with ac supply return (or neutral) line. Each return system must be wired separately. Never use chassis ground (safety) as a conductor to return circuit current.

Reducing Noise

- Use “snubbers” (QUENCHARC™ P/N: 0804-0147-0000) to filter out noise generated by relays, relay contacts, solenoids, motors, etc. A snubber is a simple filter device using a 0.1µf, 600 volt, non-polarized capacitor in series with a 100Ω, 1/2 watt resistor. The device should be installed at the noise source and can be used on ac or dc circuits.

- The ultimate protection from power source noise is an “uninterruptible” power supply. This “senses” the ac power line; when the power source fluctuates, a battery powered 60Hz inverted circuit takes over, supplying power within one-half to the cycle of the ac line.