

# ***User's Handbook for FRC-20***

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## **WARRANTY**

**STACO ENERGY PRODUCTS CO.**, Dayton, Ohio, warrants its apparatus to be free from defects in material and workmanship under normal use and service for a period of one year from date of shipment from the factory or a **STACO ENERGY PRODUCTS CO.** warehouse. The obligation under this warranty is limited to repair or replacement of the apparatus or parts thereof at the factory of **STACO ENERGY PRODUCTS CO.** We will not assume any expense or liability for repairs made outside our plant without our written consent.

**STACO ENERGY PRODUCTS CO.** is not responsible for damage to any associated instruments, equipment, or apparatus nor shall be held liable for loss of profit or other special damages. This warranty does not apply to any apparatus which has been tampered with or altered in any way or which has been subjected to misuse, neglect or accident. This warranty is in lieu of all other warranties, expressed or implied, and no other representative or person is authorized to assume for us any other liability.

Before returning any apparatus or parts thereof under the terms of this warranty, written authorization must be obtained from **STACO ENERGY PRODUCTS CO.**, otherwise the shipment cannot be accepted.

The sender is responsible for all transportation charges to and from the factory.

## INSPECTION

Your FRC-20 Controller has been carefully packed for shipment. However, since damage may occur in transit, we recommend that you thoroughly inspect your unit for damage prior to installation. Report damage or missing parts to the factory.

## INSTALLATION

The Staco FRC-20 is designed to be mounted in a clean and dry environment. The unit can be mounted in any orientation by using the four (4) bottom mounting holes (#8 screw). However, consideration should be given to access to terminal connections and configuration jumpers on the top of the unit. Since some of the electrical connections will contain lethal voltage potentials, provisions to protect personnel from accidental contact with these terminals must be made.

## CONNECTIONS

For proper operation of the FRC-20 controller the user is to provide the following connections:

1. Controlled voltage feedback is connected to TB1-1 and TB1-4.
  - a. If the voltage feedback signal is maximum of 600 VAC connect the provided strapping bars from TB1-2 to TB1-3 (series connected).
  - b. If the voltage feedback signal is less than 300 VAC then connect one of the provided strapping bars from TB1-1 to TB1-2 and the other strapping bar from TB1-3 to TB1-4 (parallel connection).
2. 120 VAC controller power is connected to J1-1 (HOT) and J1-2 (NEUTRAL).
3. 120 VAC variable transformer motor drive supply is connected to J2-1 (HOT) and C (NEUTRAL) on the variable transformer (VT) terminal motor drive block. This supply should be interlocked with the VT's supply voltage to prevent the motor from driving when supply power is not present.
- 4a. If a 1 K ohm potentiometer is used for the controller set point -
  - a. Connect potentiometer CW terminal to J3-6 (5 VDC supply).
  - b. Connect potentiometer wiper terminal to J3-7 (set point signal).
  - c. Connect potentiometer CCW terminal J3-8 (DC common).
- 4b. If a 4-20ma signal is used for the controller set point -
  - a. Connect the negative current signal to J3-8.
  - b. Connect the positive current signal to J3-4.
- 4c. If a 0-5 VDC signal is used for the controller set point -
  - a. Connect the positive 0-5 VDC signal to J3-7.
  - b. Connect the common of the VDC signal to J3-8.

5. If an optional lighted reset switch is used -
  - a. Connect the LED + terminal to J3-1.
  - b. Connect the N.O. reset switch to J3-2.
  - c. Connect the LED - terminal and switch common to J3-5.

## CONFIGURATION

For optimum operation the FRC-20 needs to be configured for the application it will be used for. This is accomplished by the proper placement of the provided shorting jumpers at locations W1 and W2.

### Full Range / Limited Range

The W1 top jumper (away from pc board) determines if the controller is controlling FULL RANGE - where the controller set point signal range equals 0 to voltage feedback range or if the controller is controlling LIMITED RANGE - where the controller set point signal equals the top one third (1/3) of the voltage feedback range (ie. 100 to 150 VAC, 200 to 300 VAC or 400 to 600 VAC). The jumper is set as follows:

Full range control - W1 top jumper is set to short the right two pins. Limited range control - W1 top jumper is set to short the left two pins.

### Set Point Source

The W1 bottom jumper (closest to the PC board) determines if the controller is using a set point signal from a 4 to 20 ma current source or a set point signal from a 0 to 5 VDC source (1 K ohm potentiometer or 5 VDC source). The jumper is set as follows:

4 to 20 ma signal - W1 bottom jumper is set to short the right two pins.

Potentiometer or 5 VDC signal - W1 bottom jumper is set to short the left two pins.

### Voltage Feedback Range

The W2 top (away from PC board) and bottom (closest to the pc board) jumpers determines the voltage feedback range. These jumpers are used along with the placement of the shorting straps on TB1 to set the voltage feedback maximum range. The jumpers are set as follows:

**Maximum of 600 VAC feedback voltage** - use one jumper to short the left two (2) bottom pins of W2, the other jumper to short the right two (2) bottom pins of W2. None of the top pins of W2 are connected. The strapping bars on TB1 are set to connect TB1-2 to TB1-3 (series connected).

**Maximum of 300 VAC feedback voltage** - use one jumper to short the left two (2) bottom pins of W2, the other jumper to short the right two (2) bottom pins of W2.

None of the tops pins of W2 are connected. The strapping bars on TB1 are set to connect TB1-1 to TB1-2 and TB1-3 to TB1-4 (parallel connection).

**Maximum of 150 VAC feedback voltage** - use one jumper to short the middle two (2) top pins of W2, the other jumper to short the middle two (2) bottoms pins of W2. The strapping bars on TB1 are set to connect TB1-1 to TB1-2 and TB1-3 to TB1-4 (parallel connections).

### **R22 Set Point Supply Trim Potentiometer**

R22 potentiometer adjusts the 5 VDC supply voltage to the external feedback resistor set point signal. For normal operation when using a set point potentiometer this potentiometer should be turned full CW to provide a 5 VDC potentiometer supply voltage or adjusted to set a maximum set point. If a fixed resistor network is used to provide a single point set point for the controller, R22 can be used as a trim potentiometer.

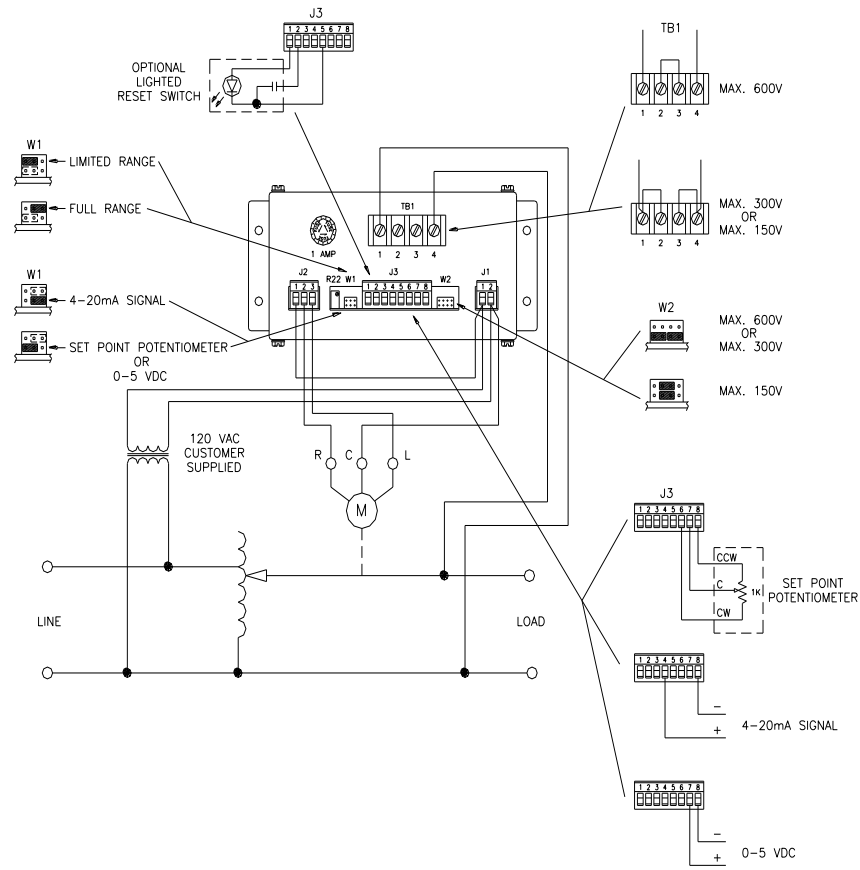
## **SERVICING**

The Staco FRC-20 Controller is a precision product which should require no maintenance. If a malfunction does occur, complete the following procedure to determine whether the fault lies in the controller or in the external circuits.

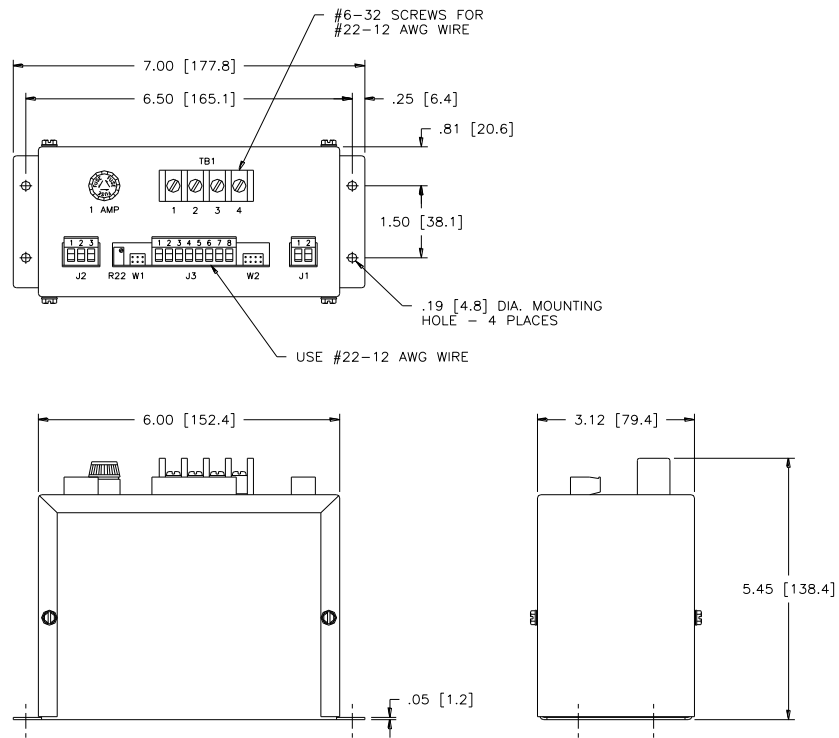
1. Check the controller supply power at connector J1-1 to J1-2. The voltage should be within 95 to 135 VAC.
2. Check the motor supply power at connector J2-1 to variable motor drive terminal block common -C. The voltage should be within 95 to 135 VAC, 60 Hz.
3. Check the feedback voltage at TB1-1 to TB1-4. The feedback voltage must be within the limits set by the TB1 strapping for maximum voltage, W2 jumper for maximum voltage configuration, and the W1 top jumper selected control range.
4. Check the set point signal at J3. The set point signal voltage or current must be connected to the proper terminals (ref CONNECTIONS items 4a, 4b, or 4c) and the W1 bottom jumper must be set for the corresponding configuration (ref. CONFIGURATION).
5. Check the 1 AMP motor supply fuse on top of the controller. If the fuse is blown check for motor control circuit problems (see SERVICING item 6) and replace with the 1 AMP AGC fuse.
6. Check the operation of the variable transformer motor-drive by unplugging J2 from the controller and applying line voltage (95 to 135 VAC) between terminals C and R on the motor plate terminal block to raise the output voltage. Remove the power

from the R terminal and applying line voltage (95 to 135 VAC) between terminals C and L on the motor plate terminal block to lower the output voltage. Be sure to remove the test wiring before reconnecting J3.

If all voltages are present and within limits, all jumpers and straps are configured correctly, the motor fuse is good, and the motor drive operates properly, then the malfunction is in the controller. The controller will have to be returned to the factory for repair. A written Return Material Authorization must be obtained from Staco's Customer Service Department prior to returning any merchandise.



### FRC-20 Connections and Configuration



**FRC-20 Dimensions**

**NOTES:**