



INSTRUCTION MANUAL D5-3023-2
ENCODER TESTER
 Model 3RE5
 For use with 1 thru 15 HP
 HR2000™
 High Performance Controllers

THE PRODUCTS DESCRIBED IN THIS INSTRUCTION MANUAL (I / M) ARE MANUFACTURED BY RELIANCE® ELECTRIC INDUSTRIAL COMPANY.

DANGER

ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

Description

The Encoder Tester Kit is for use with HR2000™ controller. The Encoder Tester provides a means to check the amount of angular difference between motor stator position and encoder stator position primarily following the servicing of the motor. The Encoder Tester compares the generated electromotive force (EMF) voltage phase angle of the motor, when it is running free, to the output voltage phase angle of the motor's encoder, or pulse generator (PG). Any resultant phase angle deviation is displayed on the analog meter on the front of the Encoder Tester. See Figure 1 for the Encoder Tester block diagram. The Encoder Tester must be disconnected from the system before resuming normal operation.

The Kit consists of the encoder unit, an attached cable with clips for making power connections to the controller, and an 11.8 - inch (0.3 meter) interconnecting cable.

Installation

1. Select a location to mount the Encoder Tester that will allow the two supplied cables to connect to the controller. See Figure 2 for mounting dimensions.

Note: The Encoder Tester is designed for wall mounting. Standoff hardware is not necessary. Mounting hardware is not supplied.

2. Mount the Encoder Tester in the selected location.

CAUTION: Complete all drilling cutting, welding, etc., before mounting the Encoder Tester. During installation, protect the controller from metal chips, weld splatters and other debris. Failure to observe these precautions could result in damage to, or destruction of, the equipment.

3. Run a suitable equipment grounding conductor or bonding jumper unbroken from the Encoder Tester to the grounding electrode conductor (earth ground).

DANGER

EQUIPMENT IS AT LINE VOLTAGE WHEN A-C POWER IS CONNECTED TO THE CONTROLLER. DISCONNECT ALL UNGROUNDED CONDUCTORS OF THE A - C POWER LINE FROM THE CONTROLLER. AFTER POWER IS REMOVED, VERIFY WITH A VOLTMETER AT CONTROLLER FACEPLATE TERMINAL 147 (+) AND REGULATOR BOARD TERMINAL B1 (-) THAT THE D - C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL PARTS OF THE CONTROLLER. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

4. Verify that power is removed from the controller.

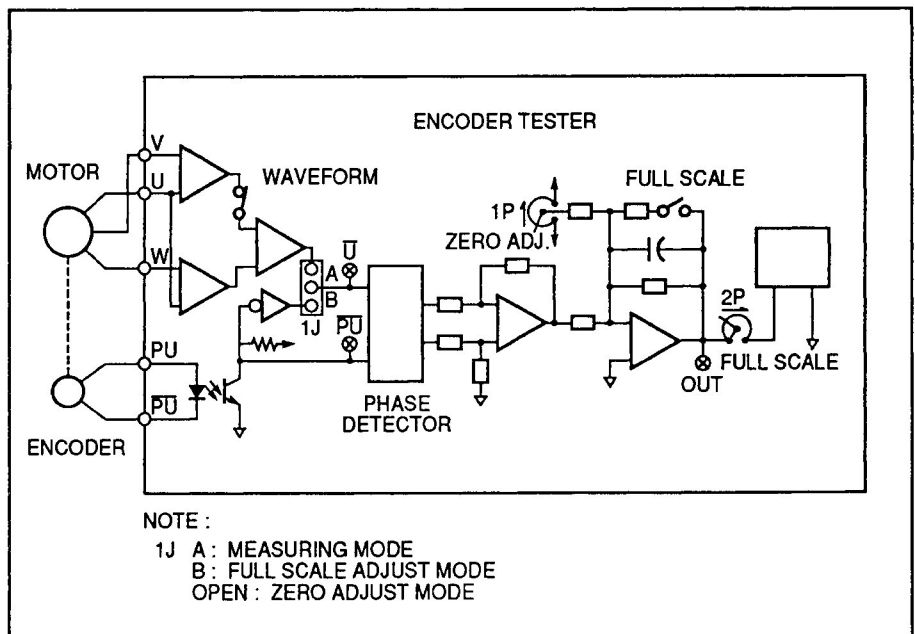


Figure 1. Encoder Tester Block Diagram.

5. Disconnect the encoder cable from 3CN on the face of the controller hinged panel and reconnect it to 1CN (FR PG) on the Encoder Tester. See Figure 3.
6. Clip the red, white, and black leads of the Encoder Tester cable to terminals 601 (U), 602 (V), and 603 (W), respectively, on the faceplate of the controller. Note: The correct phase divergence cannot be indicated if these leads are not connected to the respectively labeled terminals. See Figure 3.
7. Connect the supplied interconnecting cable with connectors between 2CN (TO AMP) on the Encoder Tester and 3CN on the face of the controller hinged panel.

Operation

DANGER
EQUIPMENT IS AT LINE VOLTAGE WHEN A-C POWER IS CONNECTED TO THE CONTROLLER. DISCONNECT ALL UNGROUNDED CONDUCTORS OF THE A-C POWER LINE FROM THE FACEPLATE TERMINAL 147(+) AND REGULATOR BOARD TERMINAL B1 (-) THAT THE D-C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL PARTS OF THE CONTROLLER. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

1. With power OFF, uncouple the motor from the machine or load.
2. Set the left-hand switch on the front of the Encoder Tester for the sinewave for HR2000 motors.
3. Set the right-hand switch on the front of the Encoder Tester for the $\pm 90^\circ$ scale.
4. Put the controller in the Encoder Test Mode by setting the controller regulator dip switches 1SW-1 and 1SW-2 to ON. This will disable feedback to allow the motor to run at a high rate of speed.

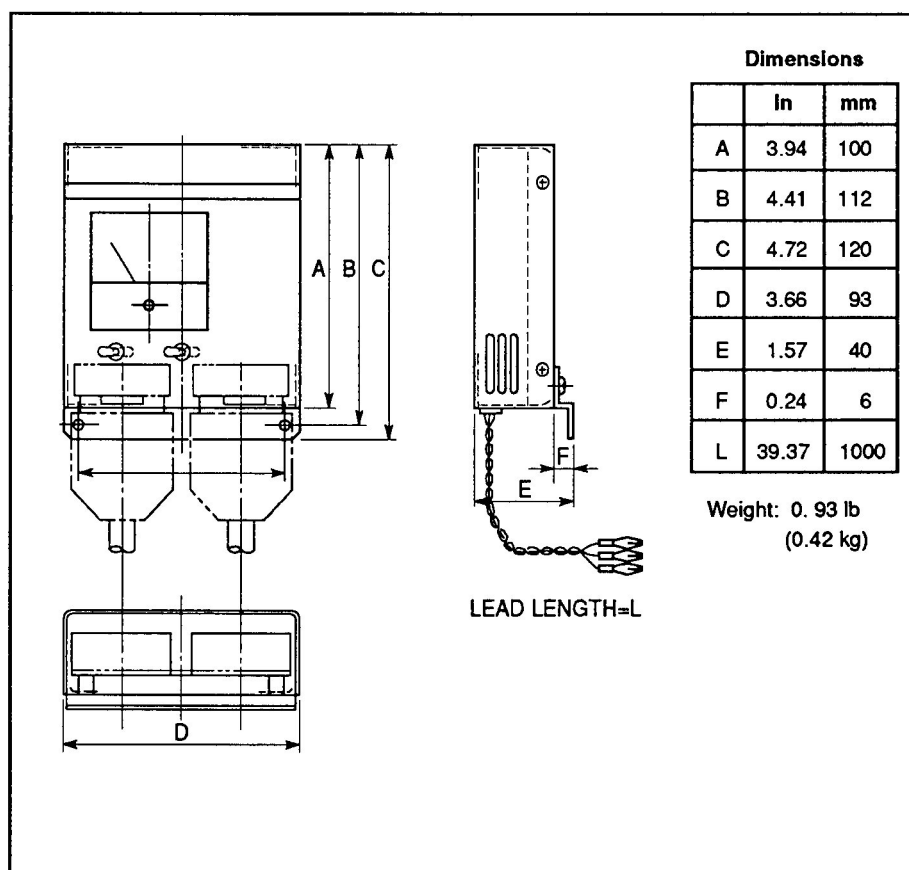


Figure 2. Encoder Tester Dimensions.

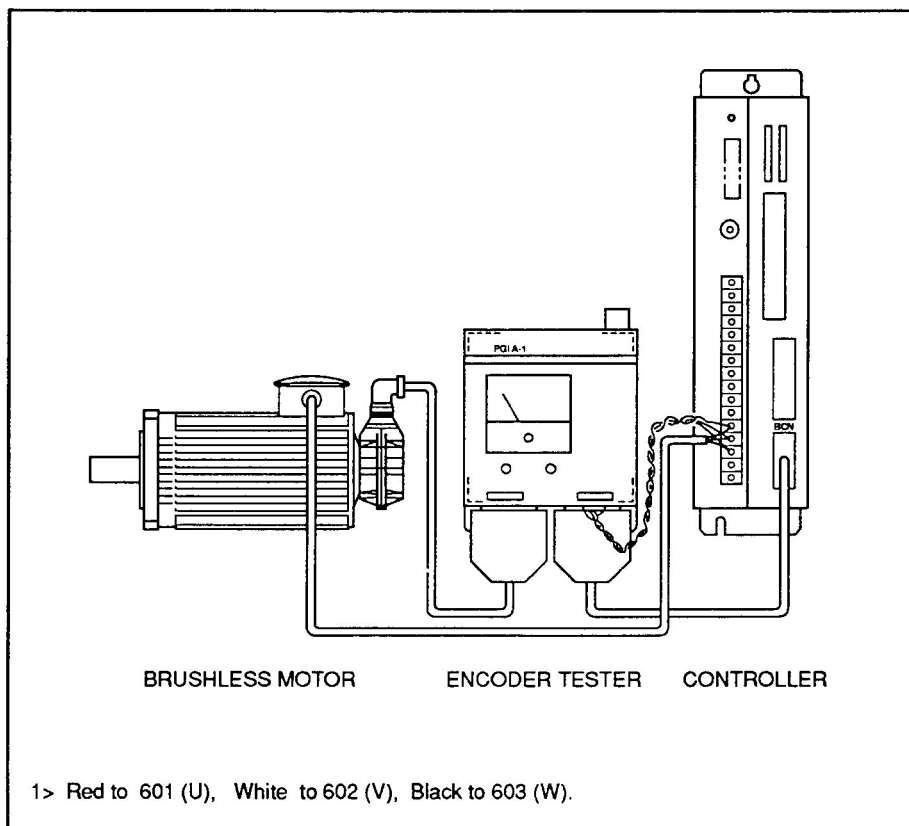


Figure 3. Connection Diagram.

5. Set the controller test polarity switch 3SW to "-" (minus), or "down" position.
6. Make sure the controller directional dip switch 2SW -6 is "ON".
7. Deactivate the Dynamic Braking Kit if applicable.

DANGER
REMAINING STEPS ARE MADE WITH POWER ON. EXERCISE EXTREME CAUTION BECAUSE HAZARDOUS VOLTAGE EXISTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

8. Turn power ON.
9. Set the controller test pot TST fully CCW.
10. Give the controller a Start command.
11. Turn slowly the controller test pot TST CW. The motor should accelerate until near rated speed in the FWD direction. (CCW from the shaft-end.)

NOTE: Tester reads correctly only when the motor is rotating FWD.

12. Give the controller a Stop command, allowing the motor to coast (run freely).
13. Observe the Encoder Tester meter.
 - If the meter reads greater than $\pm 9^\circ$, go to Step 14.
 - If the meter reads within $\pm 9^\circ$, go to Step 15.
 - If the meter reads within $\pm 2^\circ$, go to Step 16.

DANGER
EXERCISE EXTREME CAUTION BECAUSE THE MOTOR GENERATES A HAZARDOUS VOLTAGE [APPROXIMATELY 200 VOLTS AT RATED SPEED (2000 ~ 3000 RPM)] WHILE RUNNING FREE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

14. If the meter indicates a mechanical angle outside $\pm 9^\circ$, adjust encoder rotor coupling as follows (Refer to Figure 4.):
 - Give the controller a Stop command and wait for the motor to come to a complete stop.
 - Turn power OFF.
 - After verifying power is off, remove the outer encoder housing and loosen the two hex set screws that secure the encoder rotor and the motor rotor.
 - Turn the motor rotor the number of degrees and in the direction indicated on the meter:
 - CW if the meter deflects positive (+).
 - CCW if the meter deflects negative (-).
 - Tighten the two hex screws.
 - Return to Step 8 and repeat this procedure until the meter deflection is within $\pm 9^\circ$.

15. If the meter indicates a mechanical angle within $\pm 9^\circ$, adjust the relationship of the encoder stator as follows (Refer to Figure 4.):
 - Turn the right-hand switch on the front of the Encoder Tester to the $\pm 9^\circ$ scale.
 - Loosen the three screws that secure the encoder to the motor.
 - Turn the encoder the number of degrees and in the direction indicated on the meter:
 - CW if the meter deflects positive (+)
 - CCW if the meter deflects negative (-).
 - Tighten the three screws.
 - Return to Step 9 and repeat this procedure until the meter deflection is within $\pm 2^\circ$.

16. If the meter indicates a mechanical angle within $\pm 2^\circ$, no adjustment is necessary.
17. Give the controller a Stop command and wait for the motor to come to a complete stop.
18. Turn power OFF.

19. Couple the motor to the machine or load.
20. Put the controller in the desired operation mode by resetting the controller regulator dip switches 1SW -1 and 1SW-2.
21. Reactivate the Dynamic Braking Kit if applicable.
22. Disconnect the interconnecting cable between 2CN (TO AMP) on the Encoder Tester and 3CN on the controller.
23. Disconnect the encoder cable from 1CN (FM PG) on the Encoder Tester and reconnect it to 3CN on the controller.
24. Remove the red, white and black Encoder Tester clip leads from the controller terminals.

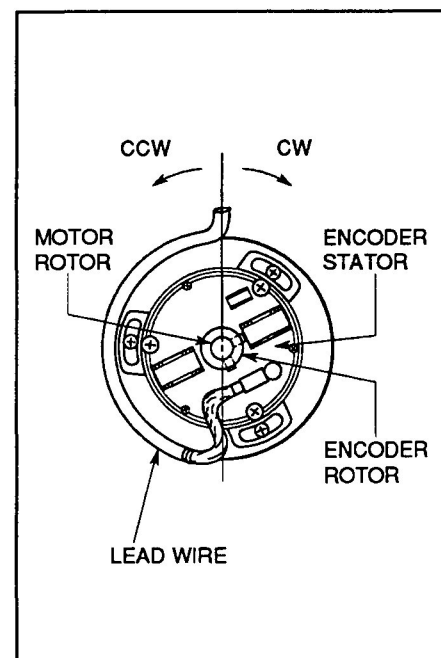


Figure 4. Encoder / Motor Stator and Rotor Configuration.

Operation

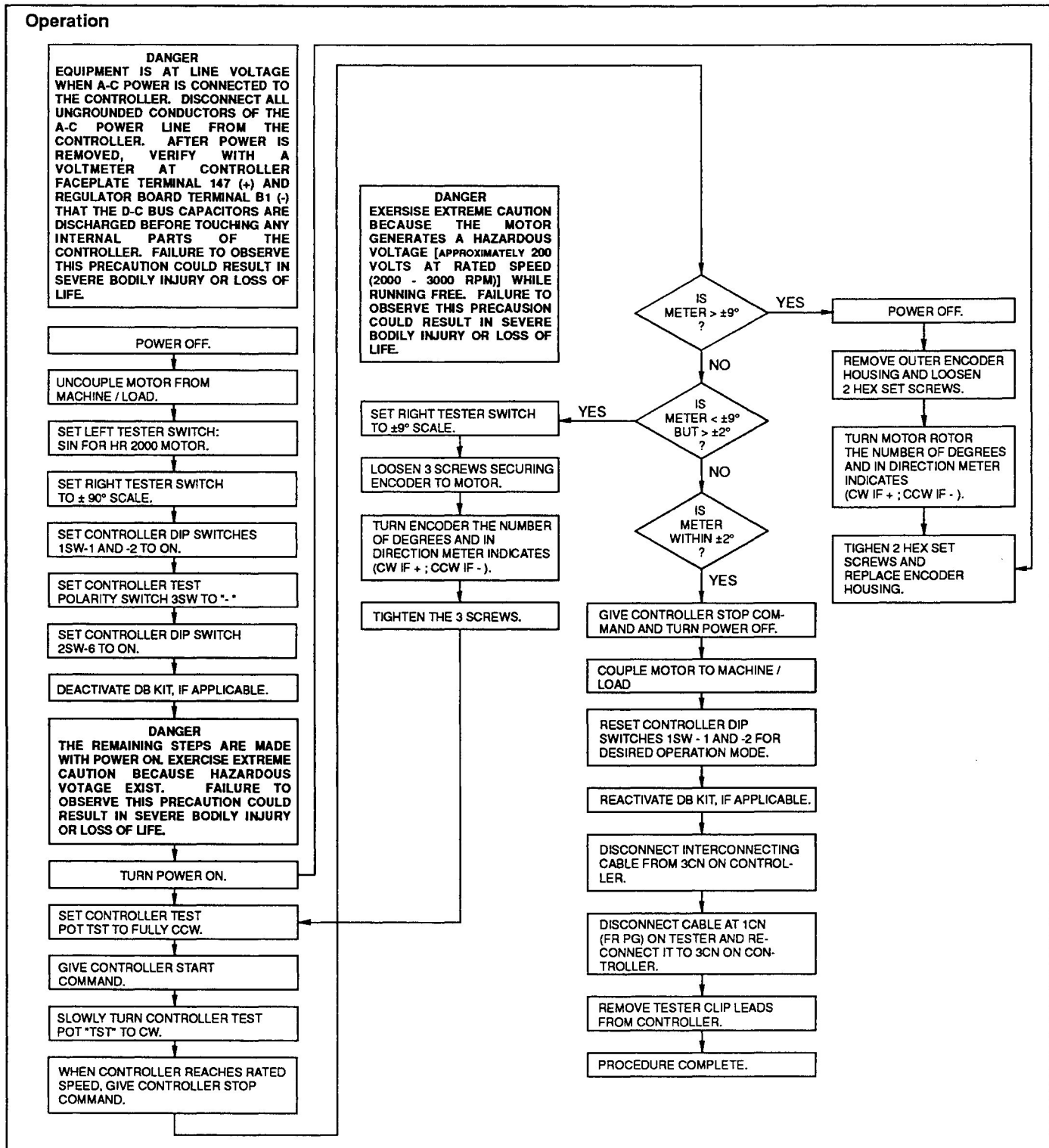


Figure 5. Encoder Tester Operation Flow Chart.

Reliance Electric / 24701 Euclid Avenue / Cleveland, Ohio 44117

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