#### MOTOR START POTENTIAL RELAY

#### **General Description**

A voltage sensitive, electromagnetic type motor starting relay with normally closed snap-action contacts used to disconnect the start capacitor on capacitor-start, induction-run and capacitor-start, capacitor-run motors. The relay has a protective cover which eliminates the need for additional electrical and mechanical protection. A variety of mounting brackets are available. Terminals may be either Quick Connect Tab Type or Screw Type.

#### **Typical Applications**

- · Central air conditioner compressors
- Submersible pump motors
- Motors generally over 1/3 HP with start capacitors

#### Operation

The relay is energized by a magnet coil electrically connected across the start winding of the motor and responds to the increase in start winding voltage as the motor accelerates from zero to the normal running speed. The relay contacts are actuated by the armature of the relay to disconnect the start capacitor at a speed where the motor has sufficient torque to bring it up to normal running speed. The relay remains energized during the run operation of the motor, keeping the relay contacts open. When the motor is de-energized, the relay contacts re-close for the next motor start. Each relay is designed for a specific application which includes the coil rating for continuous run voltage and the pickup and dropout calibration for proper motor starting.

#### **Terminals**

Quick Connect Type

0.250" x 0.032" (6.3 mm x 0.8 mm)

Screw Type, Tin Plated Brass

#8-32 Thread

#### **Electrical Ratings**

Contacts

35 Amperes max, 50/60 Hz, break only (3ARR3) 50 Amperes max, 50/60 Hz, break only (3ARR22)

Continuous Coil Rating

60 Hz; 130 to 500 Volts 50 Hz; 117 to 470 Volts

See Appendix "B" for Coil Groups and Ratings.

### Potential Motor Start Relay **35A and 50A Rating**



#### **Endurance**

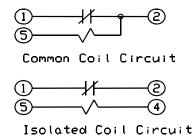
 100,000 to 500,000 operations (depending on load)

#### Mounting

- Mounting Bracket
   Select from available brackets in Appendix "C".
- Mounting Position
   Each relay is calibrated in the intended mounting position. Specify desired mounting position from Appendix "D".

#### Circuits

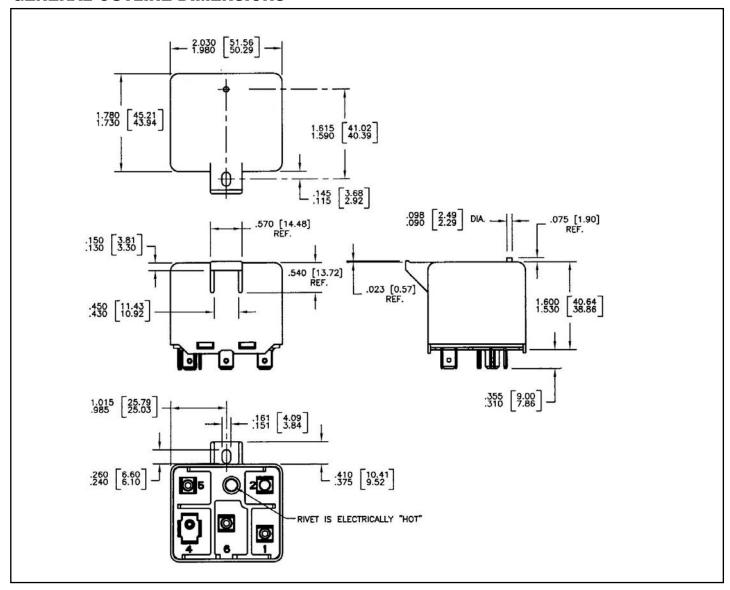
If there is a terminal in position #6, it must be the same polarity as terminals #1, #2, and #4 to prevent possible flashover. If there is no terminal in #6 position, #4 can be either polarity.



**ZETTLER Controls, Inc.** 

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#### **GENERAL OUTLINE DIMENSIONS**



#### **Application Procedure**

Use the part number scheme from *Appendix "A"* to create part number requirements.

**Agency Approvals** UL File #SA 44129 CSA included in UL

#### Calibration

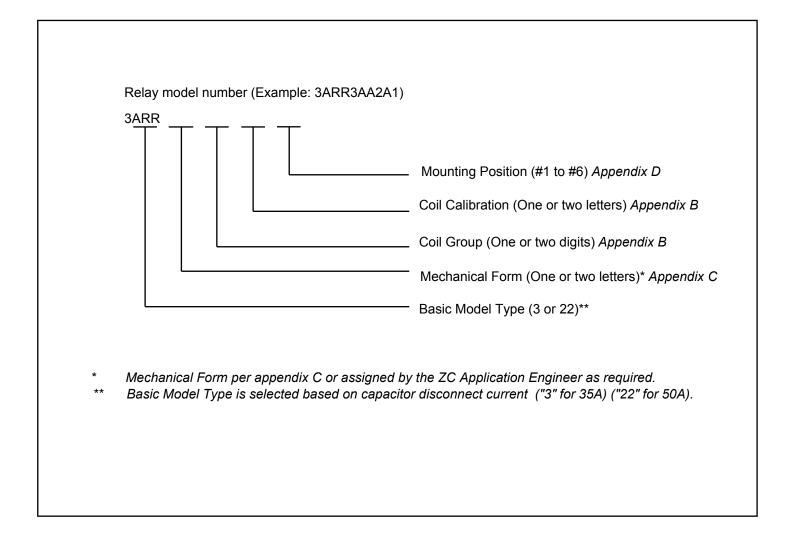
Relay is factory calibrated for pickup and dropout voltages to match motor speed and torque curves for the specific application requirements. See *Appendix "B"* for calibrations available for each coil group.

#### ZETTLER Controls, Inc.

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#### **APPENDIX A** (Ordering Part Number)



# APPENDIX B (Coil Group and Calibration)

74-407791

POTENTIAL RELAY APPLICATION SELECTION OF THE PROPER COIL VOLTAGE RATING MADE FOR SARRS, SARRS2

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74-407791

THE CONTINUOUS DUTY VOLTAGE OF THE RELAY COIL MUST BE EQUAL TO OR WILL BE THAN THE MAXIMUM VOLTAGE TO WHICH IT WILL BE EXPOSED. THIS YOLTAGE NILL BE THE VOLTAGE INDUCED IN THE MOTOR START WINDING WHEN THE MOTOR IS RUNNING AFTER THE START WINDING HAS BEEN DISCONNECTED. IT WILL BE THE GREATEST WHEN THE THE LINE YOLTAGE IS AT ITS MAXIMUM, WHEN THE MOTOR IS RUNNING AT ITS MAXIMUM. SPEED (LIGHTLY LOADED), AND WHEN THE RUN CAPACITOR SIZE IS LARGEST.

THE EFFECT OF THE "EFFECTIVE AMBIENT TEMPERATURE" SURROUNDING THE RELAY MUST ALSO BE TAKEN INTO ACCOUNT.

THE FFECTIVE AMBIENT TEMPERATURE IS NOT THE AMBIENT TEMPERATURE IN WHICH SURPRIANCE OR EQUIPMENT IS INSTALLED, BUT IS THE AMBIENT TEMPERATURE SURROUNDING THE RELXY WILLE THE APPLIANCE IS OPERATING. OFTEN THE ENCLOSED CONTROL COMPARTMENT WILL BE SUBSTANTIALLY HIGHER IN TEMPERATURE THAN THE AREA AROUND THE APPLIANCE. IN SOME CASES OTHER HEAT SOURCES OR RADIANT EFFECTS ARE CONTRIBUTORS TO ITS TEMPERATURE.

THE MAXIMUM ALLOWABLE TEMPERATURE OF THE COIL WINDING IS 120°C, WHEN MEASURED BY CHANGE IN RESISTANCE METHOD.

THIS MEANS THAT THE COIL BROUP NUMBER SELECTED MUST NOT PRODUCE A HEAT RISE, MITCH MEN ADDED TO THE EFFECTIVE AMBIENT TEMPERATURE, WILL RESULT IN THE COIL TEMPERATURE EXCEEDING THE MAXIMUM ALLOWABLE FOR THE SPECIFIC INSULATION CLASS.

IF THIS SHOULD OCCUR, A COIL GROUP SHOULD BE SELECTED WHICH WILL PRODUCE A LOWER FEAT RISE WITH THE MAXIMUM VOLTAGE APPLIED TO THE COIL, A GROUP WITH A HIGHER COIL RAIING WILL PRODUCE A LOWER HEAT RISE AT A SPECIFIC APPLIED VOLTAGE.

IF THE COMPRESSOR/MOTOR MANUFACTURER IS NOT SURE OF THE ACTUAL EFFECTIVE AMBIENT IN THE APPLIANCE IN WHICH THE RELAY IS INSTALLED, A WORST CONDITION OF 40°C OR HIGHER SHOULD BE USED IN SELECTING THE PROPER COIL GROUP, FOR EXAMPLE, UNITS INSTALLED OUTDOORS OR IN TIGHTLY CONFINED SPACES.

TO PREDICT A HEAT RISE AT A NEW VOLTAGE, MULTIPLY THE KNOWN RISE AT A SPECIFIC VOLTAGE BY THE SQUARE OF THE RATIO OF THE NEW VOLTAGE GVER THE OLD.

TABLES OF COILS BY GROUP, ALONG WITH CALIBRATION IDENTIFICATION
FOLLOW ON SHEETS 1 THRU 4. THE COIL RATINGS FOR SPECIFIC GROUPS FOR 50 HZ
OPERATION ARE ON SEPARATE SHEETS. IT SHOULD BE NOTED THAT FOR A GIVEN COIL,
GROUP, THE VOLTAGE RATING AT 60 HZ IS HIGHER THAN FOR 50 HZ.

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74-407791 SH.1

# **ZC MOTOR START RELAY (3ARR3, 3ARR22) DATA**

CUSTOMER COLD PICK-UP AND DROP-OUT FOR EACH COIL GROUP

COIL GROUPS ARE U.L. CLASS B RATINGS AND VDE RECOGNIZED. (U.L. FILE SA 44129)

CALIBRATION VALUES ARE BASED ON AVERAGE COIL COPPER TEMPERATURES OF: COLD 35°C. HOT 95°C.

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# ZC MOTOR START RELAY (3ARR3, 3ARR22) DATA CUSTOMER COLD PICK-UP AND DROP-OUT FOR EACH COLL GROUP

COIL GROUPS ARE U.L. CLASS B RATINGS AND VDE RECOGNIZED.

CALIBRATION VALUES ARE BASED ON AVERAGE COIL COPPER TEMPERATURES OF: COLD 35°C. HOT 95°C.

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# ZC MOTOR START RELAY (3ARR3, 3ARR22) DATA

CUSTOMER COLD PICK-UP AND DROP-OUT FOR EACH COIL GROUP

COIL GROUPS ARE U.L. CLASS B RATINGS AND VDE RECOGNIZED

CALIBRATION VALUES ARE BASED ON AVERAGE COIL COPPER TEMPERATURES OF: COLD 35°C. HOT 95°C.

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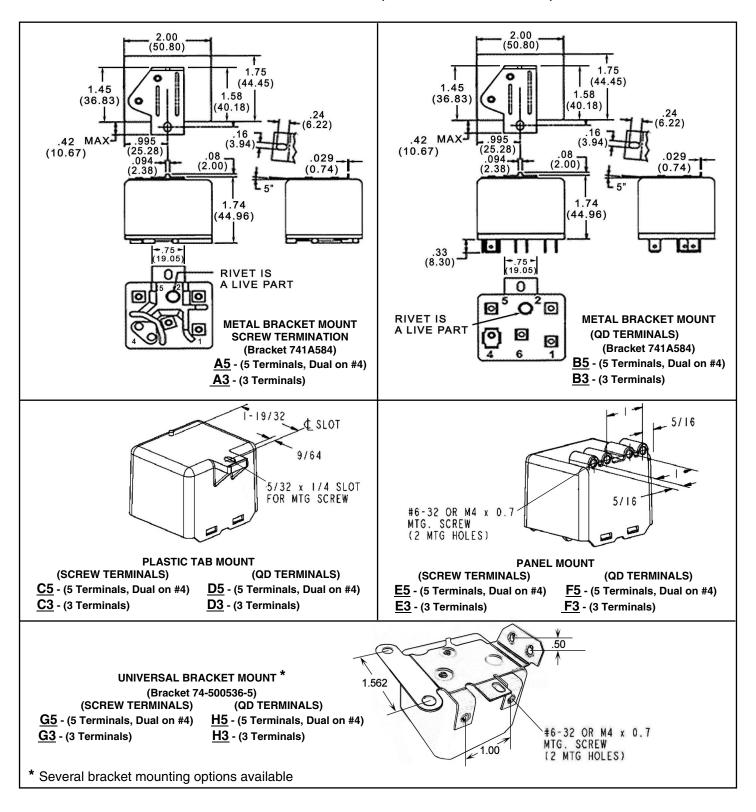
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CALIBRATION VALUES ARE BASED ON AVERAGE COIL COPPER TEMPERATURES OF: COLO 35°C. HOT 95°C.

COIL GROUPS ARE U.L. CLASS B RATINGS AND VDE RECOGNIZED

DROP-OUT 74-407791 SHEET 4 MAX PICK-UP OROP-OUT PICK-UP DROP-OUT PICK-UP MIN MAX MIN MAX MIN MAX MIN MAX MIN MAX 133V—A 60°C 153V—A 60°C 153V—A 60°C 230V—A 60°C 230V—A 60°C 153V—A 60°C 154V—A COMPANY AND CONTAINS PROPERED STANDS CONFIDENTIAL COMPANY AND CONTAINS PROPERED STANDS COMPANY THIS DOCUMENT IS LOANED ON THE EXPRESS COMPITON THIS DOCUMENT IS LOANED ON THE EXPRESS COMPITON THAT RETHER IT NOR THE INFORMATION CONTAINED THEREIN SHALL BE USED SED BY THE RECIPIENT ONLY AS APPROVED EXPRESS ON SEALL BE USED BY THE RECIPIENT ONLY AS APPROVED EXPRESS AND THE INFORMATION SHALL BE REFLUENCED TO THE COMPANY UPON ITS REQUIRENT SHALL BE REFLUENCED. GROUP 28 THIS DOCUMENT IS THE PROPERTY OF ZETTLER CONTROLS 17,660 PROPRIETARY AND CONFIDENTIAL GROUP 27, 47 MAXIMUM COIL VOLTAGES FOR SPECIFIED MAXIMUM TEMPERATURE RISE 900 15 152 152 GROUP 26, 46 75 75 260 233 252 224 ţ. 133 133 133 204 ( 133 223 ( 9 GROUP 25, 45 POS 119 119 180 195 60 1 119 186 214 60 1 119 204 233 60 1 119 223 252 60 1 600 11 POS. GROUP 24, 44 162 175 55 171 184 55 180 193 55 186 215 55 205 234 55 224 252 55 ϔ 90 171 1 90 186 2 109 205 2 109 224 2 P0S.4 888 GROUP 23, 43 71 136 150 45 9 71 150 163 45 9 71 159 172 45 9 168 182 45 9 178 192 45 9 185 213 231 45 1 221 250 45 1 220 ភេ POS. 3 82 690UP 22, 42 111 124 30 120 134 30 130 144 30 140 153 30 149 163 30 159 172 30 200 oi N POS. 28 22 88 48 GROUP 21, 41 888 20 1,350 134 143 143 143 9/ POS. 1 130 29 340 370 385 395 140 150 3300 COIL RESISTANCE 8 25°C (OHMS) REFERENCE PICK-UP VOLTS 160 170 80 5 260 320 3350 350 120 150 150 150 190 280 170 300 180 20 MOUNTING BEBBBBBBBBBBBBCK 2222222 (YEATZ) CALIBRATION IDENTIFICATION AR AB AF AE A P B P P P P B A A A A A ATA

#### **APPENDIX C** (Mechanical Form)



#### **ZETTLER Controls, Inc.**

#### **APPENDIX D** (Mounting Positions)

