

Product Facts

- Designed to be the smallest, lightest weight, lowest cost sealed contactor in the industry with its current rating (500+A carry, 2000A interrupt at 320VDC).
- Built-in coil economizer – only 1.7W hold power @ 12VDC and it limits back EMF to 0V. Models requiring external economizer also available.
- Optional auxiliary contact for easy monitoring of power contact position.
- Hermetically sealed – intrinsically safe, operates in explosive/harsh environments with no oxidation or contamination of coils or contacts, including long periods of nonoperation.
- Versatile coil/power connections.
- AIAG QS9000 designed, built and approved



Typical applications include battery switching and back-up, DC voltage power control, circuit protection and safety.

Performance Data

| Parameter | Units | Value for 686 Series |
|--|---------|----------------------------------|
| Contact Arrangement, power contacts | | 1 Form A (SPST-NO) |
| Rated Operating Voltage | VDC | 12 - 96 |
| Continuous (Carry) Current, Typical | A | 500 @ 65C, 400 mcm conductors |
| Make/Break Current at Various Voltages ^{1/} | A | See next page |
| Break Current at 320VDC ^{1/} | A | 2,000, 1 cycle ^{2/} |
| Contact Resistance, Typ. (@200A) | mohms | 0.2 |
| Load Life | Cycles | See next page |
| Mechanical Life | Cycles | 100,000 |
| Contact Arrangement, auxiliary contacts | | 1 Form A (SPST-NO) |
| Aux. Contact Current, Max. | A | 2A @ 30VDC / 3A @ 125VAC |
| Aux. Contact Current, Min. | mA | 100mA @ 8V |
| Aux. Contact Resistance, Max. | ohms | 0.417@ 30VDC / .150 @ 125VAC |
| Operate Time @ 25C | | |
| Close (includes bounce), Typ. | ms | 40 |
| Bounce (after close only), Max. | ms | 7 |
| Release (includes arcing), Max @ 2000A | ms | 12 |
| Dielectric Withstanding Voltage | Vrms | 2,200 @ sea level (leakage <1mA) |
| Insulation Resistance @ 500VDC | megohms | 100 ^{2/} |
| Shock, 11ms 1/2 sine, peak, operating | G | 20 |
| Vibration, sine, 80-2000Hz., peak | G | 20 |
| Operating Ambient Temperature | C | -40 to +65 |
| Weight, Typical | lb.(kg) | 1.3 (.60) |

^{1/} Main power contacts

^{2/} 50 at end of life

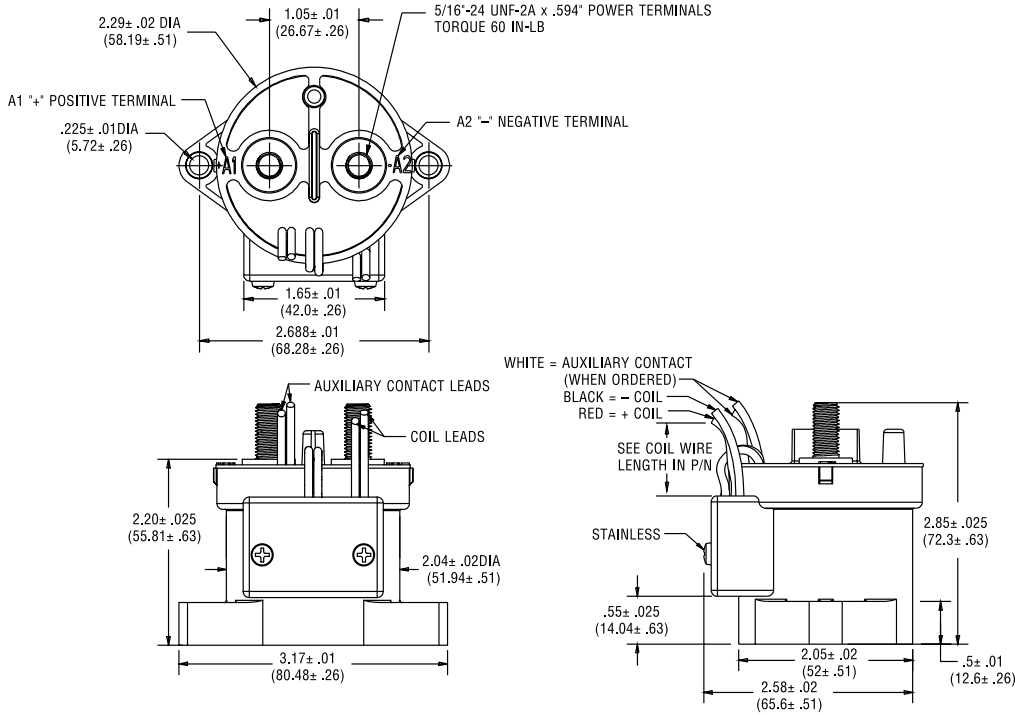
^{3/} Does not meet dielectric & IR after test, 1700 amp for unit with Aux. Contacts

Coil Operating Voltage (valid over temperature range)

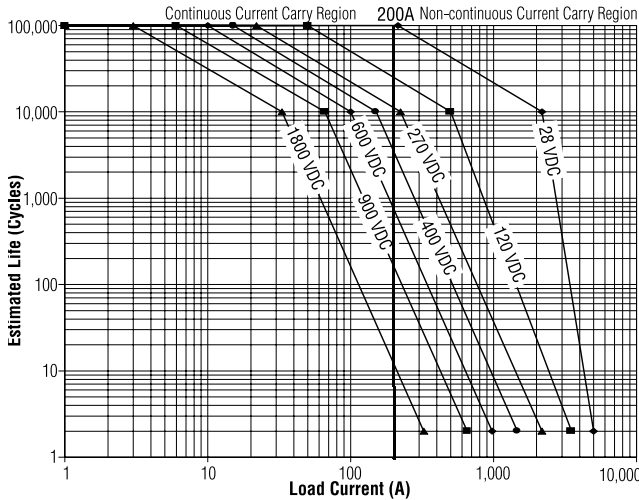
| Nominal Voltage | 12VDC | 24VDC | 48VDC |
|-----------------------------|-------------|--------------|--------------|
| Voltage (will operate) | 9.6-13.2VDC | 19.2-26.9VDC | 38.4-52.8VDC |
| Voltage (Max.) | 13.2VDC | 26.9VDC | 52.8VDC |
| Pickup (close) Voltage Max. | 9.6VDC | 19.2VDC | 38.4VDC |
| Holding Current (Avg.) | 1.0A@12V | 0.59A@24V | 0.33A@48V |

686 Series Solenoid (Continued)

Outline Dimensions



Estimated Make & Break Power Switching Ratings



NOTES:

- 1) For resistive loads with 300 H maximum inductance
- 2) Estimates based on extrapolated data. User is encouraged to verify rating in actual application.
- 3) End of life when dielectric strength between terminals falls below 50 megohms @ 500VDC.
- 4) The maximum contact make and break power is estimated at 208KW. Break only above 208KW to avoid contact welding.

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

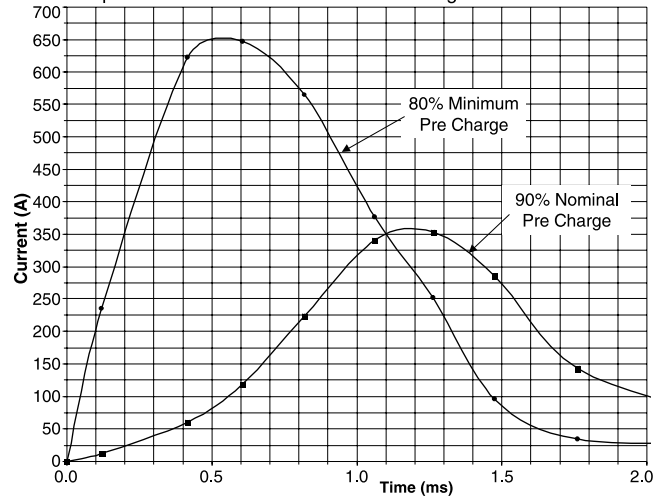
Dimensions are shown for reference purposes only. Specifications subject to change.

Electrical Load Life Ratings for Typical 686 Applications

| Make/Break Life Capacitive & Resistive Loads at 320VDC (1) (2) | |
|--|-------------------------|
| @90% capacitive pre-charge (make only) see chart below | Cycles 50,000 |
| @80% capacitive pre-charge (make only) see chart below | Cycles 50 |
| @200A make/break (2 consecutive, reverse polarity) (1) | Cycles 12 |
| 2,000A (break only) (1) | Cycles 1* |
| Mechanical Life | Cycles 1 million |

- (1) Resistive load includes inductance L = 25μH. Load @ 2500A tested @ 200μH.
 (2) Life based on projected Weibull Life with 95% reliability.
 * Does not meet dielectric and IR after test.

686 Capacitive Make Test Curves for Pre-Charged Motor Controller



White
Rodgers

8100 W. FLOISSANT AVENUE
 P.O. BOX 36922
 ST. LOUIS, MO 63136
 (314) 553-3600

RELAYS AND CONTACTORS

D.C. Power Contactors – Type 686

Type 686



| Sec. | STANCOR PART NUMBER | Duty Cycle | Terminal Type* | Pole Form | Bracket Style | Coil Volt. D.C. | Coil Resistance (Ohms) @25°C | Contact Material | Contact Rating-(Amps.) Inductive Load | | | DIMENSIONS INCHES | | | Weight (oz.) | Agency Certif. | | |
|------|---------------------|------------|----------------|-----------|---------------|-----------------|------------------------------|------------------|---------------------------------------|--------------------------|----------------------------|-------------------|---|------|--------------|----------------|----|---|
| | | | | | | | | | Volt. D.C. | Normally Open Continuous | Normally Closed Continuous | L | W | H | | | | |
| A | 686-901 | Continuous | 4 | SPNO | Vertical | 12-36 | 3.3 | Copper | 12-36 | 500 | 1200 | - | - | 3.17 | 2.58 | 2.85 | 15 | - |
| | 686-902 | Continuous | 4 | SPNO | Vertical | 48-96 | 3.3 | Copper | 48-96 | 500 | 1200 | - | - | 3.17 | 2.58 | 2.85 | 15 | - |

— Water Resistant

* Terminal Type: "4" = Isolated Coil

** Inrush Current: Current applied within the first 1/2 second of contact closure

For outline drawings refer to page 59.

Engineering Design Data

| D.C. Type | Coil Rating Nominal Magnetic Coil Rating (Watts) | Operation in % of Nom. Coil Voltage Rating | | Breakdown Voltages * All Terminals - 60 Hz RMS | | | Contact Material | | Electrical Life | | Mechanical Life | | Max. Oper. Temp. °F |
|-----------|--|--|-------------------|--|-----------------------------|-----------|------------------|-------|---------------------|----------------|------------------|----------------|---------------------|
| | | Pick-up | Max. Safe Operate | Opposite Polarity | Open Contacts Same Polarity | To Ground | Power | Pilot | Oper. At Rated Load | Oper. Per Min. | Oper. At No Load | Oper. Per Min. | |
| 686 | 2.4 | 80 | 110 | 2200 | 2200 | 2200 | Copper | - | 100,000 | 2 | 100,000 | 6 | 149 |

* Dielectric @ Sea Level

Storage Temperature

— -40°F to 247°F

Terminations

— Contacts: 5/16" - 24 UNF - 2A Thread

— Coil:

Leads: Black (-), Red (+)

Terminals: #10-32 stud coil terminals

Recommended Mounting

— Available with bottom or side mounting. Not position sensitive.

Hardware Torque Specification

— Contact Terminal: 45-60 in-lbs.

— Coil Terminal: 12-18 in-lbs.

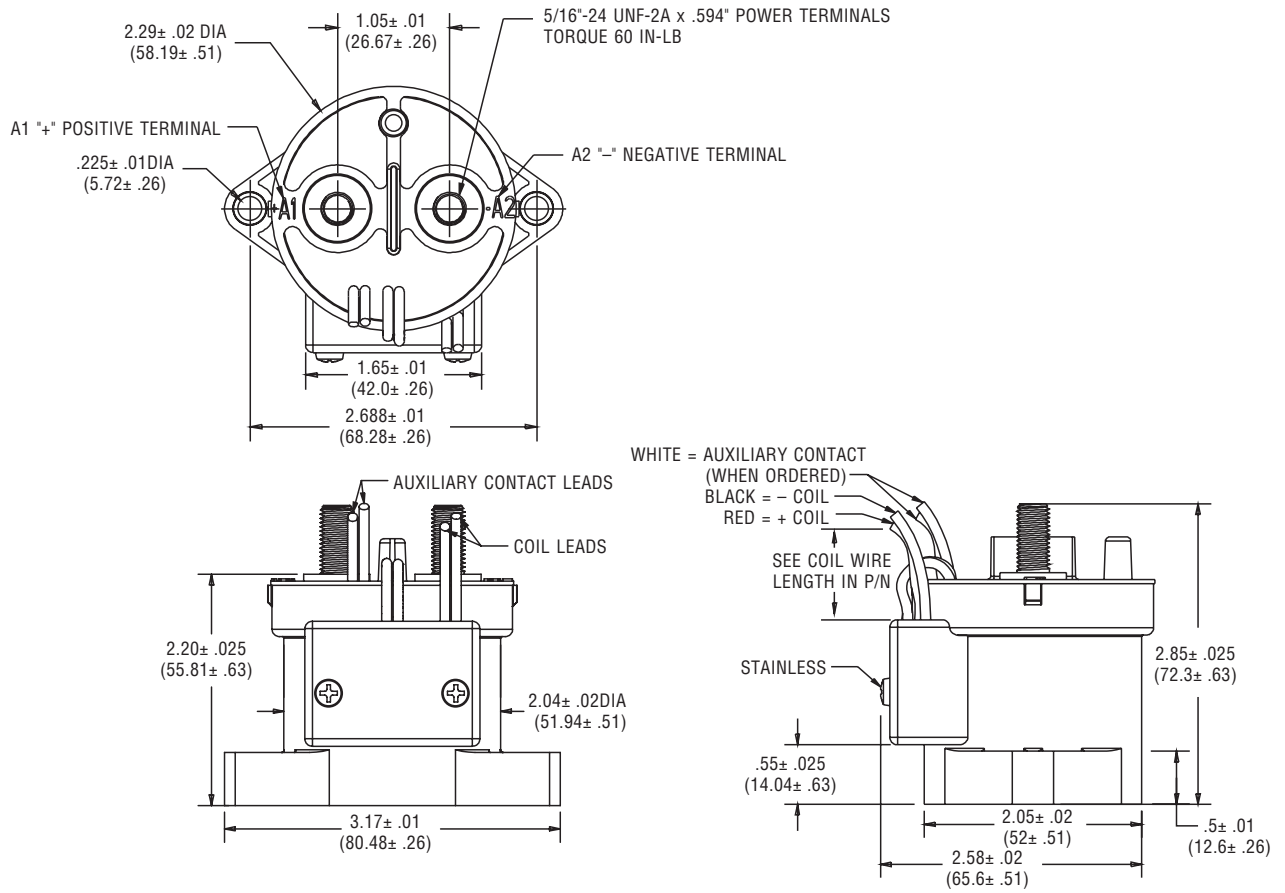
Type 686 Custom Design Capabilities

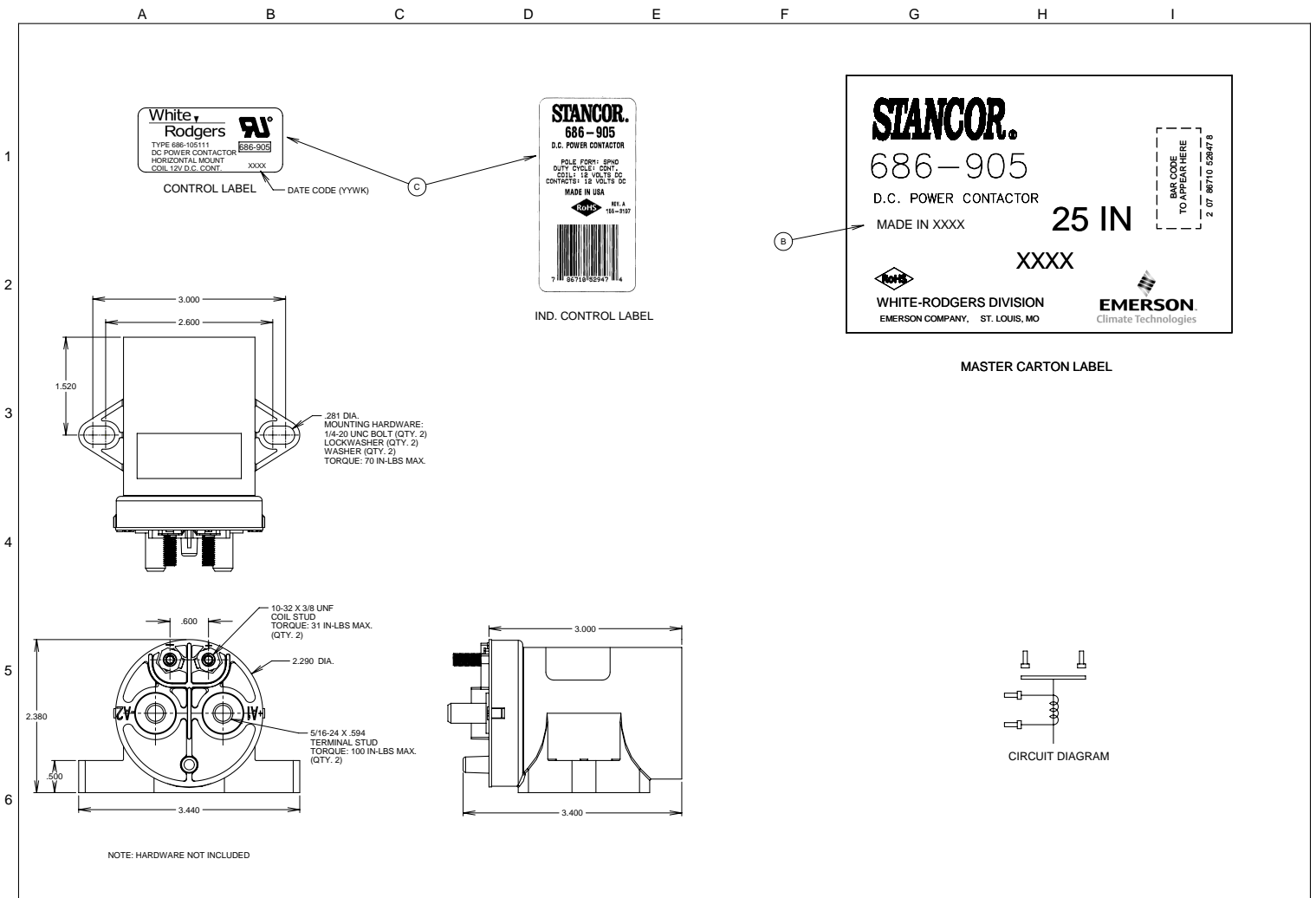
— Coil voltages 12 VDC through 96 VDC

— Please complete application data form on page 95 of this section.

— **Type 686 RoHS Compliant**

Outline Dimensions





| ECN NO. | LETTER | REVISION RECORD | DATE | BY | FINISH |
|---------|--------|--|----------|----|--------|
| 159828 | C | REVISED CONTROL LABEL & IND. CONTROL LABEL | 09-03-07 | SA | |
| 158521 | B | 'COUNTRY OF ORIGIN' ADDED TO MASTER CARTON LABEL | 4-16-07 | EK | |
| 157067 | A | RELEASED | 11-6-06 | RH | |

| ECN NO. | LETTER | REVISION RECORD | DATE | BY |
|---|--------|-----------------|------|----|
| MATERIAL (ALL MATERIALS AND PROCESSES MUST BE COMPLIANT WITH RHM AND JIG LEVEL 'A') | | | | |
| FINISH: | | | | |

| | | | | |
|--|---------------|--|---------|-----------------------------------|
| DO NOT SCALE DRAWING. WORK TO DIMENSIONS. | | DESIGN | CTD | CLASSIFICATION OF CHARACTERISTICS |
| IF A TOLERANCE IS SPECIFIED, ALL DIMENSIONS TO BE MET UNLESS OTHERWISE SPECIFIED | | ★ | ★★ | (CRITICAL) |
| | | ★ | ★★ | (MAJOR) |
| | | ★ | ★★ | (MINOR) |
| C of C Review: JH | | DATE: | 4-16-07 | |
| SIMILAR TO: | | REFER TO QPRO T3-1611 FOR EXPLANATION OF CLASSIFICATION OF CHARACTERISTICS | | |
| PROJ. NO.: | SUPERSEDING: | THIS DOCUMENT IS THE PROPERTY OF WHITE RODGERS DIVISION OF EMERSON ELECTRIC CO. NEITHER THIS DOCUMENT NOR ANY INFORMATION CONTAINED HEREIN MAY BE REPRODUCED OR DISCLOSED TO THIRD PARTIES WITHOUT WHITE RODGERS' WRITTEN CONSENT. | | |
| MADE FOR (ORIG. USAGE): | PART NO. WAS: | SCALE: | NONE | |
| CHECKED BY: ROGER HARDIEWAY | DATE: | 11-6-06 | | |
| DRAWN BY: ED KOWALCZYK | DATE: | 11-6-06 | | |
| TITLE: CUSTOMER CONTROL DRAWING FOR 686-905 | | White Rodgers | | |
| PART NO.: 1000-1230 | | EMERSON Climate Technologies | | |