

EV600 CONTACTOR

600A/28-1000Vdc SPST

Product Features:

- 600A Bidirectional Switching and Carry
- SPST Main Contacts, SPST Auxiliary Contacts
- 3000A Break at 400Vdc
- 4.2kA pulse withstand current
- Dual Coil Electronic “Cut-Throat” Economizer with Integrated Coil Suppression
- Hermetically Sealed- operates in explosive/harsh environments.



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PRODUCTION DATA SHEET

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Physical Data	Units	EV600
Contact Arrangements: Main Contacts		SPST Form X
Auxiliary Contacts (3A/125Vrms or 1A/30Vdc) (1)		SPST Form A
Dimensions	inches	See drawing
Weight, Nominal	Kg	0.56

Environmental Data		
Shock, 11ms 1/2 sine (operating)	G _{peak}	20
Sine Vibration, 20 G _{peak}	Hz	55-2000
Operating/Storage Temperature Range (2)	°C	-55 to +85
Operating Altitude (max)	ft	70,000

Electrical Data		
Voltage Rating: Main Contacts (3)	Vdc	28-1000
Current Rating, Continuous: Main Contacts (4)	A	600A
Contact Resistance: Main Contacts (5)	mΩ mV mΩ	0.2 max @600A 110 max @600A 150@1A
Aux Contacts:		
Hot Switching Performance, Resistive Load		
200A make/ break @ +/-400Vdc	cycles	4000
600A make/break@ +/-400Vdc	cycles	10
3000A carry/break @ +/-400 Vdc	cycles	2
Maximum pulse through closed contacts (6)	Amps	+/-4000
Mechanical Life (min)	cycles	100,000
Dielectric Withstand Voltage		
Terminal to Terminal		10kVdc
Terminals to Coil		3950 Vdc
Insulation resistance		
Terminal to Terminal/ Terminals to Coil		100MΩ min @ 500Vdc new 50MΩ min @ 500Vdc end of life

(1) Minimum Load: 5V/5mA

(2) Ambient conditions and conductor size affect rating.

(3) Maximum Load Interrupt at 1000Vdc = 250Adc

(4) Keep relay terminals below 150C max continuous, 175C max for two hours, and 200C for 1 minute. 214 mm sq. conductor size recommended for 600A carry (2X 4/0 AWG). See derating curve for current vs. ambient temperature – operating ambient to +85C allowed with current derating.

(5) Stabilized reading. Contact resistance may exceed spec in the first 3 minutes of current carry.

(6) 1ms rise time, 10ms pulse duration.



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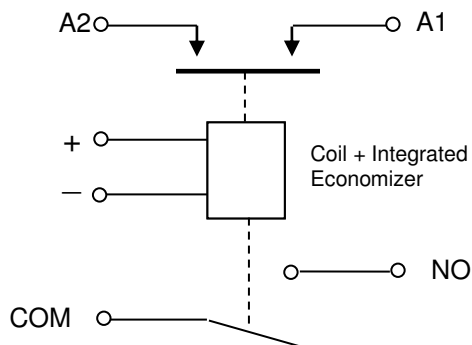
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Coil Data @ 20C (Internal Two-Coil Economizer)**12V Coil****24/28V Coil**

Coil Voltage Range	Vdc	9-14	18-28
Nominal Pickup Current	A	5.5	4.5
Nominal Holding Current	A	0.25	0.30
Pickup Voltage	Vdc	≥ 9	≥ 16
Dropout Voltage	Vdc	≤ 3.5	≤ 10
Pickup Pulse (max)	ms	50	50
Coil Resistance +/-5%	Ω	2.0 Pickup/43 Hold	5.7 Pickup/104 Hold
Coil Holding Power	W	3.2	5.3
Main Contacts:			
Operate Time (max)	ms	20	20
Operate Bounce (max)	ms	3	3
Release time	ms	5	5

Schematic**EV600 (Electronic Cut-Throat Economizer)**

Coil Wire: 22 AWG, Red = +, Black = Return

Auxiliary: 22 AWG;

White = NO

White = COM

All wires Raychem FLHTC6009-22, 1kV rated

**Kilovac** Brand

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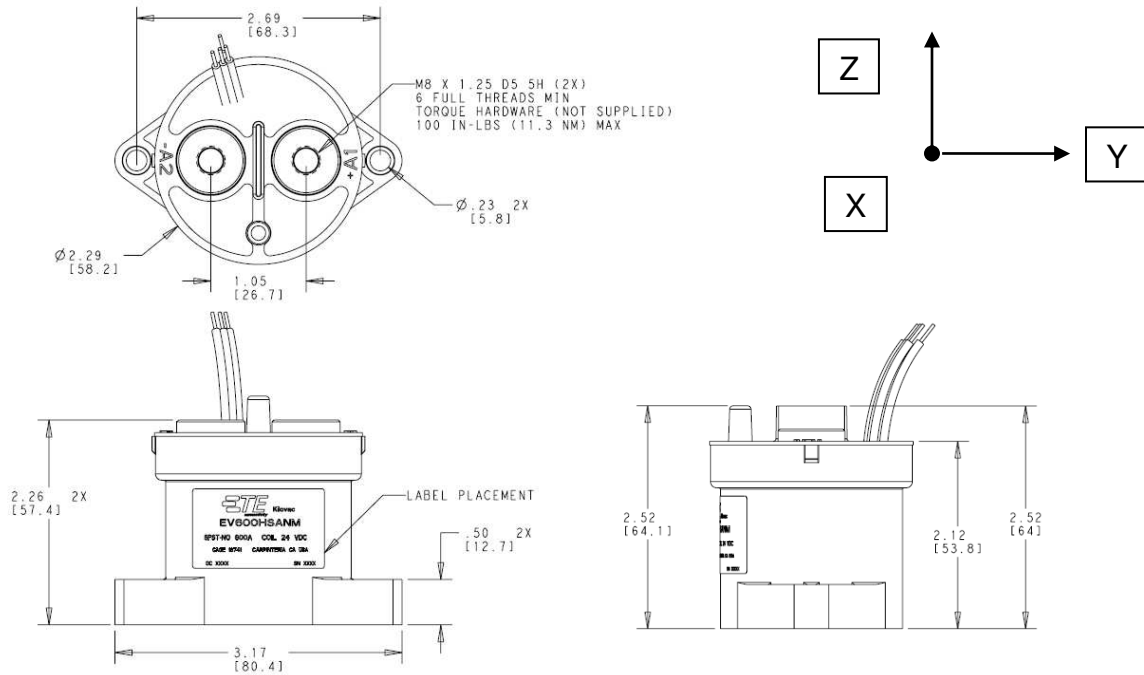
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Outline Drawing

Dimensions +/- .03 [.76]



PN Selection

	EV	600	H	S	A	N	M
EV							
600 = Series Designator							
H= SPST-NO W/AUX							
S = 24-28Vdc Coil Economized							
V = 12Vdc Coil Economized							
A = 15-inch coil leads							
N = No Connector							
M= Bottom mount (2X #10 holes) Female M8 X 1.25 Power Terminals							



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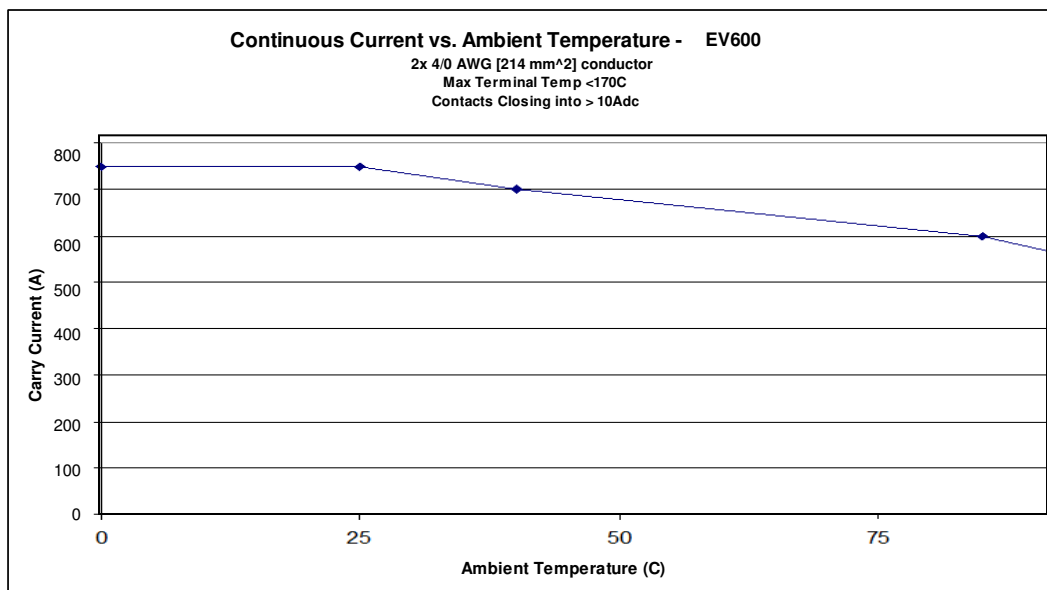
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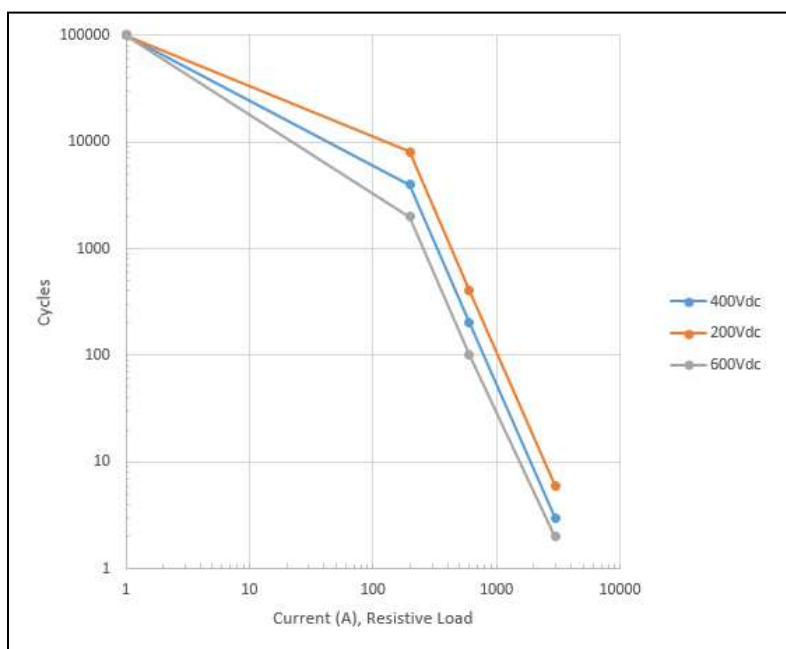
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Continuous Current vs. Temperature



**Estimated Load Switching Life vs. Voltage and Current
 (Break-Only >650A)**



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Application Notes:

Introduction - Product Capabilities And Typical Applications

Kilovac EV contactors are designed to be the highest performance, smallest and lightest weight, sealed High Voltage contactors in the industry. With current carrying capability of up to 600A and power interruption up to 1200kW, they are used in a variety of industrial, marine, automotive, and commercial applications. Primarily designed to switch resistive loads, they can be used in a variety of circuit applications bearing in mind a few important considerations. This application note focuses on a few of the more common circuit configurations, and what to consider when selecting, installing and using the contactors.

1. Installation

Kilovac EV contactors can be mounted in any orientation, and due to the nature of their hermetic seal and isolated enclosure, can be mounted in close proximity to other equipment. However, care must be taken with regard to the termination of the power cables to the main terminals. It is important that the main power connection lugs are mated directly to the terminal seats. Be sure that the hardware stackup is in the proper order, and that washers and other spacers are not placed between the lug and terminal seat. Extraneous connection resistance can cause considerable power dissipation and terminal heating at high current carry. Refer to Figure 1 and Table I for the recommended hardware stackup and torque.

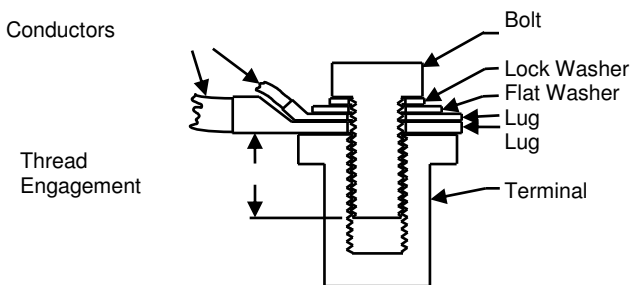


Figure 1
Main Terminal Hardware Installation

Table I

THREAD ENGAGEMENT(turns)	TORQUE
Less than 5	Use longer fastener
5 TO 7	7.9 Nm (70 in-lb.) MAX
7 TO 8	9.0 Nm (80 in-lb.) MAX
8 TO 11	9.0 Nm (80 in-lb.) 11 Nm (100 in-lb.) MAX
Mounting Feet (all)	1.7-3.3 Nm (30-35 in-lb.)

Use the same guidelines and torque maximum values for stud terminal contactors as well.

2. Coils, Drive Circuits and Coil Economizing

Since the power required to close the contacts is generally much greater than the required holding power, Kilovac EV contactors are packaged with low-profile coils that utilize either an electronic economizer (switch-mode PWM), or mechanical cut-throat economizer. The economizer lets-through the higher power required for contact closure, then reduces the power for holding, greatly reducing the coil power consumption and heating. These circuits are packaged with the contactor and include coil suppression components as well.

3. Load Types and Power Switching Recommendations

In general, all EV/LEV contactors are designed primarily for connection and interruption of resistive loads and slightly inductive loads ($L/R < 1\text{ms}$). High currents (up to 3000A) can be interrupted in case of circuit faults, and high continuous currents upwards of 600A can be maintained through closed contacts. Some important points to consider are:

- Closing into current spikes due to uncharged filter capacitors. Capacitors should be pre-charged whenever possible to avoid excessive contact erosion and nuisance welds. Keep inrush current spikes below 4.5kA always. Care should also be taken when considering other high-inrush loads such as lamps or motors.



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b. Large current spikes through closed contacts. Large current spikes through closed contacts in excess of 4500A can sometimes cause spot welding or contact levitation.

c. Circuit inductance. Contactor break-arcs generally last as long as it takes to dissipate the stored inductive energy of the load ($t(\text{arc}) = 1.1 \cdot L/R$).

Longer arcs due to circuit inductance can accelerate contact wear, and in extreme cases, can cause contactor failure. Kilovac recommends that the time constant of the load be less than 1ms for safe operation and maximum life.

Contactors life is a function of the power level switched. Higher make/break currents erode contact materials faster and accelerate loss of dielectric withstanding between the open contacts. The graph on sheet 5 can be used as a guideline for estimating product life at a given load.

4. Recommended Conductor Sizes for Continuous Current Carry

Many sources exist for recommending the proper conductor size for a given current carry. Many of these sources are concerned primarily with wire insulation safety issues. Cable bundling, conduit types, length of runs, etc., are all important considerations. With regard to a contactor placed in line with the conductors, it is important to make sure that the wire size is sufficient such that the contactor terminals themselves do not overheat, leading to a failure of the device. In most cases, the primary path for removal of heat from the contactor terminals is the conductors themselves. Convection to atmosphere and conduction via the base mountings play a lesser role in this type of contactor due to the nature of the construction. 350 kcmil conductor is recommended for maximum carry capabilities over the temperature range.

The recommended maximum power terminal temperature for EV contactors is 150° C continuous, 175° C for 2 hours and 200C for 1 minute.

5. Auxiliary Circuits

Auxiliary SPST contacts are available on all EV600 models. Auxiliary contacts are rated at 125Vac/ 1A or 30Vdc/3A, with a minimum load of 5Vdc/5mA. Kilovac's auxiliary contact actuating method will indicate the true position of the main contacts. *The auxiliary contact actuation is directly coupled to the main contact moving bridge and will not indicate "open" unless both contact gaps of the double-make, Form X contact are fully disconnected.* Keep in mind that the auxiliary contact is mainly a status indication and should not be used to directly power other loads such as a relay coil or high-power lamp load.

6. Environmental Considerations

All Kilovac contactors are characterized for operation in thermal, vibration, moisture and fluid environments. Refer to the Environmental Data section on sheet 2 for details.



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