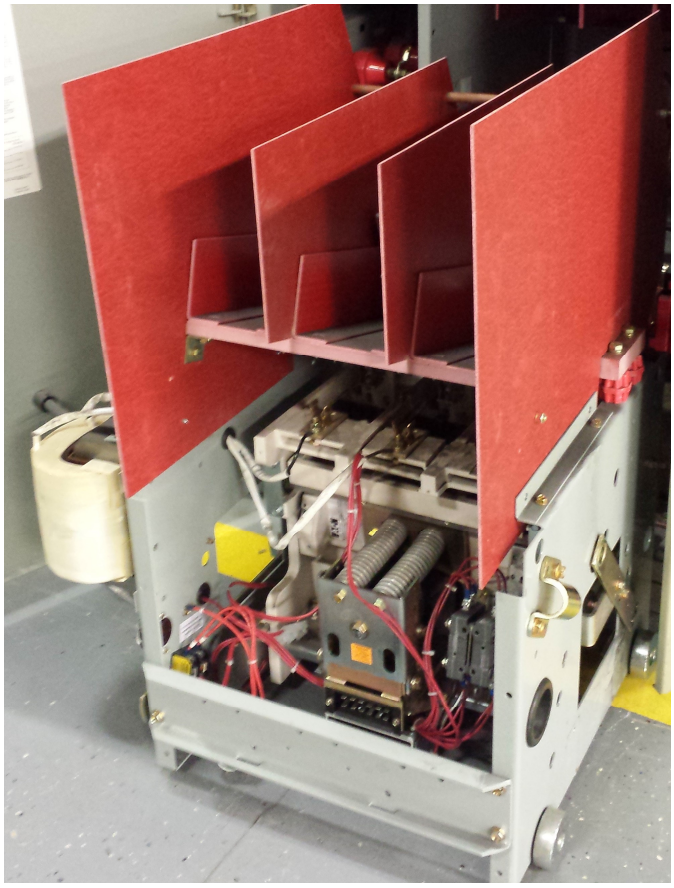
Instructions for Installation, Operation and Maintenance of the **SL800 Classic** 7.2 Kilovolt, 720 Amp. Vacuum contactor

Instruction Bulletin



DANGER

HAZARDOUS VOLTAGE

Read and understand these instructions before attempting any installation, operation or maintenance of the SL vacuum contactor. Retain this document for future use.

This equipment shall be installed and serviced only by qualified electrical personnel. A qualified person is one who is familiar with the construction and operation of this equipment and who is aware of the hazards involved.

DESCRIPTION

The **SL800 Classic** vacuum contactor is a 7.2kV, 720 amp contactor designed for starting and controlling three-phase, 50 or 60 Hz AC motors. Horsepower ratings are shown in Table I. Motor full load current should not exceed the contactor current rating.

The short-circuit capacity of the power system may exceed the interrupting capacity of the contactor. The contactor should have short-circuit protection with current-limiting fuses as specified for the application. Substitute fuses should not be used without proper authorization by the factory. Ratings for the contactor are shown in Table II.

TABLE I. APPLICATION DATA

Range of System Voltage	Horsepower Ratings			Transformer Switching Rating (kVA)	Interrupting Capacity (rms) Symmetrical at Nominal Utilization Voltage	
	Synchronous Motor		Induction Motor		Fuses (kA)	Controller (kVA)
	0.8 PF	1.0 PF				
2200-2500	3000	3500	3000	250	50	200,000
3800-5000	5000	6000	5000	4500	50	350,000
6200-7200	8000	10000	8000	6000	50	570,000

TABLE II. RATINGS

Maximum Interrupting Current (3 Operations)	12,500A	**Control Voltages**	
		AC	110/120, 220/240 Volts 50/60 Hz
Rated Current	720 Amperes		
Maximum Rated Voltage	7,200 Volts	**DC**	125 Volts
Making/Breaking Capacity		**Control Circuit Burden (Rated Volt)**	
AC4-Make	8,000 Amperes UL 7,650 Amperes IEC	Closing	2600 VA
AC4-Break	6,400 Amperes UL 6,120 Amperes IEC	Holding	80 VA
Short Time Current		**Auxiliary Contact Rating**	
30 Seconds	4,800 Amperes	Voltage (Maximum)	600 Volts
1 Second	12,000 Amperes	Continuous Current	10 Amperes
7.8 Milliseconds	89.2 kA	Making Capacity (AC)	7200 VA
Mechanical Life	250,000 Operations	Making Capacity (DC)	200 VA
Electrical Life	200,000 Operations	Breaking Capacity (AC)	720 VA
BIL	60kV	Breaking Capacity (DC)	200 VA
Dielectric Strength (60 Hz)	18.2 kV (1 minute)	**Latch (when specified)**	
Closing Time	80 Milliseconds	Mechanical Life	250,000 Operations
Opening Times	50 to 330 Milliseconds Dip Switch Selectable Refer to Table IIIb	Trip Voltages (DC)	24/48/96 Volts
		Trip Voltages (AC)	110/120/220/240 Volts (50/60 Hz)
Arcing Time	12 Milliseconds (3/4 cycle) or less	Min Trip Voltage	80% Rated Coil Voltage
		Trip Burden 24 VDC	1200 VA
Pickup Voltage	80% Rated Coil Voltage	48 & 96 VDC	400 VA
Dropout Voltage	60% Rated Coil Voltage	110 & 220 VAC	500 VA

INSTALLATION

DANGER

ALL WORK PERFORMED ON THIS CONTACTOR SHOULD BE DONE WITH THE MAIN DISCONNECT DEVICE OPEN AND LOCKED OUT. AS WITH ANY CONTACTOR OF THIS VOLTAGE, THERE IS DANGER OF ELECTROCUTION AND/OR SEVERE BURNS.
MAKE CERTAIN THAT POWER IS OFF. CHECK FOR VOLTAGE WITH VOLTAGE SENSOR OR A METER OF THE APPROPRIATE RANGE.
MAKE CERTAIN THAT ALL TRANSFORMERS ARE ISOLATED TO PREVENT FEEDBACK AND THE RESULTANT GENERATION OF HIGH VOLTAGE.

The **SL800 Classic** contactor is a direct replacement for SJA800A contactors in Classic Ampgard starter assemblies. No mechanical changes to the starter cell or the contactor are required when installing the SL800 Classic contactor.

The contactor weighs about 210 pounds. It should be handled gently to avoid damage to the vacuum bottles and factory adjustments. A horizontal plate is provided at the front for pulling the contactor out of its cell, or for pushing it back into place.

When a type SJA contactor is installed in a medium voltage controller it can be moved to a draw out position or removed from the enclosure as follows:

1. Provide a lift truck or suitable platform to receive the contactor as it comes out.
2. Make sure all circuits are de-energized.
3. Remove the three power circuit fuse assemblies using the fuse puller supplied with the starter.
4. Disconnect the control plug and stow it so that the cable will not be damaged. Disconnect the two 3-point separable terminal blocks on the right front of the isolating switch.
5. Trip the latch on the left side by holding it upward (using your foot if desired, when unit is at floor level).
6. While holding the latch up, pull the contactor out ward. It will roll forward and should re-latch at a detent position, partially out of the cell. All routine inspection and maintenance can be done with the contactor in this latched position.
7. To remove the contactor completely, reverse the latch, pressing it downward. The contactor can then be rolled out of its cell.

Once the contactor is on the floor, it can be moved easily by means of a short length of 0.75-inch (19.1-mm) pipe inserted into a bracket on the top front of the right side sheet. The contactor can be pushed or pulled like a wagon in this manner.

To install the SL800 Classic contactor, reverse the procedure.

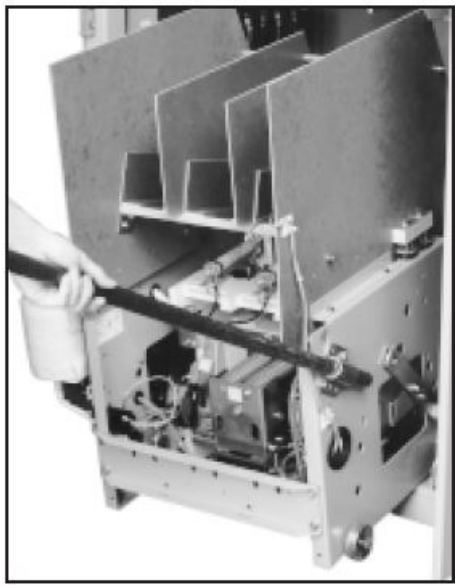


Fig. 1 Moving the Contactor

CONTACTOR OPERATION

The SL contactor has its main contacts sealed inside ceramic tubes from which all air has been evacuated, i.e., the contacts are in vacuum. The arc simply stops when the current goes through zero as it alternates at line frequency. The arc usually does not survive beyond the first half cycle after the contacts begin to separate. The ceramic tube with the moving and stationary contacts enclosed is called a vacuum interrupter or a vacuum bottle and there is one such bottle for each pole of the contactor. A metal bellows (like a small, circular accordion) allows the moving contact to be closed and pulled open from the outside without letting air into the vacuum chamber of the bottle.

The moving contacts are driven by a molded plastic crossbar rotating with a square steel shaft supported by two shielded, pre-lubricated ball bearings that are clamped in true alignment for long life and free motion. Only the end edges of the square shaft are rounded to fit the bearings, so that portions of the four shaft flats go through the bearings for positive indexing of the mechanical safety interlocks.

The contacts in an un-mounted vacuum bottle are normally-closed, because the outside air pressure pushes against the flexible bellows. For contactor duty, the contacts must be open when the operating magnet is not energized. Therefore, the contacts of the vacuum bottles must be held apart mechanically against the air pressure when used in a contactor. In the SL contactor, all of the bottles are held open by two kickout springs on the front of the contactor. The kickout springs press against the moving armature and crossbar and thereby force the bottles into the open contact position. Note that in the open position, the crossbar is pulling the moving contacts to hold them open.

Up to an altitude of 3300 feet, the contactor is designed to tolerate normal variations in barometric pressure. Special factory modifications are required if the contactor is to be applied at high altitude. Contact the factory if the contactor will be applied at elevations above 3300 feet.

The contactor is closed by energizing the contactor control board with the appropriate control voltage at terminals 1 and 2. The control board rectifies the input voltage and applies a pulse width modulated DC output voltage to the coil. The output voltage is approximately full voltage for the first 200 milliseconds after energization, during which time the contactor closes and seals. The output voltage is then automatically reduced to approximately 15 VDC to maintain the contactor in the closed position.

The coil core is magnetized which rotates the armature shaft, armature, and crossbar. As the armature moves toward the coil core, the main contacts close. The crossbar continues to move an additional distance (known as overtravel), which allows for contact preload and wear. The overtravel distance is the gap between the lower bottle nut and the pivot plate as shown in Figure 2.

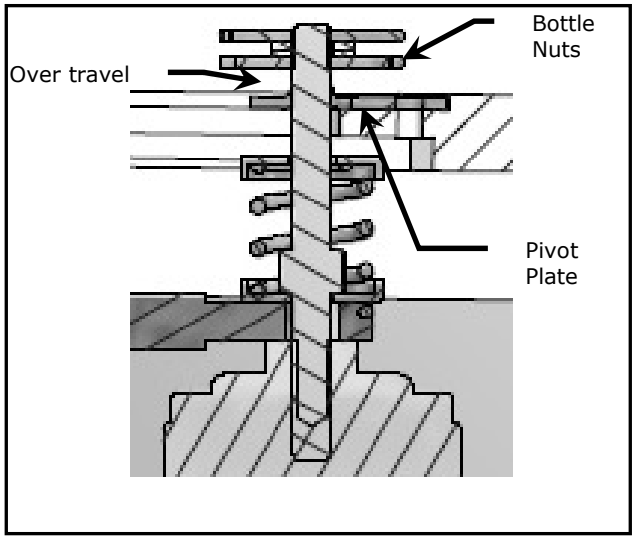


Fig. 2 Closed Contactor

When control power is removed from the control board, the magnetically held contactor remains closed for a preset time and then opens. The range of time between the removal of control power and contact opening is from 50 to 330 milliseconds depending on the setting selected on the control board. The time can be adjusted for such factors as fuse coordination and voltage loss ride-through. Unless otherwise specified, the factory default dropout setting is 130 milliseconds, or approximately 8 line cycles (60Hz). To maintain proper coordination with the starter power fuses, do not use the 50ms setting.

A selectable dip switch is located on the control board for setting the control voltage level and the contactor dropout time. See Figure 3. The control board must be removed from the cavity in the contactor housing to gain access to the dip switch. Table IIIa lists the available voltage settings and Table IIIb lists the available dropout settings. These tables are also printed on the back of the control board. The control voltage setting should match the starter control circuit voltage.

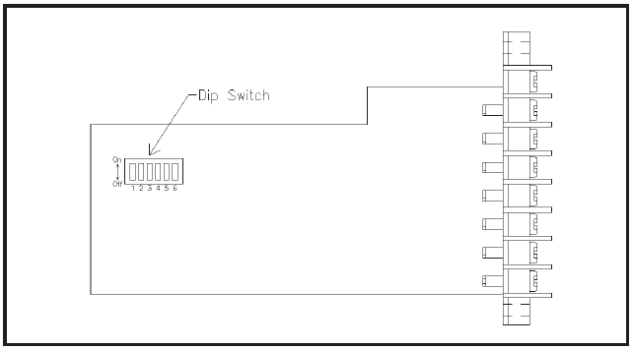


Fig. 3 Coil Control Board with Dip Switch

TABLE IIIa. DIP SWITCH SETTING-CONTROL VOLTAGE			
Setting	SW1	SW2	SW3
110 Vac 50 Hz	Off	Off	Off
120 Vac 60 Hz	On	Off	Off
220 Vac 50 Hz	Off	On	Off
240 Vac 60 Hz	On	On	Off
125 VDC	Off	Off	On

TABLE IIIb. CONTROL BOARD DROPOUT SETTINGS			
Delay Setting	SW4	SW5	SW6
50 ms	On	Off	Off
130 ms	Off	On	Off
250 ms	On	On	Off
330 ms	Off	Off	On

The control board provides the economizing function for the main coil circuit. The L63 interlock used in the economizing circuit on the SJA800A contactor is therefore not needed in this design. It has been removed from the SL800 Classic contactor.

WIRING

Refer to Figure 4 for standard control wiring for magnetically held contactors. To close the contactor, apply power to terminals 1 and 2 on the control board. Power must be maintained to terminals 1 and 2 to keep the contactor in the closed position. The closing coil is connected to terminals 5 and 6.

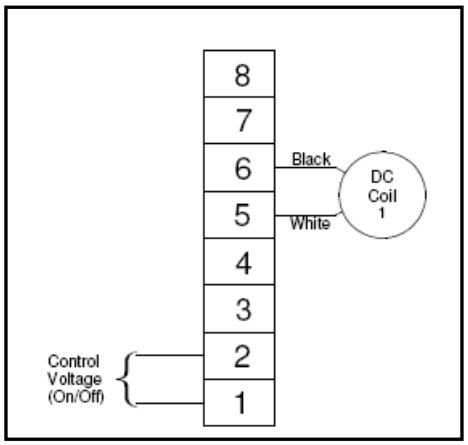
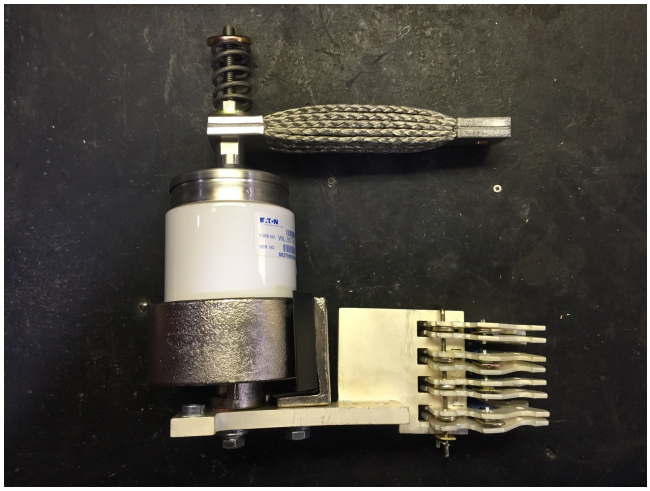


Fig. 4 Connections for Magnetically Held Contactor

RENEWAL AND REPLACEMENT PARTS

- SL800 Classic VI Assemblies, set of three - 54A1307G27



- Control Board - 54A1307G24
- Contactor Coil - 54A1307G18