
OPERATION AND MAINTENANCE MANUAL

ZTS SERIES POWER PANEL

40-4000 AMPS

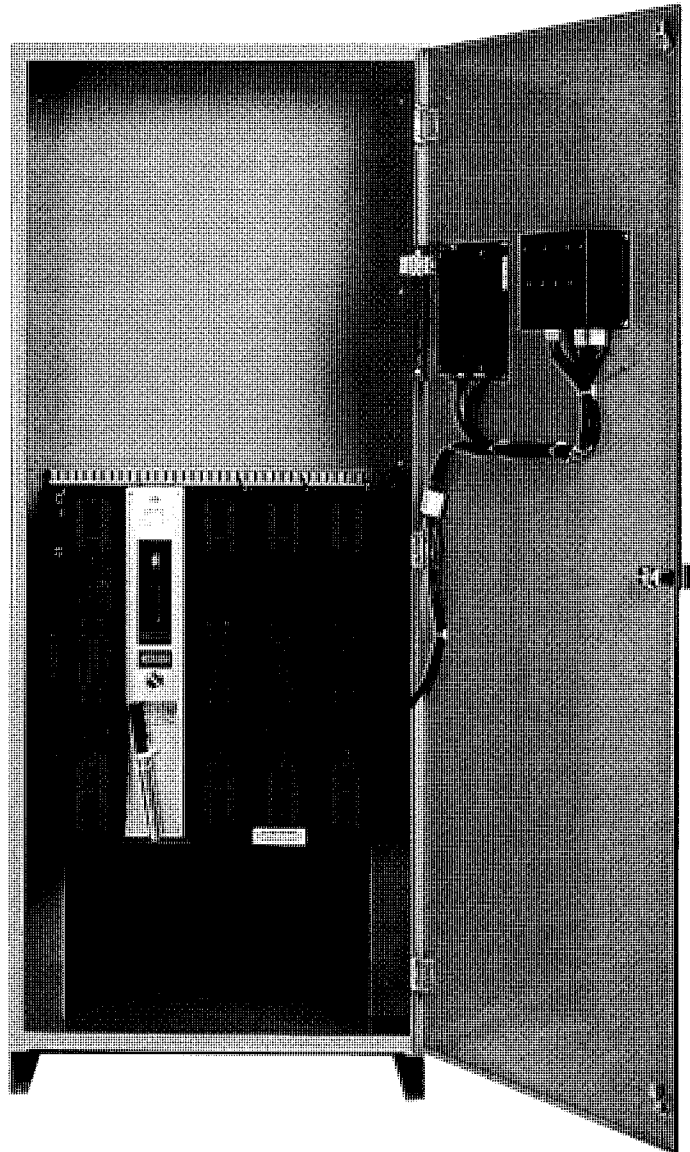


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Introduction

Zenith Transfer Switches are used to provide a continuous source of power for lighting and other critical loads by automatically transferring from the normal source of power to an emergency source of power in the event that the normal source voltage falls below preset limits.

Voltage sensing and system control is performed via a state-of-the-art microcontroller located on the cabinet door. It is designed to give highly accurate control of the transfer switch system.

All Zenith transfer switches are designed for use on emergency or standby systems, and are rated for total system or motor loads. Transfer switches are UL Listed under Standard 1008 and CSA Certified under Standard C22.2 No. 178 and IEC Listed under Standard 947.

This manual provides information on the installation, operation and maintenance of the switch. In addition, a complete information package is supplied with each transfer switch which details the features and accessories provided on that switch. The information package should be kept in a readily accessible location to provide complete reference information on this critically important piece of equipment.

A complete information package includes the following:

- Operation and Maintenance Manual for Power Panel (this manual)
- Operation and Maintenance Manual for Control Panel*
- Specific schematics for each transfer switch*

** Supplied with the transfer switch*

Safety

▲ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Installation for each ATS is detailed in the information package which includes:

- Operation and Maintenance Manual for Control Panel (this manual)
- Power Panel Manual
- Specific Schematics Supplied With Each Transfer Switch

Final Equipment Inspection

Prior to energizing the transfer switch:

1. Remove any debris incurred due to shipment or installation. **DO NOT** use a blower since debris may become lodged in the electrical and mechanical components and cause damage. Use of a vacuum is recommended.
2. Verify that all cabled connections are correct and that phase rotation of both sources match.
3. Check engine start connections and verify the correct connection of all control wires.
4. Check settings of all timers and adjust as necessary. Also adjust any optional accessories as required.
5. Check the integrity of power connections by verifying actual lug torque values as specified in the power panel manual.
6. Make sure that all covers and barriers are installed and properly fastened.

NOTE: Power Panels ship from Zenith in the Normal Position.

Equipment Inspection and Storage

Immediately inspect the transfer switch when received to detect any damage which may have occurred during transit. If damage is found or suspected, file claims as soon as possible with the carrier and notify the nearest Zenith representative.

Before installation, it is necessary to store the transfer switch in a clean dry place, protected from dirt and water. Provide ample air circulation and heat, if necessary, to prevent condensation.

Storage Temperature: -30° C to + 85° C (-22° F to +185° F)

Operating Temperature (Ambient): -20° C to +75° C (-4° F to +167° F)
[40-400 Amps (Molded Type)]
-20° C to +60° C (-4° F to +140° F)
[400 Amp (Metal Frame), 600-4000 Amps]

Humidity: 5% to 95% (non-condensing)

Installation

⚠ DANGER

HAZARDOUS VOLTAGE (Can Cause Severe Injury or Death)

Turn OFF all power before installation, adjustment, or removal of transfer switch or any of its components.

Each Zenith transfer switch is factory wired and tested. A complete information package is furnished with each switch which includes:

- Sequence of operation.
- Description and operation of all accessories supplied.
- Power panel connection diagram and schematic.
- Description and identification of all customer field connections.

Installation of Zenith transfer switches includes:

- Mounting the transfer switch cabinet.
- Connection of all Normal, Emergency, and Load cables or bus bars.
- Connection of external control circuits as required.

Mounting

Adequate lifting means must be used to mount the transfer switch into place. The recommended method for moving the transfer switch using the lifting eyes, where supplied, and a spreader bar is illustrated in *Figure 1*. Enough room should be allowed to open the cabinet doors fully for inspection and servicing of the switch per NEC and local codes.

Before drilling conduit entry holes or any accessory mounting holes, cover and protect the switch and control panel to prevent dirt and metal fragments from entering the mechanical and electrical components. Failure to do so may result in damage and malfunction of the switch.

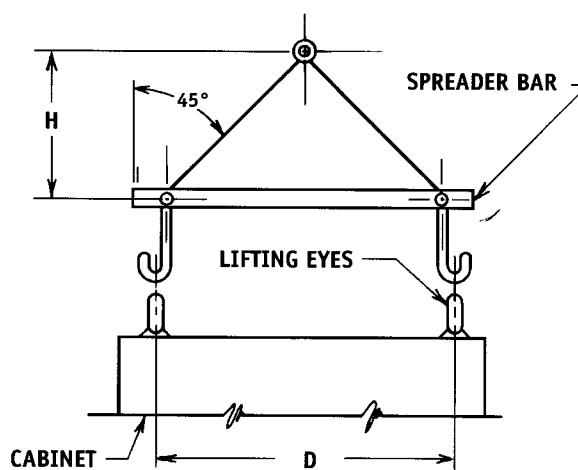


Figure 1

⚠ NOTICE

When lifting the switch using a spreader bar, height H must be equal to half of distance D.

Installation *(cont'd)*

Power Connections

Zenith transfer switches are supplied with UL listed solderless screw type terminals as standard for the Normal, Emergency and Load power connections. *Table 1* lists the number and sizes of cable lugs supplied as standard for each switch amp rating.

Connect the Normal, Emergency, and Load conductors to the clearly marked terminals on the transfer switch. Remove surface oxides from cables by cleaning with a wire brush. Verify that all connections are correct before tightening the lugs. All cable lug connections must be tightened to the proper torque values as shown in *Table 2*.

Do not run cables or wiring behind front-connected transfer switches.

Screw Type Terminals for External Power Connections				
Switch Size (Amps)	Normal, Emergency & Load Terminals		Neutral Bar (When Required)	
	Cable Per Pole	Range of Wire Sizes	No. of Cables	Range of Wire Sizes
40	1	#8 to 1/0 AWG	3	#8 to 1/0 AWG
80	1	#8 to 1/0 AWG	3	#8 to 1/0 AWG
100	1	#8 to 1/0 AWG	3	#8 to 1/0 AWG
150	1	#8 to 3/0 AWG	3	#8 AWG to 300 MCM
200 <i>(240 V only)</i>	1	#8 to 3/0 AWG	3	#8 AWG to 300 MCM
225, 250*	1	#6 AWG to 250 MCM	3	#6 AWG to 300 MCM
260, 300*, 400	1	#4 AWG to 600 MCM	3	#4 AWG to 300 MCM
600	2	#2 AWG to 600 MCM	8	#2 AWG to 600 MCM
800 1000 1200	4	#2 AWG to 600 MCM	12	#2 AWG to 600 MCM
1600 2000 3000 4000	Line, load and neutral terminals are located in the rear of the switch and arranged for bus bar connections.			

Table 1

Tightening Torque for Lugs		
Socket Size Across Flats	Torque	
	Lb. - In.	Lb. - Ft.
1/8	45	4
5/32	100	8
3/16	120	10
7/32	150	12
1/4	200	17
5/16	275	23
3/8	375	31
1/2	500	42
9/16	600	50

* IEC Ratings Only

Table 2

Installation *(cont'd)*

Control Connections

A complete information package is furnished with each transfer switch including a complete connection diagram and schematic which details all necessary control circuit field connections.

The engine start control wires connect to the engine start relay terminals located to the left of the microprocessor. *Figure 2* shows the location of these terminals.

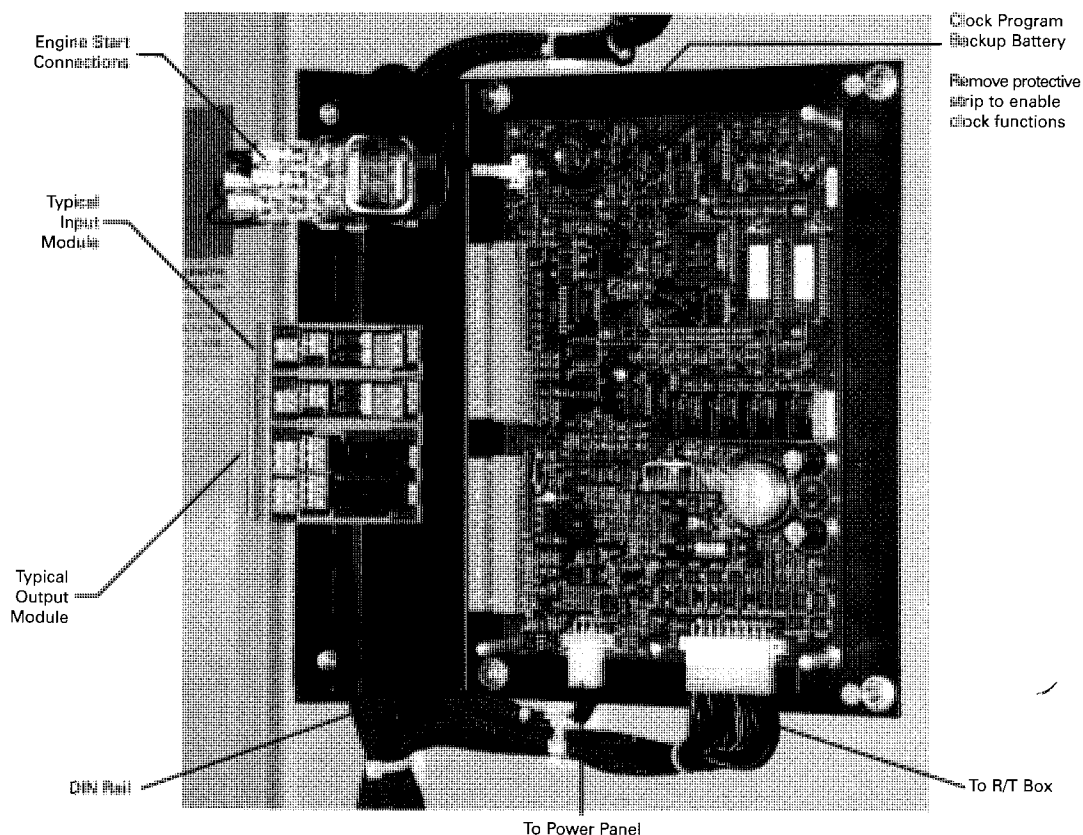


Figure 2

The terminals are clearly identified by a label on the microcontroller backplate. In the case of manual transfer switches, or in other applications not requiring the microprocessor, clearly marked terminal blocks are provided in the upper left corner of the control panel for the engine start control wires.

Terminals for field connections to the A3 Emergency auxiliary contacts and the A4 Normal auxiliary contacts are also provided. These terminals are clearly marked and appear on the side of the power panel (right hand side for 30-400 A switch). On 400 amp metal frame units these terminals appear on the bracket above the operator handle.

Installation *(cont'd)*

Final Equipment Inspection

Prior to energizing the transfer switch:

- a. Remove any debris incurred due to shipment or installation. **DO NOT** use a blower since debris may become lodged in the electrical and mechanical components and cause damage. Use of a vacuum is recommended.
- b. Verify that all cabled connections are correct and that phase rotation of both sources match.
- c. Check engine start connections and verify the correct connection of all control wires.
- d. Check settings of all timers and adjust as necessary. Also adjust any optional accessories as required. [See MX200 manual (50R-2000) for instructions on timer and option adjustments.]
- e. Check the integrity of power connections by verifying actual lug torque values as specified in this manual.
- f. Make sure that all covers and barriers are installed and properly fastened.

Functional Test

The functional testing of the transfer switch consists of electrical tests described in this section. Before proceeding, refer to the information package supplied with the transfer switch. Read and understand all instructions and review the operation of all accessories provided.

Before starting the operation test, check the equipment rating nameplate on the transfer switch to verify the correct system voltage. An example of the equipment rating nameplate is shown in *Figure 3*.

To begin the test, close the Normal source circuit breaker. The controller will illuminate the Normal Available LED if proper voltage is sensed. Verify the phase to phase voltages at the Normal line terminals.

Next, close the Emergency source breaker and start the engine generator. The Emergency Available LED indicator will illuminate when preset voltage and frequency levels are reached. Check the phase to phase voltages at the Emergency line terminals. Also, verify that the phase rotation of the Emergency source is the same as the phase rotation of the Normal source.

After the sources have been verified, shut down the engine generator, and put the starting control in the automatic position. Complete the visual inspection of the transfer switch, and close and lock the cabinet door.

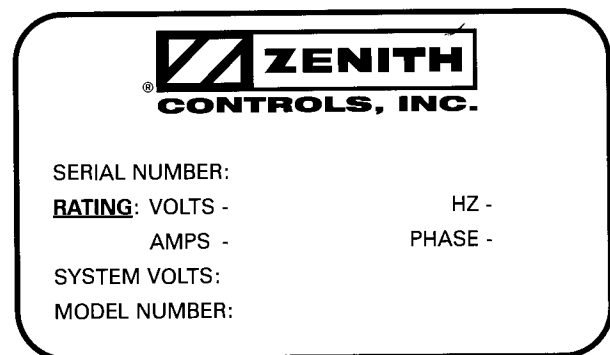


Figure 3

Installation *(cont'd)*

Initiate the electrical transfer test by activating the TS test switch. **HOLD THE TEST SWITCH UNTIL TRANSFER TO EMERGENCY IS ACCOMPLISHED.** After the P time delay, the microcontroller will send an engine start signal and sensing will determine when the auxiliary source reaches preset levels. The switch will transfer to the Emergency source after the time delay of the W timer.

Deactivating the test switch will start retransfer to the Normal source. The switch will retransfer to the Normal source after the time delay of the T timer. The U engine overrun timer allows the engine generator to run unloaded for a preset cool down period.

For complete details of timer and voltage sensing operations, please refer to the MX200 Operation Manual (50R-2000).

▲ NOTICE

**A periodic test of the transfer switch under load conditions is recommended to insure proper operation.
(See National Electric Code articles 700 and 701).**

Sequence of Operation

Figure 4 is a typical schematic diagram of a Zenith transfer switch. The information supplied with the transfer switch includes a schematic diagram and description of operation of all timers and settings.

Transfer of the load to the Emergency source begins automatically when any phase of the Normal source falls below the preset dropout point and this undervoltage failure condition is detected by the MX200 microcontroller. The engine start timer P begins its timing cycle. The P time delay is provided to override momentary outages and to prevent nuisance starting of the engine generator. If the Normal source voltage returns above the pickup setting, the P timing cycle is reset, and the transfer sequence is stopped.

If the normal source voltage does not return before the P time delay is completed, the P timer drops out and sends a starting signal to the engine generator. The microcontroller senses the voltage and frequency of the Emergency source. When both the voltage and the frequency of the Emergency source reach the preset values timer W begins its timing cycle. The W timer provides an adjustable transfer delay to the Emergency source as required.

When the W time is completed, the CCE relay energizes the CE solenoid to close the transfer switch into the emergency source. The SE limit switch activates to de-energize the CCE relay.

The sequence for retransfer to the Normal source begins automatically when the microcontroller detects that the voltage on all phases of the Normal source reach the preset pickup point.

When the Normal source restores, switching to the Normal source is initiated by energizing timer T, beginning its timer cycle. The T timer provides an adjustable delay to ensure that the Normal source has stabilized before reconnection to the load. If the Normal source fails before the T time delay completes, the retransfer sequence is stopped.

When the T time delay is completed, the CCN relay energizes the CN solenoid to retransfer the switch into the normal source. The SN limit switch activates to de-energize the CCN relay. Simultaneously, the engine over-run timer U begins its timing cycle. This timer provides a period of time for the engine generator to run without load and cool down before shutdown.

For complete details of the timers and settings, please refer to the MX200 microcontroller manual (50R-2000).

Sequence of Operation *(cont'd)*

Typical Transfer Switch Equipment Power Circuit Schematic

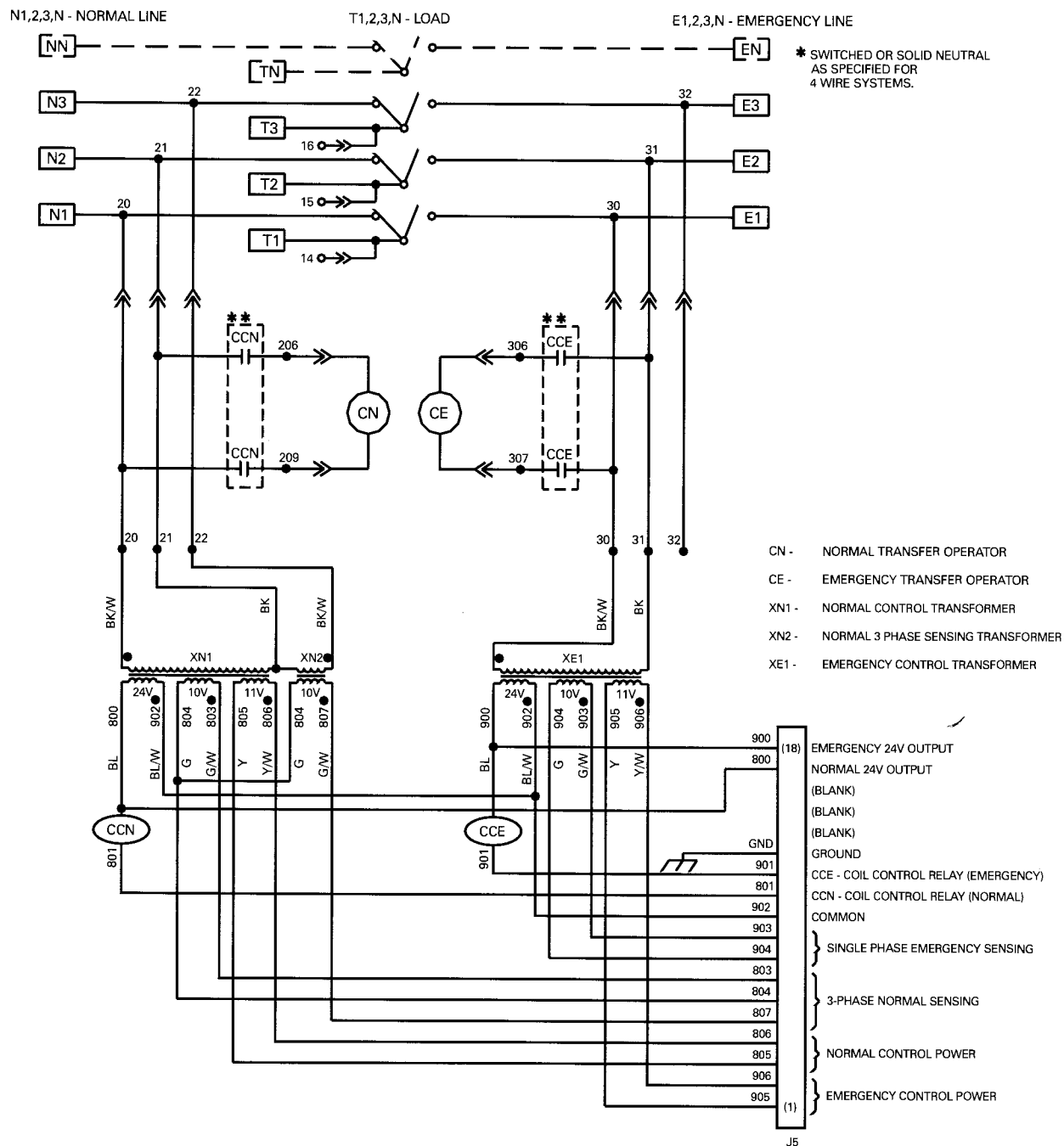


Figure 4

Maintenance and Testing

A preventive maintenance program will insure high reliability and long life for the transfer switch. The preventive maintenance program for the transfer switch should include the following items:

▲ DANGER

De-energize all sources of power before doing any work on the transfer switch.

Inspection and Cleaning

The switch should be inspected for any accumulation of dust, dirt, or moisture, and should be cleaned by vacuuming or wiping with a dry cloth or soft brush. **DO NOT** use a blower since debris may become lodged in the electrical and mechanical components and cause damage.

Remove the transfer switch barriers and check the condition of the contacts. Any surface deposits must be removed with a clean cloth (**DO NOT USE EMERY CLOTH OR A FILE**). If the contacts are pitted or worn excessively, they should be replaced. A general inspection of mechanical integrity should be made to include loose, broken or badly worn parts.

Servicing

All worn or inoperative parts must be replaced using Zenith recommended replacement parts. Please refer to the Replacement Parts manual for specific part information and ordering procedures. Please contact the Zenith Technical Services Department for the Replacement Parts manual.

The operating mechanism of the transfer switch is lubricated with Lubriplate 105. The lubricant applied at the factory provides adequate lubrication for the lifetime of the switch. Should debris contaminate the mechanism, clean and apply additional Lubriplate.

Zenith can provide complete preventative maintenance services. Please contact the Zenith Technical Services Department for additional information.

Testing

A manual operator handle is provided with the transfer switch for maintenance purposes only. Manual operation of the switch must be checked before it is operated electrically. Both power sources must be disconnected before manual operation of the switch. Insert the handle and operate the transfer switch between the Normal and Emergency positions. The transfer switch should operate smoothly without binding. Return the switch to the Normal position, remove the handle, and return it to the holder provided.

After completing the inspection, cleaning and servicing of the transfer switch, reinstall the switch cover, and close and lock the cabinet door. Reclose the circuit breakers feeding the utility and generator sources to the switch.

Maintenance and Testing *(cont'd)*

Initiate the electrical transfer test by activating the TS test switch. P timer will time out and the microcontroller will send an engine start signal. When the W time has elapsed, the switch will complete its transfer by closing into the Emergency source.

Deactivating the test switch will start retransfer to the Normal source. The switch will complete its retransfer to Normal after the time delay of the T timer. The U engine overrun timer allows the engine generator to run unloaded for a preset cool down period.

▲ NOTICE

**A periodic test of the transfer switch under load conditions is recommended to insure proper operation.
(See National Electric Code articles 700 and 701).**

Maintenance and Testing *(cont'd)*

Troubleshooting

Before beginning any troubleshooting activity, refer to the information package supplied with the transfer switch and review the description and operation of all accessories supplied. Also refer to the Installation section of this manual.

Engine Does Not START

Annunciation	Possible Cause	Corrective Action
EMERGENCY AVAILABLE LED off	Engine start wires not terminated properly	Check Engine Start Connections
	Generator in "OFF" position	Investigate why Engine Control Switch was turned off

Engine Does Not STOP

Annunciation	Possible Cause	Corrective Action
LCD Display - "Delay to Engine Stop"	U timing cycle not complete	Check U Timer setting
NORMAL POSITION and NORMAL and EMERGENCY AVAILABLE LEDs on, but U timer has timed out.	Engine start wires not terminated correctly	Check Engine Start Connections
	Generator in "Manual"	Put generator in "Auto"

ATS Will Not Transfer To EMERGENCY

Annunciation	Possible Cause	Corrective Action
EMERGENCY AVAILABLE LED off	Emergency voltage or frequency not within acceptable parameters	Check Engine Start Connections, Generator Breaker, Generator output, and Engine Control Switch
None	Power supply connector unplugged	Plug in connector
LCD Display - "Diagnostic Code 001"	Limit switch or RT box connector unplugged	Call Technical Services
LCD Display - "Delay to Emergency"	W timing cycle not complete	Check W Timer setting

ATS Will Not Transfer To NORMAL

Annunciation	Possible Cause	Corrective Action
NORMAL AVAILABLE LED off	Normal voltage or frequency not within acceptable parameters	Check utility and utility breakers
None	Power supply connector unplugged	Plug in connector
LCD Display - "Diagnostic Code 001"	Limit switch or RT box connector unplugged	Call Technical Services
LCD Display - "Delay to Normal"	T timing cycle not complete	Check T Timer setting

Maintenance and Testing *(cont'd)*

FIELD NOTES

Model Number _____

Serial Number _____

Date Shipped _____

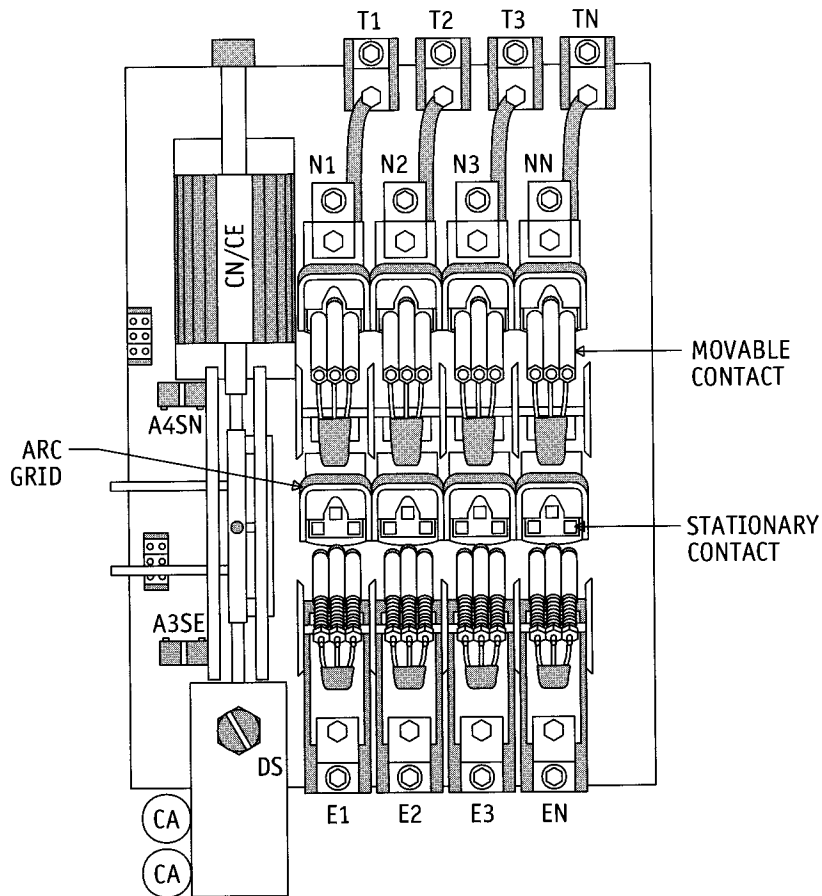
Start-Up Date _____

Drawings Supplied _____

Test and Maintenance Notes			
Date	Tested	Observations	Notes

Replacement Parts

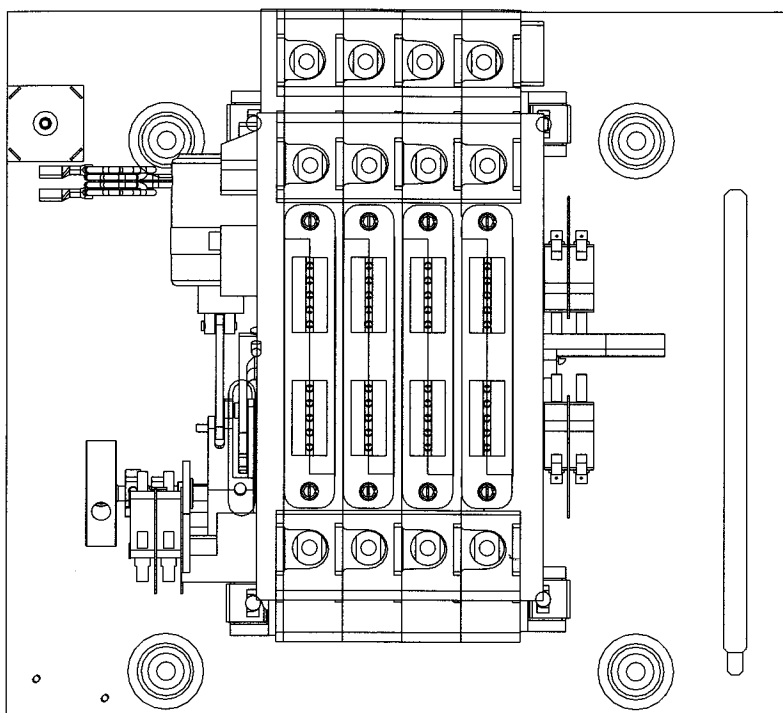
Power Panel — 40 to 260 Amps Linear Actuator Type



TAG	DESCRIPTION	STOCK NUMBERS BY AMPERAGE					
		40	80	100	150	225	260
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug	PS-4419	PS-4423	PS-4423	27P-1128	27P-1126	27P-1127
	Wire Size	#14-2	#14-1/0	#14-1/0	#8-3/0	#6 to 250 MCM	#6 to 350 MCM
	Stationary Contact Assembly Kit	27P-1141	27P-1141	27P-1141	27P-1111	27P-1111	27P-1111
	Stationary Load Contact Assembly Kit	27P-1140	27P-1140	27P-1140	27P-1109	27P-1109	27P-1109
	Arc Grid Assembly Kit	27P-1014	27P-1014	27P-1014	27P-1014	27P-1014	27P-1014
	Movable Contact Assembly Kit	27P-1036	27P-1036	27P-1036	27P-1037	27P-1037	27P-1037
CN/CE, CA	Linear Actuator and Capacitors	CA (See Note)					
	Note: 2S denotes two capacitors wired in series	Coil Volts	Poles	CN/CE	Quantity	Part	mf
		120	2	K-2104PN	1	PS-4007	340-408
		240	2	K-2105PN	1	PS-4016	108-130
		208	3	K-2141PN	1	PS-4084	145-174
			4	K-2142PN	1	PS-4084	145-174
		575/600	3	K-2198PN	2S	PS-4083	36-43
			4	K-2197PN	2S	PS-4083	36-43
		480	3	K-2119PN	2S	PS-4008	72-86
			4	K-2111PN	2S	PS-4008	72-86
		416	3	K-2190PN	2S	PS-4008	72-86
SN	CN1 Cut-out Switch	L-5022					
SE	CE1 Cut-out Switch	L-5022					
A3	Emergency Position Auxiliary Contact	SPDT, L-5022; DPDT, L-5021					
A4	Normal Position Auxiliary Contact	SPDT, L-5022; DPDT, L-5021					
DS	Disconnect Switch	Operator I-4018; Contact Block L-1028					

Replacement Parts *(cont'd)*

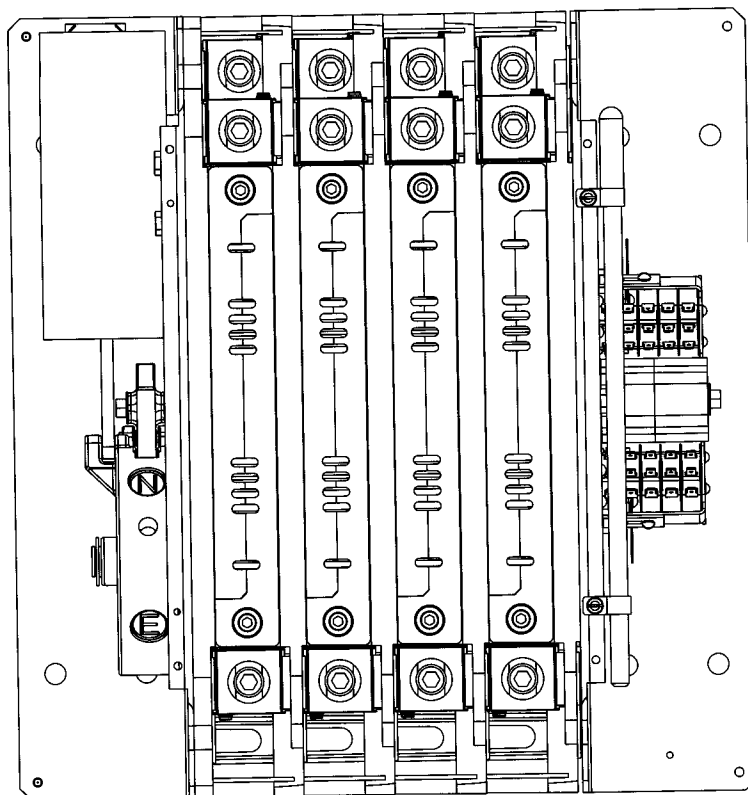
Power Panel — 40 to 200 Amps Solenoid Type



TAG	DESCRIPTION	VOLTAGE	40 TO 200 AMPS
CN/CE	Solenoid	120 208 220 240 277 380/416 440/480 575/600	K-2207 K-2208 K-2208 K-2228 K-2211 K-2212 K-2209 K-2213
	Solenoid Plunger and Link	ALL	57P-1030
SCN/SCE	Coil Cutout Switch	120-480V	L-3078
SCN/SCE	Coil Cutout Switch	600V	L-4027
BR	Rectifier	ALL	PS-5076
A3/A4	Auxiliary Contacts		L-3078

Replacement Parts *(cont'd)*

Power Panel — 225 to 400 Amps Molded Type

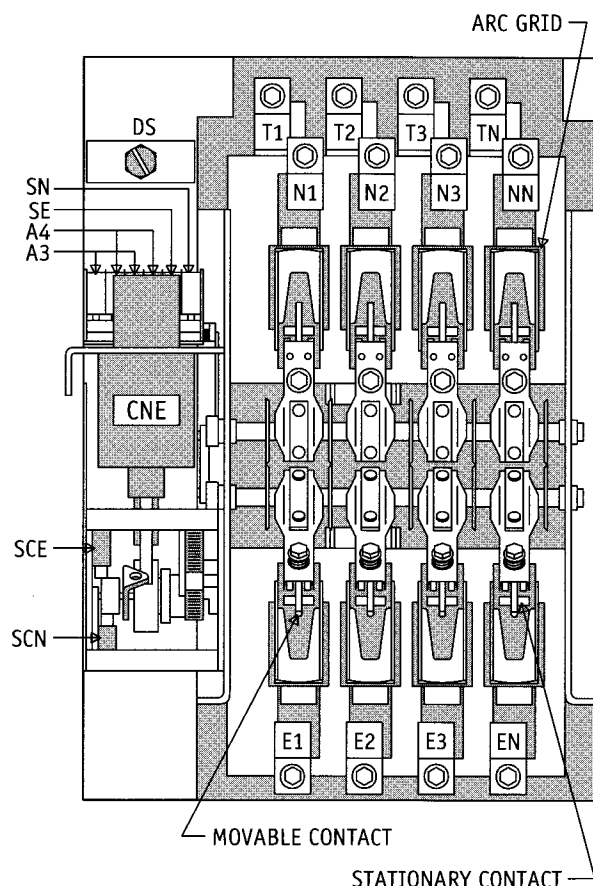


TAG	DESCRIPTION	STOCK NUMBERS BY AMPERAGE		
		225, 250*	260, 300*	400
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug	PS-4418F	S-2591	S-2591
	Wire Size	#6 to 250 MCM	#4-600 MCM	#4-600 MCM
		Coil Volts		
CN/CE	Solenoid	120 208/220 240 277 380/416 440/480 575/600	K-2229 K-2230 K-2231 K-2232 K-2233 K-2234 K-2235	
CN-P	Solenoid Plunger and Link	58P-1029		
SCN/SCE	Coil Cutout Switches	L-3079		
A3/A4	Auxiliary Contacts	L-3078		
BR	Rectifier	PS-5076		

* IEC Ratings Only

Replacement Parts *(cont'd)*

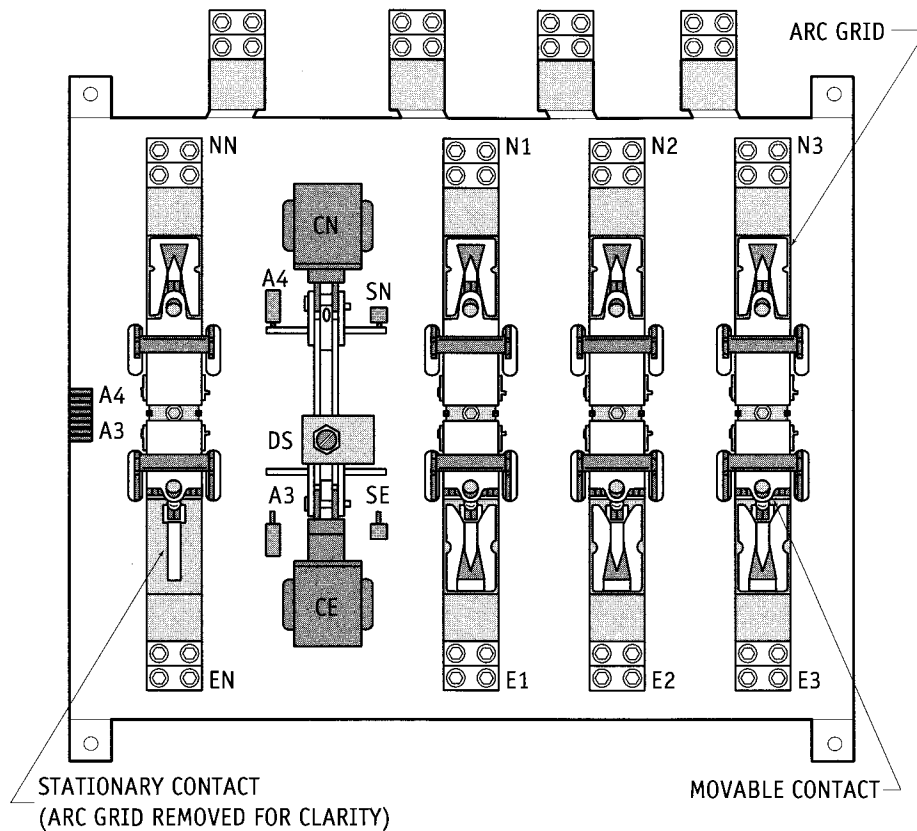
Power Panel — 400 Amps Metal Frame Type



TAG		DESCRIPTION		PART NUMBER
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Normal	Cable Connection Lugs #4-600 MCM		PS1815F
	Emergency			
	Load			PS1815
	Stationary Contact Assembly Kit			
	Stationary Load Contact Assembly Kit			46P-1100E
	Arc Grid Assembly Kit			46P-1101E
	Movable Contact Assembly Kit			46P-1102E
	Linear Actuator and Capacitors			46P-1103E
	Linear Actuator and Capacitors			46P-1140
CNE	Main ATS Operating Coils	Coil Volts	Poles	
		120	2	K-2178
		240	2,3,4	K-2189
		208	2,3,4	K-2177
		575/600	2,3,4	K-2196
		480	2,3,4	K-2176
		416	2,3,4	K-2188
		380	2,3,4	K-2188
SN	CN1 Limit Switch			L-5021
SE	CE1 Limit Switch			
A3	ATS Emergency Position Switch			
A4	ATS Normal Position Switch			
SCN/SCE	CNE Limit Switches			L-3079
DS	ATS Solenoid Disconnect Switch			L-4018 L-1029
	Operator 2 - Position Maintain			
	Contact Block N.C. (1)			
BR	Rectifier			PS-5076

Replacement Parts *(cont'd)*

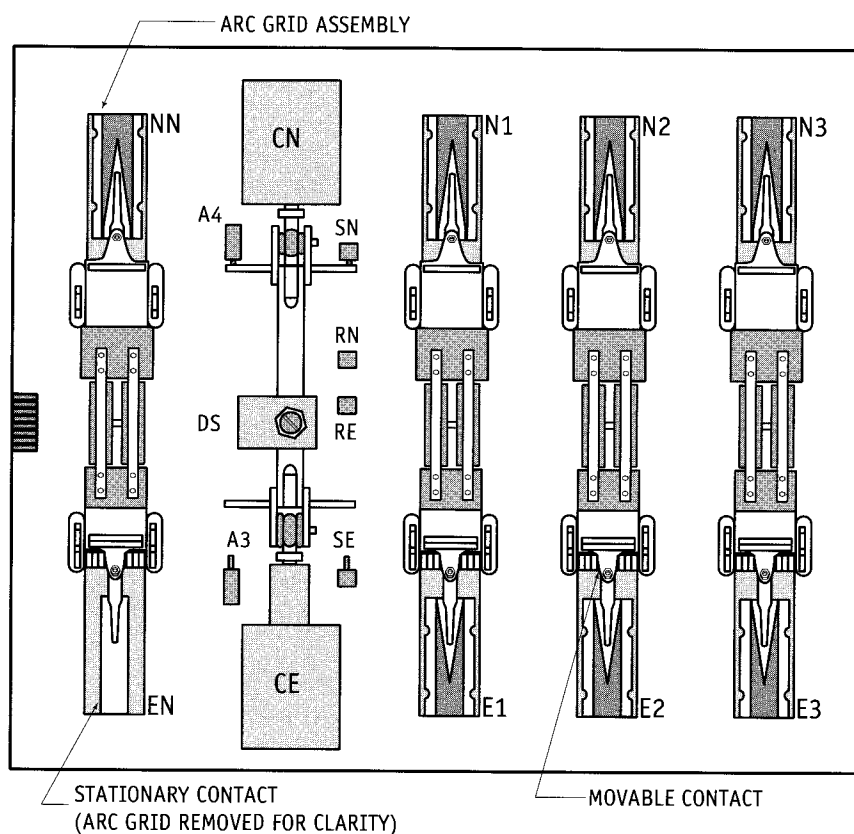
Power Panel — 600 to 1200 Amps



TAG	DESCRIPTION			STOCK NUMBERS BY AMPERAGE			
				600	800	1000	1200
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug			S1393F (2)	S1392F (4)	S1392F (4)	S1392F (4)
	Wire Size			#2-600 MCM	#2-600 MCM	#2-600 MCM	#2-600 MCM
	Stationary Contact Assembly Kit			Consult Factory			
	Arc Grid Assembly Kit			23P-1366			
	Movable Contact Assembly Kit			Consult Factory			
CN/CE	Main Operating Coils	Coil Volts	Poles				
		120	2	K-2090F	K-2073F	K-2073F	K-2073F
		240	2	K-2092F	K-2070F	K-2070F	K-2070F
			3	K-2078F	K-2070F	K-2070F	K-2070F
			4	K-2091F	K-2074F	K-2074F	K-2074F
		208	3,4	K-2091F	K-2074F	K-2074F	K-2074F
		575/600	3,4	K-2095	K-2155	K-2155	K-2155
		480	3	K-2080F	K-2071F	K-2071F	K-2071F
			4	K-2079F	K-2071F	K-2071F	K-2071F
	416	3	K-2080F	K-2071F	K-2071F	K-2071F	
SN	CCN Cut-out Switch		23P-1333				
SE	CCE Cut-out Switch		23P-1327		23P-1452		
A3	Emergency Position Aux Contact		(Qty 1) 23p-1327 (Qty 2) 23p-1328 (Qty 3) 23p-1334 (Qty 4) 23p-1336				
A4	Normal Position Aux Contact		(Qty 1) 23p-1333 (Qty 2) 23p-1334 (Qty 3) 23p-1328 (Qty 4) 23p-1330				
DS	Disconnect Switch		Operator L-4009; ; Contact Block L-1020				

Replacement Parts *(cont'd)*

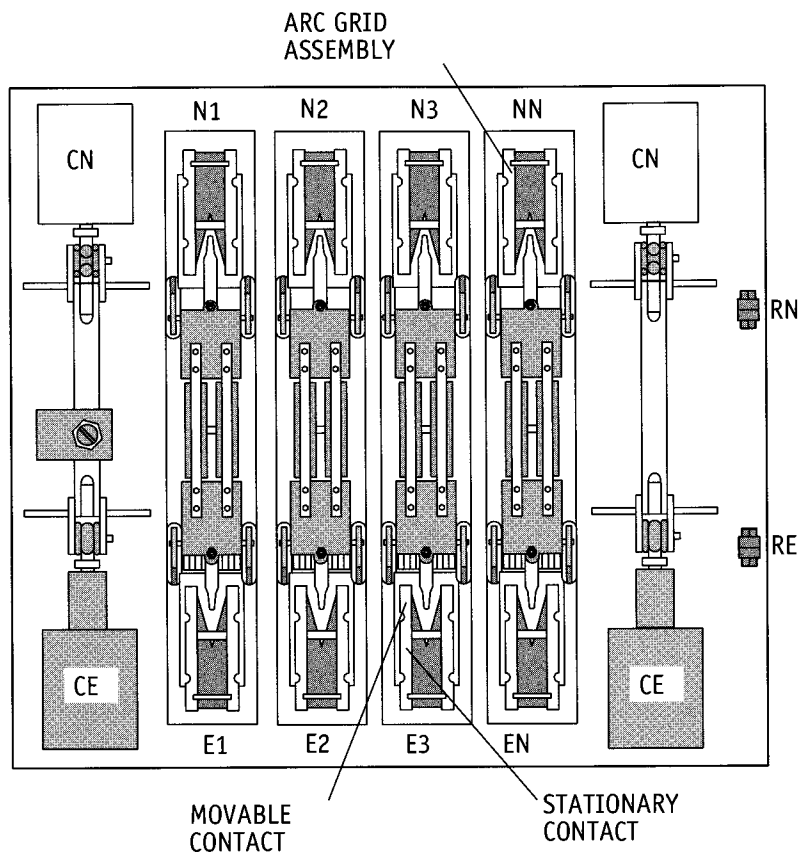
Power Panel — 1600 to 3000 Amps



TAG	DESCRIPTION	STOCK NUMBERS BY AMPERAGE		
		1600	1600	1600
N 1,2,3, N E 1,2,3, N T 1,2,3, N	Cable Connection Lug	S1126F (2) Optional	S1126F (2) Optional	S1126F (2) Optional
	Wire Size	(8) #2-600 MCM	(8) #2-600 MCM	(8) #2-600 MCM
	Stationary Contact Assembly Kit	23P-1594	23P-1594	23P-1594
	Arc Grid Assembly Kit	23P-1171	23P-1171	23P-1171
	Movable Contact Assembly Kit	23P-1400	23P-1400	23P-1400
CN/CE	Main Operating Coils	Coil Volts	Poles	
		120	2	SPO
		240	2,3	K-2123F
			4	K-2127F
		208	3	K-2125F
			4	K-2128F
		575/600	3	K-2153F
			4	K-2154F
		480	3	K-2120F
			4	K-2130F
		416	3	K-2126F
SN	CCN Cut-out Switch	23P-1352		
SE	CCE Cut-out Switch	23P-1356		
A3	Emergency Position Aux Contact	(Qty 1) 23p-1356 (Qty 2) 23p-1357 (Qty 3) 23p-1353 (Qty 4) 23p-1355		
A4	Normal Position Aux Contact	(Qty 1) 23p-1352 (Qty 2) 23p-1353 (Qty 3) 23p-1357 (Qty 4) 23p-1359		
DS	Disconnect Switch	Operator L-4009; ; Contact Block L-1020		
RN, RE	Rectifier	23P-1473 (Up to 240V); 23P-1582 (Up to 600V)		

Replacement Parts *(cont'd)*

Power Panel — 4000 Amps



TAG	DESCRIPTION			STOCK NUMBERS
N 1,2,3, N E 1,2,3, N	Cable Connection Lug			S1511F (3) Optional
T 1,2,3, N	Wire Size			(12) #2-600 MCM
	Stationary Contact Assembly Kit			23P-1655
	Arc Grid Assembly Kit			23P-1171
	Movable Contact Assembly Kit			23P-1640
CN/CE	Main Operating Coils	Coil Volts	Poles	
		240	3	K-2219
			4	K-2219
		208	3	K-2226
			4	K-2226
		575/600	3	K-2221
			4	K-2221
		480	3	K-2218
			4	K-2218
		416	3	K-2220
SN	CCN Cut-out Switch			23P-1352
SE	CCE Cut-out Switch			23P-1356
A3	Emergency Position Aux Contact			(Qty 1) 23p-1356 (Qty 2) 23p-1357 (Qty 3) 23p-1353 (Qty 4) 23p-1355
A4	Normal Position Aux Contact			(Qty 1) 23p-1352 (Qty 2) 23p-1353 (Qty 3) 23p-1357 (Qty 4) 23p-1359
DS	Disconnect Switch			Operator L-4009; ; Contact Block L-1020
RN, RE	Rectifier			23P-1473 (Up to 240V); 23P-1582 (Up to 600V)



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