

INSTALLATION INSTRUCTIONS

Original Issue Date: **9/02**

Model: **450-2000 kW**

Market: **Industrial Generator Sets with the 550 Controller**

Subject: **Twenty-Relay Dry Contact Kits 365569-KP13 and 365569-KP20**

Introduction

The twenty-relay dry contact kit provides normally open and normally closed contacts in a form C configuration to activate warning devices and other customer-provided accessories allowing remote monitoring of the generator set. Typically, lamps, audible alarms, or other devices signal faults or status conditions. Connect any generator set fault output to the dry contact kit. See Figure 1 for an illustration of the twenty-relay dry contact kit.

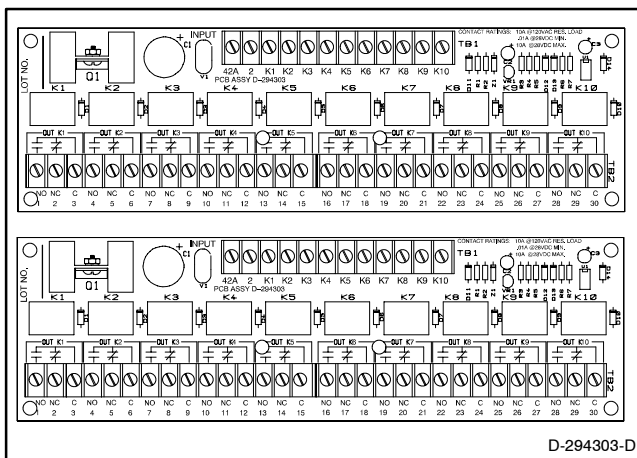


Figure 1 Twenty-Relay Dry Contact Kits

Check the electrical requirements of the customer-provided accessories prior to installation of the relay dry contact kit. Customer-provided accessories require their own electrical source and must not exceed the relay contact ratings that follow.

Do not use terminals 42A or N on the controller connection kit terminal strip to supply voltage to customer-provided accessories. Customer-provided DC accessories require separate leads connected directly to the battery for the voltage supply. Attach customer-supplied 12/24-volt DC accessories to the battery positive (+) connection at the starter solenoid and to the battery negative (-) connection at the engine ground. The 120 VAC accessories require a customer-supplied voltage source.

Relay Contact Rating

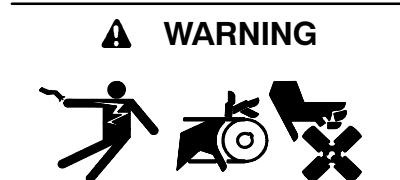
Maximum Switching Current 10 amps
 Minimum Switching Current 10 milliamps
 Maximum Switching Voltage 120 volts AC or
 28 volts DC

Read the entire installation procedure and compare the kit parts with the parts list in this publication before beginning installation. Perform the steps in the order shown.

Observe applicable local and national electrical codes when installing the wiring system.

Safety Precautions

Observe the following safety precautions while installing the kit.



Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

Installation Procedure

1. Remove the generator set from service.

- 1.1 Place the generator set master switch in the OFF position.
- 1.2 Disconnect the power to the battery charger, if equipped.
- 1.3 Disconnect the generator set engine starting battery, negative (-) lead first.

2. Mount and connect the controller connection assembly.

2.1 365569-KP13 kit

- 2.1.1 Remove the junction box upper rear panel and hardware.
- 2.1.2 Remove the inner panel access door screws and swing open the access door.
- 2.1.3 Attach the controller connection assembly (GM13984) to the junction box bracket studs using six spacers (X-712-9) and nuts (X-70-12). Place the spacers between the controller connection assembly and the mounting bracket. See Figure 2 for the mounting location.

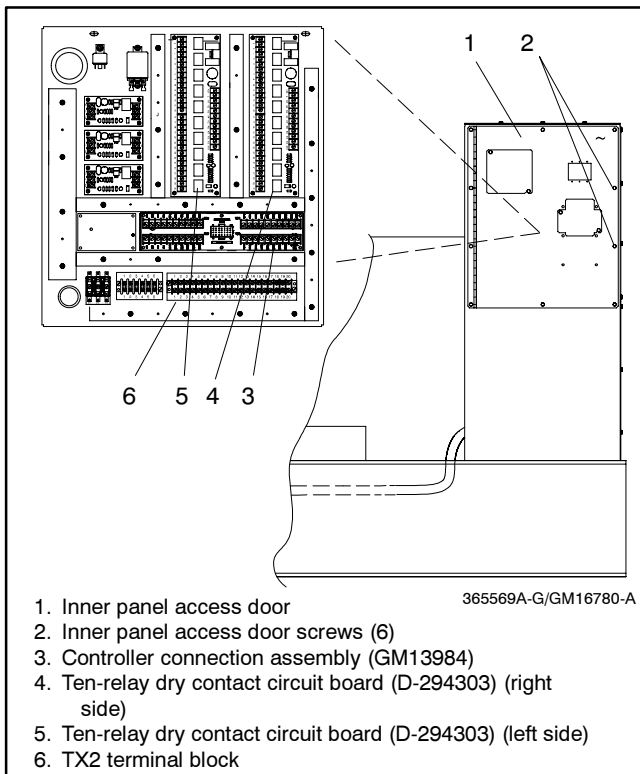


Figure 2 Terminal Block Bracket Mounting in Junction Box (450-2000 kW)

- 2.1.4 Plug the wiring connection harness (GM16753) into the controller connection assembly's P25 connector.
- 2.1.5 Remove the controller cover and hardware.
- 2.1.6 Route the other end of the wiring connection harness (GM16753) through the junction box port to the controller interconnection circuit board.
- 2.1.7 Plug the wiring harness connector into the controller interconnection circuit board's P23 connector. Connect lead ES3 to TB1 terminal 3 and connect lead ES4 to TB1 terminal 4. See Figure 3. If access to the controller interconnection circuit board is difficult, remove the two controller panel top screws and center bottom screw and then loosen the bottom screws to swing the rear controller panel down.
- 2.1.8 Proceed to step 3.

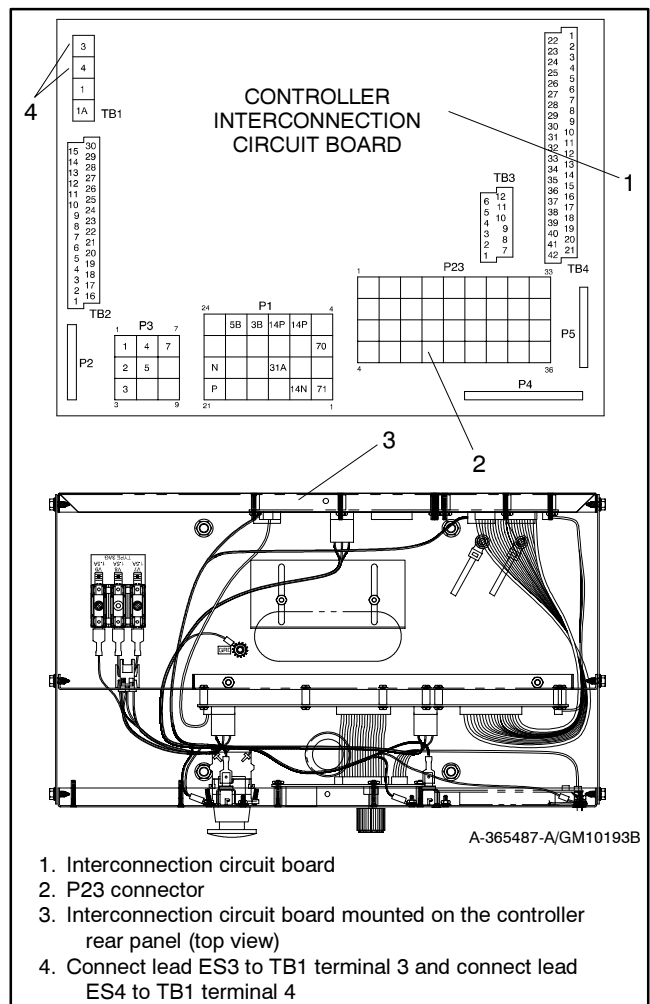


Figure 3 Attaching Wiring Connection Harness to the Interconnection Circuit Board

2.2 **365569-KP20 kit**

2.2.1 Proceed to step 3.

3. **Mount and connect the TX2 terminal block (for switchgear applications).**

3.1 Attach the TX2 terminal block (273769) and strip marker (279271) to the junction box bracket using two screws (X-49-6) and whiz nuts (X-6210-3). See Figure 2 for the mounting location.

3.1.1 Disconnect lead 1A from TB1-1A. Cut the existing terminal from lead 1A and attach the 1/4 in. push-on terminal (X-431-29) to lead 1A. See Figure 4.

3.1.2 Connect the wiring harness (GM16754) to the TX2 terminal block and to terminal strips TB1 and TB4 on the controller interconnection circuit board.

3.1.3 Connect the optional line circuit breaker auxiliary switch and overcurrent trip switch, if required.

3.1.4 Swing the rear controller panel up and replace the screws, if previously removed. Replace the controller cover and hardware. Tighten all controller screws.

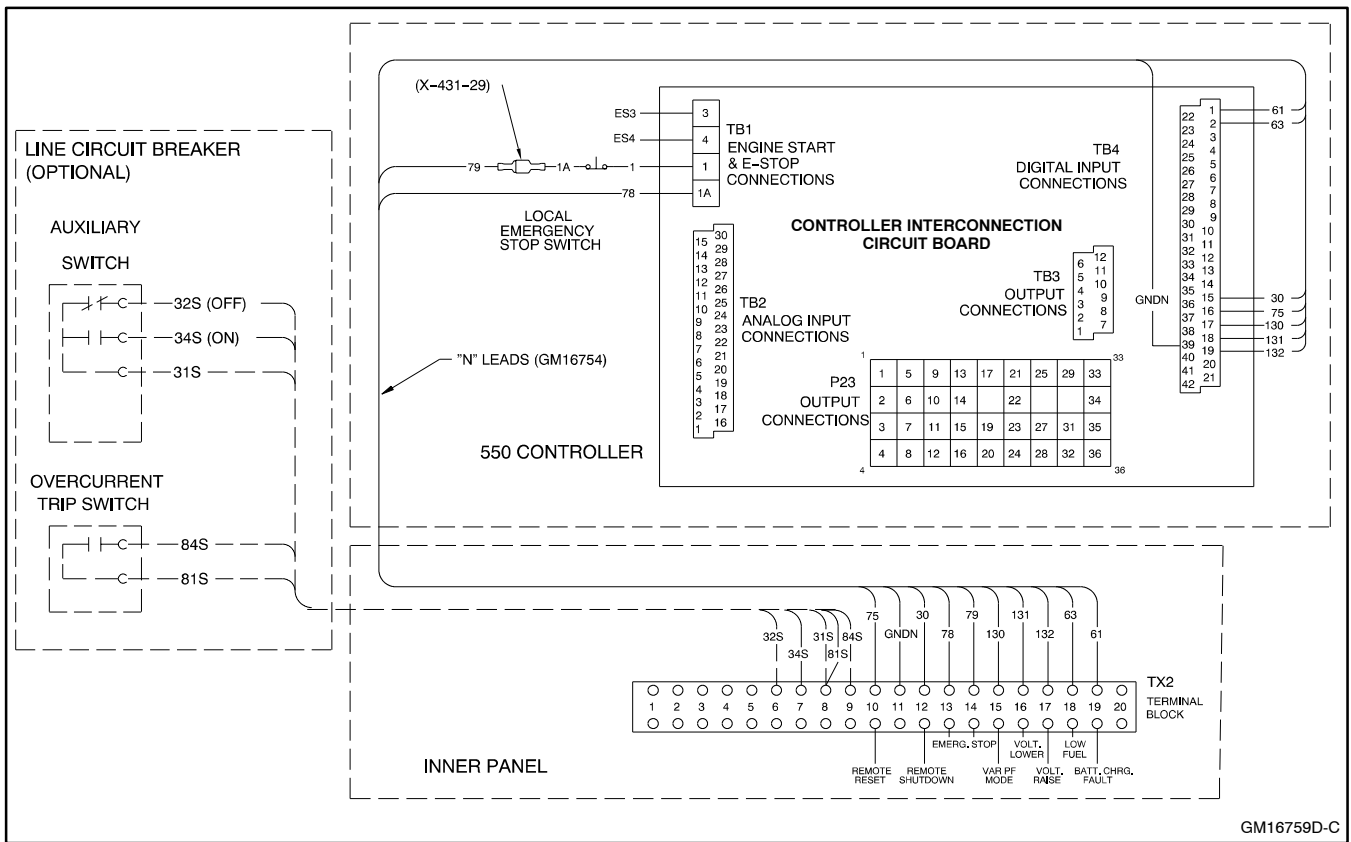


Figure 4 Attaching Wiring Connection Harness to TX2 Terminal Block

4. Mount the two ten-relay dry contact assemblies.

- 4.1 Mount the two ten-relay dry contact circuit boards (D-294303) to the junction box bracket studs using 12 spacers (X-712-9) and nuts (X-70-12). Place the spacers between the ten-relay dry contact circuit board and the mounting bracket. See Figure 2 for the mounting location.
- 4.2 Connect the 12-lead dry contact relay wiring harness (GM16755) to the left side ten-relay dry contact kit relay input terminals. See Figure 5 for connection information.
- 4.3 Connect the 12-lead dry contact relay wiring harness (GM16756) to the right side ten-relay dry contact kit relay input terminals. See Figure 5 for connection information.

5. Connect the two ten-relay dry contact assemblies to the controller connection assembly.

- 5.1 Connect the left side ten-relay dry contact wiring harness to the controller connection assembly in the junction box. See Figure 5. Leads 42A and N provide power to the relays. The user can select up to ten fault terminals for connecting the K1-K10 signal leads. See Figure 6 and Figure 7 for terminal connections.

Note: Factory default settings are shown. To customize, select fault terminals using descriptions and terminals shown in Figure 6 and Figure 7.

- 5.2 Repeat step 5.1 for the right side dry contact wiring harness.

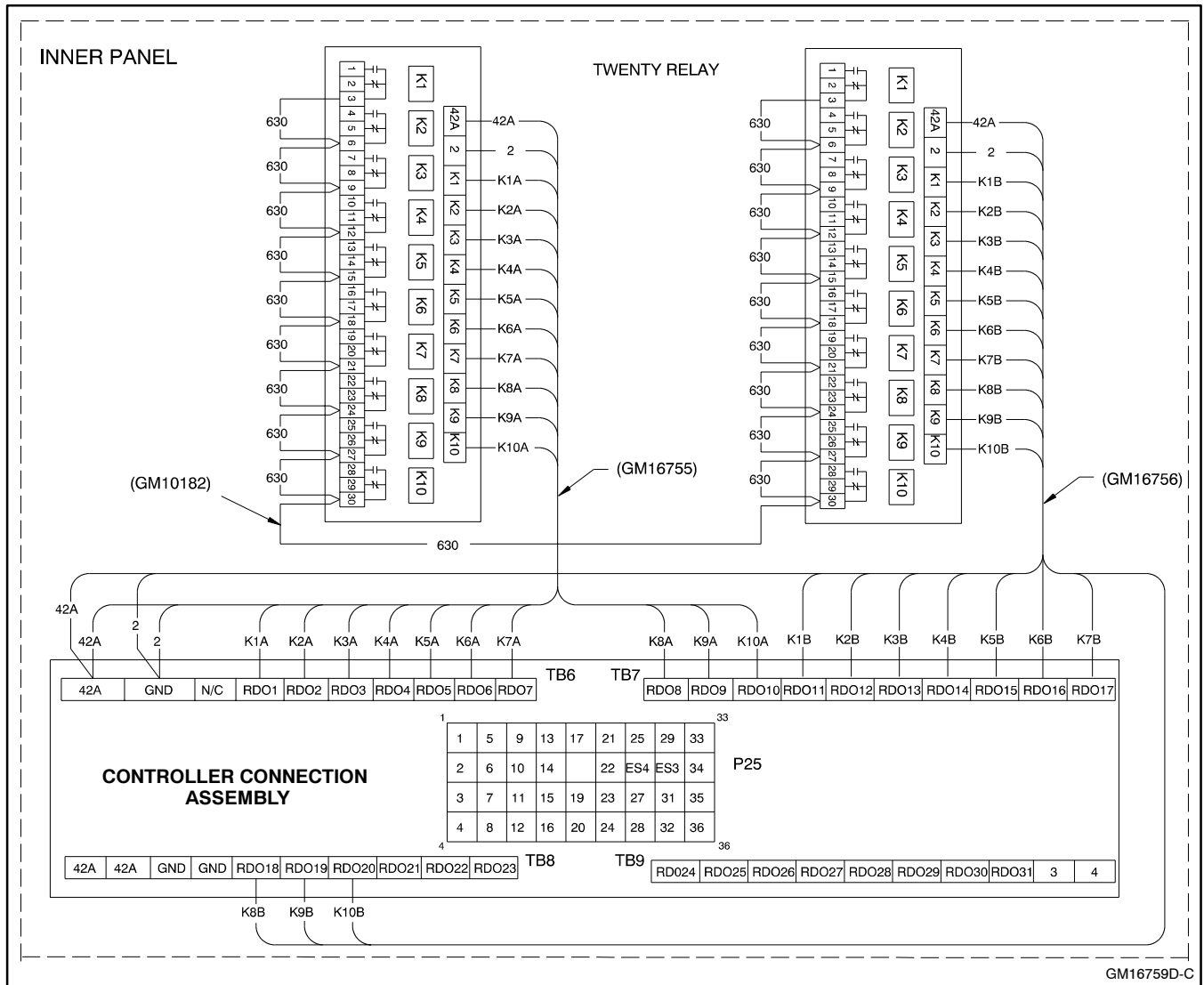
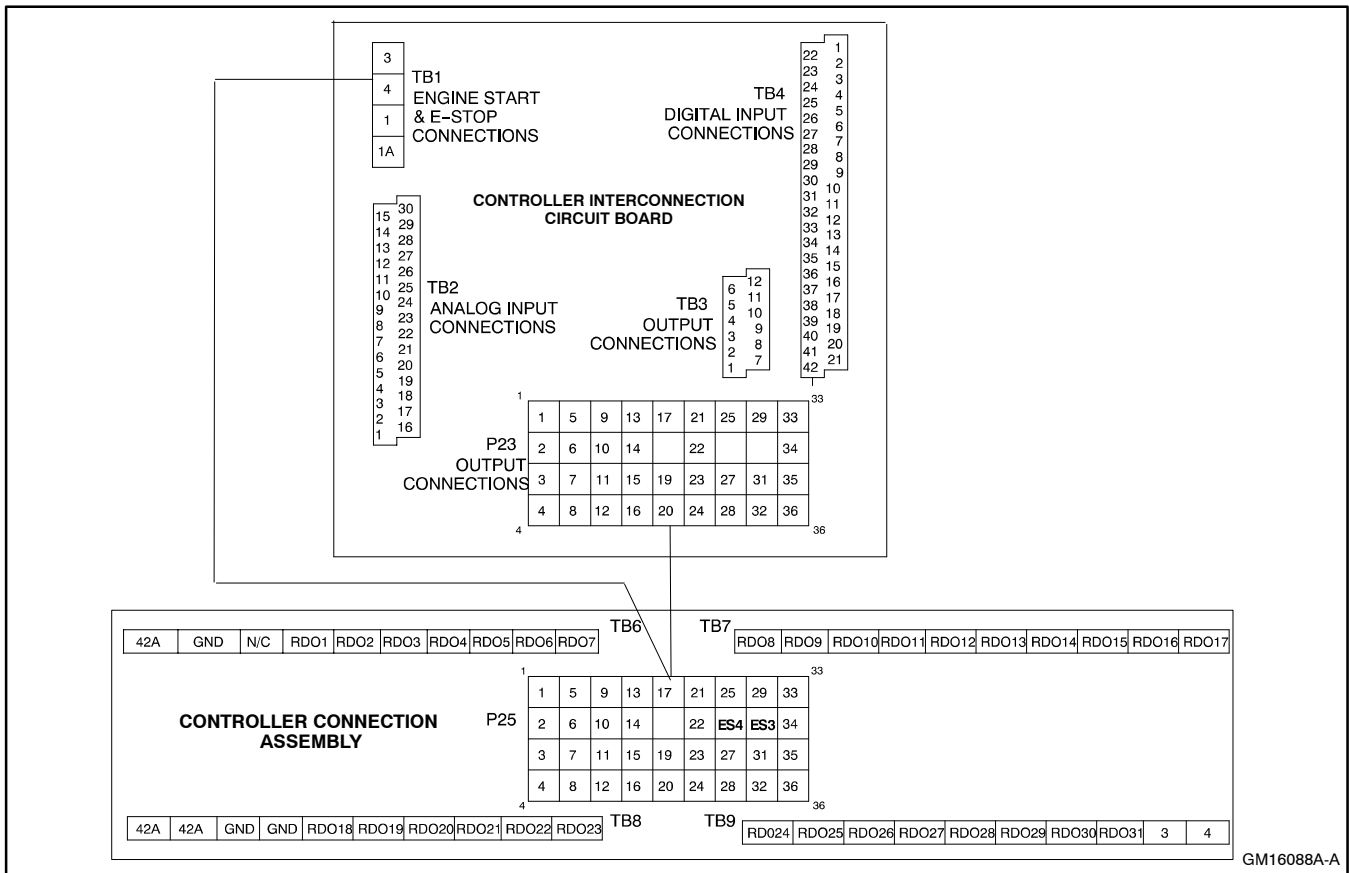


Figure 5 Twenty-Relay Dry Contact Relay Kit Connections



GM16088A-A

Figure 6 Controller Connection Assembly Terminal Connections

TB6 Terminal Strip—RDOs 1-7		TB9 Terminal Strip—RDOs 24-31	
Term.	Description	Term.	Description
42A	Battery (+)	RDO24	Speed sensor fault
GND	Battery (-)	RDO25	Loss of AC sensing
N/C		RDO26	ECM loss of communication
RDO1	Overspeed (39)	RDO27	Undervoltage
RDO2	Overcrank (12)	RDO28	Overfrequency
RDO3	High coolant temperature shutdown (36)	RDO29	Underfrequency
RDO4	Low oil pressure shutdown (38)	RDO30	Load shed kW overload
RDO5	Low coolant temperature (35)	RDO31	Load shed underfrequency
RDO6	High coolant temperature warning (40)	3	Remote start
RDO7	Low oil pressure warning (41)	4	Remote start
TB7 Terminal Strip—RDOs 8-17		NOTE: RDO-1 though RDO-31 are customer definable with the following factory defaults: emergency stop, high coolant temperature, low oil pressure, overcrank, and overspeed. RDO numbers in parentheses are the factory wire designations.	
Term.	Description	*NFPA-110 common alarm faults include:	
RDO8	Low fuel (63)	Air damper indicator	
RDO9	Master switch not in auto (80)	Battery charger fault	
RDO10	NFPA 110 common alarm (32)*	EPS supplying load	
RDO11	Battery charger fault (61)	High battery voltage	
RDO12	Low battery voltage (62)	High coolant temperature warning	
RDO13	High battery voltage	High coolant temperature shutdown	
RDO14	Emergency stop (48)	Low battery voltage	
RDO15	Generator running (70R)	Low coolant level	
RDO16	Time delay engine cooldown (TDEC) (70C)	Low coolant temperature warning	
RDO17	System ready (60)	Low fuel (level or pressure)	
TB8 Terminal Strip—RDOs 18-23		Low oil pressure warning	
Term.	Description	Low oil pressure shutdown	
42A	Battery (+)	Master switch not in auto	
42A	Battery (+)	Overcrank	
2	Battery (-)	Overspeed	
2	Battery (-)	NOTE: RDO numbers in parentheses are the factory wire designations.	
RDO18	Defined common fault (32A)		
RDO19	Low coolant level		
RDO20	Overvoltage (26)		
RDO21	Idle mode		
RDO22	EPS supplying load		
RDO23	Air damper indicator (56)		

Figure 7 Controller Connection Terminal Strip Identification with Relay Driver Outputs (RDOs)

6. Connect the ten-relay dry contact assemblies to the customer-supplied device.

Select the normally open (NO) and/or normally closed (NC) contacts of the relay, form C dry contact, depending upon the application. Use a two-wire harness for either NO or NC connections. Use a three-wire harness for both NO and NC connections.

- 6.1 Supply two or three lengths of stranded wire to make leads long enough to connect the customer-supplied device to the dry contact terminals and power supply. Use color-coded wire for easy identification. Make leads long enough to allow for walls, ductwork, and other obstructions. Use separate conduit for the dry contact wiring.
- 6.2 **12/24-Volt DC Devices.** Attach the customer-supplied 12/24-volt DC accessories to the starting battery positive (+) connection at the starter solenoid and to the battery negative (-) connection at the engine ground. Otherwise, use a separate 12/24-volt DC supply. Do not use terminals 42A and N on the controller connection kit terminal strip to supply the voltage to the relay contacts. Supply separate leads connected directly to the battery for the supply voltage. The circuit must include fuse or circuit breaker protection.

Install the 18-lead dry contact wiring harness (GM10182) to electrically connect the relay common (C) terminals together when using a DC power supply. See Figure 8. Remove the 18-lead

dry contact wiring harness (GM10182) when applying an AC power supply.

- 6.3 **120-Volt AC Devices.** Connect the customer-supplied accessories to a separate 120-volt AC power supply. The circuit must include fuse or circuit breaker protection.
 - 6.4 Connect the customer-supplied device per the installations and/or schematic supplied with the device to a power source and to the dry contact terminals. Cut the customer-supplied leads to length, strip lead ends, crimp on spade terminals (not supplied), and connect the leads to the relay contact screw terminals. Keep the relay dry contact wiring away from the generator set output leads.
 - 6.5 Swing the access door closed and install the screws.
 - 6.6 Replace the junction box panel and hardware.
- 7. Restore the generator set to service.**
- 7.1 Check that the generator set master switch is in the OFF position.
 - 7.2 Reconnect the generator set engine starting battery, negative (-) lead last.
 - 7.3 Reconnect power to the battery charger, if equipped.
 - 7.4 Move the generator set master switch to AUTO for startup by remote transfer switch or remote start/stop switch.

Test the Dry Contact Relays

Verify the dry contact relay function by using the following procedure when troubleshooting.

Test Procedure

1. Remove the customer-supplied device wiring from the relay dry contact output terminals.
2. Test the relay operation by connecting an ohmmeter across the NO and C terminals on the relay terminal strip.
3. Use a jumper wire to ground the selected fault terminal on the controller connection terminal strip. The relay contacts should close and the ohmmeter should display a low resistance reading (continuity).
4. Install the customer-supplied device wiring on the relay dry contact output terminals.

Parts List

Twenty-Relay Dry Contact Kits

Kit: 365569-KP13		
Qty.	Description	Part Number
2	Circuit board, ten-relay dry contact	D-294303
1	Wiring harness, dry contact relay, 12 lead (left side)	GM16755
1	Wiring harness, dry contact relay, 12 lead (right side)	GM16756
1	Wiring harness, dry contact, (relay common terminal)	GM10182
18	Lead, 18 gauge, 4 in.	SW02-1804-2222
1	Lead, 18 gauge, 20 in.	SW02-1820-2222
12	Nut, 8-32 hex	X-70-12
12	Spacer, 0.25 in OD x 0.5 in.	X-712-9
1	Connection device and hardware includes:	GM16759-1
6	Nut, 8-32 hex	X-70-12
6	Spacer, 0.25 in. OD x 0.5 in.	X-712-9
1	Connection assembly, controller	GM13984
1	Harness, controller connection wiring	GM16753
1	Block, terminal	273769
1	Strip, marker	279271
1	Harness, wiring dry contact	GM16754
2	Screw, pan head	X-49-6
2	Nut, whiz	X-6210-3
1	Terminal, 1/4 in. male	X-431-29

Kit: 365569-KP20		
Qty.	Description	Part Number
2	Circuit board, ten-relay dry contact	D-294303
1	Wiring harness, dry contact relay, 12 lead (left side)	GM16755
1	Wiring harness, dry contact relay, 12 lead (right side)	GM16756
1	Wiring harness, dry contact, (relay common terminal)	GM10182
18	Lead, 18 gauge, 4 in.	SW02-1804-2222
1	Lead, 18 gauge, 20 in.	SW02-1820-2222
12	Nut, 8-32 hex	X-70-12
12	Spacer, 0.25 in OD x 0.5 in.	X-712-9
1	Block, terminal	273769
1	Strip, marker	279271
1	Harness, wiring dry contact	GM16754
2	Screw, pan head	X-49-6
2	Nut, whiz	X-6210-3
1	Terminal, 1/4 in. male	X-431-29