Honeywell

EC/RM7830A, EC/RM7850A 7800 SERIES Relay Modules

SPECIFICATION DATA

GENERAL

The Honeywell EC/RM7830, EC/RM7850 Relay Module is a microprocessor-based integrated burner control for automatically fired gas, oil, or combination fuel burner on/off (EC/RM7830A) or full modulation (EC/RM7850A) power burner applications. The EC/RM7830A or EC/RM7850A system consists of the relay module, wiring subbase, amplifier and purge card. Options include the keyboard display module (KDM), personal computer interface, Data ControlBus™ Module, and Combustion System Manager® Software. The KDM can be mounted on the relay module or on the face of a panel door. The KDM can also be remotely mounted from the panel if this is approved for the application.

The EC/RM7830, EC/RM7850 is programmed to provide a level of safety, functional capability and features beyond the capacity of conventional controls.

The basic functions of the EC/RM7830A, EC/RM7850A includes automatic burner sequencing, flame supervision, system status indication, system or self-diagnostics, and troubleshooting.

FEATURES

- **Safety Features:**
  - **— Interlock check.**
  - **— Dynamic Ampli-Check™.**
  - **— Closed loop logic test.**
  - **— Dynamic input check.**
  - **— Dynamic safety relay test.**
  - **— Dynamic self-check logic.**
  - **— High Fire Purge Switch test (EC/RM7850A).**
  - **— Expanded safe-start check.**
  - **— Internal hardware status monitoring.**
  - **— Low Fire Start Switch test (EC/RM7850A).**
  - **— Tamper-resistant timing and logic.**
- **Ignition attempts: 1 or 5. Selectable by model number.**
- **Access for external electrical voltage checks.**
- **Application flexibility.**
- **Microcomputer technology allows dependable, long-term operation.**
- **First-out annunciation and system diagnostics provided by a 2-row by 20-column vacuum fluorescent display (VFD) located on the KDM (optional). Text readout available in English, Spanish, Portuguese, French, German, Japanese (Katakana), Chinese, and Italian languages.**
- **Five sequence information light emitting diodes (LEDs) with symbols for Power, Pilot, Flame, Main, and Alarm (see Fig. 1).**
- **Five-function Run/Test Switch.**
- **Interchangeable plug-in flame amplifiers.**
- **Non volatile memory; EC/RM7830A, EC/RM7850A retain history files and sequencing status after the loss of power.**
- **Remote reset (subject to application approval; optional).**
- **Remote mounting of KDM (subject to application approval).**
- **Burner control data available on the optional KDM:**
  - **— Flame signal strength.**
  - **— Hold status.**
  - **— Lockout/alarm status.**
  - **— Sequence status.**
  - **— Sequence time.**

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- **— Total cycles of operation.**
- **— Total hours of operation.**
- **— Fault history providing the six most recent faults:**
  - **Cycles of operation at the time of the fault.**
  - **Fault message and code.**
  - **Hours of operation at the time of the fault.**
  - **Sequence status at the time of the fault.**
  - **Sequence time at the time of the fault.**
- **— Diagnostic information:**
  - **Device type.**
  - **Flame amplifier type.**
  - **Flame failure response time (FFRT).**
  - **Manufacturing code.**
  - **On/off status of all digital inputs and outputs.**
  - **Selected prepurge time.**
  - **Software revision and version of relay module and optional KDM.**
  - **Status of configuration jumper.**
  - **Status of Run/Test Switch.**

SPECIFICATIONS

Electrical Ratings (see Tables 1 through 4):
Voltage and Frequency:
EC7830/EC7850: 220 to 240 Vac (+10%/-15%), 50/60 Hz (±10%).
RM7830/RM7850: 120 Vac (+10%/-15%), 50/60 Hz (±10%).
Keyboard Display Module (optional): 13 Vdc peak fullwave rectified (+20%/-15%).
Power Dissipation:
Relay Module: 10W maximum.
KDM: 3W maximum.
Maximum Total Connected Load: 2000 VA.
Fusing (Total Connected Load): 15A, type SC or equivalent.

NOTE: Recommended grounding practices are footnoted in Tables 1 through 4 and provided in Table 5.

Sequence timing for normal operation is provided in Table 6.

Environmental Ratings:
Ambient Temperatures:
Operating: -40°C to +60°C (-40°F to +140°F).
Storage: -40°C to +66°C (-40°F to 150°F).
Humidity: 85% RH continuous, noncondensing.
Vibration: 0.5G environment.

Dimensions: See Fig. 1.

Weight:
Relay Module: 0,730 kg unpacked.
KDM: 0,113 kg unpacked.

IMPORTANT:
Flame Detection System available for use with EC/RM7830, EC/RM7850. Select your plug-in Flame Signal Amplifier and applicable Flame Detector from Table 7.

SIL 3 Capable:
SIL 3 Capable in a properly designed Safety Instrumented System. See form number 65-0312 for Certificate Agreement.

Approvals:
This product complies with the following European directives:
Gas Appliance Directive: 90/269/EEG.
Low Voltage Directive: 73/23/EEG.
EMC Directive: 89/336/EEG.
GASTEC: CE-63AP3070/1.
Factory Mutual: J.I.0Y0A9.AF.
EN298: “Automatic gas burner systems for gas burners and gas burning appliances with or without fans.”
Oil Approvals:
EC7830: DIN-5F106/96.
EC7850: DIN-5F107/96.

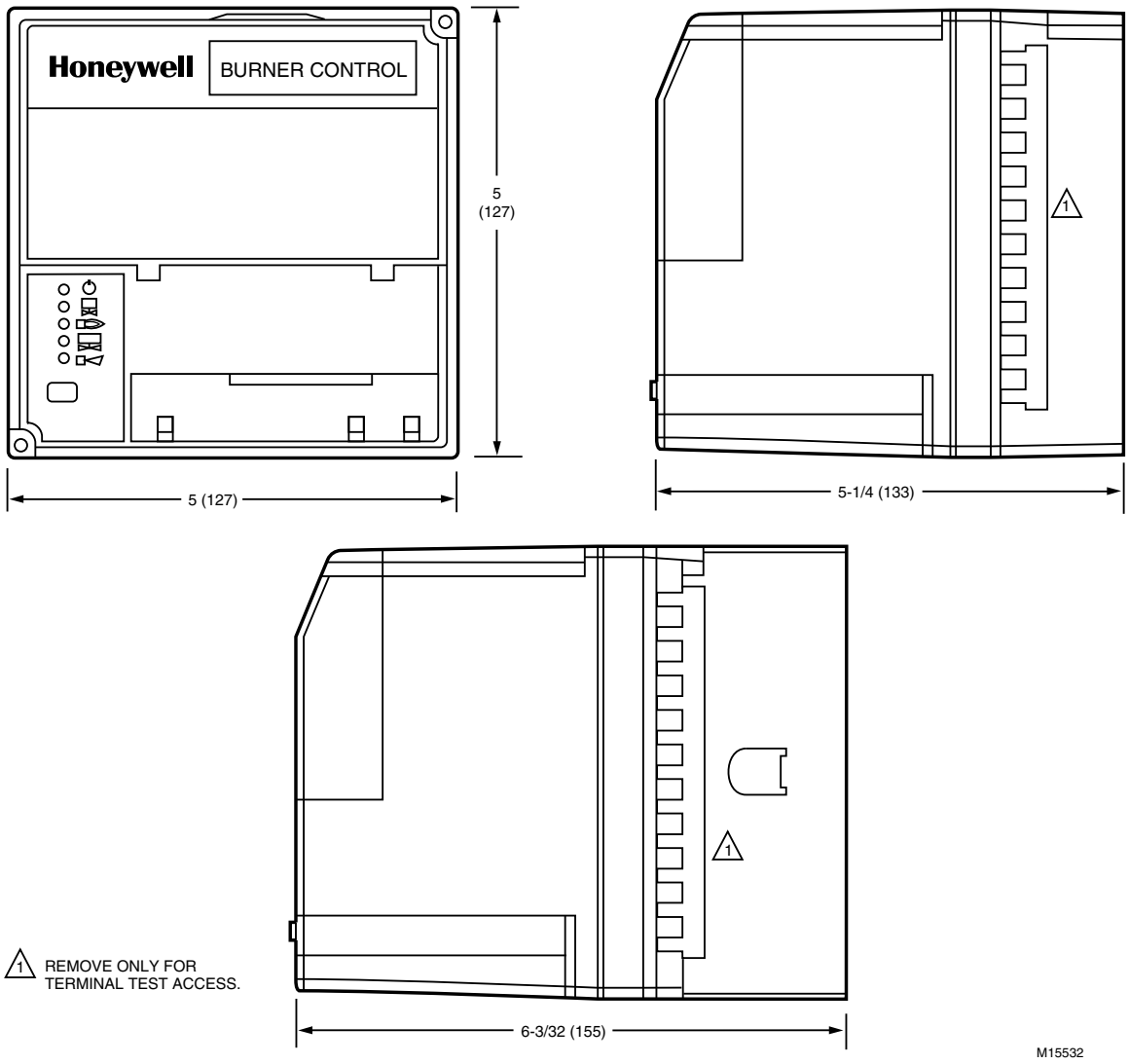

Fig. 1. Mounting dimensions of relay module and wiring subbase in in. (mm).

Table 1. EC7830A Terminal Ratings.

Terminal No.	Abbreviation	Description	Ratings
G	—	Flame Sensor Ground[a]	—
Earth G	—	Earth Ground[a]	—
N	—	Line Voltage Common (Neutral)	—
3	AL	Alarm (Normally Open)	220/230/240 Vac, 1A, 10A inrush for 5000 cycles.
4	FAN	Burner/Blower Motor	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.
5	L1	Line Voltage Supply (L1)	220-240 Vac (+10%/-15%), 50/60 Hz (±10%)[b]
6	RT	Limits and Burner Control	220/230/240 Vac, 5A (maximum).
7	LD2	Airflow Switch input	220/230/240 Vac, 1 mA.
8	PV1	Pilot Valve 1 (interrupted)	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.[c]
9	MV	Main Fuel Valve	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.[c]
10	IGN	Ignition	220/230/240 Vac, 2A ignition.
F (11)	—	Flame Signal	136 to 220 Vac, current limited.
12 - 15	Unused	—	—
16	—	Control Voltage	220-240 Vac (+10%/-15%).
17	ES2	Preignition Interlock Input	220/230/240 Vac, 1 mA.
18 - 19	Unused	—	—
20	LOS	Lockout Input	220/230/240 Vac, 1 mA.
21	PV2	Pilot Valve 2 (Intermittent)	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.[c]
22	SHTR	Shutter	220-240 Vac, 0.25A.[d]

[a] See Table 5.
[b] 2000 VA maximum connected load to 7800 SERIES Relay Module Assembly.
[c] Total load current, excluding burner/boiler motor and firing rate outputs cannot exceed 5A, 25A inrush.
[d] 220-240 Vac to 120 Vac, 10 VA (minimum) stepdown transformer (not provided) required to drive shutter.

Table 2. RM7830A Terminal Ratings.

Terminal No.	Abbreviation	Description	Ratings
G	—	Flame Sensor Ground[a]	—
Earth G	—	Earth Ground[a]	—
N	—	Line Voltage Common (Neutral)	—
3	AL	Alarm (Normally Open)	120 Vac, 1A pilot duty.
4	FAN	Burner/Blower Motor	120 Vac, 4A at PF = 0.5, 20A inrush.[b]
5	L1	Line Voltage Supply (L1)	115 to 125 Vac (+10%/-15%), 50/60 Hz (±10%)[c]
6	RT	Limits and Burner Control	120 Vac, 5A (maximum).
7	LD2	Airflow Switch input	120 Vac, 1 mA.
8	PV1	Pilot Valve 1 (interrupted)	120 Vac, 4A at PF = 0.5, 20A inrush.[d]
9	MV	Main Fuel Valve	120 Vac, 4A at PF = 0.5, 20A inrush.[d]
10	IGN	Ignition	120 Vac, 2A at PF = 0.2.[d]
F (11)	—	Flame Signal	136 to 220 Vac, current limited.
12 - 15	Unused	—	—
16	—	Control Voltage	115 to 125 Vac (+10%/-15%).
17	ES2	Preignition Interlock Input	120 Vac, 1 mA.

Table 2. RM7830A Terminal Ratings. (Continued)

Terminal No.	Abbreviation	Description	Ratings
18 - 19	Unused	—	—
20	LOS	Lockout Input	120 Vac, 1 mA.
21	PV2	Pilot Valve 2 (Intermittent)	120 Vac, 4A at PF = 0.5, 20A inrush.[d]
22	SHTR	Shutter	Shutter drive for dynamic self-check flame sensor.

[a] See Table 5.
[b] Honeywell has tested this output at 9.8A at PF = 0.5, 58.8A inrush for 100,000 cycles (EN298 approval does not require this test).
[c] 2000 VA maximum connected load to 7800 SERIES Relay Module Assembly.
[d] Total load current, excluding burner/boiler motor and firing rate outputs cannot exceed 5A, 25A inrush.

Table 3. EC7850A Terminal Ratings.

Terminal No.	Abbreviation	Description	Ratings
G	—	Flame Sensor Ground[a]	—
Earth G	—	Earth Ground[a]	—
N	—	Line Voltage Common (Neutral)	—
3	AL	Alarm (Normally Open)	220/230/240 Vac, 1A, 10A inrush for 5000 cycles.
4	L!	Line Supply Voltage (L1)	220-240 Vac (+10%/-15%), 50/60 Hz (±10%).
5	FAN	Burner/Blower Motor	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.
6	RT	Limits and Burner Control	220/230/240 Vac, 5A (maximum).
7	LD2	Airflow Switch Input	220/230/240 Vac, 1 mA.
8	PV1	Pilot Valve 1 (Interrupted)	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.[c]
9	MV	Main Fuel Valve	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.[c]
10	IGN	Ignition	220/230/240 Vac, 4A at PF = 0.2.[c]
F (11)	—	Flame Signal	136 to 220 Vac, current limited.
12	HI	Firing Rate High Fire	220/230/240 Vac, 0.5A at PF = 0.5.[d]
13	COM	Firing Rate Common	220/230/240 Vac, 0.5A at PF = 0.5.[d]
14	MOD	Firing Rate Modulate	220/230/240 Vac, 0.5A at PF = 0.5.[d]
15	LO	Firing Rate Low Fire	220/230/240 Vac, 0.5A at PF = 0.5.[d]
16	—	Control Voltage	230 Vac (+10%/-15%).
17	ES2	Preignition Interlock Input	220/230/240 Vac, 1 mA.
18	ES1	Low Fire Switch Input	220/230/240 Vac, 1 mA.
19	ES3	High Fire Switch Input	220/230/240 Vac, 1 mA.
20	LOS	Lockout Input	220/230/240 Vac, 1 mA.
21	PV2	Pilot Valve 2 (Intermittent)	220/230/240 Vac, 4A at PF = 0.5, 20A inrush.[c]
22	SHTR	Shutter	Shutter drive for dynamic self-check flame sensor.[e]

[a] See Table 5.
[b] 2000 VA maximum connected load to 7800 SERIES Relay Module Assembly.
[c] Total load current, excluding burner/boiler motor and firing rate outputs cannot exceed 5A, 25A inrush.
[d] Can also be 24 Vac, 3A at PF = 0.5.
[e] 220-240 Vac to 120 Vac, 10 VA (minimum) stepdown transformer (not provided) required to drive shutter.

Table 4. .RM7850A Terminal Ratings.

Terminal No.	Abbreviation	Description	Ratings
G	—	Flame Sensor Ground[a]	—
Earth G	—	Earth Ground[a]	—
N	—	Line Voltage Common (Neutral)	—
3	AL	Alarm (Normally Open)	120 Vac, 1A pilot duty.
4	L!	Line Supply Voltage (L1)	120 Vac (+10%/-15%), 50/60 Hz (±10%).[b]
5	FAN	Burner/Blower Motor	120 Vac, 4A at PF = 0.5, 20A inrush.
6	RT	Limits and Burner Control	120 Vac, 5A (maximum).
7	LD2	Airflow Switch Input	120 Vac, 1 mA.
8	PV1	Pilot Valve 1 (Interrupted)	120 Vac, 4A at PF = 0.5, 20A inrush.[c]
9	MV	Main Fuel Valve	120 Vac, 4A at PF = 0.5, 20A inrush.[c]
10	IGN	Ignition	120 Vac, 2A ignition.[d]
F (11)	—	Flame Signal	136 to 220 Vac, current limited.
12	HI	Firing Rate High Fire	120 Vac, 0.5A at PF = 0.5.[e]
13	COM	Firing Rate Common	120 Vac, 0.5A at PF = 0.5.[e]
14	MOD	Firing Rate Modulate	120 Vac, 0.5A at PF = 0.5.[e]
15	LO	Firing Rate Low Fire	120 Vac, 0.5A at PF = 0.5.[e]
16	—	Control Voltage	115 to 120 Vac (+10%/-15%).
17	ES2	Preignition Interlock Input	120 Vac, 1 mA.
18	ES1	Low Fire Switch Input	120 Vac, 1 mA.
19	ES3	High Fire Switch Input	120 Vac, 1 mA.
20	LOS	Lockout Input	120 Vac, 1 mA.
21	PV2	Pilot Valve 2 (Intermittent)	120 Vac, 4A at PF = 0.5, 20A inrush.[d]
22	SHTR	Shutter	Shutter drive for dynamic self-check flame sensor.

[a] See Table 5.
[b] 2000 VA maximum connected load to 7800 SERIES Relay Module Assembly.
[c] Honeywell has tested this output at 9.8A at PF = 0.5, 58.8A inrush for 100,000 cycles. EN298 approval does not require this test.
[d] Total load current, excluding burner/boiler motor and firing rate outputs cannot exceed 5A, 25A inrush.
[e] Can also be 24 Vac, 3A at PF = 0.5.

Table 5. Recommended Grounding Practices.

Ground Type	Recommended Practice
Earth ground (subbase and relay module)	**1.** Use to provide a connection between the subbase and the control panel of the equipment. Earth ground must be capable of conducting enough current to blow the 15A fuse (or breaker) in the event of an internal short circuit. **2.** Use wide straps or brackets to provide minimum length, maximum surface area ground conductors. If a leadwire must be used, use 14 AWG copper wire. **3.** Make sure that all mechanically-tightened joints along the ground path are free of nonconductive coatings and protected against corrosion on mating surfaces.
Signal ground (KDM, Data ControlBus™ Module, Communications Interface ControlBus™ Module).	Use the shield of the signal wire to ground the device to the signal ground terminal 3(c) of each device. Connect the shield at both ends of the daisy chain to earth ground.

Table 6. Sequence Timing for Normal Operation.

Device	Initiate	Standby	Purge or Waiting	Preignition	First Safety Time	Pilot Stab.	Main Trial Time***	Main Stab.	Run	Post Purge
EC7830A1033	2 sec.	*	**	3 sec.	3 or 5 sec.	5 sec.	3 or 5 sec.	5 sec.	*	2 sec.
EC7830A1041										30 sec.
EC7830A1066										15 sec.
EC7850A1064[a]										30 sec.
EC7850A1072										2 sec.
EC7850A1080										30 sec.
EC7850A1122										15 sec.
EC7850A1148	2 sec.	*	**	3 sec.	3 or 2 sec.	5 sec.	3 or 5 sec.	5 sec.	*	2 sec.
RM7830A1003	2 sec.	*	**	3 sec.	3 or 5 sec.	5 sec.	3 or 5 sec.	5 sec.	*	2 sec.
RM7830A1011										15 sec.
RM7830A1029										30 sec.
RM7850A1001										2 sec.
RM7850A1019										15 sec.
RM7850A1027										30 sec.
RM7850A1035	2 sec.	*	**	3 sec.	3 or 2 sec.	5 sec.	3 or 5 sec.	5 sec.	*	2 sec.

* Standby and Run can be an infinite period.
** Waiting time is determined by the ST7800A Purge Card selected.
*** Second Safety Time is Main Trial Time plus Flame Failure Response Time.
[a] Dynamic Damper Check.

Table 7. Flame Detection System.

Plug-in Flame Signal Amplifiers					Applicable Flame Detectors		
Type	Color	Self-Checking	Model	Flame Failure Response Time	Fuel	Type	Models
Rectification[a]	Green	No	R7847A	1 or 2 sec. maximum	Gas	Rectifying Flame Rod Holders[b]	C7004, C7007, C7011. Complete Assemblies: C7008, C7009, Q179.
		Dynamic Ampli-Check	R7847B[d]		Gas	Rectifying Flame Rod Holders[b]	C7004, C7007, C7011. Complete Assemblies: C7008, C7009, Q179.
Ultraviolet	Purple	No[a]	R7849A		Gas, oil	Ultraviolet (Minipeeper®)	C7027, C7035, C7044.[e]
		Dynamic Ampli-Check[a]	R7849B[d]			Ultraviolet (Minipeeper®)	
		Dynamic Self-Check	R7861A[f]			Ultraviolet	C7061.[g,h]
	Blue		R7886A[f]	2 sec. maximum	Gas, oil, coal	Ultraviolet (Adjustable Sensitivity)	C7076.[g]

[a] Dynamic Self-Check Ultraviolet Amplifiers should be used only on burners that cycle on-off at least once every 24 hours. Appliances with burners that remain on continuously for 24 hours or longer should use C7061A Flame Detector with R7861A Amplifier.
[b] Order flame rod separately; see holder instructions.
[d] Circuitry tests flame signal amplifier 12 times a minute during burner operation and shuts down burner if amplifier fails.
[e] C7027, C7035, and C7044 Flame Detectors should be used only on burners that cycle on-off at least once every 24 hours. Appliances with burners that remain on continuously for 24 hours or longer should use C7061A Flame Detector with R7861A Amplifier as ultraviolet flame detection system.
f Circuitry tests all electronic components in the flame detection system (amplifier and detector) 12 times a minute during burner operation and shuts down the burner if the detection system fails.
[g] For EC7830/EC7850 applications, a 220/240 Vac to 120 Vac 10 VA step-down transformer (not provided) must be used to drive the shutter.
[h] Refer to instructions packed with C7061 for specifics on shutter wiring.

Please note the following to comply with EN60730 for remote mounting of the KDM and/or remote reset. It is necessary to provide electrical separation using insulation at least equivalent to double or reinforced insulation. Do this by either:

- Optically isolating the communication and/or remote reset lines from the control cabinet, or
- Providing physical separation from the communication and/or remote reset lines using electrical conduit and part no. 204718A Remote Display Cover Assembly or other suitable enclosure that meets IP40 class of protection.

Mounting:
Q7800A Wiring Subbase for Panel Mount: To meet EN60730 requirements, mount the relay module is a secured panel that meets IP40 class of protection.

Required Components:
R78XX Plug-in Flame Signal Amplifier.
ST7800A Plug-in Purge Timer Cards: Selectable from two seconds to 30 minutes.
Q7800A Wiring Subbase.

Accessories:
Keyboard Display Modules (KDM)(Optional):
S7800A1001 English Language.
S7800A1035 French Language.
S7800A1043 German Language.
S7800A1050 Italian Language.
S7800A1068 Spanish Language.
S7800A1118 Katakana (Japanese) Language.
S7800A1126 Portuguese Language.
S7800A1142 English Language.

Communications:
S7810A1009 Data ControlBus™ Module (if no KDM is used).
S7810M1029 ModBus Network Protocol.

Miscellaneous:
A7800A1002 7800 SERIES Tester.
203541 Data ControlBus Connector, 5-wire.
203765 Remote Display Mounting Bracket.
221729 Relay Module Dust Cover.
204718A Keyboard Display Module Cover, NEMA 4, clear.
204718B Keyboard Display Module Cover, NEMA 1, clear.
204718C Keyboard Display Module Cover, NEMA 4, clear, with reset button.
205321B Flush Display Mounting Kit.
221818A Extension Cable, display, (1524 mm).
221818C Extension Cable, display (3048 mm).
213514A Rectification Flame Simulator.
203659 Ultraviolet Flame Simulator.
50023821-001 NEMA IV for S7800A1001 or S7800A1142 Series 5 Display
50023821-002 NEMA IV for S7800A1001 or S7800A1142 Series 5 Display with Reset Button

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