

Series C Internal Accessories



Contents

Description	Page
Product Overview	V4-T2-220
Standards and Certifications	V4-T2-221
Quick Reference	V4-T2-222
G-Frame (15–100 Amperes)	V4-T2-225
F-Frame (10–225 Amperes)	V4-T2-239
J-Frame (70–250 Amperes)	V4-T2-257
K-Frame (70–400 Amperes)	V4-T2-265
L-Frame (125–600 Amperes)	V4-T2-289
M-Frame (300–800 Amperes)	V4-T2-315
N-Frame (400–1200 Amperes)	V4-T2-326
R-Frame (800–2500 Amperes)	V4-T2-341
Motor Circuit Protectors (MCP)	V4-T2-360
Motor Protection Circuit Breakers (MPCB)	V4-T2-371
Type ELC Current Limiter Attachment (Size 0–4)	V4-T2-373
Current Limiting Circuit Breaker Module	V4-T2-374
Internal Accessories	
Product Selection	V4-T2-379
Technical Data and Specifications	V4-T2-398
External Accessories	V4-T2-410

Internal Accessories

Product Overview

Alarm Switch

For remote indication of automatic trip operation. Does not function with manual switching; however, it will operate when either a shunt trip or undervoltage release is operated. A “make” contact closes and a “break” contact opens when the alarm/lockout switch operates. The switch automatically resets when the circuit breaker is reset.

Auxiliary Switch

The auxiliary switch provides circuit breaker contact status information by monitoring the position of the molded cross bar that contains the moving contact arms. The auxiliary switch is used for remote indication and interlock system verification, and consists of one or two SPDT switches housed in a plug-in module. Each SPDT switch has one “a” and one “b” contact. When the circuit breaker contacts are open, the “a” contact is open and the “b” contact is closed.

Auxiliary Switch and Alarm Switch Combination

Each catalog number listed in tables on **Pages V4-T2-382** and **V4-T2-383** includes one auxiliary switch and one alarm switch. In an auxiliary switch ASL switch combination, the auxiliary switch is always mounted on the side of the plug-in module next to the center pole of the circuit breaker.

Shunt Trip

The shunt trip provides remote controlled tripping of the circuit breaker. The shunt trip consists of an intermittent rated solenoid with a tripping plunger and a cutoff switch assembled to a plug-in module. When required for ground fault protection applications, certain AC rated shunt trips, as noted in the electrical rating table, are suitable for operation at 55 percent of rated voltage.

Select shunt trip catalog number for the voltage within the indicated voltage range. Shunt trip coils are designed to be applied at specific AC or DC voltages within the voltage range shown. Electrical ratings are also shown on applicable circuit breaker accessory nameplates.

Low Energy Shunt Trip

Low energy shunt trip devices are designed to operate from low energy output signals from dedicated current sensors typically applied in ground fault protection schemes. However, with a proper control voltage source, they may be applied in place of conventional trip devices for special applications. Flux paths surrounding permanent magnets used in the shunt trip assembly hold a charged spring poised in readiness to operate the circuit breaker trip mechanism.

When a 100 microfarad capacitor charged to 28 Vdc is discharged through the shunt trip coil, the resultant flux opposes the permanent magnet flux field, which releases the stored energy in the spring to trip the circuit breaker. As the circuit breaker resets, the shunt trip reset arm is actuated by the circuit breaker handle, resetting the shunt trip. The plug-in module is mounted in retaining slots in the top of the trip unit. Coil is intermittent-rated only. Cutoff provisions required in control circuit.

Undervoltage Release Mechanism

The undervoltage release mechanism monitors a voltage (typically a line voltage) and trips the circuit breaker when the voltage falls to between 70 and 35 percent of the solenoid coil rating.

The undervoltage release mechanism consists of a continuous rated solenoid with a plunger and tripping lever mounted in a plug-in module. The tab on the tripping lever resets the undervoltage release mechanism when normal voltage has been restored and the circuit breaker handle is moved to the reset (or OFF) position. With less than pickup voltage applied to the undervoltage release mechanism, the circuit breaker contacts will not touch when a closing operation is attempted.

Note: Undervoltage release mechanism accessories are not designed for, and should not be used as, circuit interlocks.

Accessory Terminal Block (R-Frame)

(For fixed-mounted configuration.)

Internal accessory wiring leads are normally supplied with pigtail leads (18 AWG) that exit from the right side of the circuit breaker. Where specified, fixed-mounted accessory terminal blocks are available. A maximum of one 24-point terminal block can be installed on the right side of the circuit breaker for the internal accessories.

For convenience in determining the appropriate number of terminal block points required, refer to **Page V4-T2-378**.

PowerNet and Zone Interlock Kits (OPTIM 550 only) K-, L- and N-Frames

Eaton's PowerNet Communications Kit can be ordered to add PowerNet communications to an existing OPTIM 550 breaker in the field. An 18-inch (457.2 mm) wiring pigtail is routed to the rear of the breaker: two wires for PowerNet and two wires for 24 Vdc (45 mA load). It is recommended that the power supply be an "isolated high quality" unit.

K-Frame and HMCP (K) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Factory Installation Kit ①	
		Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
1	Left	A01	A02	A03	A04	A1X3PK	A1X3LTK
	Right ②③	A05	A06	A07	A08	A1X3PK	A1X3RTK ④
2	Left	A09	A10	—	A11	A2X3PK	A2X3LTK
	Right ②③	A12	A13	—	A14	A2X3PK	A2X3RTK ④
	Right	A21	A22	—	—	1482D28G10 ⑥⑦	—
3	Left	A18	—	—	A15	A3X3LPK	A3X3LTK
	Right ③	A17	—	—	A16	A3X3RPK	A3X3RTK ④

L-, HMCP (L) and (M) Frames and Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Factory Installation Kit ①	
		Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
1	Left	A01	A02	A03	A04	A1X4PK	A1X4LTK
	Right ②	A05	A06	A07	A08	A1X4PK	A1X4RTK ④
2	Left	A09	A10	—	A11	A2X4PK	A2X4LTK
	Right ②	A12	A13	—	A14	A2X4PK	A2X4RTK ④
3	Left	A18	—	—	A15	A3X4PK	A3X4LTK
	Right ②	A17	—	—	A16	A3X4PK	A3X4RTK ④

N-Frame and HMCP (N) Auxiliary Switch

Number of Contacts A and B	Mounting Location (Pole)	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads			Terminal Block Same Side Suffix Number	Field Mounted Factory Installation Kit ①	
		Same Side Suffix Number	Rear ② Suffix Number	Opposite Side Suffix Number		Pigtail Leads Catalog Number	Terminal Block Catalog Number
1	Left	A01	A02	A03	A04	A1X5PK	A1X5LTK
	Right ②	A05	A06	A07	A08	A1X5PK	A1X5RTK ④
2	Left	A09	A10	—	A11	A2X5PK	A2X5LTK
	Right ②	A12	A13	—	A14	A2X5PK	A2X5RTK ④
3	Left	A18	—	—	A15	A3X5LPK	A3X5LTK
	Right ②	A17	—	—	A16	A3X5RPK	A3X5RTK ④

R-Frame Auxiliary Switch (RH Only)

Number of Contacts A and B	Factory Mounted Connection Type and Location 18-Inch (457.2 mm) Pigtail Leads		Field Mounted Field Installation Kits ①	
	Suffix Number ⑤		Pigtail Leads Catalog Number ⑤	
2	A12		A2X6RPK	
4	A19		A4X6RPK	

Notes

- ① Listed with Underwriters Laboratories for field installation under E64983.
 ② Standard mounting location—leads exit rear of breaker.
 ③ Breakers with K-Frame OPTIM 550 can only accept accessories in left pole.
 ④ Not for use on four-pole circuit breakers.
 ⑤ A maximum of two auxiliary switches (any combination of 2a/2b or 4a/4b plug-in modules may be installed in a circuit breaker).
 ⑥ This option is not field installable.
 ⑦ Available on the OPTIM 550 only. Communications are not available with this option.

Accessories Selection Guide and Ordering Information

Enclosures

Type 1 General Purpose

- Surface or flush mounting
- 15–1200 ampere range
- 600 Vac, 500 Vdc

Type 1 enclosed breakers are designed for use in commercial buildings, apartment buildings and other areas where a general purpose enclosure is applicable. The breaker is front operable and is capable of being padlocked in either the ON or OFF position. Ratings through 1200 amperes are listed with Underwriters Laboratories as approved for service entrance application. Both surface and flush mounted enclosures are available.

Type 3R Rainproof Surface Mounting

- Interchangeable hubs (through 400 amperes)
- 15–1200 ampere range
- 600 Vac, 500 Vdc

This general purpose outdoor service center employs a circuit breaker inside a weatherproof sheet steel breaker enclosure to serve

as a main disconnect and protective device for feeder circuits. Ratings through 1200 amperes are listed by Underwriters Laboratories as suitable for service entrance application.

Type 12 Dustproof Surface Mounting

- No knockouts or other openings
- 15–1200 ampere range
- 600 Vac, 500 Vdc

The Type 12 enclosure is designed in line with specifications for special industry applications where unusually severe conditions involving oil, coolant, dust and other foreign materials exist in the operating atmosphere. The handle padlocks in the OFF position and the cover is interlocked with the handle mechanism to prevent opening the cover with the circuit breaker in the ON position. Ratings through 1200 amperes are listed by Underwriters Laboratories as suitable for service entrance application.

Enclosure Selection Data

Breaker Frame Amperes	Enclosure Type Class	Catalog Number
FG 15–225	Type 1	SFDN225
	Type 3R	RFDN225
	Type 12	JFDN225
JG 175–250	Type 1	SJDN250
	Type 3R	RJDN250
	Type 12	JJDN250
KG 300–400	Type 1	SKDN400
	Type 3R	RKDN400
	Type 12	JKDN400
LG 450–600	Type 1	SLDN600
	Type 3R	RLDN600
	Type 12	JLDN600
NG 700–1200	Type 1	SNDN1200
	Type 3R	RNDN1200
	Type 12	JNDN1200

Options and Accessories

Standard Terminals

Breaker Frame	Max. Amp Rating	AWG Wire Range	Metric Wire Range mm ²	Catalog Number
FG	100	14–1/0	2.5–50	3T100FB ①
FG	150	4–4/0	25–95	3TA225FD ①
JG	250	4–350 kcmil	25–185	TA250KB
KG	350	250–500 kcmil	120–240	TA350K
KG	400	3/0–250 kcmil (2)	95–120	3TA400K ①
LG	600	250–500 kcmil (2)	120–240	3TA603LDK
NG	700	1–500 kcmil (2)	50–300	TA700NB1
NG	1000	3/0–400 kcmil (3)	95–185	TA1000NB1
NG	1200	4/0–500 kcmil (4)	120–300	TA1200NB1

Neutral Kits, Insulated and Groundable

Max. Enclosure Rating (Amperes)	Main Lug Number Size Cu/Al	Ground Lug Size Cu/Al	Catalog Number
100	(1) 14–1/0	(1) 14–1/0	INK100
250	(1) 6–350 kcmil	(1) 4–300 kcmil	INK250
400	(1) 4–750 kcmil or (2) 1/0–250 kcmil	(1) 4–300 kcmil	INK400
600	(2) 250–500 kcmil	(1) 4–300 kcmil	INK600
1200	(3) 1/0 to 750 kcmil or (4) 1/0 to 750 kcmil	(1) 6–250 kcmil	INK1200

Internal Accessories

Auxiliary Switch ②

Breaker Frame	Factory Mounted	1A-1B Field Kit Catalog Number	Factory Mounted	2A-2B Field Kit Catalog Number
FG ③	A06	A1X1PK	A13	A2X1RPK
JG	A06	A1X2PK	A13	A2X2PK
KG	A06	A1X3PK	A13	A2X3PK
LG	A06	A1X4PK	A13	A2X4PK
NG	A06	A1X5PK	A13	A2X5PK

Shunt Trip ②

Breaker Frame	Rating	Factory Mounted	Field Kit Catalog Number
FG ③	12–24 Vdc	S02	SNT1LP03K
JG	12–24 Vdc	S42	SNT2P04K
KG	12–24 Vdc	S42	SNT3P04K
LG	12–24 Vdc	S02	SNT4LP03K
NG	12–24 Vdc	S02	SNT5LP03K

Notes

① Package of three terminals.

② Other accessories are available. Same as standard frame breakers.

③ Field installation on the FG Frame is not UL listed.

Internal Accessories—Right Pole Mounting

	FD PV ①		JG PVS		KD PV KD PVS		LG PV		MDL PV	
	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number
Auxiliary Switch										
1A-1B	A06	A1X1PK	A1	AUX1A1BPK	A06	A1X3PK	A1	AUX1A1BPK	A06	A1X4PK
2A-2B	A13	A2X1RPK	A2	AUX2A2BPK	A13	A2X3PK	A2	AUX2A2BPK	A13	A2X4PK
Alarm Switch										
1 make/1 break	B06	A1L1RPK	B1	ALM1M1BJPKL	B06	A1L3RPK	B1	ALM1M1BJPK	B06	A1L4RPK
Auxiliary and Alarm Combo										
1A-1B, 1 make/1 break	C05	AAL1RPK	B2w	AUXALRMJPK	C05	AAL3RPK	B2	AUXALRMJPK	C05	AA114RPK

Internal Accessories—Left Pole Mounting

	FD PV ①		JG PVS		KD PV KD PVS		LG PV		MDL PV	
	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number	Factory Modification Code	Field Kit Catalog Number
Shunt Trip										
12 Vdc	S02	SNT1LP03K	S4	SNT012CPK	S42	SNT3P04K	S4	SNT012CPK	S02	SNT4LP03K
24 Vdc	S02	SNT1LP03K	S6	SNT024CPK	S42	SNT3P04K	S6	SNT024CPK	S02	SNT4LP03K
48 Vdc	S06	SNT1LP08K	S7	SNT4860CPK	S50	SNT3P06K	S7	SNT4860CPK	S86	SNT4LP23K
60 Vdc	S06	SNT1LP08K	S7	SNT4860CPK	S50	SNT3P06K	S7	SNT4860CPK	S86	SNT4LP23K
125 Vdc	S10	SNT1LP12K	S5	SNT125DPK	S10	SNT3P11K	S2	SNT120CPK	S42	SNT4LP26K
250 Vdc	S14	SNT1LP18K	—	—	S14	SNT3P14K	—	—	S14	SNT4LP14K
120 Vac	S10	SNT1LP12K	S2	SNT120CPK	S10	SNT3P11K	S2	SNT120CPK	S10	SNT4LP11K
Undervoltage Release										
12 Vdc	U30	UVH1LP20K	—	—	T02	UVH3LP20K	U1	UVR012DPK	T02	UVH4LP20K
24 Vdc	U34	UVH1LP21K	U2	UVR024CPK	T02	UVH3LP21K	U2	UVR024DPK	T06	UVH4LP21K
48 Vdc	U38	UVH1LP22K	U4	UVR048DPK	T10	UVH3LP22K	U4	UVR048DPK	T10	UVH4LP22K
60 Vdc	—	—	U4	UVR048DPK	—	—	—	—	—	—
125 Vdc	U42	UVH1LP26K	U6	UVR125DPK	T14	UVH3LP26K	U6	UVR125DPK	T14	UVH4LP26K
250 Vdc	U46	UVH1LP28K	U8	UVR250DPK	T18	UVH3LP28K	U8	UVR250DPK	T18	UVH4LP28K
120 Vac	U14	UVH1LP08K	U5	UVR120APK	U18	UVH3LP08K	U5	UVR120APK	U18	UVH4LP08K

Notes

① Underwriters Laboratories requires that internal accessories for the FD PV be installed at the factory. Internal accessories are UL listed for factory installation under E7819. Where local codes and standards permit and UL listing is not required, internal accessories can be field installed. Accessory installation should be done before the circuit breaker is mounted and connected.

One accessory can be mounted per pole, per breaker.

Shunt Trip ①

Breaker Type	Voltage Rating	Mounting Location	Catalog Number	Factory Modification Code
E ² F/E ² FM	48–127 Vac or 48–60 Vdc	Left pole	SNT1LP08K ②	S06
	208–230 Vac or 110–127 Vdc	Left pole	SNT1LP12K ②	S10
E ² J/E ² JM	110–240 Vac or 110–125 Vdc	Left pole	SNT2P11K ③	S10
E ² K/E ² KM/E ² KW	110–240 Vac or 110–125 Vdc	Left pole	SNT3P11K ③	S10
E2LME/E2LMZ	24 Vac/Vdc	Left pole	SNT024CPK	S6
	48–60 Vac/Vdc	Left pole	SNT4860CPK	S7
	110–240 Vac/Vdc	Left pole	SNT120CPK	S2
E ² L/E ² LM/E ² LW/E ² M/ E ² MM/E ² MW	48–60 Vac	Left pole	SNT4LP05K ②	S06
	48–60 Vdc	Left pole	SNT4LP23K ②	S86
	110–240 Vac	Left pole	SNT4LP11K ②	S10
	110–125 Vdc	Left pole	SNT4LP26K ②	S42
E ² N/E ² NM	110–240 Vac	Left pole	SNT5LP11K ②	S10
	110–125 Vdc	Left pole	SNT5LP26K ②	S42
E ² R/E ² RM	110–240 Vac	Right pole	SNT6P11K ④	S29
	110–125 Vdc	Right pole	SNT6P26K ④	S45

Auxiliary Switch

Breaker Type	Number of Sets of Contacts (1A and 1B)	Mounting Location	Catalog Number	Factory Modification Code
E ² F/E ² FM	1	Right	A1X1PK	A06
	2	Right	A2X1RPK	A13
E ² J/E ² JM	1	Right	A1X2PK	A06
	2	Right	A2X2PK	A13
E ² K/E ² KM/E ² KW	1	Right	A1X3PK	A06
	2	Right	A2X3PK	A13
E ² LME/E ² LMZ	1	Right	AUX1A1BPK	A1
	2	Right	AUX2A2BPK	A2
E ² L/E ² LM/E ² LW/E ² M/ E ² MM/E ² MW	1	Right	A1X4PK	A06
	2	Right	A2X4PK	A13
E ² N/E ² NM	1	Right	A1X5PK	A06
	2	Right	A2X5PK	A13
E ² R/E ² RM	2	Right	A2X6RPK	A12
	4	Right	A4X6RPK	A19

Alarm (Signal/Lockout Switch)

Breaker Type	Number of Sets of Contacts (Make and Break)	Mounting Location	Catalog Number	Factory Modification Code
E ² F/E ² FM	1	Right	A1L1LPK/A1L1RPK	B06
	2	Right	A2L1LPK/A2L1RPK	B13
E ² J/E ² JM	1	Right	A1L2LPK/A1L2RPK	B06
E ² K/E ² KM/E ² KW	1	Right	A1L3LPK/A1L3RPK	B06
	2	Right	A2L3LPK/A2L3RPK	B13
E ² LME/E ² LMZ	1	Right	ALM1M1BJPK	B1
	2	Right	ALM2M2BJPK	B3
E ² L/E ² LM/E ² LW/E ² M/ E ² MM/E ² MW	1	Right	A1L4LPK/A1L4RPK	B06
	2	Right	A2L4LPK/A2L4RPK	B13
E ² N/E ² NM	1	Right	A1L5LPK/A1L5RPK	B06
	2	Right	A2L5LPK/A2L5RPK	B13
E ² R/E ² RM	1	Right	A1L6RPK	B05
	2	Right	A2L6RPK	B12

Notes

① Contact Eaton for internal accessory voltage ratings not listed.

② LH (RH also available).

③ LH or RH.

④ RH only.