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Choices in Overload Relays

B1
Overload Relays



CT7N/CT8 Thermal Bimetallic

- Key Features:
- Ambient temperature compensation
 - Rated for DC and variable frequent drive applications up to 400 Hz
 - Optional remote reset solenoid and external reset accessories



CEP7 Solid State

- Key Features:
- Current measurement based protection
 - Low energy consumption
 - Side-mount expansion modules provide adjustable levels of protection and communication



CEP9 Advanced Electronic

- Key Features:
- Provides critical motor protection functions
 - Communication and diagnostics provide detailed logs and control from relay to motor
 - Can simplify control architecture

Product Feature Overview

Relay Type	CT7N/CT8	CEP7-1	CEP9 - Parameter	CEP9
Protection Features				
Overload	•	•	•	•
Phase Loss		•	•	•
Ground Fault		•	•	•
Current Imbalance			•	•
Add-on Protection		•	•	•
Over/ Under Voltage			•	•
Voltage Imbalance			•	•
Over/ Under Power			•	•
Diagnostics Features				
% Full Load Amperes (FLA)		•	•	•
% Thermal Capacity Utilization (TCU)		•	•	•
Voltage			•	•
Power			•	•
Energy			•	•
Integration Features				
DeviceLogix™			•	•
Logix Controller				•
Connected Components Workbench™ Software			•	
EtherNet/IP™				Embedded (dual-port)
Local Programming Method				EtherNet/IP or DeviceNet ❶

❶ You can also configure CEP9 devices using an optional expansion operator diagnostic station.

Protecting your investment is critical to keeping your operations up and running. Prevent unwanted down time by choosing the right protection for your motor controls. Sprecher + Schuh is proud to offer several options in motor protection. From simple single purpose devices, to varying degrees of selection options and complete factory automation and communication, selecting the right protection is vital to ensuring motor life and longevity. Sprecher + Schuh is here to help protect your investment.

CEP7 Solid State Overload Relays

The Third Generation

Advanced solid state motor protection

The CEP7-1__ relay provides the following features:

- Electronic overload detection
- Simple configuration
- Selectable trip class
- Adjustable trip current
- Integration with CA7/CAN7 contactors
- Test and reset buttons
- Auto (CEP7-1EF only)/manual reset selection
- RMS current sensing (50/60 Hz)
- External current transformer configurations
- Single- and Three-phase compatibility within the same unit
- Direct and pass-through mounting options

The CEP7-1__ relay lets you connect accessory modules, some of which interface through the front-mounted communication port. Accessories include:

- Ground fault/jam protection module (CEP7-1EF only)
- Remote reset solenoid
- Anti-tamper shield
- Electronic remote indication display CEP7-ERID, with or without reset (CEP7-1EF units only)
- External reset adapter
- DIN rail/Panel adapter



100A



100A



100A



800A

Overload Performance

• Current Measurement-based Protection

Current measurement-based overload protection more accurately models a motor's thermal condition. Ambient temperature over the specified temperature operating range does not impact the performance of current measurement-based designs.

- **Electronic Design** Thermal modeling is performed electronically with precision solid-state components, using a state-of-the-art microprocessor. The microprocessor continually processes motor current data to accurately maintain the time-current status of the motor thermal capacity utilization (%TCU) value.

- **Thermal Memory** A thermal memory design lets the CEP7-1 Overload Relay model the heating and cooling effects of motor on and off periods. This achieves accurate protection for both hot and cold operation.

- **Phase Loss Protection** Phase loss detection is incorporated into the CEP7-1 Overload Relay, allowing it to respond quickly to this type of condition.



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CEP7-1 Overload Relays

Versatile and Expandable

- **Adjustable Trip Class and Reset Modes** The Basic CEP7-1EE relay offers Trip Class 10 and 20 with manual reset only. The Advanced CEP7-1EF relay offers Trip Class 10, 15, 20, and 30 with a selectable dial, in manual or automatic reset.
- **Pass-through Design** The CEP7-1 relay Pass-through option consumes less panel space than a standard CEP7-1 relay that is configured with a panel-mount adapter. The pass-through design provides integrated DIN Rail mount and panel mounting holes. The CEP7-1 Pass-through Electronic Overload Relay provides the same protection and expandable accessory capabilities as a standard CEP7-1 relay.
- **External CTs** For motor overload protection applications above 100A in current sensing capability, the CEP7-1EF_Z relay offers functionality with external CT configurations up to 800A maximum capacity.

Wide current adjustment range

Thermal or bimetallic overload relays typically have a small current adjustment range of 1.5:1 meaning that the maximum setting is generally 1.5 times the lower setting. Sprecher + Schuh's CEP7-1 overload relay is capable of adjustment to a maximum of five times the minimum set current, which dramatically reduces the number of units required on-hand to cover the full range of current settings up to 100 amperes.

Selectable tripping class

Both the CEP7-1 models have standard Class 10 tripping characteristics. The CEP7-1EE Basic model is equipped with dip switches that allow the select ability between Class 10 and Class 20, while the CEP7-1EF Advanced model possesses a selection dial on the face of the overload for trip classes 10/15/20 and 30. This selection feature allows you to closely match the Trip Class with the start-up time of the motor.

Adaptive Protection

Remote Reset Capability

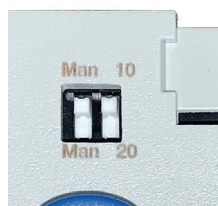
The CEP7-1EF relay offers optional remote reset capabilities through the use of an electro-mechanical reset solenoid or an electronic remote reset accessory module.

Ground Fault and Jam Protection

The CEP7-1EF relay offers optional ground fault and jam protection through the use of an accessory module. The ground fault current detection level is configurable via a mechanical rotary dial from 0.02...5A. Jam protection is configurable via two mechanical rotary dials, current level from 125...600% FLA, and delay from 0.1...10 seconds.

Robust design

The CEP7 has been designed to physically extend to the back-pan therefore aligning the mounting of the overload with the corresponding contactor. Further, the mechanical attachment and direct electrical connection to the contactor provides a robust mounting, which means less damage from shipping or during field wire installation. The bipolar latching relay which controls the normally closed trip contacts and normally open alarm circuit contacts have been self-enclosed, therefore insulating the electromagnet and shielding against airborne metal particles and other potential environmental debris. The CEP7 has been tested to operate in -20° C. or up to 60° C (140 °F.) and withstand 3G of vibration or 30G of shock on a mountain up to an altitude of 2000m or in a jungle at 95% humidity. Reliability under every conceivable environmental condition is a quality built into the design of the CEP7 electronic overload relay.



CEP7-1EE Switch Selection for Trip class (10 or 20)



CEP7-1EF Selectable Dial for
• Manual vs. automatic
• Trip class 10, 15, 20 or 30)



Increased accuracy and improved motor protection

Microelectronics provide flexible and accurate motor overload protection. Unlike traditional overload relays that simulate heat build-up in the motor by passing current through a heater element, CEP7 solid state overload relays measure motor current directly through integrated current transformers. The transformers, in turn, create a magnetic field that induces DC voltage onto the ASIC board. The electronics identify excessive current or loss of phase more accurately, and react to the condition with greater speed and reliability than traditional overload relays. In addition, CEP7 solid state relays offer setting accuracies from 2.5 – 5% and repeat accuracy of 1%.




Dramatically lowered energy requirement saves money, reduces panel space

Because traditional overload relays work on the principle of “modeling” the heat generated in the motor (recreating the heat in the bimetal elements or heaters), a significant amount of energy is wasted. In traditional bimetallic overload relays, as many as six watts of heat are dissipated to perform the protective function. Because the CEP7 uses sampling techniques to actually measure the current flowing in the circuit, very little heat is dissipated in the device...as little as 0.5 watts. This not only reduces the total amount of electrical energy consumed in an application, but it can also have a dramatic impact on the design and layout of control panels. The density of motor starters can be much greater because less heat is generated by each of the individual components. Higher density results in smaller control panels. In addition, special ventilation or air conditioning that might have been required to protect sensitive electronic equipment such as PLC's can now be reduced or eliminated. CEP7 overload relays dramatically reduced energy requirement saves money and reduces panel space.

Direct Mount / Single & Three-phase Applications ①②③

Overload Relay	Directly Mounts to Contactor...	Adjustment Range (A)	Catalog Number
CEP7-1EE Manual Reset for 1Ø and 3Ø Applications - Trip Class 10, 20			
 shown: CEP7-1EEAB	CA7-9...CA7-23 CAN7-12, CAN7-16	0.1...0.5	CEP7-1EEAB
		0.2...1.0	CEP7-1EEBB
		1.0...5.0	CEP7-1EECB
		3.2...16	CEP7-1EEDB
		5.4...27	CEP7-1EEEB
	CA7-30...CA7-55 CAN7-37, CAN7-43	5.4...27	CEP7-1EEED
		11...55	CEP7-1EEFD
	CA7-60...CA7-97 CAN7-85	20...100	CEP7-1EEGE
CEP7-1EF Automatic or Manual Reset for 1Ø and 3Ø Applications - Trip Class 10, 15, 20, 30			
 shown: CEP7-1EFAB	CA7-9...CA7-23 CAN7-12, CAN7-16	0.1...0.5	CEP7-1EFAB
		0.2...1.0	CEP7-1EFBB
		1.0...5.0	CEP7-1EFCB
		3.2...16	CEP7-1EFDB
		5.4...27	CEP7-1EFEB
	CA7-30...CA7-55 CAN7-37, CAN7-43	5.4...27	CEP7-1EFED
		11...55	CEP7-1EFFD
	CA7-60...CA7-97 CAN7-85	20...100	CEP7-1EFGE

Pass-Thru Models / Single & Three-phase Applications ②③

Overload Relay	for use with... ①	Adjustment Range (A)	Catalog Number
CEP7-1EE Manual Reset for 1Ø and 3Ø Applications - Trip Class 10, 20			
 <i>shown: CEP7-1EECP</i>	All contactors	1.0...5.0	CEP7-1EECP
		3.2...16	CEP7-1EEDP
		5.4...27	CEP7-1EEEP
		11...55	CEP7-1EEFP
		20...100	CEP7-1EEGP
CEP7-1EF Automatic or Manual Reset for 1Ø and 3Ø Applications - Trip Class 10, 15, 20, 30			
 <i>shown: CEP7-1EFGP</i>	All contactors	1.0...5.0	CEP7-1EFCP
		3.2...16	CEP7-1EFDP
		5.4...27	CEP7-1EFEP
		11...55	CEP7-1EFFP
		20...100	CEP7-1EFGP
CEP7-1EF Automatic or Manual Reset for 1Ø and 3Ø Applications - Trip Class 10, 15, 20, 30			
 <i>shown: CEP7-1EFLZ</i>	All contactors and external current transformers	30...150	CEP7-1EFHZ
		40...200	CEP7-1EFJZ
		60...300	CEP7-1EFKZ
		80...400	CEP7-1EFWZ
		100...500	CEP7-1EFLZ
		120...600	CEP7-1EFMZ
		160...800	CEP7-1EFNZ

① This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.

② The reset time of a CEP7 set in the automatic mode is approximately 120 seconds.

③ CEP7 overload relays do not work with Variable Frequency Drives, DC Applications or Softstarters with braking options.

TIP!

Most industrial applications usually call for an overload relay that must be manually reset in the event of a trip. This allows the cause of the overload to be identified before the motor is restarted. An overload relay that resets automatically is generally for specialized, or remote applications, such as rooftop AC units where restarting the motor will not harm people or equipment.

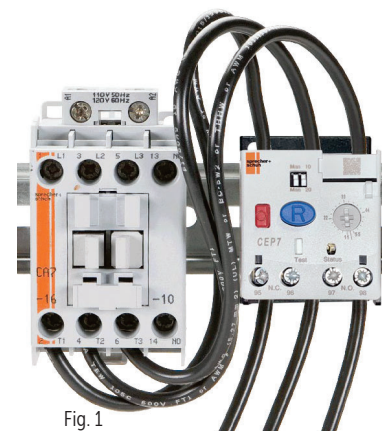
B1
CEP7-1 Overload Relays


Fig. 1



Fig. 2

Pass-thru window

Description

Fig. 1 - The Pass-Thru version of the CEP7 permits separate mounting of the overload relay.

Fig. 2 - Motor load side cables simply pass-thru a window in the overload relay body. The internal current transformers monitor the current flow.














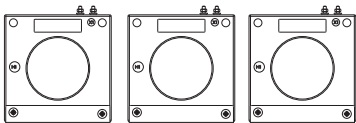
Benefits

- No need for a panel mount adapter as required with direct-connect versions
- Eliminates 3 to 6 wire terminations
- Designed for use with CA8 or CA7 contactors
- Easily replaces outdated overload relays in existing starter assemblies
- Provides state-of-the-art accuracy and motor protection

Accessories - CEP7-1

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CEP7-1 Overload Relays

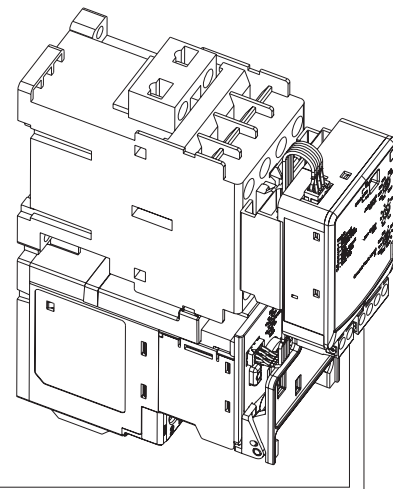
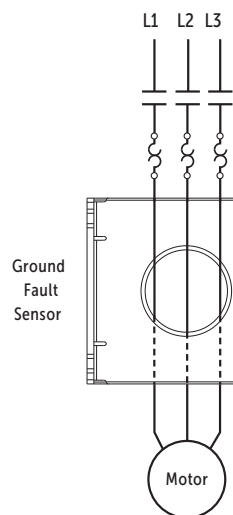
Accessory	Description		For use with...	Package Quantity	Catalog No.	
	Base Unit Anti-Tamper Shield		CEP7-1EE, CEP7-1EF	10	CEP7-1BC8	
	External Reset Adapter			1	CEP7-1ERA	
	Remote Reset Solenoid	240V AC		1	CEP7-1EMRA	
		120V AC		1	CEP7-1EMRD	
		24V AC/DC		1	CEP7-1EMRZ	
 CEP7-1EPB	 CEP7-1EPD	 CEP7-1EPE	DIN Rail/Panel Adapter	CEP7-1__B	1	CEP7-1EPB
			CEP7-1__D	1	CEP7-1EPD	
			CEP7-1__E	1	CEP7-1EPE	
	Universal Protection Module ❶ ❷ (ground fault/jam)		CEP7-1EF	1	CEP7-1EGJ	
	Protection Accessory Anti-Tamper Shield		CEP7-1EGJ	25	CEP7-1EMC	
	Reset Adapter (electronic remote reset)		CEP7-1EF	1	CEP7-1ERR	
	Electronic Remote Indication Display	with reset	CEP7-1EGJ, CEP7-1ERR	1	CEP7-ERID	
		no reset		1	CEP7-1ERIDN	
	Panel/DIN Mounting Kit (includes comm. cable)		CEP7-1EGJ, CEP7-1ERR	1	CEP7-1EIKIT1	
	Accessory Installation Kit and Spare Terminal Blocks (includes comm. cable)			1	CEP7-1EIKIT2	
Current Transformer Kits		For use with...	CT Rating			
 <i>Includes three Current Transformers (Overload relay sold separately)</i>	CA9-116...305		300:5	③	CEP7-CT-UL-300	
					CEP7-CT-CE-300	
	CA9-370...580		600:5	③	CEP7-CT-UL-600	
			400:5		CEP7-CT-CE-400	
	CA9-750...1060			~	~	Refer to Factory

- ❶ ATTENTION: The CEP7 Overload relay is not a ground fault circuit interrupter for personnel protection as defined in Article 100 of the NEC.
- ❷ Dynamic inhibit: Protective function is enabled after the motor current goes above 150% and then falls below 125%
- ❸ Utilizes UL or CE approved Current Transformers in conjunction with an overload selection – which is commonly selected as a CEP7-1EF_Z version.
In the instance that a CEP7-1E_C_ overload is used, there is a reference table on catalog page B1.9 to assist with current setting guidance.

CEP7-1 Ground Fault Sensor Installation



Ground Fault Sensor Control Wiring







CEP7-1EF Overload Relay attached to CA7 with CEP7-1EGJ module

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CEP7-1 Overload Relays

CEP7 Ground Fault Sensor Selection

Ground fault current is sensed by passing all lines carrying current to and from a motor through the window of a special current transformer called a ground fault sensor. If all the current to the motor returns through the lines in the sensor window, no significant current will be induced in the sensor secondary. If, however, ground fault current returns via a path external to the sensor, such as via the conduit walls, a current will be induced in the sensor secondary. This current will be sensed and amplified by solid state circuits. If the ground fault current is larger than the selected ground fault trip level of the overload relay, the overload relay will trip.

Sensor Type	Maximum Current	Frequency	Turns Ratio	Sensor Window I.D. 	Maximum Recommended Cable Size	For use with CEP7-EGF and CEP7-EGJ and contactor...	Catalog Number
	45A	50/60 Hz	1000:1	19.1mm (0.75 in.)	8 AWG @ 600V ❶	CA7-9...CA7-37	CEP7-CBCT1
	90A	50/60 Hz	1000:1	39.6mm (1.56 in.)	2 AWG @ 600V ❶	CA7-9...CA7-85	CEP7-CBCT2
	180A	50/60 Hz	1000:1	63.5 mm (2.50 in.)	250MCM (120mm²) @ 600V ❶	CA7-9...CA9-190	CEP7-CBCT3
	420A	50/60 Hz	1000:1	82.3 mm (3.25 in.)	350MCM (185mm²) @ 600V ❷	CA7-9...CA9-400	CEP7-CBCT4

❶ For a three phase system with one cable per phase.
❷ For a three phase system with two cables per phase.

Specifications - CEP7 Electronic Overload Relay

This section contains specifications, wiring diagrams, and certification information for the CEP7 Electronic Overload Relay and its accessories.

Wiring Diagrams

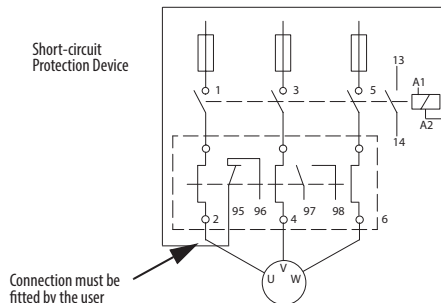
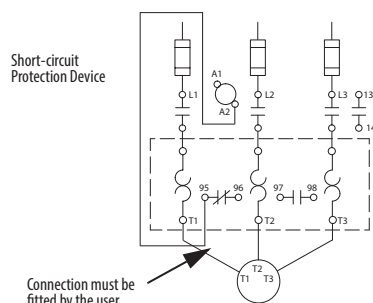
The figures in this section illustrate various wiring configurations for the CEP7 Electronic Overload Relay and accessories.

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CEP7-1 Overload Relays

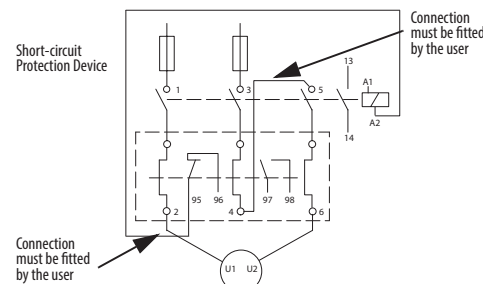
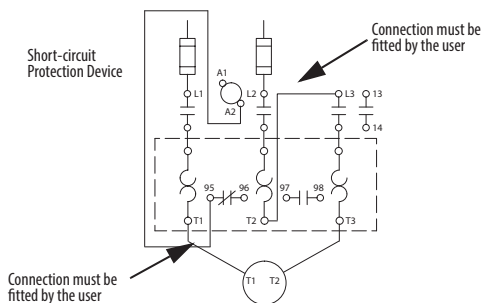
3-Phase / Full-voltage / Direct-on-Line Starter

UL/NEMA Symbology and IEC Symbology

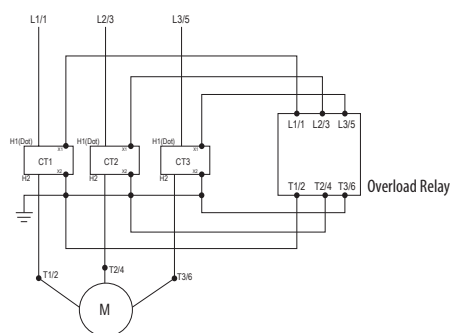


1-Phase / Full-voltage / Direct-on-Line Starter

UL/NEMA Symbology and IEC Symbology



CEP7 Overload Relay (Cat. No. CEP7-1EF_Z) with External Transformer



Standards Compliance and Certifications

This section contains specifications, wiring diagrams, and certification information for the CEP7 Electronic Overload Relay and its accessories.

Standards Compliance	Certifications
CSA22.2, No. 60947-4-1	cULus Listed – File No. E14840
EN 60947-4-1	CE Marked
UL 60947-4-1	RCM (formerly C-tick)
GB/T 14048.4-2010	CCC
SJ/T 11364, GB/T 26572, SJ/Z 11388	Environmental Protection Use Period 25 (China RoHS)
	Morocco Regulatory Certification

General Protection

Protection Type	CEP7-1EE		CEP7-1EF, CEP7-1EF	
	Trip	Warning	Trip ❶	Warning ❶
Overload	Yes	No	Yes	Yes
Phase Loss	Yes	No	Yes	Yes
Ground Fault ❷	No	No	Yes	Yes
Jam ❷	No	No	Yes	Yes

❶ Trip/Warning indication also available using the CEP7-1ERR/1EGJ and CEP7-ERID / 1ERIDN accessory modules.

❷ Additional ground fault and jam protection accessory CEP7-1EGJ required.

Overload Protection

Attribute	Rating	
	CEP7-1EE..	CEP7-1EF..
Type of Relay	Ambient Compensated Time-Delay Phase Loss Sensitive	
Nature of Relay	Solid-state	
FLA Setting	Rotary Dial	
Trip Rating	120% FLA	
Trip Class	10, 20	10, 15, 20, 30
Reset Mode	Manual	Automatic or Manual
Overload Reset Level	Auto Reset occurs at 70% TCU when accessory powered, after 2 minutes when self powered. Manual Reset can occur anytime by pressing the manual reset button. Electronic Reset (ERID input) can only occur below 70% TCU.	

* Typical reset time for CEP7-1EF devices set to automatic reset mode is dependent upon overload trip class. Typical reset time for Trip Class 10 is 90 seconds, Trip Class 15 is 135 seconds, Trip Class 20 is 180 seconds, and Trip Class 30 is 270 seconds.

Ground Fault Protection

Attribute	Rating CEP7-1EF
Type	Core Balanced
Intended Use	Equipment Protection
Classification (Per UL 1053)	Evaluated to UL 1053 but not listed as such
Internal Protection Range	0.02...5.0 A
Trip and Warning Time Delay	Fixed at 100 msec \pm 20 msec

Technical Information

Motor/Load Ratings

Terminals	1/L1, 3/L2, 5/L3, 2/T1, 4/T2, 6/T3	
Terminal Style Devices		
Rated Insulation Voltage - (U_i)	[V]	690V AC
Rated Operating Voltage - (U_e) IEC	[V]	690V AC
Rated Operating Voltage - (U_e) UL	[V]	600V AC
Pass-thru Style Devices		
Rated Insulation Voltage - (U_i)	[V]	1000V AC
Rated Operating Voltage - (U_e) IEC	[V]	1000V AC
Rated Operating Voltage - UL/CSA	[V]	600V AC
Rated Impulse Voltage - (U_{imp})	[kV]	6 kV AC
Rated Operating Current - (I_e)	See product selection table	
Rated Frequency	[Hz]	45...65

Control Relay Ratings

Relay N.O./N.C.		
Type of Contacts	Ag/Ni	
Rated Thermal Current (I_{the})	B600: 5.0 A; C600: 2.5 A; R300: 1.0 A	
Contact Reliability	[V]	17 V, 5 mA
Rated Insulation Voltage - (U_i)	[V]	690V AC
Rated Operation Voltage - (U_e)	[V]	690 AC (IEC) / 600 AC (UL/CSA)
Rated Operating Current (I_e)	[V]	B600: 3 A (@120V AC), 1.5 A (@240V AC)
	[V]	C600: 1.5 A (@120V AC), 0.75 A (@240V AC)
	[V]	R300: 0.22 A (@125V DC), 0.11 A (@250V DC)
Minimum Operating Current	[V]	10 mA @ 5V DC
Rating Designation	N.O. C600 / N.C. B600 (AC) N.O. / N.C. R300 (DC)	
Utilization Category	AC-15/DC-13	
B600 VA Rating	3,600VA make / 360VA break	
C600 VA Rating	1,800VA make / 180VA break	
R300 VA Rating	28VA make / 28VA break	

Rated Number of Mechanical Operations

Relay N.O./N.C.	10,000
W/ CA7-9...CA7-37	13,000,000
W/ CA7-43...CA7-55	12,000,000
W/ CA7-60...CA7-97	6,000,000

Table for using Current Transformers with CEP7-1E_C_ (range 1.0...5.0 amps) overload relay

Current Setting	CT Ratio 150:5 Equivalent FLA	CT Ratio 200:5 Equivalent FLA	CT Ratio 300:5 Equivalent FLA	CT Ratio 500:5 Equivalent FLA	CT Ratio 600:5 Equivalent FLA	CT Ratio 800:5 Equivalent FLA	CT Ratio 1000:5 Equivalent FLA	CT Ratio 1500:5 Equivalent FLA
1.00	30	40	60	100	120	160	200	300
1.25	38	50	75	125	150	200	250	375
1.50	45	60	90	150	180	240	300	450
1.75	53	70	105	175	210	280	350	525
2.00	60	80	120	200	240	320	400	600
2.25	68	90	135	225	270	360	450	675
2.50	75	100	150	250	300	400	500	750
2.75	83	110	165	275	330	440	550	825
3.00	90	120	180	300	360	480	600	900
3.25	98	130	195	325	390	520	650	975
3.50	105	140	210	350	420	560	700	1050
3.75	113	150	225	375	450	600	750	1125
4.00	120	160	240	400	480	640	800	1200

❶ For multiple conductor applications, the same size and style wire must be used.

Technical Information

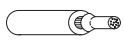

Environmental Ratings			Overload Rating	Accessory Rating
Ambient Temperature	Storage	[°C]	-40...+85 (-40...+185 °F)	
	Operating (open)	[°C]	-20...+65 (-4...+149 °F)	
	Operating (enclosed)		-20...+50 °C (-4...+122 °F)	-20...+55 °C (-4...+131 °F)
Humidity	Operating	[%]	5...95% Non-condensing; 92% R.H.	
	Damp Heat - Steady State (per IEC 60068-2-78)		93% R.H., 40 °C (104 °F), 56 days	
	Damp Heat - Cyclic (per IEC 60068-2-30)		93% R.H., 25 °C/40 °C (77 °F/104 °F), 21 Cycles	
Cooling Method			Natural convection	
Vibration (per IEC 68-2-6), operating			[G]	3
Shock (per IEC 68-2-27), operating			[G]	30
Maximum Altitude			[m]	2000
Pollution Environment			Pollution Degree 3	
Degree of Protection			IP20 (front of panel)	IP20

Electromagnetic Compatibility

Immunity and Emissions			Overload Rating	Accessory Rating
Electrostatic Discharge Immunity				
IEC 61000-4-2, IEC 60533			6 kV Contact Discharge, 8kV Air Discharge (Performance Criterion "B")	8 kV Contact Discharge, 8kV Air Discharge (Performance Criterion "B")
Radio Frequency Immunity				
IEC 61000-4-3		[Hz]	10V/m; 80 MHz...1.0 GHz	
		[Hz]	3V/m; 1.4 GHz...2.0 GHz	
		[Hz]	1V/m; 2.0 GHz...2.7 GHz	
IEC 60533		[Hz]	10V/m; 80 MHz...2.0 GHz (Performance Criterion "A")	
Electrical Fast Transient / Burst Immunity				
IEC 61000-4-4, IEC 60533			[V]	4kV (3-phase Power); 2kV (Control Power & Communication I/O when CEP7-1ERR or CEP7-1EGJ accessory installed); Performance Criterion "A"
Surge Immunity				
IEC 61000-4-4, IEC 60533			[V]	2kV (L-N); 1kV (L-L); Performance Criterion "B"
Radiated Emissions				
CISPR11 Environment A			[Hz]	30 MHz...1.0 GHz
IEC 60533			[Hz]	150KHz...2.0GHz
Conducted Emissions				
CISPR11 Environment A			[Hz]	150 KHz...30 MHz
IEC 60533			[Hz]	10 KHz...30 MHz (General Power Distribution Only)
Conducted Immunity				
IEC 61000-4-6, IEC 60533			[Hz]	Modulation 80% AM at 1 KHz; 10V RMS (150 KHz...80 MHz)
Power Frequency Magnetic Field Immunity				
IEC 60947-1, IEC 61000-4-8			[Hz]	30 A/m; 50 Hz
Voltage Variation Immunity				
IEC 61000-4-11, IEC 60533			[V]	— Control Power 40...240V (AC/DC)

Wiring Specifications

Wiring Specifications for CEP7-1E__B, CEP7-1E__D, and CEP7-1E__E

Wire Type		Control Wiring		Power Wiring					
		All		CEP7-1E B		CEP7-1E D		CEP7-1E E	
		Range	Torque	Range	Torque	Range	Torque	Range	Torque
 Flexible Stranded w/ Ferrule	1 Wire	0.75...2.5 mm²	1.4 N•m	2.5...16 mm²	2.5 N•m	2.5...16 mm²	2.5 N•m	4...35 mm²	4.6 N•m
	2 Wires ①			2.5...10 mm²	3.4 N•m	2.5...10 mm²	3.6 N•m	4...25 mm²	
 Stranded / Solid	1 Wire	0.75...4.0 mm² (18...12 AWG)	1.4 N•m (12 lb•in)	2.5...16 mm² (14...6 AWG)	2.5 N•m (22 lb•in)	2.5...16 mm² (14...6 AWG)	2.5 N•m (22 lb•in)	4...35 mm² (12...1 AWG)	4.6 N•m (40 lb•in)
				25 mm² (4 AWG)	3.4 N•m	25 mm² (4 AWG)	3.4 N•m (30 lb•in)	4...35 mm² (12...1 AWG)	
	2 Wires ①			2.5...16 mm² (14...6 AWG)	3.0 lb•in	2.5...16 mm² (14...6 AWG)	3.6 N•m (32 lb•in)	4...35 mm² (12...2 AWG)	

Technical Information

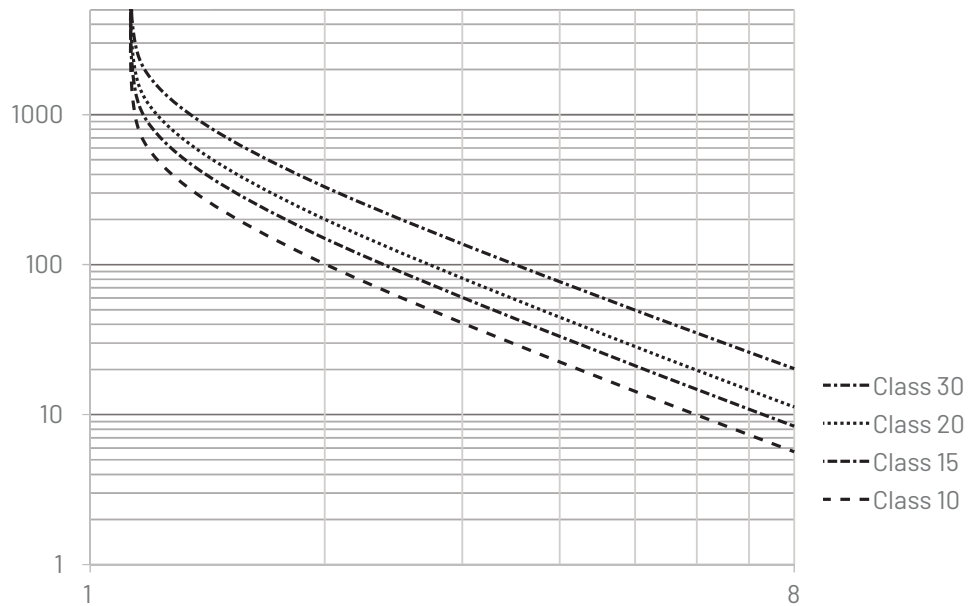
Overload Trip Curves

Typical reset time for CEP7-1EF devices set to automatic reset mode is dependent upon overload trip class. Typical reset time for Trip Class 10 is 90 seconds, Trip Class 15 is 135 seconds, Trip Class 20 is 180 seconds, and Trip Class 30 is 270 seconds.

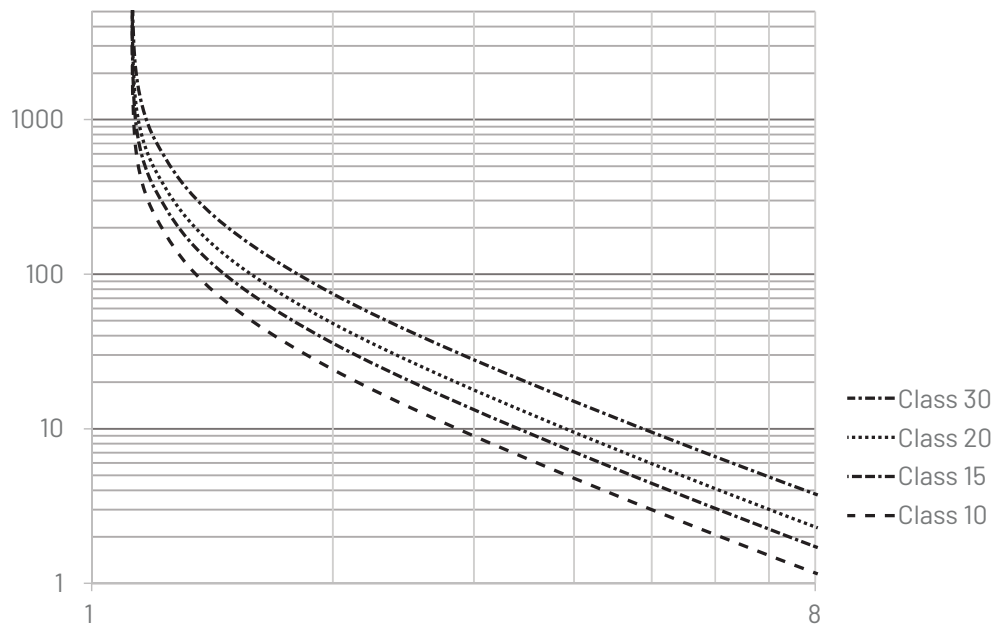
B1

CEP7-1 Overload Relays

Cold Trip Curves



Hot Trip Curves

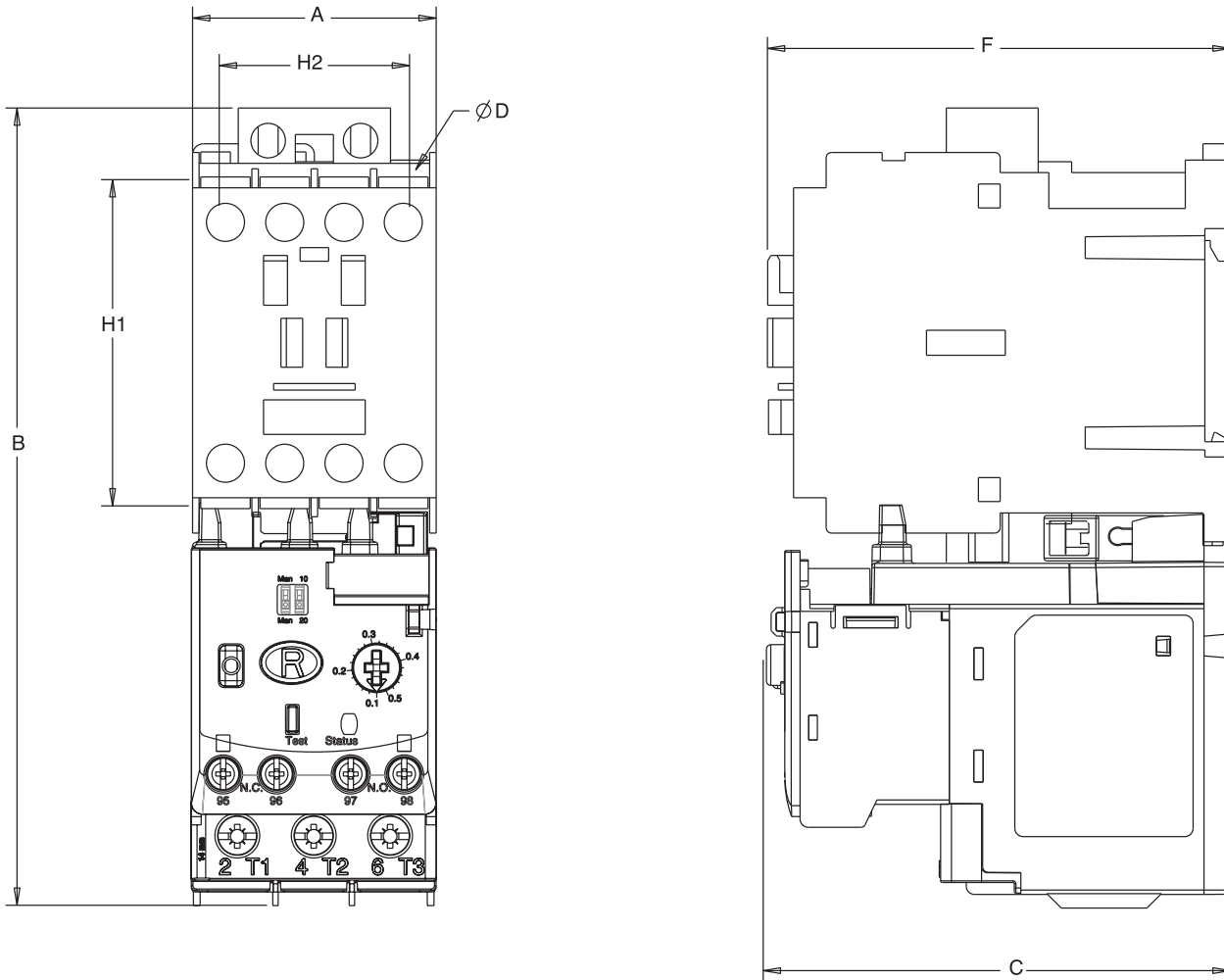


B1

CEP7-1 Overload Relays

CEP7-1 Mounted to CA7 Contactor

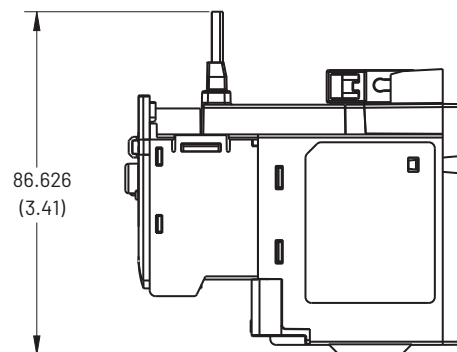
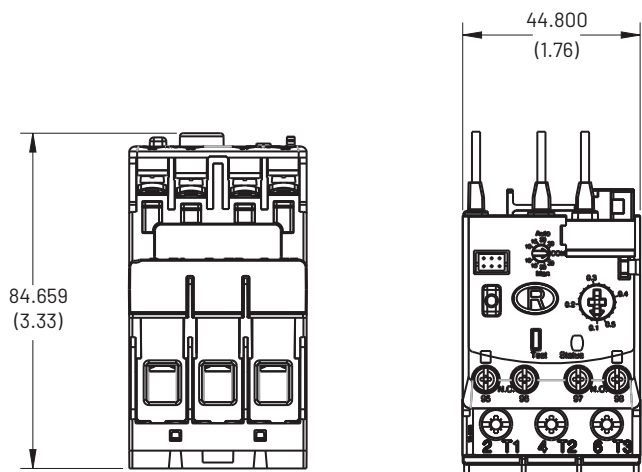
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



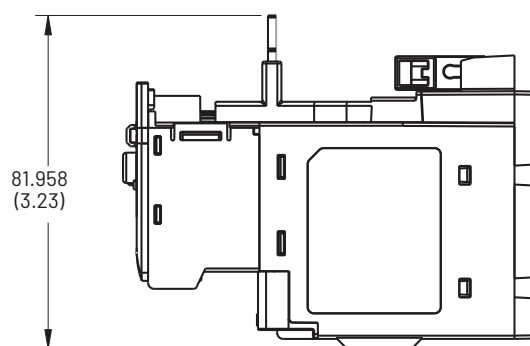
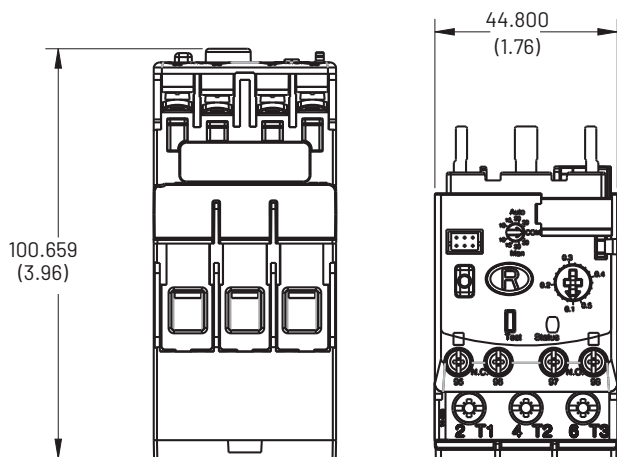
Overload	Mounted to Contactor		A Width	B Height	C Depth	D	F	H1	H2
CEP7-1EE/EF_B	CA7-9...23 CAN7-12...16	mm (in)	45 (1-25/32)	146.6 (5-25/32)	85.2 (3-23/64)	4.5 (3/16)	86.5 (3-13/32)	60 (2-23/64)	35 (1-3/8)
CEP7-1EE/EF_D	CA7-30...37 CAN7-37	mm (in)	45 (1-25/32)	146.6 (5-25/32)	101.2 (3-63/64)	4.5 (3/16)	104 (4-3/32)	60 (2-23/64)	35 (1-3/8)
CEP7-1EE/EF_D	CA7-43...55 CAN7-43	mm (in)	54 (2-1/8)	146.6 (5-25/32)	101.2 (3-63/64)	4.5 (3/16)	107 (4-3/32)	60 (2-23/64)	45 (1-25/32)
CEP7-1EE/EF_E	CA7-60...97 CAN7-85	mm (in)	72 (2-53/64)	192.3 (7-37/64)	120.4 (4-3/4)	5.4 (7/32)	125.5 (4-15/16)	100 (3-15/16)	55 (2-11/64)

CEP7-1 Direct-Mount

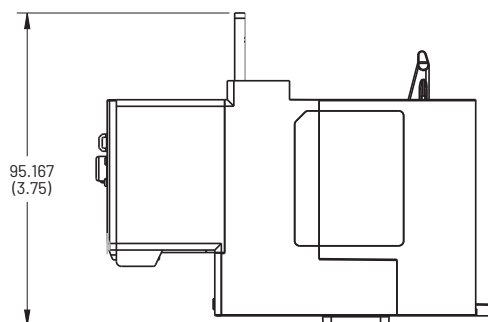
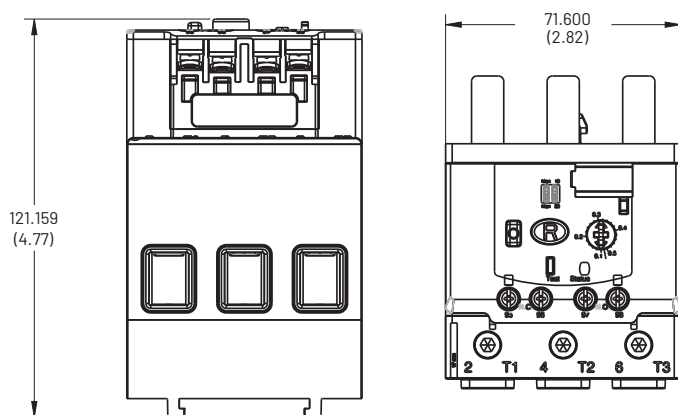
CEP7-1__B



CEP7-1__D



CEP7-1__E



B1

CEP7-1 Overload Relays

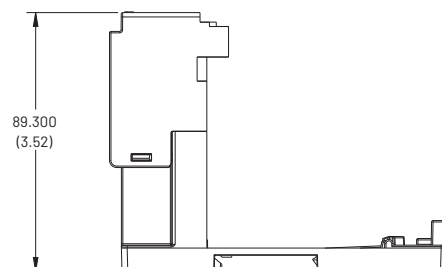
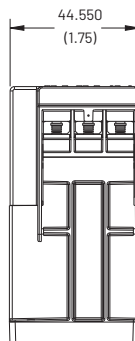
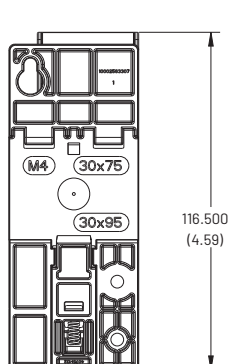
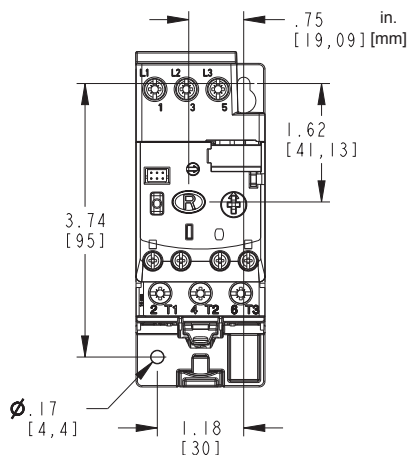
CEP7-1 with CEP7-1EP... Panel Mount Adaptor

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.

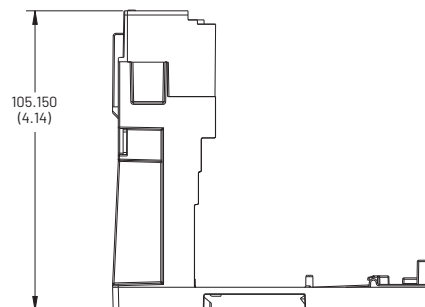
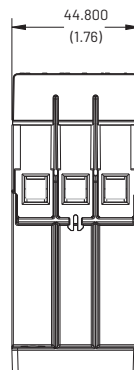
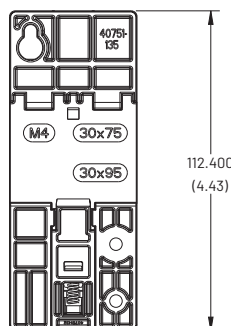
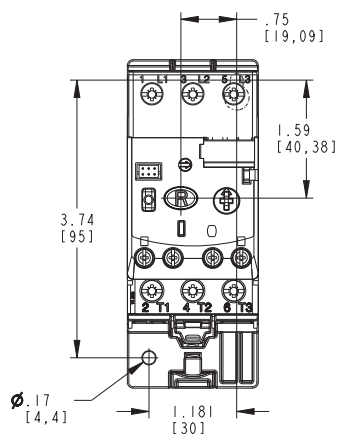
B1

CEP7-1 Overload Relays

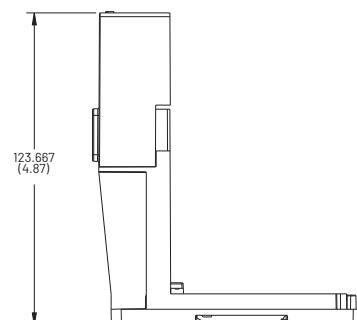
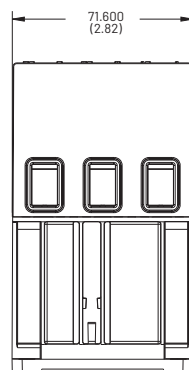
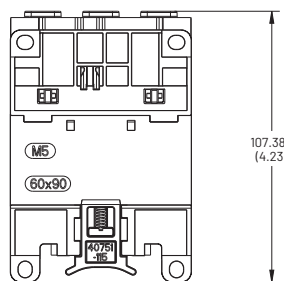
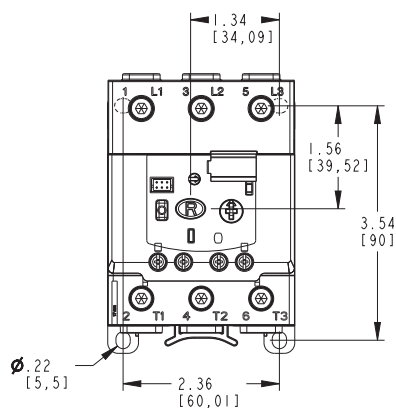
CEP7-1EPB Panel Mount for CEP7-1__B

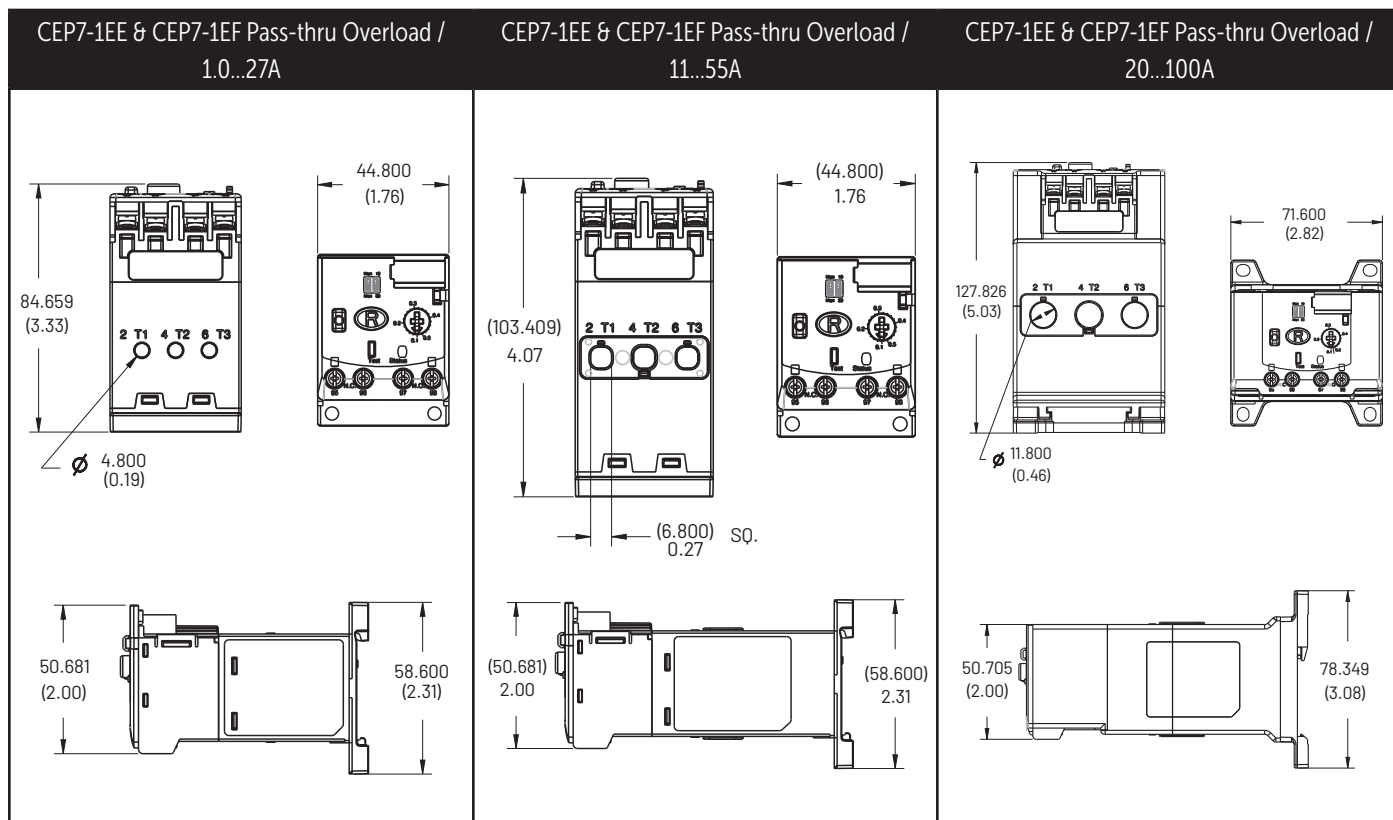


CEP7-1EPD Panel Mount for CEP7-1__D



CEP7-1EPE Panel Mount for CEP7-1__E



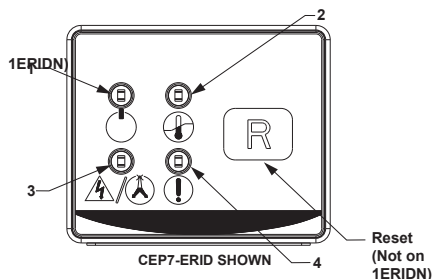


CEP7-ERID and CEP7-1ERIDN Remote Indicator

Indication

Starter:

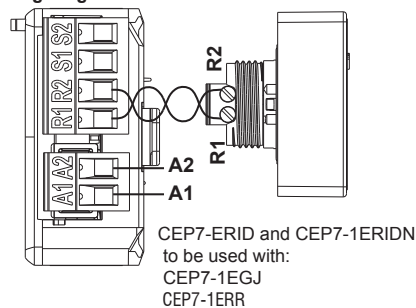
- ① Fault Code:
- 3-Ground Fault
- 5-Jam
- 9-Welded Cont *
- 10-Comm Loss
- 11-Test Trip



* Applies to OLRF Module only - KTE9-OLRF

LED	Function	Symbol	Fault or Status	Flash Code
			Module Power	Green (Flash)
			Module Power + Motor Current	Green (Solid)
			Hardware Fault	Red (Solid)
2	Overload		Overload Trip / Warning*	10 Red / Yellow (Flash)
3	Phase Loss		Short Circuit Trip	Red (Solid)
			Phase Loss Trip / Warning	Red / Yellow (Flash)
			Ground Fault Trip / Warning	3 Red / Yellow (Flash)
4	Fault Status		Jam Trip / Warning	5 Red / Yellow (Flash)
			Welded Cont*	9 Red (Flash)
			Comm Loss / Warning	10 Red / Yellow (Flash)
			Test Trip	11 Red (Flash)

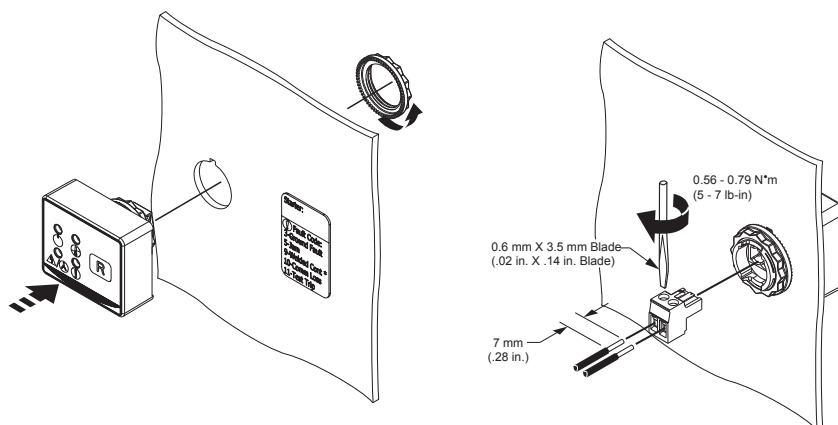
Wiring Diagram



Main Connections

Rated Insulation Voltage (Ui):	30V
Rated Operational Voltage (Ue) IEC/UL:	24V DC
Torque	
mm ²	0.55 N·m
VG	(5 lb-in)

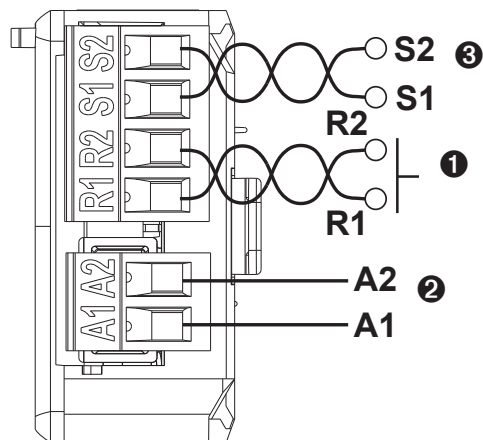
Recommend use of twisted pair for remote reset 24 AWG Minimum



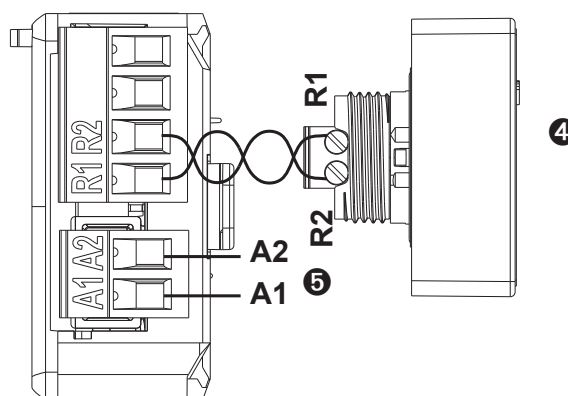
Expansion Accessory Ratings CEP7-1EGJ/1ERR

Attribute	Rating
Rated Insulation Voltage U_i	264V (AC/DC)
Rated Operating Voltage U_e , IEC	24...240V (AC/DC)
Rated Frequency	45...65 Hz
Power Consumption	0.8 Watts at 24V AC; 1.0 Watts at 240V AC

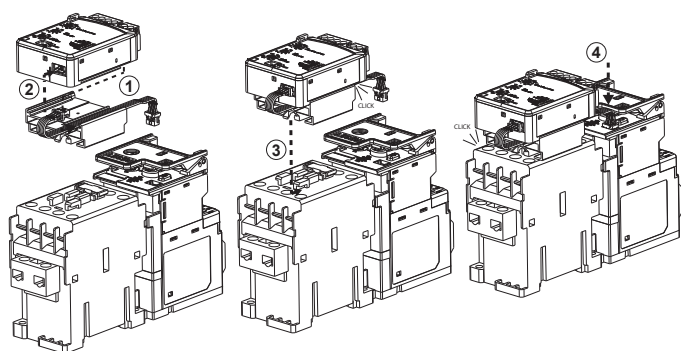
CEP7-1EGJ Universal Protection Expansion Module Wiring



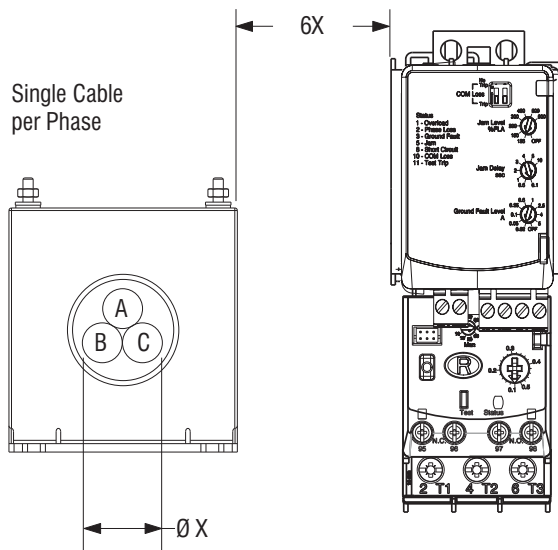
CEP7-1ERR Electronic Reset and Indication Display Module Wiring



Module Installation



Module Installation with CEP7-CBCT



- ① Terminals R1 and R2 are used with CEP7-ERID and CEP7-1ERIDN modules.
- ② External power must be user supplied. 24...240V, 47...63 Hz or DC.
- ③ Connect current sensor to Terminal S1 and S2

- ④ Terminals R1 and R2 are used with CEP7-ERID and CEP7-1ERIDN modules.
- ⑤ External power must be user supplied. 24...240V, 47...63 Hz or DC.

Series CT7N Bimetallic Overload Relays

Choose CT7N overloads
in DC applications and
when monitoring Variable
Frequency Drives



Sprecher + Schuh provides
outstanding motor protection with
our CT7N Bimetallic Overload Relay

Sprecher + Schuh has always paid particular attention to the subject of motor protection. This concern is reflected in our CT7N line of thermal overload relays which include many standard features not available with the eutectic alloy overload blocks and heater elements of the past.

Consistent and reliable protection

The consistent high quality of Sprecher + Schuh thermal overload relays is ensured by a complex, factory current calibration procedure performed on each unit at full operating temperature. Calibration is performed at the largest and smallest current the overload can handle. The accurate time/current characteristic curve obtained in this manner guarantees reliable motor protection every time.

Superior Class 10 characteristics

Today's T-Frame motors have less copper and iron than the old U-Frame motors that were popular when traditional Class 20 overload relays were designed. For this reason, faster Class 10 overloads like the CT7N Series have been recognized by many motor manufacturers as the ideal type to assure optimum protection of "T" frame motors with applications involving normal start-up conditions.

Protection from single phase conditions

A unique feature not found in traditional thermal overload relays provides accelerated tripping under single phase conditions. This is accomplished with a special "differential tripping" mechanism built into CT7N (see illustration at right).

Ambient temperature compensation

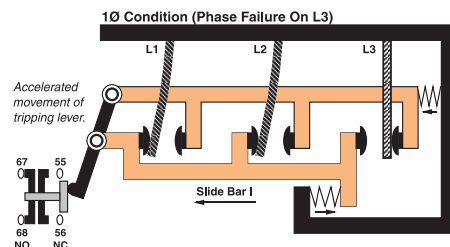
All Sprecher + Schuh thermal overload relays are temperature compensating. An additional bimetallic ambient compensation strip, built into the conductor-bimetal transmission path, ensures that the tripping characteristics of the relay remain constant over an ambient temperature range of -20°C to $+60^{\circ}\text{C}$.

Single phase applications

CT7N Series thermal overload relays can be applied for protection of single phase AC motors. The relays have the same characteristics as shown for three phase operation. To maintain these characteristics, each element of the overload relay must carry the motor current as shown in the connection diagram on page B2:7.

Other standard features

CT7N bimetallic overload relays feature a selectable reset permitting manual or automatic reset modes. A separate NO signal contact is also provided on CT7N overloads, which is isolated from the NC trip contact. This permits the use of a trip signal voltage different than that of the control voltage. The CT7N is also designed to close-couple connect directly to our CA7 contactors, resulting in a compact package.



CT7N Bimetallic Overload Relays offer accelerated
tripping under single phase conditions



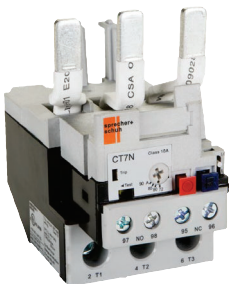
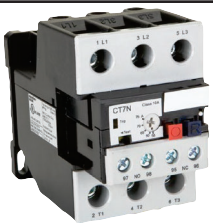
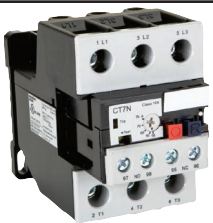
B2

CT7N Overload Relays

CT7N Bimetallic Overload Relays, Manual or Automatic Reset ①④

B2






CT7N Overload Relays

Overload Relay	Directly Mounts to Contactor...	Adjustment Range (A)②③	Trip Class 10 Catalog Number
 <p>CT7N-23-C16</p>	CA7-9...CA7-23	0.10...0.16	CT7N-23-A16
		0.16...0.25	CT7N-23-A25
		0.25...0.40	CT7N-23-A40
		0.35...0.50	CT7N-23-A50
		0.45...0.63	CT7N-23-A63
		0.55...0.80	CT7N-23-A80
		0.75...1.0	CT7N-23-B10
		0.90...1.3	CT7N-23-B13
		1.1...1.6	CT7N-23-B16
		1.4...2.0	CT7N-23-B20
		1.8...2.5	CT7N-23-B25
		2.3...3.2	CT7N-23-B32
		2.9...4.0	CT7N-23-B40
		3.5...4.8	CT7N-23-B48
		4.5...6.3	CT7N-23-B63
		5.5...7.5	CT7N-23-B75
 <p>CT7N-37-C30</p>	CA7-30...CA7-37	7.2...10	CT7N-23-C10
		9.0...12.5	CT7N-23-C12
		11.3...16	CT7N-23-C16
		15...20	CT7N-23-C20
		17.5...21.5	CT7N-23-C21
		21...25	CT7N-23-C25
		15...20	CT7N-37-C20
		17.5...21.5	CT7N-37-C21
		21...25	CT7N-37-C25
		24.5...30	CT7N-37-C30
 <p>CT7N-85-C90</p>	CA7-43...CA7-55	29...36	CT7N-37-C36
		33...38	CT7N-37-C38
		17...25	CT7N-43-C25
		24.5...36	CT7N-43-C36
 <p>CT7N-97-C97P</p>	CA7-60...CA7-97	35...47	CT7N-43-C47
		45...60	CT7N-55-C60
		35...47	CT7N-85-C47
		45...60	CT7N-85-C60
		58...75	CT7N-85-C75
 <p>CT7N-97-C97P</p>	Separate mounting required (Panel or DIN-Rail mounted device)	72...90	CT7N-85-C90
		85...97	CT7N-97-C97
		35...47	CT7N-85-C47P
		45...60	CT7N-85-C60P
		58...75	CT7N-85-C75P



- ① CT7N Bimetallic Overload Relays can be used with AC contactors, Electronic DC contactors (CA7-9E...55E) and Two-Winding DC contactors (CA7-60D...97D).
- ② To select the setting range for use in Wye-Delta Starters, multiply the rated operating current of the motor by a factor of 0.58.

- ③ For motors with service factor of 1.15 or greater, use motor nameplate full load current. For motors with service factor of 1.0, use 90% of the motor nameplate full load current.
- ④ Under phase loss condition, this 3-phase two slider bar tripping mechanism will trip in approximately 45 seconds.

Accessories

Component	Description	For Use With...	Catalog Number
	DIN-rail / Panel Mount Adapter - For separately mounting thermal overload relays	CT7N-23..37	CT7N-37-P-A
	Screw Adapter - For screw fixing of the CT7N-37-P-A panel adapter (1 required per adapter) Pkg. of 10.	CT7N-37-P-A	Use KT7-45-AS
	Remote Reset Solenoid - ④⑤ For remote resetting of the overload relay	CT7N ④ CT8 24V AC 50-60Hz 48V AC 50-60Hz 110V 50Hz/120V 60Hz 220-240V 50-60Hz 24V DC 48V DC 110V DC 125V DC	CMR7N-24V50-60 CMR7N-48V50-60 CMR7N-110V50-120V60 CMR7N-220-240V50-60 CMR7N-24VDC CMR7N-48VDC CMR7N-110VDC CMR7N-125VDC
	External Reset Button - Used for manually resetting overloads mounted in enclosures	CT7N all	Use D7 Reset
	Adaptor External Reset - Mounts on relay reset button and provides larger actuation surface.	CT7N ④ CT8	CT7N-RA3

Marking Systems ①

Component	Description	Pkg. Qty.	Catalog Number
	Label Sheet - 1 sheet with 105 self-adhesive paper labels each, 6 x 17mm	1	CA7-FMS
	Marking Tag Sheet - 1 sheet with 160 perforated paper labels each, 6 x 17mm. To be used with transparent cover.	1	CA7-FMP
	Transparent Cover - To be used with Marking Tag Sheets.	100 ②	CA7-FMC

- ① The labeling field of the overload relay may also be written on by hand.
② Minimum order quantity is one package of 100. Price each x 100 = package price.
③ CMR7N-✱ and CT7N-RA3 will not mount on separate mount versions of CT7N.











- ④ Coil consumption of AC coils is 8VA.
⑤ Coil consumption of DC coils is 12 watts.

Electrical Data

Main Circuits			CT7N
Rated Insulation Voltage U_i			690 [V]
Rated Impulse Strength U_{imp}			6
Between main poles and between main poles & auxiliaries			
Between auxiliary circuits			4 [kV]
Rated Operating Voltage U_e			690 [V AC]
IEC			440 [V DC]
UL, CSA			600 [V AC]
Rated Frequencies			50/60 [Hz]
Power dissipation			
up to 0.4 A			7 [W]
CT7N-23...37			6 [W]
0.5...36 A			12 [W]
38 A			12 [W]
CT7N-43...55			18 [W]
25...47 A			
CT7N-85...97			
47...90 A			
Lifespan			
Stop function, operates the release contact			0.25 [Mil. ops.]
Mechanical			
Electrical, at max. contact rating			0.25 [Mil. ops.]
Trip Class			
IEC/EN 60947-4-1			CT7N-23/37 10A
UL			CT7N-43/55/85/97 10
Trip Rating (ultimate tripping current)			125% FLA
Phase Loss Sensitivity: Trip rating at phase loss			115% FLA
Reset mode			Automatic or Manual
Test release			Manual release of auxiliary contacts
Trip indicator			Flag visible through opening on front of relay
Approximate weight (unpackaged)			
CT7N-23			.115 kg
CT7N-37-C20...25			.115 kg
CT7N-37-C30...38			.155 kg
CT7N-45/55			.330 kg
CT7N-85			.360 kg
CT7N-85- _P			.415 kg

Operating Limits		CMR7N
Maximum Command Impulse		5s
AC 50/60Hz	Pick-up [$x U_s$]	0.8...1.1
	Drop-out [$x U_s$]	
DC	Pick-up [$x U_s$]	0.7...1.25
	Drop-out [$x U_s$]	
Coil Consumption		
AC 50/60Hz	Pick-up [VA-W]	
	Hold-in [VA-W]	
DC	Pick-up [$x U_s$]	17 (24, 110, 125V) 25 (48V)
	Drop-out [$x U_s$]	17 (24, 110, 125V) 25 (48V)

Control Circuits			CT7N
Rated Operating Current I_e			
AC-15	24V	[A]	4
	240V	[A]	2
	400V	[A]	1.6
	690V	[A]	0.15
DC-13	24V	[A]	2
	110V	[A]	0.4
	220V	[A]	0.25
	440V	[A]	0.08
Thermal Current I_{th}			5
Short Circuit withstand, Fuse			IEC, gL/gG [A] 6
Short-circuit withstand, circuit breaker $\leq 1kA$ prospective short-circuit-current			[A] 4
Min. contact load for reliable operation			15V, 2 mA
Approvals			
UL Rating			A600/Q300
CSA			C22.2 No. 14
cULus			E33916, NKCR, NKCR7
IEC/EN			6094 S7-1, -4-1, -5-1

Terminations	Main Circuits							Control Circuits	Remote Reset
	CT7N-23-A16...C25	CT7N-37-C20...25	CT7N-37-C30...38	CT7N-43 CT7N-55	CT7N-85 CT7N-97	CT7N-37-P-A		CT7N	CMR7N
Terminal Cross-Sections									
Terminal Type									
Terminal Screws	M4	M4	M4	M5	M6	M4		M3.5	M3.5
 Fine stranded with Ferrule	[mm²] 2x (1.5...4)	2x (1.5...4)	1x (2.5...10)	1x (2.5...16)	1x (10...35)	1x (1.5...10)		2x (1...4)	2x (1...2.5)
 Solid or Course Stranded	[mm²] 2x (1.5...6)	2x (1.5...6)	1x (2.5...16)	1x (2.5...25)	1x (10...35)	1x (1.5...16)		2x (1...4)	1x (1...2.5)
	[AWG] 2x (16...10)	2x (14...10)	1x (10...6)	1x (10...6)	1x (8...1)	1x (16...6)		2x (18...12)	1x (16...12)
Recommended Torque	[Nm] 1.5...2.2	1.5...2.2	2.5...3.5	2.5...3.5	4.5...6	1.8...2.8		1.2	1.2
	[lb-in] 13...20	13...20	22...31	22...31	40...53	16...25		10.6	10.6
Pozidrive Screwdriver	Size 2	2	2	2	~	2		2	2
Slotted Screwdriver	mm .8 x 5.5	.8 x 5.5	.8 x 5.5	.8 x 5.5	~	.8 x 5.5		.8 x 5.5	.8 x 5.5
Hexagon Socket Screw	Size ~	~	~	~	4	~		~	~

General Data

CT7N		CT7N	
Type of overload relay	Bimetallic, Ambient Compensated, Phase Loss Sensitive	Environmental	
Compensation temperature range	-20...+60°C (-4...+140°F)	Climatic Conditions	Storage Temp. Range -55...+80°C
Type of Protection	IP00		Operating Temperature Range -20...+60°C
in connected state	IP2X (in a connected state)		Air moisture (Storage/Operating) 5...95% rel. humidity
Finger Protection	Safe from touch by fingers and back of hand (VDE 0106, Part 100)	Vibration	(per IEC/EN 60068-2-6), service 3g
Materials	RoHS compliant		IEC/EN 61373 (vibration railways) cat. 1, class B
Flame Resistivity (Outer housing parts)	UL94: V0		IEC/EN 60092-504 (vibration ships). service 0.7g all axes, 2-200 Hz
		Shock	(per IEC/EN 6800-2-27), transport 30g
			IEC/EN 60068-2-27 (shock half-sinus) service 11 ms > 5 g
			(per IEC/EN 61373 (shock railways) cat. 1, class B
		Max. Altitude	2000 m
		Pollution Degree	3

B2

CT7N Overload Relays

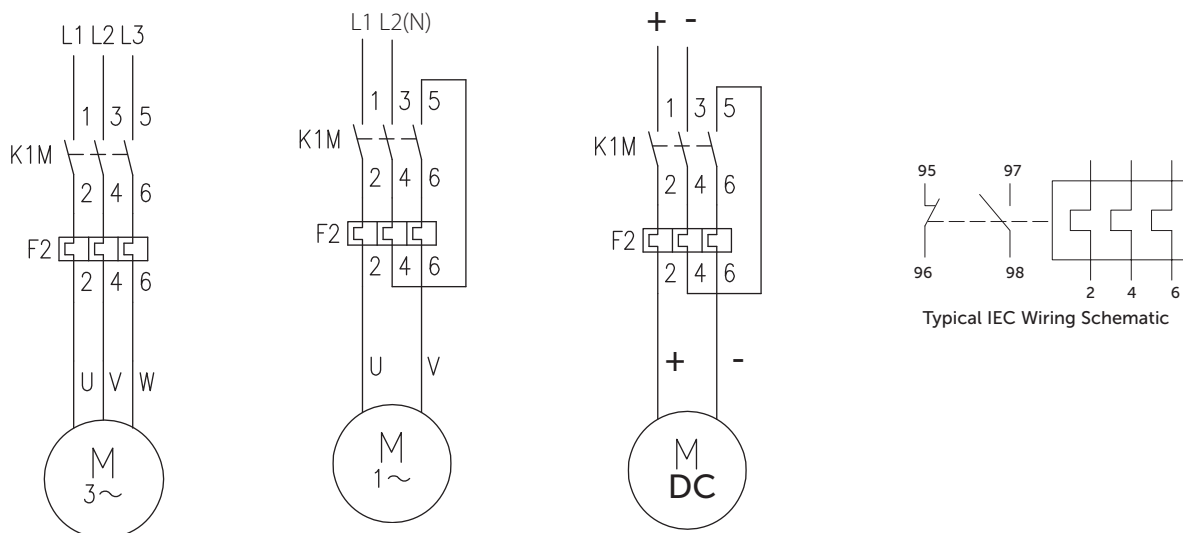
Thermal Overload Relay Maximum Fuse

For Use With...	Catalog Number	Adjustment Range (A)	Max. Back-up fuse [A]		
			gL/gG 50 kA, 690V AC IEC/EN 60947-4-1 Coordination		UL Class K5 5 kA, 600V AC
			Type 1	Type 2	UL 508
CA7-9...CA7-23	CT7N-23-A16	0.10...0.16	50	~	1
	CT7N-23-A25	0.16...0.25		~	1
	CT7N-23-A40	0.25...0.40		2	1
	CT7N-23-A50	0.35...0.50		2	2
	CT7N-23-A63	0.45...0.63		2	2
	CT7N-23-A80	0.55...0.80		4	3
	CT7N-23-B10	0.75...1.0		4	3
	CT7N-23-B13	0.90...1.3		6	4
	CT7N-23-B16	1.1...1.6		6	5
	CT7N-23-B20	1.4...2.0		10	8
	CT7N-23-B25	1.8...2.5		16	10
	CT7N-23-B32	2.3...3.2		16	12
	CT7N-23-B40	2.9...4.0		16	15
	CT7N-23-B48	3.5...4.8		16	15
	CT7N-23-B63	4.5...6.3		20	20
	CT7N-23-B75	5.5...7.5		25	25
	CT7N-23-C10	7.2...10		25	35
	CT7N-23-C12	9.0...12.5		35	50
	CT7N-23-C16	11.3...16		35	60
	CT7N-23-C20	15...20	80	40	80
	CT7N-23-C21	17.5...21.5		50	80
	CT7N-23-C25	21...25		50	100
	CT7N-23-C25	21...25		50	100
CA7-30...CA7-37	CT7N-37-C20	15...20	80	40	80
	CT7N-37-C21	17.5...21.5		50	80
	CT7N-37-C25	21...25		50	100
	CT7N-37-C30	24.5...30	100	63	100
	CT7N-37-C36	29...36	125	63	125
	CT7N-37-C38	33...38		63	150
CA7-43...CA7-55	CT7N-43-C25	17...25	100	50	100
	CT7N-43-C36	24.5...36	125	80	125
	CT7N-43-C47	35...47	160	100	175
	CT7N-55-C60	45...60	200	125	150
CA7-60...CA7-97	CT7N-85-C47	35...47	160	100	175
	CT7N-85-C60	45...60	200	125	250 ❶
	CT7N-85-C75	58...75	200	125	300 ❶
	CT7N-85-C90	72...90	250	160	350 ❶
	CT7N-97-C97	85...97	250	160	250 ❶
Separate mounting required (Panel-mounted device)	CT7N-85-C47P	35...47	160	100	175 ❷
	CT7N-85-C60P	45...60	200	125	250 ❶❷
	CT7N-85-C75P	58...75	200	125	300 ❶❷
	CT7N-85-C90P	72...90	250	160	350 ❶❷
	CT7N-97-C97P	85...97	250	160	250 ❶❷

❶ Max. Back-up fuse [A], UL Class K5, 10 kA, 600V AC

❷ Only in combination with CA7 Contactors.

Connection Diagrams



B2

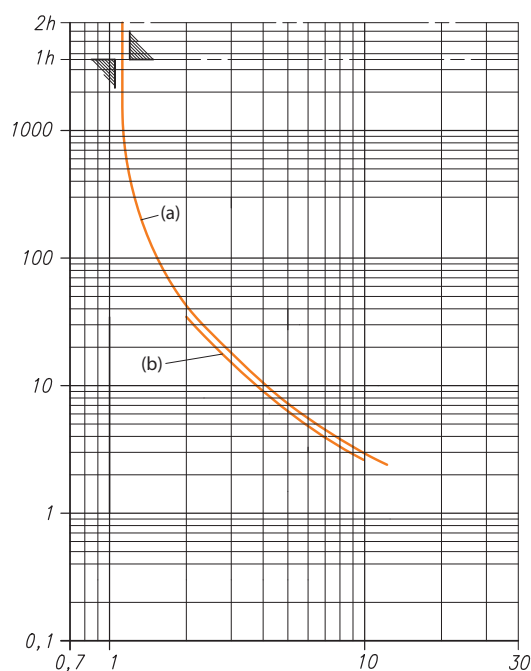
CT7N Overload Relays

Tripping Characteristics

These tripping characteristics refer to IEC/EN 60947-1 and are average values from cold start at an ambient temperature of 20°C. Trip time is pictured as a function of operating current. With the device at max. operating temperature, the trip time decreases to approximately 25% of the shown value.

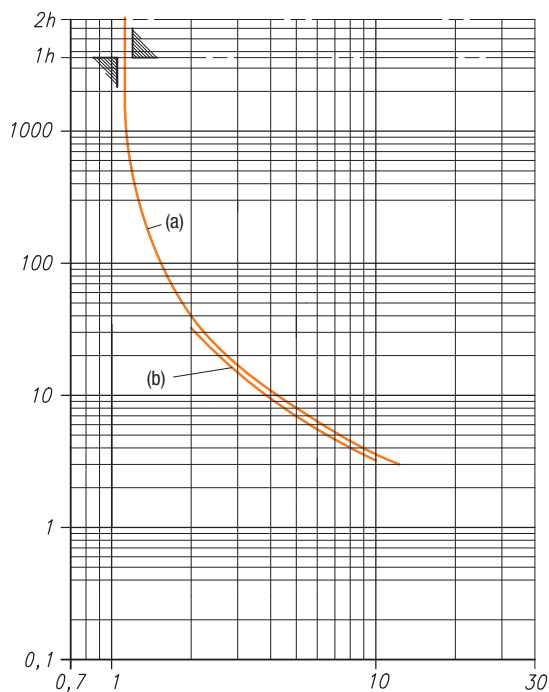
- (a) Tripping characteristics 3-poles from the cold state
- (b) Tripping characteristics 2-poles from the cold state

CT7N-23-A16...A40 Overload Relays

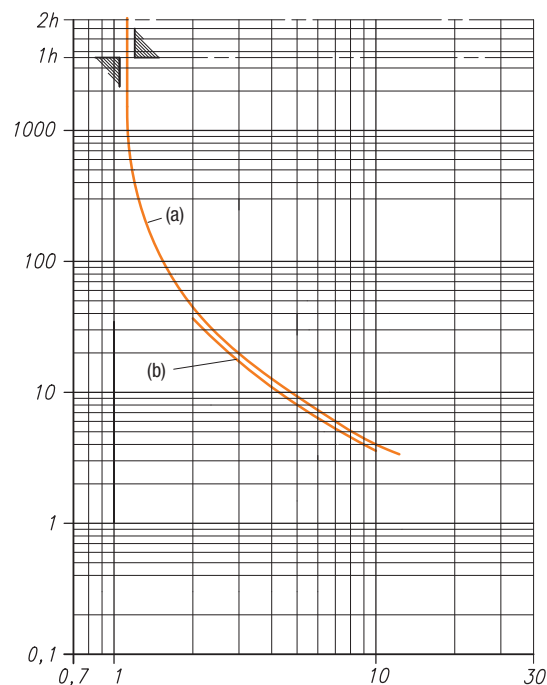


Tripping Characteristics (Continued)

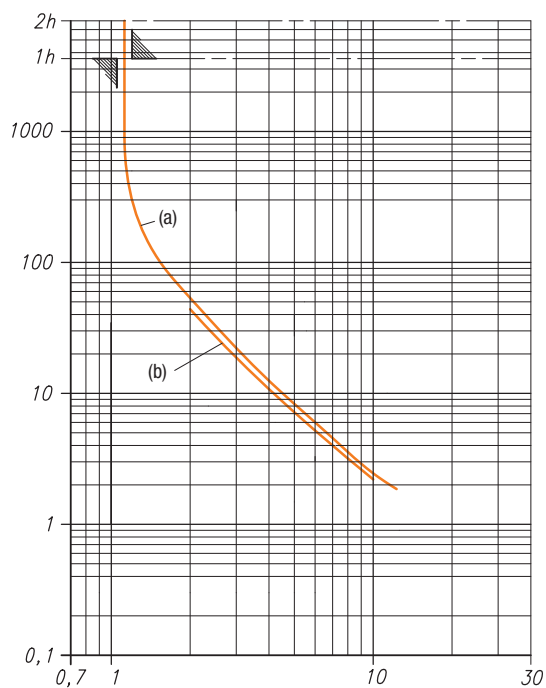
CT7N-23-A50...B40 Overload Relays



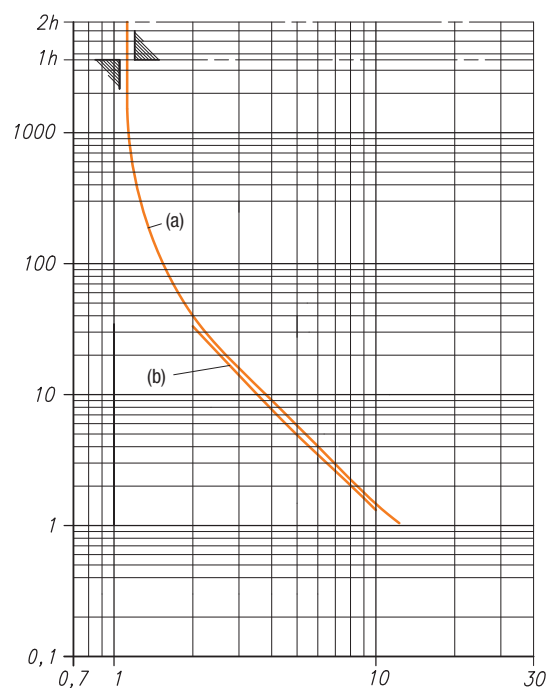
CT7N-23-B48...C25 Overload Relays



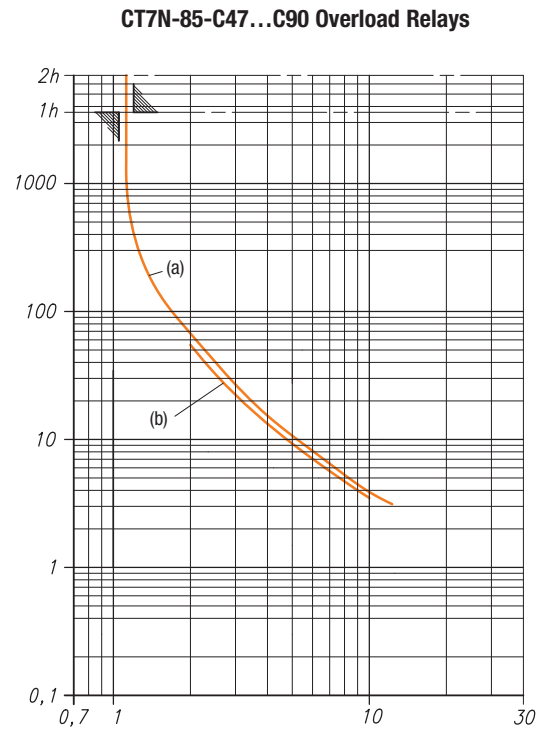
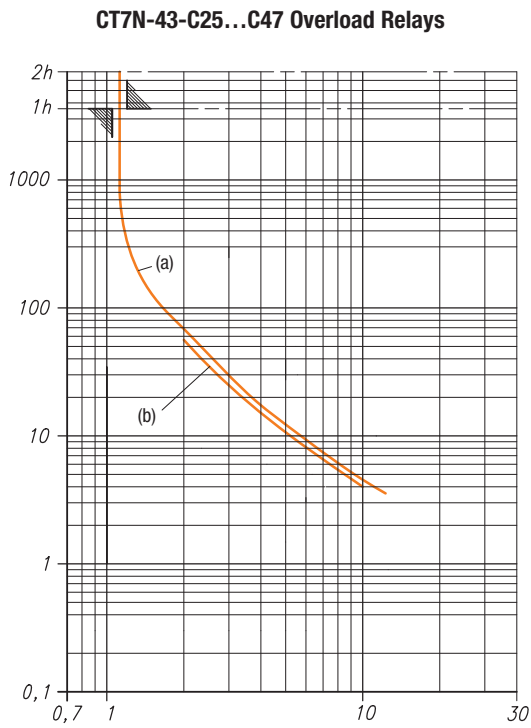
CT7N-37-C20...C25 Overload Relays



CT7N-37-C30...C38 Overload Relays

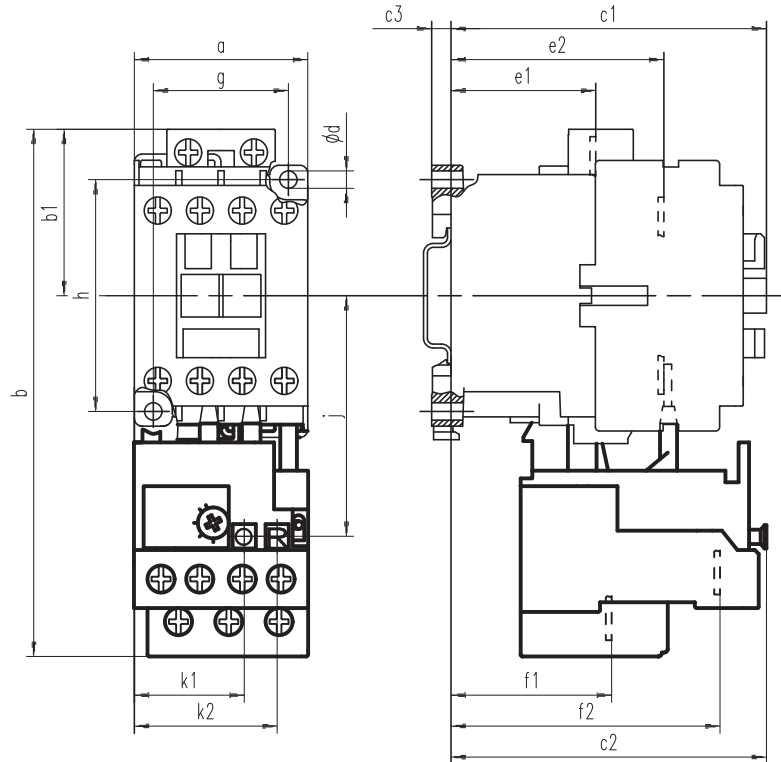


Tripping Characteristics (Continued)



Series CT7N (Mounting to CA7 Contactors)

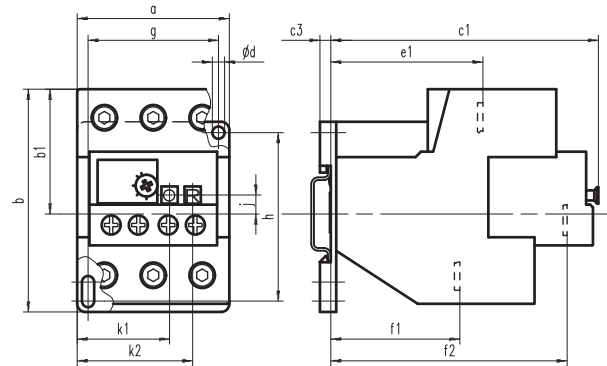
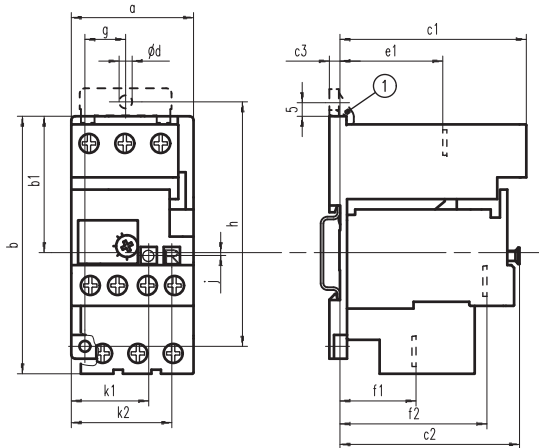
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



Contactors + Overload	a	b	b1	c1	c2	c3	ød	e1	e2	f1	f2	g	h	j	k1	k2
CA7-9...23 + CT7N-23-A16...C25	45 (1-25/32)	136.5 (5-3/8)	43 (1-11/16)	81.5 (3-13/64)	80.5 (3-11/64)	5 (13/64)	4.5 (3/16)	37.5 (1-15/32)	55 (2-11/64)	40.5 (1-19/32)	68.5 (2-45/64)	35 (1-3/8)	60 (2-23/64)	63.5 (2-1/2)	29 (1-9/64)	37.5 (1-15/32)
CA7-30...37 + CT7N-37-C20...C25	45 (1-25/32)	136.5 (5-3/8)	43 (1-11/16)	99.5 (3-28/32)	89 (3-1/2)	5 (13/64)	4.5 (3/16)	37.5 (1-15/32)	60.5 (2-3/8)	45.5 (1-51/64)	73 (2-7/8)	35 (1-3/8)	60 (2-23/64)	63.5 (2-1/2)	29 (1-9/64)	37.5 (1-15/32)
CA7-30...37 + CT7N-37-C30...C38	45 (1-25/32)	149 (5-55/64)	43 (1-11/16)	99.5 (3-28/32)	89 (3-1/2)	5 (13/64)	4.5 (3/16)	37.5 (1-15/32)	60.5 (2-3/8)	47 (1-27/32)	73 (2-7/8)	35 (1-3/8)	60 (2-23/64)	63.5 (2-1/2)	29 (1-9/64)	37.5 (1-15/32)
CA7-43 + CT7N-43-C25...C47	54 (2-1/8)	149 (5-55/64)	43 (1-11/16)	102 (4-1/64)	100 (3-15/16)	5 (13/64)	4.5 (3/16)	37.5 (1-15/32)	61 (2-13/32)	48 (1-57/64)	88 (3-15/32)	45 (1-25/32)	60 (2-23/64)	66.5 (2-5/8)	34 (1-11/32)	42.5 (1-43/64)
CA7-55 + CT7N-55-C60	54 (2-1/8)	149 (5-55/64)	43 (1-11/16)	102 (4-1/64)	100 (3-15/16)	5 (13/64)	4.5 (3/16)	37.5 (1-15/32)	61 (2-13/32)	48 (1-57/64)	88 (3-15/32)	45 (1-25/32)	60 (2-23/64)	66.5 (2-5/8)	34 (1-11/32)	42.5 (1-43/64)
CA7-60...85 + CT7N-85-C47...C90	72 (2-53/64)	191 (7-33/64)	64 (2-33/64)	120 (4-23/32)	108 (4-1/4)	5.5 (7/32)	5.4 (7/32)	45 (1-25/32)	74 (2-29/32)	55.5 (2-3/16)	80 (3-5/32)	55 (2-11/64)	100 (3-15/16)	87.5 (3-7/16)	41.5 (1-41/64)	50 (1-31/32)
CA7-97 + CT7N-97-C97	72 (2-53/64)	191 (7-33/64)	64 (2-33/64)	120 (4-23/32)	108 (4-1/4)	5.5 (7/32)	5.4 (7/32)	45 (1-25/32)	74 (2-29/32)	55.5 (2-3/16)	80 (3-5/32)	55 (2-11/64)	100 (3-15/16)	87.5 (3-7/16)	41.5 (1-41/64)	50 (1-31/32)

Series CT7N Separate Mount (+ Adaptor)

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.

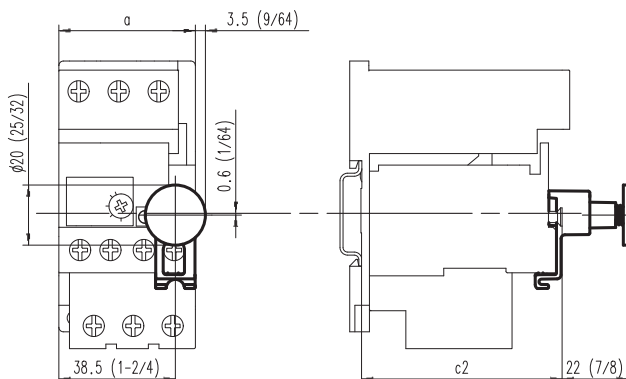


CT7N-23..37 with Panel Mount Adapter

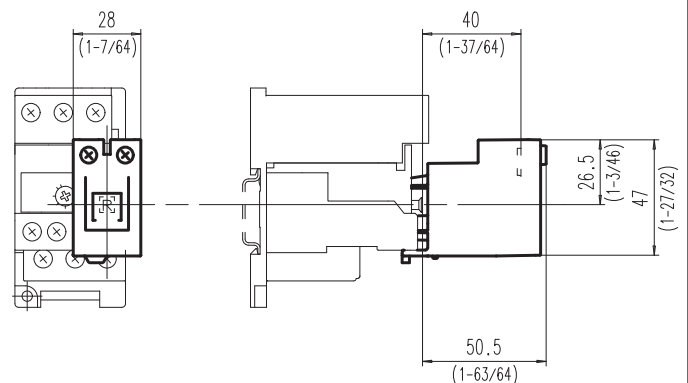
CT7N-85...97 Separate Mount

Overload + DIN Rail/Panel Mounting Adapter	a	b	b1	c1	c2	c3	ød	e1	f1	f2	g	h	k1	k2
CT7N-23-A16...C25 + CT7N-37-P-A CT7N-37-C20...C25 + CT7N-37-P-A	45 (1-25/32)	89.5 (3-17/32)	50 (1-31/32)	69 (2-23/32)	66 (2-19/32)	4 (5/32)	4.5 (3/16)	38 (1-31/64)	26 (1-1/32)	54 (2-1/8)	15 (19/32)	90 (3-35/64)	29 (1-9/64)	37.5 (1-15/32)
CT7N-37-C30...C38 + CT7N-37-P-A	45 (1-25/32)	91.5 (3-39/64)	50 (1-31/32)	69 (2-23/32)	66 (2-19/32)	4 (5/32)	4.5 (3/16)	38 (1-31/64)	28 (1-7/64)	54 (2-1/8)	15 (19/32)	90 (3-35/64)	29 (1-9/64)	37.5 (1-15/32)
CT7N-85-C47P...CT7N-97-C97P	56 (2-13/64)	82 (3-15/64)	46 (1-13/16)	99.5 (3-28/32)	~	4 (5/32)	4.5 (3/16)	56 (2-13/64)	47.5 (1-7/8)	87 (3-27/64)	~	60 (2-23/64)	41.5 (1-41/64)	50 (1-31/32)

CT7N-RA3 External Reset Adaptor



CMR7N Remote Reset Solenoid



Series CT8 Thermal Overload Relays

Simple and effective
motor protection
for applications to
12 Amps

Sprecher + Schuh has been a leader in providing superior motor protection. The CT8 is an economical thermal overload relay yet includes proven features like “Differential tripping”, Automatic / Manual reset modes, and isolated alarm circuit contacts as standards.

Consistent and reliable protection

The consistent high quality of Sprecher + Schuh thermal overload relays is ensured by a complex current calibration procedure performed after each unit is at full operating temperature. Calibration is performed at the largest and smallest current the overload can handle. The accurate time/current characteristic curve obtained in this manner guarantees reliable motor protection every time.

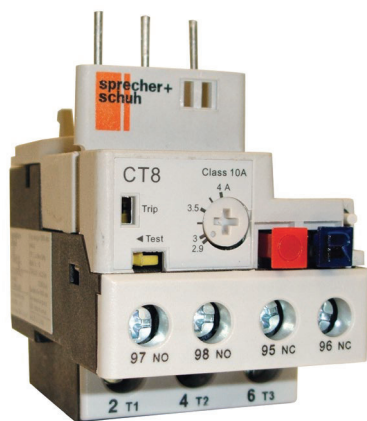
Superior Class 10 characteristics

Today’s T-Frame motors have less copper and iron than the old U-Frame motors that were popular when traditional Class 20 overload relays were designed. For this reason, faster Class 10 overloads like the CT8 Series have been recognized by many motor manufacturers as the ideal type to assure optimum protection of “T” frame motors.



Protection from single phase conditions

A unique feature not found in traditional thermal overload relays provides accelerated tripping under single phase conditions. This is accomplished with a special “differential tripping” mechanism built into CT8 (see illustration at right).



Sprecher + Schuh provides outstanding motor protection with our CT8 Thermal Overload Relay

Ambient temperature compensation

All Sprecher + Schuh thermal overload relays are temperature compensated. An additional bimetallic ambient compensation strip, built into the conductor-bimetal transmission path, ensures that the tripping characteristics of the relay remain constant over an ambient temperature range of -20°C to $+60^{\circ}\text{C}$.

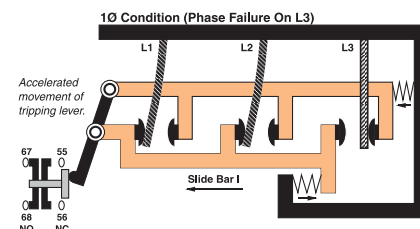
Single phase applications

CT8 Series thermal overload relays can be applied for protection of single phase AC motors. The relays have the same characteristics as shown for three phase operation. To maintain these characteristics, each element of the overload relay must carry the motor current as shown in the connection diagram on page B3:4.

Other standard features

CT8 thermal overload relays feature a fail-safe “trip-free” design that prevents the device from being held closed during an overload. In addition, a selectable lever permits the user the option to choose the manual or automatic reset modes.

A separate NO signal contact is also provided on CT8 overloads which is isolated from the NC trip contact. This permits the use of a trip signal voltage different than that of the control voltage.



CT8 Thermal Overload Relays offer accelerated tripping under single phase conditions


B3

CT8 Overload Relays

CT8 Thermal Overload Relays - Trip Class 10, Manual or Automatic reset ❶

B3




CT8 Overload Relays

Overload Relay	Directly Mounts to Contactor..	Adjustment Ranges [A]	Catalog Number
 <p>CT8</p>	CA8-09...12	0.10...0.16	CT8-A16
		0.16...0.25	CT8-A25
		0.25...0.4	CT8-A40
		0.35... 0.5	CT8-A50
		0.45...0.63	CT8-A63
		0.55...0.80	CT8-A80
		0.75...1.0	CT8-B10
		0.90...1.3	CT8-B13
		1.10...1.6	CT8-B16
		1.4...2.0	CT8-B20
		1.8...2.5	CT8-B25
		2.3...3.2	CT8-B32
		2.9...4.0	CT8-B40
		3.5...4.8	CT8-B48
		4.5...6.3	CT8-B63
		5.5...7.5	CT8-B75
		7.2...10	CT8-C10
	CA8-12	9.0...12.5	CT8-C12

Thermal Overload Relay Features:

- Standard motor protection for AC and DC motors
- Overload protection Trip Class 10A
- Auxiliary switch (1 NO and 1 NC)
- Phase loss sensitivity
- Manual/Auto reset button
- Test release
- Stop button
- Trip indicator

Accessories


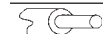
Enclosure	Description	For Use With...	Catalog Number
	Remote Reset Solenoid - ❹❺ For remote resetting of the overload relay	CT7N CT8 24V AC 50-60Hz 110V 50Hz/120V 60Hz 220-240V 50-60Hz 24V DC 110V DC 125V DC	CMR7N-24V50-60 CMR7N-110V50-120V60 CMR7N-220-240V50-60 CMR7N-24VDC CMR7N-110VDC CMR7N-125VDC
	External Reset Button - Used for manually resetting overloads mounted in enclosures	CT7N all	Use D7 Reset
	Adaptor External Reset - Mounts on relay reset button and provides larger actuation surface.	CT7N CT8	CT7N-RA3

❶ Contactors noted will physically attach to the overload relays listed. This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.

Electrical Data

Main Circuits		
Rated Insulation Voltage U	[V]	690 AC
Rated Impulse Strength U_{imp}	[kV]	6 AC
Rated Operating Voltage U^a	IEC/UL [V]	690/600 AC



Terminations - Power

Terminal Type		M3.5
 Fine stranded w/ ferrule	[mm²]	2 x (1.5...4)
 Solid or coarse stranded	[mm²]	2 x (1.5...4)
	[AWG]	2 x (16...12)
Torque Requirement	[Nm]	1.2
	[Lb-in]	10.6
Pozidrive screwdriver	Size	2
Slotted screwdriver	[mm]	1 x 6



Control Circuits

Rated Insulation Voltage U	[V]	690 AC
Rated Impulse Strength U_{imp}	[kV]	4 AC
Rated Operating Voltage U^a	IEC/UL [V]	690/600 AC
Rating Designation		A600/Q300 N.O./N.C.
Rated Operating Current	I_e	
AC-15	24V [A]	4
	240V [A]	2
	400V [A]	1.6
	600V [A]	0.15
DC-13	24V [A]	2
	110V [A]	0.4
	220V [A]	0.25
	440V [A]	0.08
Thermal Current	I_{the} [A]	5
Short Circuit Withstand, fuse gG	[A]	6
Contact Reliability		15V, 2mA

Terminations - Control

Terminal Type		M3.5
 Fine stranded w/ ferrule	[mm²]	2 x (1...4)
 Solid or coarse stranded	[mm²]	2 x (1...4)
	[AWG]	2 x (18...12)
Torque Requirement	[Nm]	1.2
	[Lb-in]	10.6
Pozidrive screwdriver	Size	2
Slotted screwdriver	[mm]	1 x 6

General Data

Weight	[kg (lb)]	0.115 (.25)
Standards		IEC/EN 60947-1, -4-1, -5-1; UL508; CSA C22.2 NO. 14
Approvals		 
Temperature Compensation		Continuous (Temperature Range -5...+40°C per IEC 60947-4-1, EN60947; PTB: -20...+60°C)
Vibration Resistance	(PER IEC 68-2-6) [G]	3
Shock Resistance	(PER IEC 68-2-27) [G]	30
Type of Protection		IP2X

Environmental

Ambient Temperature	Storage	-55...+80 °C (-67...+176 °F)
	Operating	-20...+60 °C (-4...+140 °F)
Humidity	Operating	5...95% Non-condensing per IEC 68-2-3 and IEC 68-2-30
Max. Altitude	[m]	2000
Pollution Environment		Pollution Degree 3
Protection	Type of Relay	Ambient Compensated, Time Delay, Phase Loss Sensitive
	Nature of Relay	Bimetallic Overload Relay
	Trip Rating	125% FLA
	Trip Class	IEC: 10A, UL 10
	Reset Mode	Automatic or Manual
Power dissipation	up to 0.4 A	7 W
	0.5...12.5 A	6 W

Operating Limits

Maximum Command Impulse		5s
AC 50/60Hz	Pick-up [$x U_s$]	0.8...1.1
	Drop-out [$x U_s$]	
DC	Pick-up [$x U_s$]	0.7...1.25
	Drop-out [$x U_s$]	

Coil Consumption

AC 50/60Hz	Pick-up [VA-W]	
	Hold-in [VA-W]	
DC	Pick-up [$x U_s$]	17 (24, 110, 125V) 25 (48V)
	Drop-out [$x U_s$]	17 (24, 110, 125V) 25 (48V)

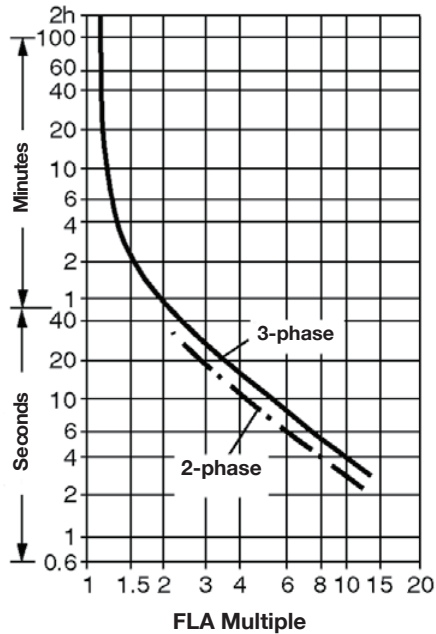
B3

CT8 Overload Relays

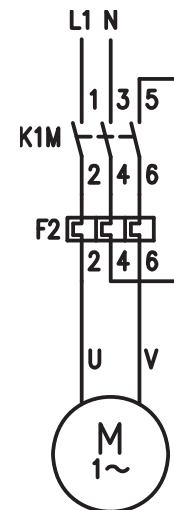
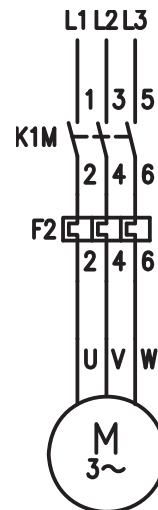
Tripping Characteristics

These trip characteristics refer to IEC 60947 and are average values from cold start at an ambient temperature of 20 °C. Trip time is pictured as a function of operating current. With the device at normal operating temperature, the trip time decreases to approximately 25% of the shown value.

Trip Class 10A

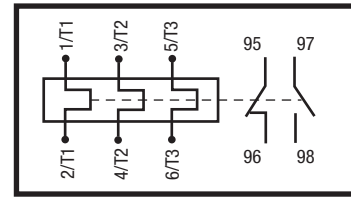
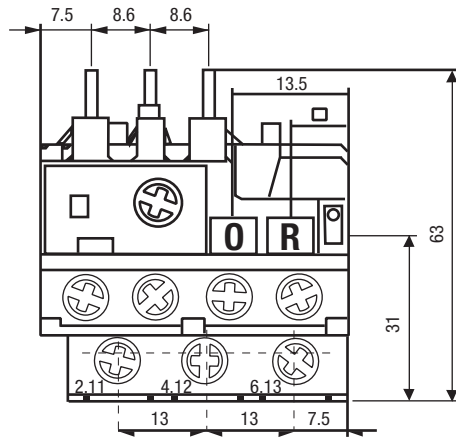


Connection Diagrams

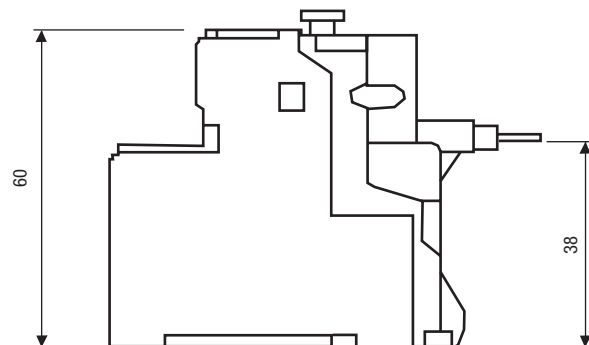
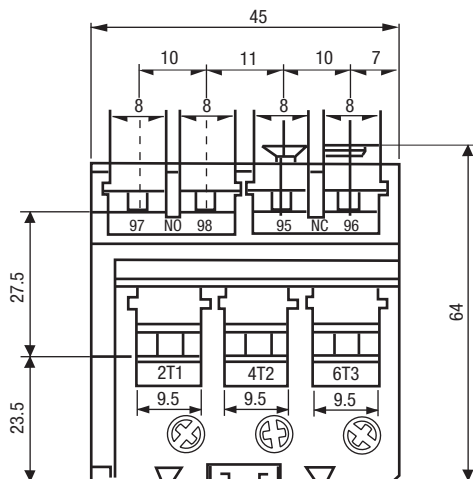


Series CT8

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



Terminal Marking



B3

CT8 Overload Relays

Series CEP9 Electronic Overload Relays

Choose Series CEP9
overloads for advanced
communication and
motor protection



- Intelligent motor protection (EtherNet/IP enabled)
- Scalable solution
- Diagnostic Information
- Integrated I/O
- Adjustable trip class 5...30
- Wide current range
- Test/Reset button
- Programmable trip and warning settings
- True RMS current/voltage sensing (50/60 Hz)
- Protection for single- and three-phase motors

The CEP9 Electronic Overload Relay is an advanced electronic overload from Sprecher + Schuh. Its modular design, communication options, diagnostic information, simplified wiring and integration into Logix make this the ideal overload for motor control applications in an automation system. The CEP9 Overload Relay provides flexibility, reduces engineering time, and maximizes uptime for important motor starter applications.

Intelligent Motor Protection

Easy automation system integration

- Network Connectivity
- Native I/O
- DeviceLogix™ Technology Enabled
- Pre-programmed Operating Modes

Diagnostic Information

Monitor motor performance

- Voltage, Current and Energy
- Trip / Warning Histories
- % Thermal Capacity Utilization
- Time to Trip
- Time to Reset
- Operational Hours
- Number of Starts
- Snapshot Log



Modular Design

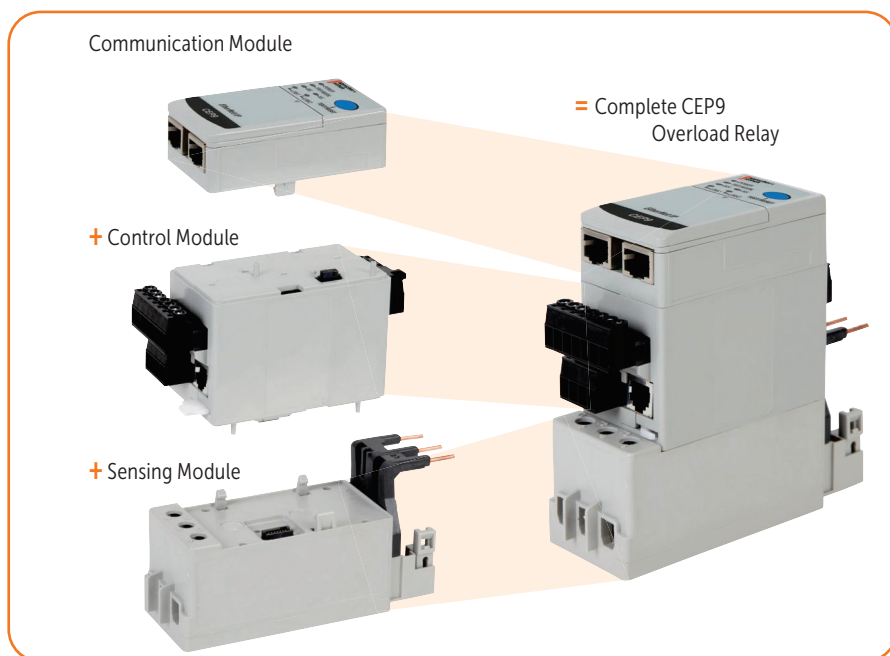
For exact application needs

- Wide Current Range
- Multiple Sensing Capabilities
- Expansion I/O
- Operator Interface

On Board Features

The CEP9 Overload Relay incorporates the newest technologies directly into the device to help simplify installation and configuration. Simplified wiring between the CEP9 overload relay and CA7 or CA9 contactor ensure easy installation.

On-device settings include network address configuration, restore factory default settings, and enable security settings. CEP9 overloads also include removable terminal blocks, I/O and Operator Station Dual Port EtherNet/IP, and it supports device level ring.



Thermal Utilization

The CEP9 Electronic Overload Relay provides overload protection through true RMS current measurement of the individual phase currents of the connected motor. Based on this information, a thermal model that simulates the actual heating of the motor is calculated. Percent of thermal capacity utilization (%TCU) reports this calculated value and can be read via a communications network. An overload trip occurs when the value reaches 100%.

Adjustable Settings

Thermal overload protection setup is accomplished simply by programming the motor's full load current (FLC) rating and the desired trip class (5...30). Programming of the actual values through software programming ensures the accuracy of the protection.

Thermal Memory

The CEP9 Electronic Overload Relay includes a thermal memory circuit designed to approximate the thermal decay for a trip class 20 setting. This means that the thermal model of the connected motor is maintained at all times, even if the supply power is removed.

Reset Modes

This flexibility allows the end-user the ability to select between manual and automatic reset for an overload trip, allowing for broad application. The point of reset is user adjustable from 1...100% TCU.

Time to Trip

During an overload condition, the CEP9 Electronic Overload Relay provides an estimated time to trip that is accessible via a communications network. This allows corrective action to be taken so that production may continue uninterrupted.

Time to Reset

Following an overload trip, the CEP9 Electronic Overload Relay will not reset until the calculated percentage of thermal capacity utilization falls below the reset level. As this value decays, the

time to reset, which is accessible via a communications network, is reported.

Thermal Warning

The CEP9 Electronic Overload Relay provides the capability to alert in the event of an impending overload trip. A thermal warning bit is set in the Warning Status when the calculated percentage of thermal capacity utilization exceeds the programmed thermal warning level, which has a setting range of 0...100% TCU.

Two-Speed Protection

The CEP9 Electronic Overload Relay offers a second FLA setting for 2-speed motor protection. What used to require two separate overload relays - one for each set of motor windings - can now be accomplished with one device. Improved protection is delivered as thermal utilization is maintained in one device during operation in both speeds.

Phase Loss

The CEP9 Electronic Overload Relay offers configurable phase loss protection, allowing the installer to enable or disable the function, plus set a time delay adjustable from 0.1...25.0 seconds. The trip level is factory-set at a current imbalance measurement of 100%.

Ground (Earth) Fault

The CEP9 Electronic Overload Relay incorporates zero sequence (core balance) sensing into its design for low level (arcing) ground fault detection. Trip and warning settings are adjustable from 20 mA...5.0 A. For devices rated greater than 200 A and for ground fault detection less than 1.0 A, the external core balance current transformer accessory is required. Class I protection is provided as defined by UL1053. The CEP9 Electronic Overload Relay provides a max. trip-inhibit setting, offering flexibility to prevent tripping

when the ground fault current magnitude exceeds 6.5 A. This can be useful to guard against the opening of the controller when the fault current could potentially exceed the controller's interrupting capacity rating.

Note: The CEP9 Electronic Overload Relay is not a Ground Fault Circuit Interrupter for personnel protection as defined in article 100 of the U.S. National Electric Code.

Stall

"Stall" is defined as a condition where the motor is not able to reach full-speed operation in the appropriate amount of time required by the application. This can result in motor overheating as current draw is in excess of the motor's full load current rating. The CEP9 Electronic Overload Relay provides user-adjustable stall protection. The trip setting has a range of 100...600% FLA, and the enable time is adjustable up to 250 seconds.

Jam (Overcurrent)

The CEP9 Electronic Overload Relay can respond quickly to take a motor off-line in the event of a mechanical jam, thereby reducing the potential for damage to the motor and the power transmission components.

Trip adjustments include a trip setting adjustable from 50...600% FLA and a trip delay time with a range of 0.1...25.0 seconds. A separate warning setting is adjustable from 50...600% FLA.



Underload (Undercurrent)

A sudden drop in motor current can signal conditions such as:

- Pump cavitation
- Tool breakage
- Belt breakage

For these instances, rapid fault detection can help minimize damage and aid in reducing production downtime.

Additionally, monitoring for an underload event can provide enhanced protection for motors that are coded by the medium handled (e.g., submersible pumps that pump water). Such motors can become overheated despite being underloaded. This can result from an absence or an insufficient amount of the medium (due to clogged filters, closed valves, etc.).

The CEP9 Electronic Overload Relay offers underload trip and warning settings adjustable from 10...100% FLA. The trip function also includes a trip delay time with a range of 0.1...25.0 seconds.

Current Imbalance (Asymmetry)

The CEP9 Electronic Overload Relay offers current imbalance trip and warning settings adjustable from 10...100%. The trip function also includes a trip delay time with a range of 0.1...25.0 seconds.

Remote Trip

The remote trip function allows an external device (e.g., a vibration sensor) to induce the CEP9 Electronic Overload Relay to trip. External device relay contacts are wired to the CEP9 Electronic Overload Relay discrete inputs. These discrete inputs are configurable with an option for assigning the remote trip function.

Current Monitoring Functions

The CEP9 Electronic Overload Relay allows the user to monitor the following operational data over a communications network:

- Individual phase currents — in amperes
- Individual phase currents — as a percentage of motor FLC
- Average current — in amperes
- Average current — as a percentage of motor FLC
- Percentage of thermal capacity utilized
- Current imbalance percentage
- Ground fault current

Diagnostic Functions

The CEP9 Electronic Overload Relay allows the user to monitor the following diagnostic information over the Ethernet/IP network:

- Device status
- Trip status
- Warning status
- Time to an overload trip
- Time to reset after an overload
- History of past five trips
- History of positive warnings
- Hours of operation
- Number of starts
- Trip snapshot trip

Status Indicators

The CEP9 Electronic Overload Relay provides the following LED indicators:

- **Power** — This green/red LED indicates the status of the overload relay.
- **TRIP/WARN** — This LED flashes a yellow code under a warning condition and a red code when tripped.

Inputs/Outputs

Inputs allow the connection of such devices as contactor and disconnect auxiliary contacts, pilot devices, limit switches, and float switches. Input status can be monitored via the network and mapped to a controller's input image table. Inputs are rated 24V DC, 120V AC, or 240V AC and are current sinking. Power for the inputs is sourced separately with convenient customer sources at terminal A1. Relay contact outputs can be controlled via the network or DeviceLogix function blocks for performing such tasks as contactor operation.

Test/Reset Button

The Test/Reset button, located on the front of the CEP9 Electronic Overload Relay, allows the user to perform the following:

- **Test** — The trip relay contact will open if the CEP9 Electronic Overload Relay is in an untripped condition and the Test/Reset button is pressed for 2 seconds or longer.
- **Reset** — The trip relay contact will close if the CEP9 Electronic Overload Relay is in a tripped condition, supply voltage is present, and the Test/Reset button is pressed.

Single/Three-Phase Operation

The CEP9 Electronic Overload Relay can be applied to three-phase as well as single-phase applications. A programming parameter is provided for selection between single- and three-phase operation. Straight-through wiring is afforded in both cases.

EtherNet/IP Communications





The CEP9 EtherNet/IP communication module has two RJ45 ports that act as an Ethernet switch to support a star, linear, and ring topology and supports the following:

- 2 concurrent Class 1 connections [1 exclusive owner + (1 input only or 1 listen only)]
- 6 simultaneously Class 3 connections (explicit messaging)
- Embedded web server
- SMPT server for trip and warning events
- Embedded EDS file







B4:3

Current Sensing Module

Description	Mounting Options	For Use With	Current Range [A]	Catalog Number
	IEC Contactors	CA7-9...23	0.5...30	CEP9-ESM-I-23-30
		CA7-30...55	0.5...30	CEP9-ESM-I-55-30
			6...60	CEP9-ESM-I-55-60
		CA7-60...97	10...100	CEP9-ESM-I-97-100
		CA9-116...146	20...200	CEP9-ESM-I-146-200
	DIN Rail Mount (to 60A) ❶	All contactors and external current transformers	0.5...30	CEP9-ESM-I-T-30
	DIN Rail Mount (10 to 200A) ❷	All contactors	6...60	CEP9-ESM-I-T-60
			10...100	CEP9-ESM-I-T-100
			20...200	CEP9-ESM-I-T-200
	DIN Rail / Panel Mount	All contactors and external current transformers	0.5...30	CEP9-ESM-I-7T-30
		All contactors	6...60	CEP9-ESM-I-7T-60
			10...100	CEP9-ESM-I-7T-100
	DIN Rail Mount Pass-thru (to 60A) ❶	All contactors and external current transformers	0.5...30	CEP9-ESM-I-P-30
	DIN Rail Mount Pass-thru (10 to 200A) ❷	All contactors	6...60	CEP9-ESM-I-P-60
			10...100	CEP9-ESM-I-P-100
			20...200	CEP9-ESM-I-P-200





Current/Ground Fault Sensing Module

Description	Mounting Options	For Use With	Current Range[A]	Catalog Number
	IEC Contactors	CA7-9...23	0.5...30	CEP9-ESM-IG-23-30
		CA7-30...55	0.5...30	CEP9-ESM-IG-55-30
			6...60	CEP9-ESM-IG-55-60
		CA7-60...97	10...100	CEP9-ESM-IG-97-100
		CA9-116...146	20...200	CEP9-ESM-IG-146-200
	DIN Rail Mount (up to 60A) ❶	All contactors and external current transformers	0.5...30	CEP9-ESM-IG-T-30
	DIN Rail Mount (10 to 200A) ❷	All contactors	6...60	CEP9-ESM-IG-T-60
			10...100	CEP9-ESM-IG-T-100
			20...200	CEP9-ESM-IG-T-200
	DIN Rail / Panel Mount	All contactors and external current transformers	0.5...30	CEP9-ESM-IG-7T-30
		All contactors	6...60	CEP9-ESM-IG-7T-60
			10...100	CEP9-ESM-IG-7T-100
	DIN Rail Mount Pass-thru (to 60A) ❶	All contactors and external current transformers	0.5...30	CEP9-ESM-IG-P-30
	DIN Rail Mount Pass-thru (10 to 200A) ❷	All contactors	6...60	CEP9-ESM-IG-P-60
			10...100	CEP9-ESM-IG-P-100
			20...200	CEP9-ESM-IG-P-200


❶ For Panel Mount option use KT7-45-AS Screw Adaptor. See page F1:16.

❷ For Panel Mount option use CEP9-ESM-SA-100 Screw Adaptor. See page B4:7.



Voltage/Current/Ground Fault Sensing Module

Description	Mounting Options	For Use With	Current Range[A]	Catalog Number
	IEC Contactors	CA7-9...23	0.5...30	CEP9-ESM-VIG-23-30
		CA7-30...55	0.5...30	CEP9-ESM-VIG-55-30
			6...60	CEP9-ESM-VIG-55-60
		CA7-60...97	10...100	CEP9-ESM-VIG-97-100
		CA9-116...146	20...200	CEP9-ESM-VIG-146-200
		CA9-190...205	20...200	CEP9-ESM-VIG-205-200
	DIN Rail Mount (up to 60A) ❶	All contactors	0.5...30	CEP9-ESM-VIG-T-30
	DIN Rail Mount (10 to 100A) ❷		6...60	CEP9-ESM-VIG-T-60
10...100			CEP9-ESM-VIG-T-100	
			20...200	CEP9-ESM-VIG-T-200
	0.5...30		CEP9-ESM-VIG-7T-30	
	6...60		CEP9-ESM-VIG-7T-60	
	10...100		CEP9-ESM-VIG-7T-100	
	DIN Rail Mount Pass-thru ❶	All contactors and external current transformers	0.5...30	CEP9-ESM-VIG-CT-30

Control Module

Description		Rated Control Voltage [V]	No. of Inputs/Outputs	Catalog Number
	I/O Module	110...120V AC, 50/60 Hz	4 In/3 Out	CEP9-EIO-43-120
		220...240V AC, 50/60 Hz	4 In/3 Out	CEP9-EIO-43-240
		24V DC	6 In/3 Out	CEP9-EIO-63-24D
	Ground Fault & PTC I/O Module	110...120V AC, 50/60 Hz	2 In / 2 Out	CEP9-EIOGP-22-120
		220...240V AC, 50/60 Hz	2 In / 2 Out	CEP9-EIOGP-22-240
		24V DC	4 In / 2 Out	CEP9-EIOGP-42-24D

Communication Module



Description			Catalog Number
	EtherNet/IP Communication ❸	The EtherNet/IP communication module has two RJ45 ports that support a star, linear, and ring topology and supports the following: <ul style="list-style-type: none"> • 2 concurrent Class 1 connections [1 exclusive owner + (1 input only or 1 listen only)] • 6 simultaneous Class 3 connections (explicit messaging) • Embedded web server • SMTP server for trip and warning events (email and text messaging) • Embedded EDS files 	CEP9-ECM-ETR
	Parameter Configuration Module ❸	The Parameter Configuration Module (PCM) has one Type B USB interface port and supports the following: <ul style="list-style-type: none"> • Stand-alone non-networked applications • Three rotary dials to set Full Load Amps (FLA) • 8-position DIP switch for trip class and feature selection 	CEP9-ECM-PCM

❶ For Panel Mount option use KT7-45-AS Screw Adaptor. See page F1:16.


❷ For Panel Mount option use CEP9-ESM-SA-100 Screw Adaptor. See page B4:7.

❸ CEP9 communication modules require user configuration for full functionality.

Expansion Modules

Description		Rated Control Voltage [V]	No. of Inputs/Outputs	Catalog Number
	Analog Expansion Module (mA, V, RTD and Resistance)	~	3 Universal In / 1 Out	CEP9-EXP-AIO-31❶
	Digital Expansion 120V AC	110...120V AC, 50/60 Hz	4 In / 2 Out	CEP9-EXP-DIO-42-120
	Digital Expansion 240V AC	220...240V AC, 50/60 Hz	4 In / 2 Out	CEP9-EXP-DIO-42-240
	Digital Expansion 24V DC	24V DC	4 In / 2 Out	CEP9-EXP-DIO-42-24D
	Expansion Power Supply	110...240V AC, 50/60 Hz	~	CEP9-EXP-PS-AC
		24V DC	~	CEP9-EXP-PS-DC


Accessories

Description		For Use With	Catalog Number
	Starter Control Station with 3 meter cable	~	CEP9-EOS-SCS
	Starter Diagnostic Station with 3 meter cable	~	CEP9-EOS-SDS ❶

❶ Module requires control module firmware v3.000 or higher.

Accessories

Description		For Use With	Catalog Number
	Contactor Coil Module	CA7-9...23 contactors	CEP9-EIO-CM-23
		CA7-30...55 contactors	CEP9-EIO-CM-55
		CA7-60...97 contactors	CEP9-EIO-CM-97
	Expansion Module Cable	1 Meter	CEP9-EXP-CBL-1M
		3 Meter	CEP9-EXP-CBL-3M
	Replacement Connectors	CEP9-EIOGP-22- _	CEP9-NCIOGP-22-CNT
		CEP9-EIO-43- _	CEP9-NCIO-43-CNT
		CEP9-EIOGP-42-24D	CEP9-NCIOGP-42-CNT
		CEP9-EIO-63-24D	CEP9-NCIO-63-CNT
		CEP9-EXP-DIO-42- _	CEP9-NCXP-DIO-CNT
		CEP9-EXP-AIO-31	CEP9-NCXP-AIO-CNT
		CEP9-EXP-PS- _	CEP9-NCXP-PS-CNT
	Panel Mount Screw Adapter	CEP9-ESM- _ -T-30	KT7-45-AS
		CEP9-ESM- _ -T-60	
		CEP9-ESM- _ -7T-30	
		CEP9-ESM- _ -7T-60	
		CEP9-ESM- _ -P-30	
		CEP9-ESM- _ -P-60	
		CEP9-ESM-VIG-CT-30	
	Panel Mount Screw Adaptor	CEP9-ESM- _ -100	CEP9-ESM-SA-100 ①
	Line Side Terminal Cover	CEP9-ESM- _ -T-200	CEP9-ESM-TCL-200
	Load Side Terminal Cover	CEP9-ESM- _ -180-200 CEP9-ESM- _ -205-200 CEP9-ESM- _ -T-200	CEP9-ESM-TCT-200
	Contactor Terminal Cover (in between contactor and overload relay)	CEP9-ESM- _ -180-200	CEP9-ESM-TC-180

Current Transformer Kits		For use with...	CT Ratio		
 <p><i>Includes three Current Transformers (Overload relay sold separately)</i></p>	CA9-116...305		300:5	②	CEP7-CT-UL-300
					CEP7-CT-CE-300
	CA9-370...580		600:5	②	CEP7-CT-UL-600
			400:5		CEP7-CT-CE-400
	CA9-750...1060		~	~	Refer to Factory

❶ Sold in multiples of 10. Minimum order is one package of 10. Price is each piece.

- ② Utilizes UL or CE approved Current Transformers in conjunction with an overload selection – which is commonly selected as a CEP7-1EF_Z version. In the instance that a CEP7-1E_C overload is used, there is a reference table on catalog page B1.9 to assist with current setting guidance.

Electrical Specifications

Motor/Load Ratings

Terminals	1/L1, 3/L2, 5/L3, 2/T1, 4/T2, 6/T3
Rated Insulation Voltage (Ui)	690V AC
Rated Operating Voltage (Ue)	IEC: 690V AC UL: 600V AC
Rated Impulse Voltage (Uimp)	6 kV
Rated Operating Current (Ie)	See Catalog Number Explanation
Rated Frequency	45...65 Hz ❶
Short Circuit Ratings	See user manual
Number of Poles	3
Application	Single-phase or Three-phase

Power Supply Ratings

Rated Supply Voltage (Us)	120V AC	240V AC
Operating Range	85...132V AC	159...265V AC
Maximum Inrush Current	6 A	
Maximum Power Consumption		
CEP9:	6 W	
CEP9 with expansion:	8 W	
Maximum Power Interruption Time		
Vmin:	10 ms	10 ms
Vmax:	10 ms	10 ms

Output Relay Ratings (Control Module and Expansion Digital Module)

Terminals	Relay 0:	R03/R04
	Relay 1:	R13/R14
	Relay 2:	R23/R24
Type of Contacts	Form A SPST - NO	
Rated Thermal Current (Ithe)	5 A	
Rated Insulation Voltage (Ui)	300V AC	
Rated Operating Voltage (Ue)	250V AC	
Rated Operating Current (Ie)	3 A (@120V AC), 1.5 A (@240V AC) 0.25 A (@110V DC), 0.1 A (@220V DC)	
Minimum Operating Current	10 mA @ 5V DC	
Rating Designation	B300	
Utilization Category	AC-15	
Resistive Load Rating (p.f. = 1.0)	5 A, 250V AC 5 A, 30V DC	
Inductive Load Rating (p.f. = 0.4) (L/R = 7 ms)	2 A, 250V AC 2 A, 30V DC	
Short Circuit Current Rating	1,000 A	
Recommended Control Circuit Fuse	KTK-R-6 (6 A, 600 V)	
Rated Number of Operations Relay 0, Relay 1, and Relay 2:		
with CA7-09...CA7-55	5,000,000	
with CA7-60...CA7-97	2,500,000	

Input Ratings (Control Module and Expansion Digital Module)

Terminals	Input 0: IN0		
	Input 1: IN1		
	Input 2: IN2		
	Input 3: IN3		
	Input 4: IN4		
	Input 5: IN5		
Supply Voltage	24V DC	120V AC	240V AC
Type of Inputs	Current Sinking	~	~
On-State Voltage	11V DC	74V AC	159V AC
On-State Current (turn-on)	2 mA	5 mA	5 mA
Off-State Voltage	5V DC	20V AC	40V AC
Off-State Current	1.5 mA	2.5 mA	2.5 mA
Transition Voltage	5...11V DC	20...74V AC	40...159V AC
Transition Current	1.5...2.0 mA	2.5...5 mA	2.5...5 mA

Low Voltage Directive

The CEP9 Electronic Overload Relay expansion digital modules are tested to comply with EN60947-5-1 Low-voltage switchgear and controlgear Part 5-1: Control circuit devices and switching elements.

Expansion Digital I/O Modules

Expansion Digital I/O Modules	CEP9-EXP-DIO-42		
	-24D	-120	-240
Digital Output Rated Operational Voltage (Ue):	250V AC	250V AC	250V AC
Digital Output Rated Insulation Voltage (Ui):	2000Vrms for 1s	2000Vrms for 1s	2000Vrms for 1s
Rated Impulse Withstand Voltage (Uimp):	~	~	~
Conditional Short Circuit Current:	1000 A	1000 A	1000 A
Recommended Control Circuit Fuse:	KTK-R (6 A, 600V)	KTK-R (6 A, 600V)	KTK-R (6 A, 600V)
Utilization Category:	AC15, DC13	AC15, DC13	AC15, DC13
Pollution Degree:	3	3	3

Expansion Power Supply Modules

Expansion Power Supply Modules	CEP9-EXP-PS-AC
Rated Operational Voltage (Ue):	100...250V AC
Rated Insulation Voltage (Ui):	2640Vrms for 1s
Rated Impulse Withstand Voltage (Uimp):	4 kV
Conditional Short Circuit Current:	~
Protection Against Short Circuits:	~
Utilization Category:	~
Pollution Degree:	3

❶ Exception: Any CEP9 Overload Relay that uses an external ground fault sensor is limited to 50/60 Hz detection.

Environmental Specifications

Ambient Temperature ①		
Storage		-40...+85 °C (-40...+185 °F)
Operating	(Open)	-20...+55 °C (-4...+131 °F)
	(Enclosed)	-20...+40 °C (-4...+104 °F)
Humidity		
Operating		5...95% Non-condensing
Damp Heat – Steady State (per IEC 68-2-3)		92% r.h., 40 °C (104 °F), 56 days
Damp Heat – Cyclic (per IEC 68-2-30)		93% r.h., 25 °C/40 °C (77 °F/104 °F), 21 Cycles
Cooling Method		Natural Convection
Vibration (per IEC 68-2-6)		2.5G operating, 5 G non-operating
Shock (per IEC 68-2-27)		30 G
Maximum Altitude		2000 m ②
Pollution Environment Pollution Degree		3
Terminal Marking		EN 50012
Degree of Protection		IP20

Electromagnetic Compatibility Specifications

Electrostatic Discharge Immunity		
Test Level:		8kV Air Discharge 6kV Contact Discharge
Performance Criteria:		1 ③④
RF Immunity		
Test Level:		10V/m
Performance Criteria:		1 ③④
Electrical Fast Transient/Burst Immunity		
Test Level:		4kV (Power) 2kV (Control & Comm)
Performance Criteria:		1 ③④
Surge Immunity		
Test Level:		2kV (L-E) 1kV (L-L)
Performance Criteria:		1 ③④
Radiated Emissions		Class A
Conducted Emissions		Class A

Torque and Wire Size Specifications

		Torque		Wire Size	
CEP9 Sensing Module		30A/60A	100A	30A/60A	100A
Stranded/Solid [AWG]	Single	22 lb-in	35 lb-in	#14...6 AWG	#12...1 AWG
	Multiple	30 lb-in	30 lb-in	#10...6 AWG	#6...2 AWG
Flexible-Stranded w/Ferrule	Single	2.5 N-m	4 N-m	2.5...16mm²	4...35 mm²
	Multiple	3.4 N-m	4 N-m	6...10mm²	4...25 mm²
Course-Stranded/Solid Metric	Single	2.5 N-m	4 N-m	2.5...25mm²	4...50 mm²
	Multiple	3.4 N-m	4 N-m	6...16mm²	4...35 mm²
CEP9 Control Module		Torque		Wire Size	
Stranded/Solid [AWG]	Single	4 lb-in		#24...12 AWG	
	Multiple	4 lb-in		#24...16 AWG	
Flexible-Stranded w/Ferrule	Single	0.45 N-m		0.25...2.5 mm²	
	Multiple	0.45 N-m		0.5...0.75 mm²	
Course-Stranded/Solid Metric	Single	0.45 N-m		0.2...2.5 mm²	
	Multiple	0.45 N-m		0.2...1.5 mm²	

Protection

	Trip	Warning
Overload	Yes	Yes
Phase Loss	Yes	No
Ground Fault	Yes	Yes
Stall	Yes	No
Jam	Yes	Yes
Underload	Yes	Yes
Thermistor (PTC)	Yes	Yes
Current Imbalance	Yes	Yes
Communication Fault	Yes	Yes
Communication Idle	Yes	Yes
Remote Trip	Yes	No
Blocked Start/Start Inhibit	Yes	No
Under Voltage L-L	Yes	Yes
Over Voltage L-L	Yes	Yes
Voltage Unbalance	Yes	Yes
Phase Rotation	Yes	Yes

Overload Protection

Type of Relay	Ambient Compensated Time-Delay Phase Loss Sensitive
Nature of Relay	Solid-State
FLA Setting	See user manual
Trip Rating	120% FLA
Trip Class	5...30
Reset Mode	Automatic or Manual
Overload Reset Level	1...100% TCU

Ground Fault Protection (External Ground Fault Module)

Type	Core Balanced
Intended Use	Equipment Protection
Classification (Per UL 1053)	Class I
Protection Range	20...100 mA 100...500 mA 200 mA...1.0 A 1.0...5.0 A
Trip & Warning Time Delay	0.1...25.0 s
Protection Inhibit Time	0...250 s

Accuracy

Metering

The CEP9 Electronic Overload Relay metering accuracy is listed below:

Current	±2% of Sensing Module Current
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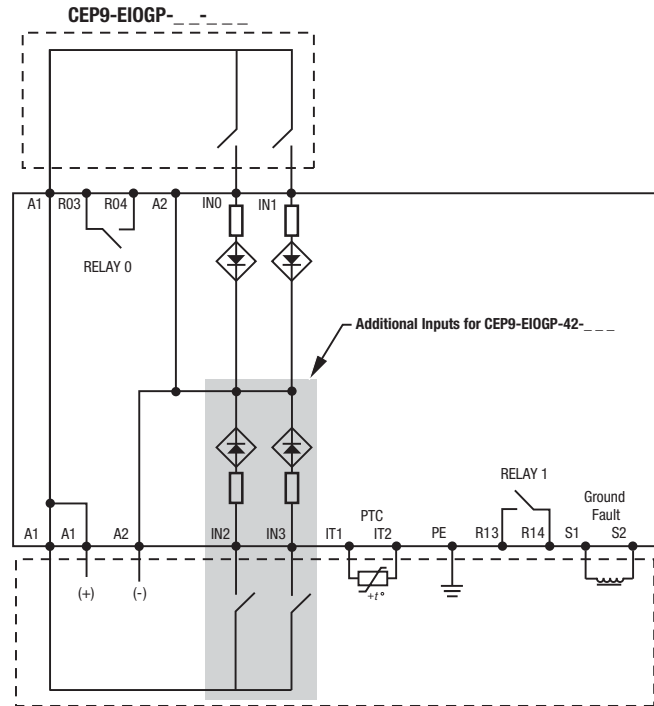
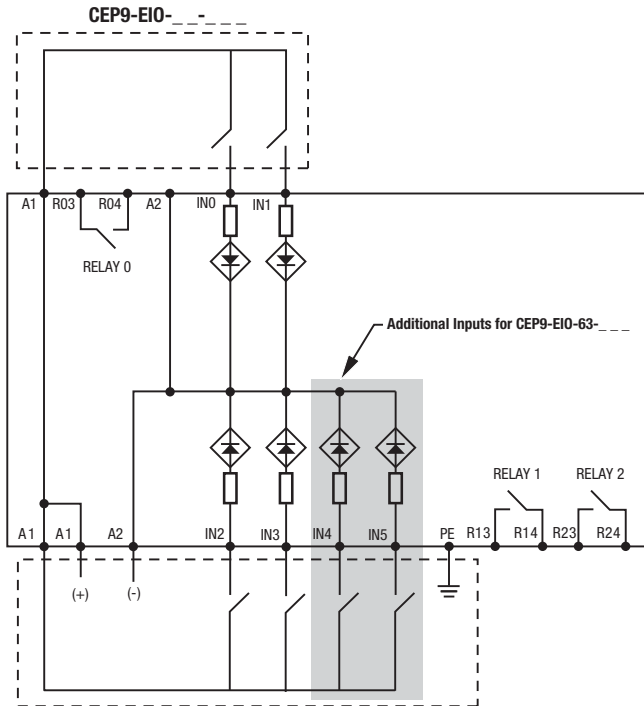
Range

Protection Timers

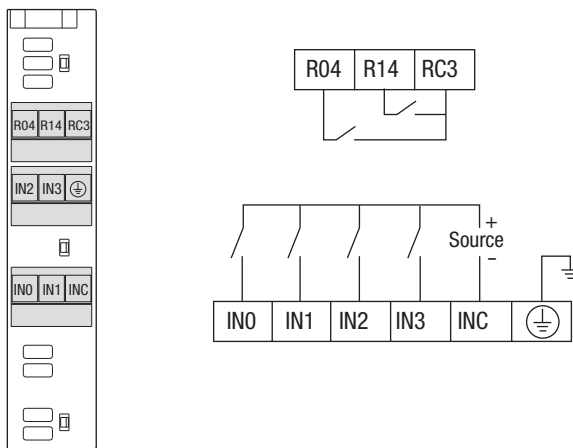
All CEP9 Electronic Overload Relay trip timers have a resolution of ±0.1 s or 0.1 s/25 s (whichever is greater).

- ① The CEP9 Electronic Overload Relay expansion power supplies (CEP9-EXP-PS-AC and CEP9-EXP-PS-DC) surrounding air temperature must not exceed 55 °C (131 °F).
- ② Any CEP9 Overload Relay that uses an external ground fault sensor is limited to 50/60 Hz detection.
- ③ Performance Criteria 1 requires the DUT to experience no degradation or loss of performance.
- ④ Environment 2.

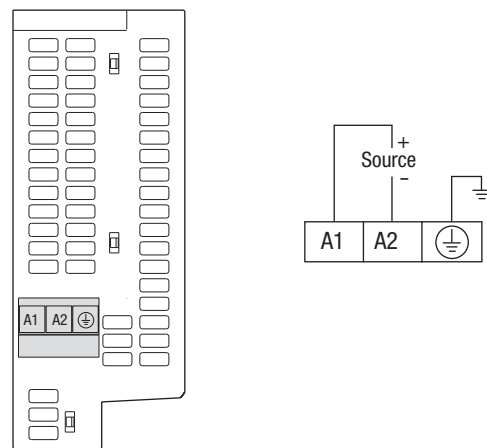
CEP9 Control Module



Expansion Digital I/O Modules (CEP9-EXP-DIO-_-)

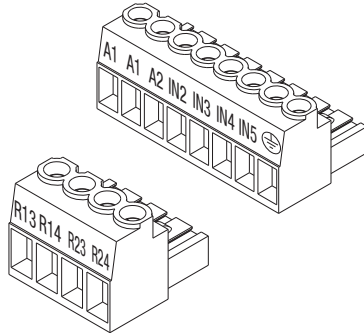


Expansion Power Supplies (CEP9-EXP-PS-_-)

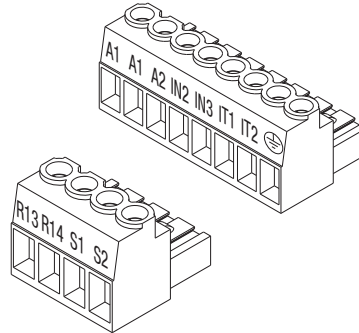


CEP9 Control Module Terminal Designations

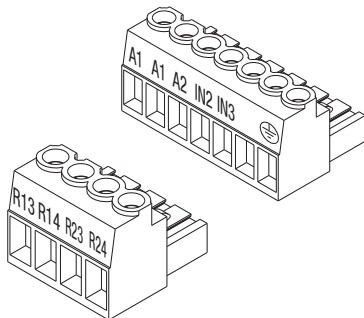
CEP9-EIO-63- ---



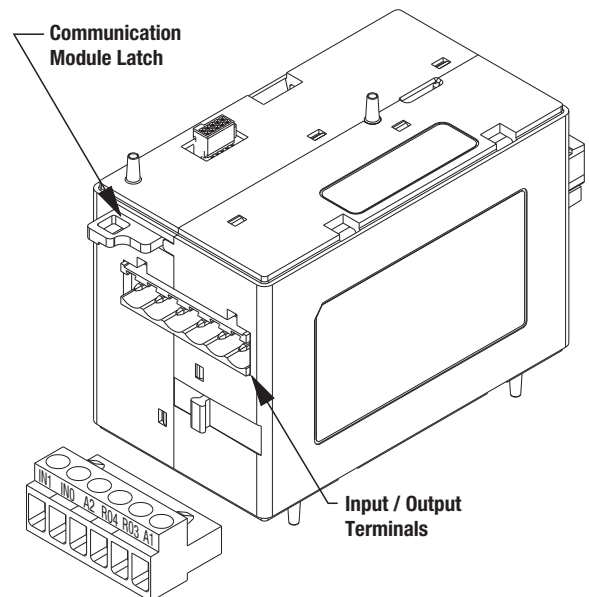
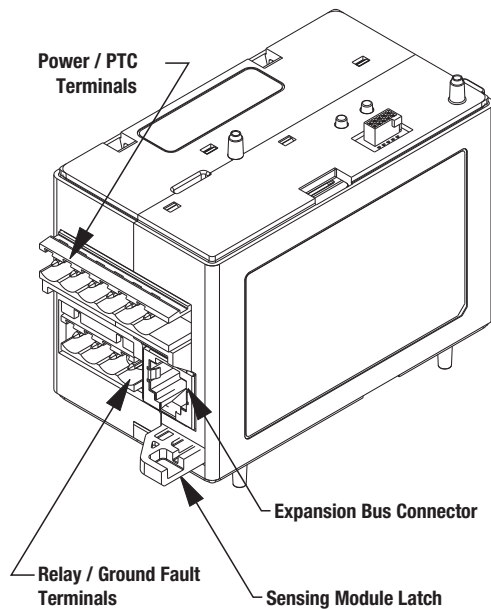
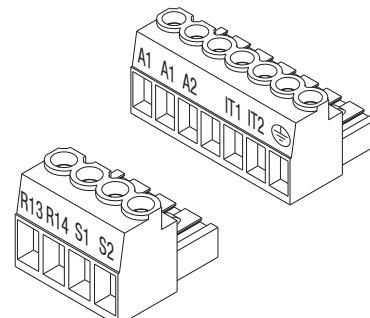
CEP9-EIOGP-42- ---



CEP9-EIO-43- ---

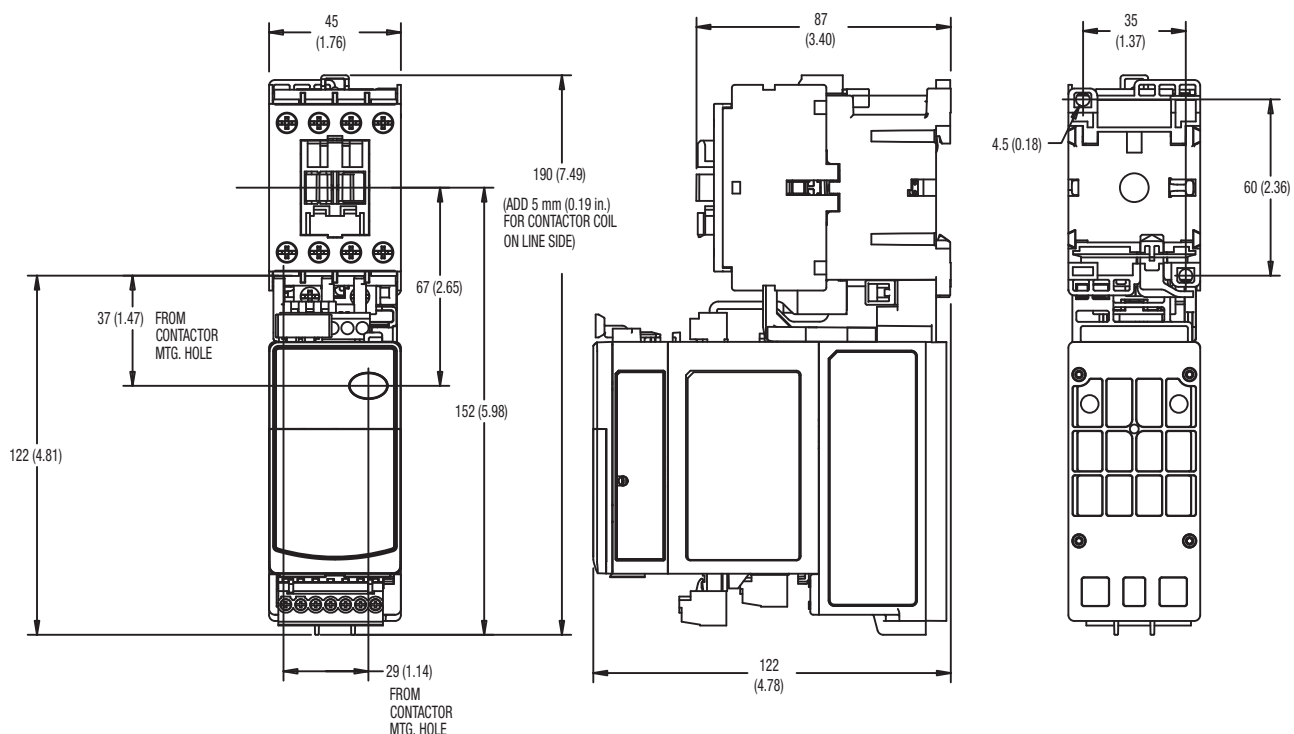


CEP9-EIOGP-22- ---

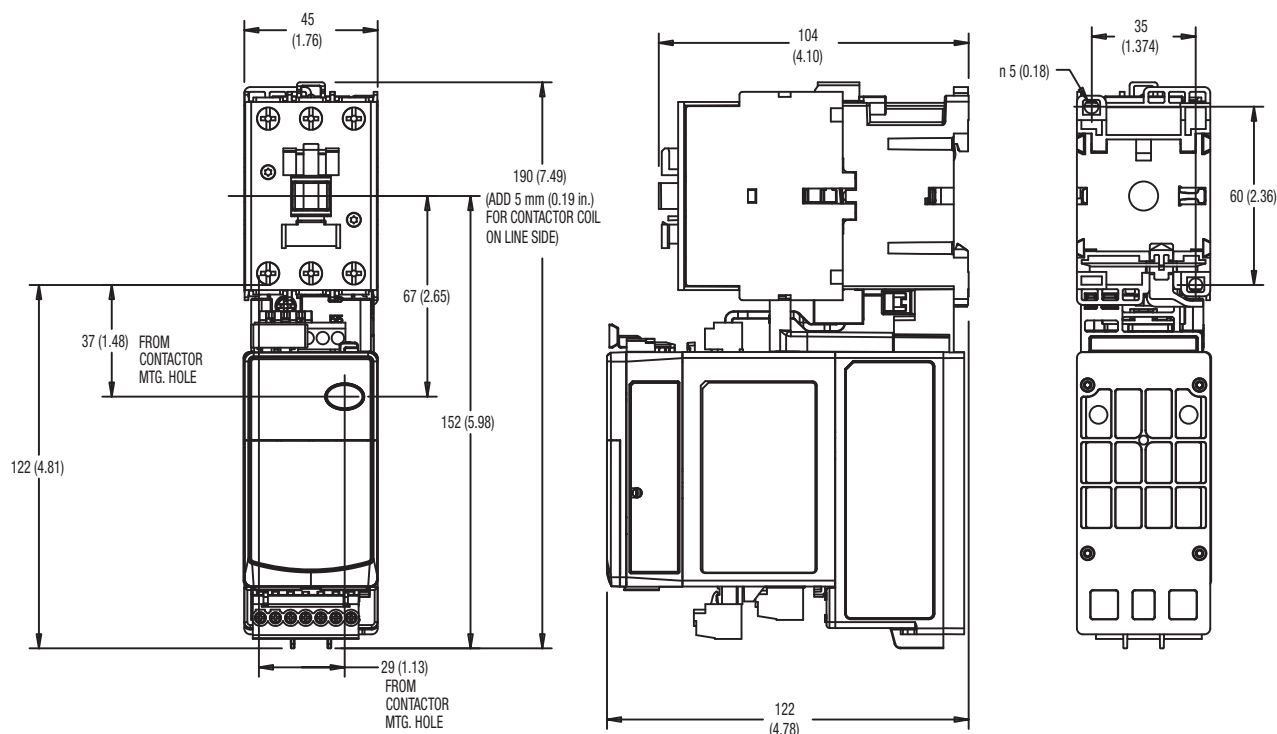


CEP9 Overload Relay Mounted on CA7-9...23 Contactor

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.

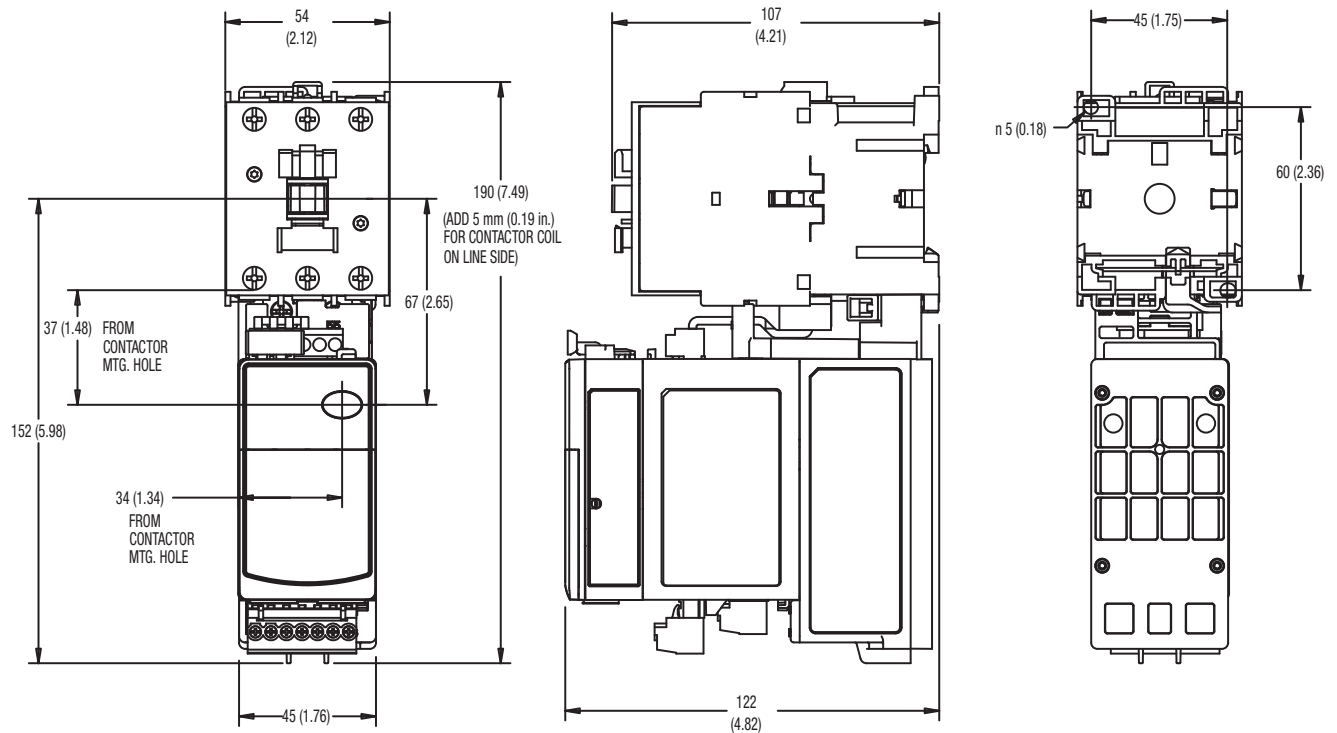


CEP9 Overload Relay Mounted on CA7-30...37 Contactor

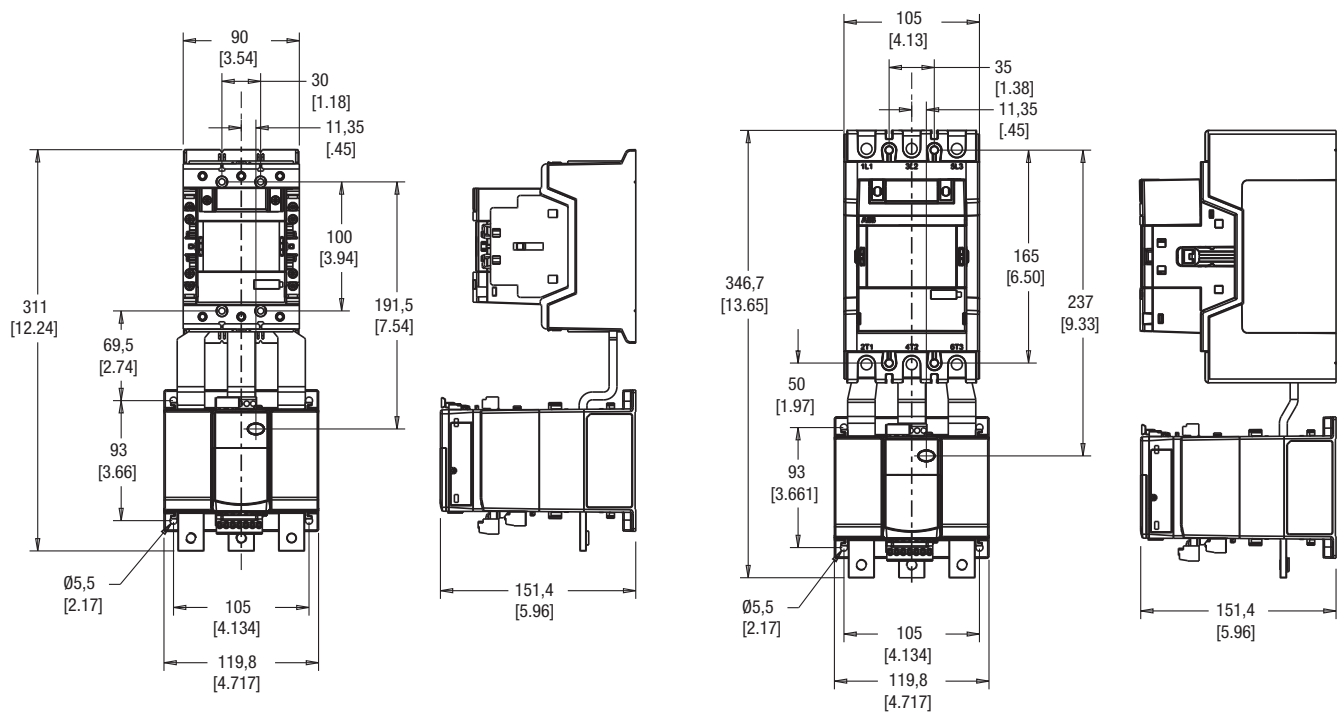


CEP9 Overload Relay Mounted on CA7-43...55 Contactor

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



CEP9 Overload Relay Mounted on CA9-116...205 Contactor

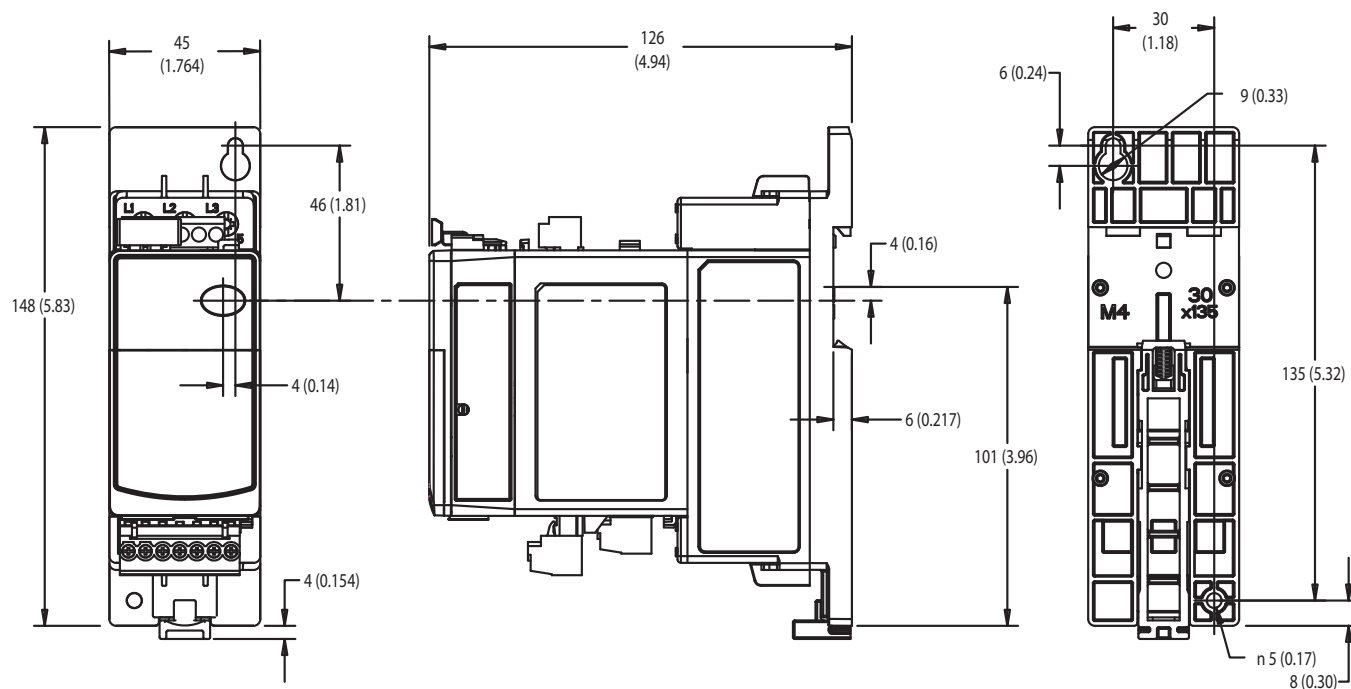


CA9-116 AND CA9-146 CONTACTORS SHOWN

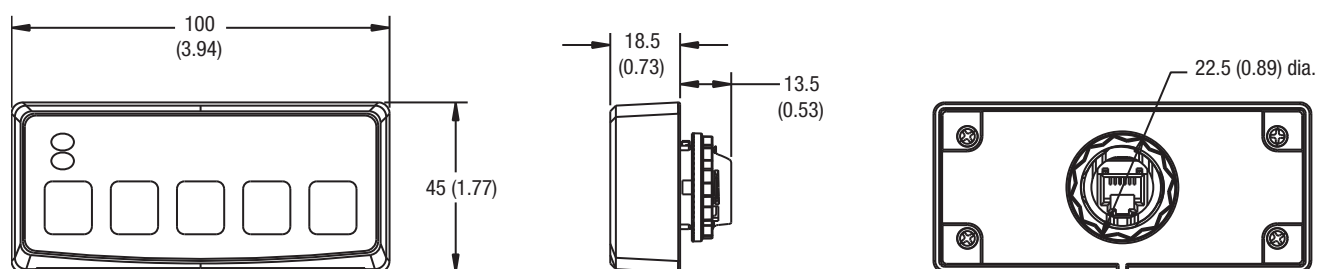
CA9-190 AND CA9-205 CONTACTORS SHOWN

CEP9 Overload Relay DIN Rail/Panel Mounted

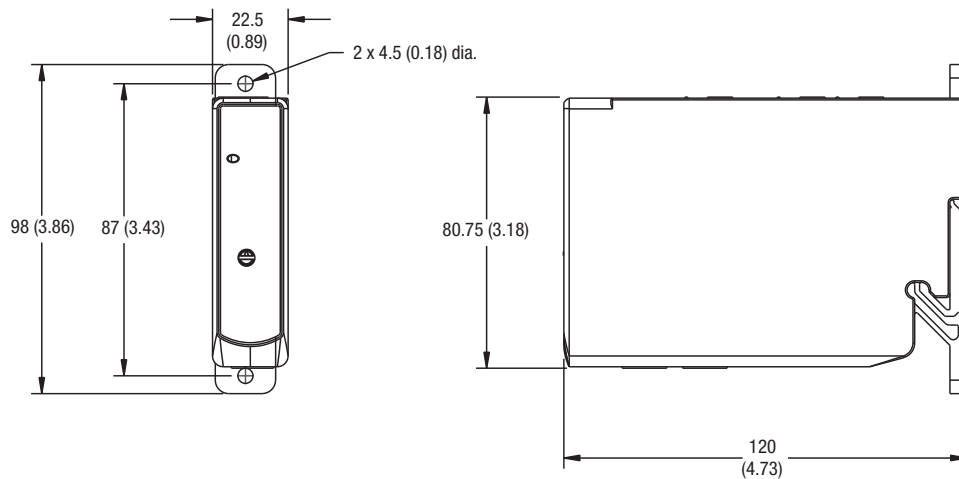
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



CEP9 Starter Control Station (CEP9-EOS-SCS)

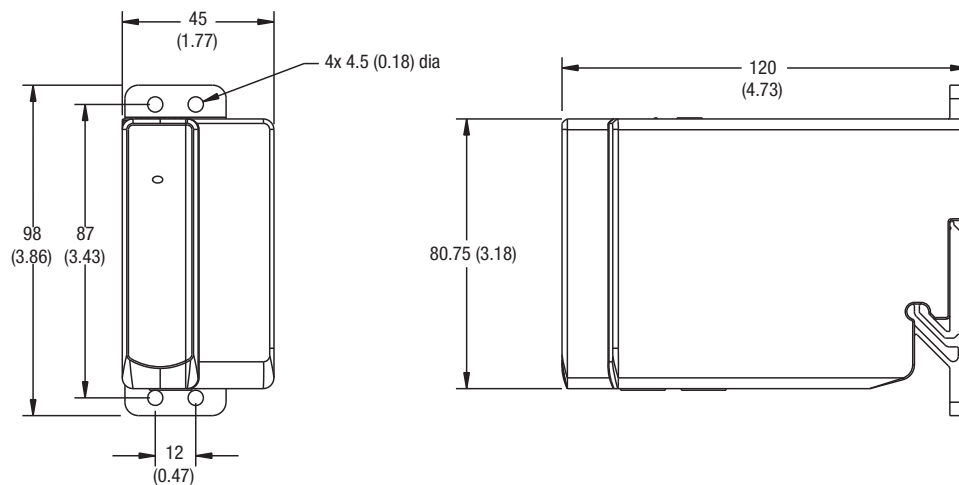


CEP9 Digital Expansion Module (CEP9-EXP-DIO-_)



CEP9 Digital Expansion Power Supply (CEP9-EXP-PS-_)

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



Notes

B

CEP9 Overloads