Overload Relays

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CEP7 Solid State Overload Relays

Advanced solid state motor protection

The introduction of the second generation of CEP7 solid state overload relays advances Sprecher + Schuh's leading edge technology with several improved features. This second generation of CEP7 overload relay includes features like:

- Selectable trip class and field installable modules
- A wider (5:1) set current adjustment range
- A more robust mechanical and electrical mounting
- Self-sealed latching mechanism

The basic concept of utilizing Application Specific Integrated Circuits (ASICs) resulting in an affordable solid state overload relays remains unchanged. This kind of versatility and accuracy was simply not possible with traditional bimetallic or eutectic alloy electromechanical overload relays.

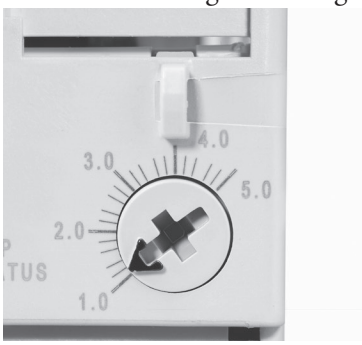
Fewer units means greater application flexibility

The CEP7 Soild State Overload is available in three basic models:

- CEP7-ED1 is a Class 10, manual reset model available up to 45 amperes which covers the most common horsepower motors and your every day application. This model is economically priced to be competitive with adjustable bimetallic overload relays.
- CEP7-EE is full featured selectable trip class (10, 15, 20 & 30) 3-phase application overload relay with provision for field mountable modules to handle remote reset, jam protection, and other modules previously available only in higher priced electronic overload relays. Manual reset or automatic reset can be selected with dip switches on the CEP7-EE models.
- CEP7S-EE is a 1-phase application overload relay packing all features of the 3-phase CEP7-EE model.

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. The first generation of CEP7 caused the industry to take note of the flexibility when it introduced a 3.2:1 adjustment ratio. A wider adjustment range is the primary reason the industry has been turning to more specifications calling for electronic overload relay protection over thermal overload relays. Sprecher + Schuh building on field experience now introduces a CEP7 overload 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 90 amperes.



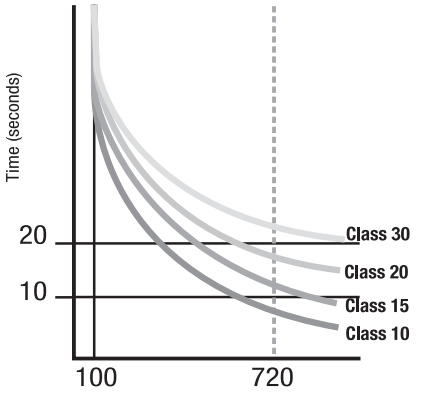
5 : 1 Current Range

45A

45A

90A

30A — 800A



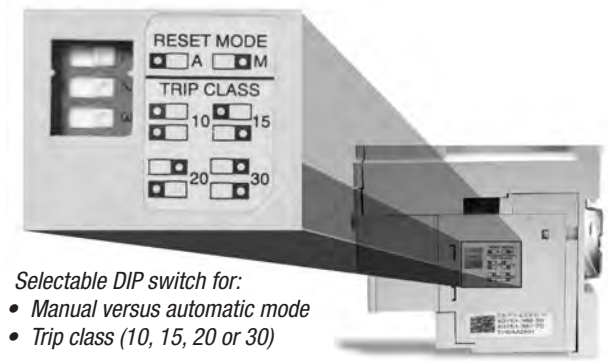
CEP7 overload relays are available with Class 10, 15, 20 or 30 tripping characteristics

Selectable tripping class

Because of today's lighter T-frame motors, Class 10 overload relays (relays that trip within 10 seconds of a locked rotor condition) have become the industry standard. If your application requires a longer motor run-up time. The CEP7-EE Selectable Trip Class has DIP-switches providing Trip Class selection of 10, 15, 20 or 30 seconds. This ability allows you to closely match the Trip Class with the run-up time of the motor.

Choice of reset options

Most industrial applications usually calls 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. In specialized cases, however, such as rooftop AC units or where restarting the motor will not harm people or equipment, automatic reset may be desired. CEP7-ED1 overload relays are available with Manual Reset exclusively which keeps the cost down. CEP7-EE models have a selectable dip switch in Manual and Automatic Reset modes.



Selectable DIP switch for:
- *Manual versus automatic mode*
- *Trip class (10, 15, 20 or 30)*

More robust design

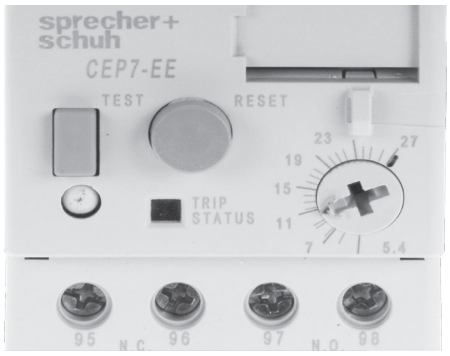
The CEP7 has been re-designed to physically extend to the back-pan therefore aligning the mounting of the overload with the corresponding contactor. Further, the mechanical attachment and direct electrical connection to the contactor has been "beefed-up." This provides for a more robust mounting which 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 insolating 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 this second generation of CEP7 electronic overload relay.

Self-powered design means convenience

By developing the power it requires from the applied voltage, the CEP7 is "self-powered," eliminating the need for a separate control power source. This is not the case with some other competitive electronic overload relays. Since the CEP7 is self-powered and a traditional auxiliary contact is used to interface with the contactor, the user can apply the CEP7 the same way as an electromechanical overload. No special connections or control schematic diagram provisions are required in 3-phase applications.

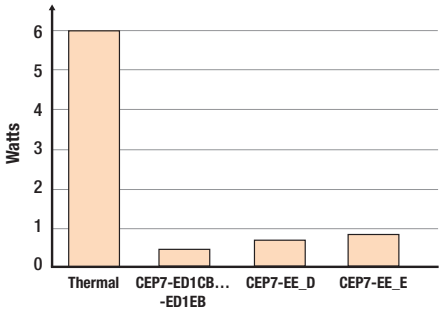
Superior phase failure protection

The CEP7's on-board electronics are constantly monitoring all three phases. If the ASIC board senses that one phase is missing during a steady state running condition on a fully loaded motor, it will trigger in 3 seconds. If a single phase condition is present during starting, the CEP7 will trip within 8 seconds (for a motor >80% loaded). These times are much faster than any thermal bimetallic overload relay. In addition, CEP7 overload relays detect a 50% phase imbalance in the same way as a phase loss.



Increased accuracy and improved motor protection

Microelectronics provides 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%.



Conventional overload relays dissipate as much as six watts of energy compared with as little as 0.5 watts for a camparable size CEP7

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.

Additional Protection with Side Mount Modules

The CEP7 offers a variety of field installable accessories for side mount on the left side. Side mount modules provide additional motor protection functionality traditionally found only on more expensive models. Modules include the following additional features.

- **Remote Reset** provision for reset after trip from a remote pilot device
- **Jam Protection/Remote Reset** provides adjustable Jam set points and trip delay plus remote reset
- **Ground Fault Protection/Remote Reset** combined with ground fault current transformers provide adjustable set points for ground fault trip protection of equipment plus remote reset
- **Ground Fault/Jam Protection/ Remote Reset** combines all three features as described above
- **PTC Thermistor Relay/Remote Reset** manages thermistor sensor signals from the motor
- **Network Communication Modules** provide motor diagnostic information via **Profibus** or **Ethernet** communication
  - Two discreet Inputs and one discreet Output
  - Differentiate between various motor protection algorithms
  - Overload and underload warning
  - Jam protection
  - Proactively alert maintenance personnel just before or when a fault occurs
  - Plus remote reset

Directly Mounted CEP7 Solid State Overload Relays, Manual Reset ❶❷❹

Overload Relay	Directly Mounts to Contactor… ❷	Adjustment Range (A)	Trip Class 10	
			Catalog Number	Price
Manual Reset for 3Ø Applications ❶				
	CA7-9…CA7-23 CAN7-12, CAN7-16	0.1…0.5	CEP7-ED1AB	77
		0.2…1.0	CEP7-ED1BB	77
		1.0…5.0	CEP7-ED1CB	77
		3.2…16	CEP7-ED1DB	77
		5.4…27	CEP7-ED1EB	77
	CA7-30…CA7-55 CAN7-37, CAN7-43	1.0…5.0	CEP7-ED1CD	123
		3.2…16	CEP7-ED1DD	123
		5.4…27	CEP7-ED1ED	123
		9…45	CEP7-ED1FD	123

Directly Mounted CEP7 Solid State Overload Relays, Automatic/Manual Reset ❶❷❸❹

Overload Relay	Directly Mounts to Contactor… ❷	Adjustment Range (A)	Adjustable Trip Class 10, 15, 20 & 30	
			Catalog Number	Price
Automatic or Manual Reset for 3Ø Applications ❶				
	CA7-9…CA7-23 CAN7-12, CAN7-16	0.1…0.5	CEP7-EEAB	88
		0.2…1.0	CEP7-EEBB	88
		1.0…5.0	CEP7-EECB	88
		3.2… 16	CEP7-EEDB	88
		5.4…27	CEP7-EEEB	88
	CA7-30…CA7-55 CAN7-37, CAN7-43	1.0…5.0	CEP7-EECD	138
		3.2…16	CEP7-EEDD	138
		5.4…27	CEP7-EEED	138
		9…45	CEP7-EEFD	138
		11…55	CEP7-EEQD	138
	CA7-60…CA7-97 CAN7-85	5.4…27	CEP7-EEEE	158
		9…45	CEP7-EEFE	158
		18…90	CEP7-EEGE	164
		60…120	CEP7-EEVE	164
Automatic or Manual Reset for 1Ø Applications ❶				
	CA7-9…CA7-23 CAN7-12, CAN7-16	1.0…5.0	CEP7S-EEPB	88
		3.2…16	CEP7S-EERB	88
		5.4…27	CEP7S-EESB	88
	CA7-30…CA7-43 CAN7-37, CAN7-43	9…45	CEP7S-EETD	138
	CA7-60…CA7-85 CAN7-85	18…90	CEP7S-EEUE	164

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.

❶ 3-phase CEP7 units are only designed for 3Ø applications. Single phase CEP7S units are only designed for single phase applications.

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

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

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

Pass-Thru CEP7 Solid State Overload Relays ❺

Overload Relay	Separate Mount for use with… ❷	Adjustment Range (A)	Trip Class 10	
			Catalog Number	Price
Manual Reset for 3Ø Applications ❶❹				
 Fig. 1	CA8-09…12 CA7-9…CA7-23 CAN7-12…CAN7-37	1.0…5.0	**CEP7-ED1CP**	**77**
		3.2… 16	**CEP7-ED1DP**	
		5.4…27	**CEP7-ED1EP**	

Overload Relay	Separate Mount for use with… ❷	Adjustment Range (A)	Adjustable Trip Class 10, 15, 20 & 30	
			Catalog Number	Price
Automatic or Manual Reset for 3Ø Applications ❶❸❹				
 Fig. 1	CA8-09…12 CA7-9…CA7-23 CAN7-12…CAN7-37	1.0…5.0	**CEP7-EECP**	**88**
		3.2… 16	**CEP7-EEDP**	
		5.4…27	**CEP7-EEEP**	
Automatic or Manual Reset for 1Ø Applications ❶❸❹				
 Fig. 1	CA8-09…12 CA7-9…CA7-23 CAN7-12…CAN7-37	1.0…5.0	**CEP7S-EEPP**	**88**
		3.2…16	**CEP7S-EERP**	
		5.2…27	**CEP7S-EESP**	

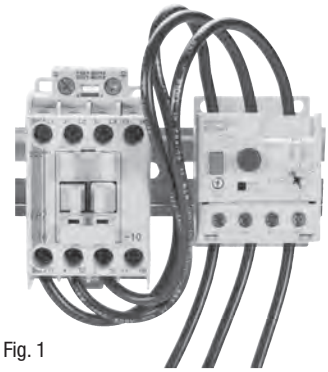


Fig. 1

Fig. 2

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

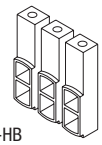
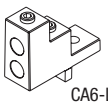
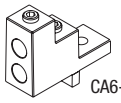
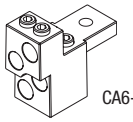
- No need for a panel mount adapter as required with direct-connect versions
- Eliminates 3 to 6 wire terminations
- Designed for use with CA8 or CA7 Contactors
- Easily replaces outdated overload relays in existing starter assemblies
- Provides state-of-the-art accuracy and motor protection

❶ 3-phase CEP7 units are only designed for 3Ø applications. Single phase CEP7S units are only designed for single phase applications.
❷ This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.
❸ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.
❹ CEP7 overload relays do not work with Variable Frequency Drives, DC Applications or Softstarters with braking options.
❺ Pass-Thru windows will accept one power wire up to #10 AWG wire (6mm^2).

Large Amp CEP7 Solid State Overload Relays, Automatic and Manual Reset ❶❷❸❹❻

Overload Relay	Directly Mounts to Contactor… ❷	CT Ratio	Adjustment Range (A)	Selectable Trip Class (10,15,20 & 30)	
				Catalog Number	Price
Automatic or Manual Reset for 3Ø Applications ❶❸					
 CEP7-EEHF	CA6-115…CA6-180 CA6-115-EI…CA6-180-EI CAN6-180(EI)	150:5	30…150	**CEP7-EEHF**	**508**
		200:5	40...200	**CEP7-EEJF**	**508**
	CA6-210-EI…CA6-420-EI CAN6-300-EI	200:5	40...200	**CEP7-EEJG**	**888**
		300:5	60...300	**CEP7-EEKG**	**888**
		500:5	100...500	**CEP7-EELG**	**888**
	CA6-630-EI…CA6-860-EI	600:5	120...600	**CEP7-EEMH**	**1397**
		800:5	160...800	**CEP7-EENH**	**1397**

Load Side Lugs & Accessories

Lug or Accessory	Description	For Use With...	Catalog Number	Price
 CA6-HB	**Main Terminal Set, ❺** **Dual Conductor, Touch Safe** • Accommodation for dual connections to each pole • Accepts flat or round conductors • Touch safe to IP20 according to IEC 60529 • Eliminates need for Terminal Shields (price as complete set, containing 2 blocks, 6 lugs)	CEP7-EEHF CEP7-EEJF	**CA6-HB2**	**See page A99**
		CEP7-EEJG CEP7-EEKG CEP7-EELG	**CA6-HB3**	
 CA6-L180  CA6-L420	**Screw Type Lugs -** • Accepts round conductors only • Copper construction (set of 3 lugs)	CEP7-EEHF CEP7-EEJF	**CA6-L180**	
		CEP7-EEJG CEP7-EEKG CEP7-EELG	**CA6-L420**	
 CA6-L630	**Screw Type Lugs -** • Accommodation for dual connections to each pole • Copper construction accepts round conductors only (set of 3 lugs)	CEP7-EEMH CEP7-EENH	**CA6-L630**	
 CA6-L860	**Screw Type Lugs -** • Accommodation for dual connections to each pole • Copper construction accepts round conductors only (set of 3 lugs)	CEP7-EEMH CEP7-EENH	**CA6-L860**	
	**Main Terminal Cover - ❺** • CA6 touch protection • Line **or** load **(price each)** • IP20; IEC60529 & DIN 40 050 protection	CA6-115(-EI) to 180(-EI) CA6-210-EI to 420-EI CA6-630-EI to 860-EI	**CA6-TC180** **CA6-TC420** **CA6-TC860**	**See page A101**

❶ 3-phase CEP7 units are only designed for 3∅ applications.
❷ This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.
❸ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.
❹ CEP7 Overload relays do not work with Variable Frequency Drives or any Sprecher + Schuh Softstarter with braking options.
❺ Terminal covers not necessary when using CA6-HB-_ insulated lugs.
❻ CEP7-EEHF…CEP7-EENH include current transformers used to monitor high amperage.

Accessories - CEP7 Side Mount Modules ❶❷

Accessory	Description	For use with…	Catalog Number	Price
 CEP7-ERR	**Remote Reset Module (Series B)** • Dip switch adjustable reset mode & type - Automatic or Manual reset mode - 1- or 3-Phase relay type operation • Provision for reset after trip from remote pilot device	Side-mount to any CEP7-EE_ CEP7S-EE_	**CEP7-ERR**	**100**
 CEP7-EJM	**Jam Protection and Remote Reset Module ❸** • Dip switch adjustable Jam Protection - Jam set points -150%, 200%, 300%, or 400% FLA - Trip delay- 0.5, 1, 2, or 4 sec. • Provision for reset after trip from remote pilot device		**CEP7-EJM**	**110**
 CEP7-EPT	**PTC Thermistor Relay and Remote Reset Module** • PTC Protection and LED Status indication Type of Control Unit: Mark A Number of Sensors: 6 Maximum Cold Resistance of Sensor Chain: 1500 Ω Trip Resistance: 3400 Ω ± 150 Ω Reset Resistance: 1600 Ω ± 50 Ω Short Circuit Trip Resistance: 25 Ω ± 10 Ω Open Circuit Trip Resistance: > 20,000 Ω Maximum Voltage at 1T1 / 1T2 (Rptc=4kΩ): < 7.5 Vdc Maximum Voltage at 1T1 / 1T2 (Rptc=open): < 30 Vdc PTC Response Time: 500ms…800ms • Provision for reset after trip from remote pilot device	Side-mount to any CEP7-EE_ CEP7S-EE_	**CEP7-EPT**	**125**
 PROFIBUS CEP7-EPRB	**Network Communication Modules** • Delivers direct access to motor performance and diagnostic data on a field bus based network in addition to seamless control • **Includes integrated I/O** 2 inputs 1 output • **Operational and diagnostic data** Average motor current Percentage of thermal capacity usage Device status Trip and warning identification Trip history (last five trips) • **Protective functions** Overload warning - 1…100% TCU Jam protection; - Trip setting 150…600% FLA - Trip delay 0.5…25 seconds - Warning setting 100…600% FLA Underload warning - 20…100% FLA	Side-mount to any CEP7-EE_ CEP7S-EE_	**CEP7-EPRB**	**415**
 ETHERNET/IP CEP7-ETN			**CEP7-ETN**	**422**

❶ Side mount modules must have 24 - 240V, 47 - 63HZ or DC applied to terminals A1 and A2 for control power. CEP7-EPRB and CEP7-ETN require 20.4 - 26.4 VDC only. See B18 for more information.

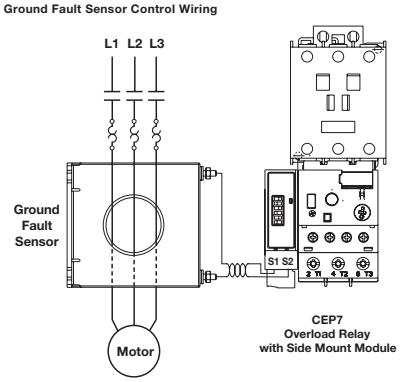
❷ See Technical Data, Wiring, and DIP Switch set up starting on.page B16

❸ Dynamic inhibit: Protective function is enabled after the motor current goes above 150% and then falls below 125%.

Accessories - CEP7 Side Mount Modules ❶❸

Accessory	Description	For use with…	Catalog Number	Price
 CEP7-EGF	**Ground Fault Protection and Remote Reset Module ❷❻•** Dip switch adjustable Ground Fault Protection > GF Current range set points - 20…100ma - 100…500mA - 0.2…1.0A - 1.0…5.0A > GF Trip level 20%-100% • LED status indication • Provision for reset after trip from remote pilot device	Side-mount to any CEP7-EE_ CEP7S-EE_ Must use with CEP7-CBCT_ Current Sensor	**CEP7-EGF**	**110**
 CEP7-EGJ	**Ground Fault/Jam Protection and Remote Reset Module ❷❻** • Dip switch adjustable Ground Fault Protection same as CEP7-EGF shown above. • Jam trip when the motor current exceeds 400% FLA setting when enabled. • LED status indication • Provision for reset after trip from remote pilot device		**CEP7-EGJ**	**145**
	**Adjustment Cover for External Modules**	All modules with DIP Switches	**CEP7-EMC**	**13**

CEP7 Ground Fault Sensor Installation



CEP7 Ground Fault Sensor Selection ❸

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	Price
	**45A**	**50/60 Hz**	1000:1	19.1mm (0.75 in.)	8 AWG @ 600V ❹	CA7-9...CA7-37	**CEP7-CBCT1**	**50**
	**90A**	**50/60 Hz**	1000:1	39.6mm (1.56 in.)	2 AWG @ 600V ❹	CA7-9...CA7-85	**CEP7-CBCT2**	**175**
	180A	**50/60 Hz**	1000:1	63.5 mm (2.50 in.)	250MCM (120mm²) @ 600V ❹	CA7-9…CA6-180	**CEP7-CBCT3**	**226**
	**420A**	**50/60 Hz**	1000:1	82.3 mm (3.25 in.)	350MCM (185mm²) @ 600V ❺	CA7-9…CA6-420	**CEP7-CBCT4**	**287**

❶ Side mount modules must have 24 - 240V, 47 - 63HZ or DC applied to terminals A1 and A2 for control power. See B18 for more information.

❷ ATTENTION: The CEP7 Overload relay is not a ground fault circuit interrupter for personnel protection as defined in Article 100 of the NEC.

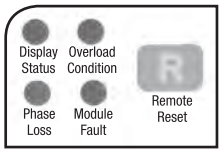
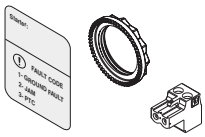
❸ See Application Details on page B16-B18

❹ For a three phase system with one cable per phase.

❺ For a three phase system with two cables per phase.

❻ Dynamic inhibit: Protective function is enabled after the motor current goes above 150% and then falls below 125%.

Accessories

Accessory	Description	For use with…	Catalog Number	Price
	**Remote Indication Display "Intellibutton" ❸** Connects, communicates, and receives power from CEP7 Side Mount Modules to remotely view status of CEP7-EE Overload Relays 	CEP7-EJM CEP7-EGF CEP7-EGJ CEP7-EPT CEP7-ERR	**CEP7-ERID**	**100**
	**Replacement Parts Kit for CEP7-ERID** Includes (1) each Mounting Ring (Plastic), Terminal Block Plug, and L.E.D. Fault Code Label	CEP7-ERID	**CEP7-NCRID**	**27**
	**DIN-rail / Panel Adaptor** For separate mounting of overload relay to back pan or top hat DIN-rail	CEP7-ED1…B CEP7(S)-EE…B	**CEP7-EPB**	**29**
		CEP7-ED1..D CEP7(S)-EE…D	**CEP7-EPD**	**29**
		CEP7(S)-EE…E	**CEP7-EPE**	**35**
	**Current Adjustment Shield** Prevents inadvertent adjustment of the current setting	all CEP7-ED1 CEP7-EE	**CEP7-BC8**	**13**
	**Solenoid Remote Reset ❷ -** For remote resetting of the solid state overload relay. Replace ✱ in Catalog Number with Coil Code.	CEP7 all	**CEP7-EMR✱**	**81**
	**External Reset Button** Used for manually resetting overloads mounted in enclosures	all CEP7	**Use D7 Reset - See Section H.**	**~**
	**External Reset Button Adaptor** Provides a larger "target area" for resetting the overload relay when using an External Reset Button	CEP7-ED1(all), CEP7-EE_B, CEP7-EE_D, CEP7-EE_E, CEP7-EE_P ❶	**CEP7-ERA**	**14**

Solenoid Remote Reset Coil Codes

(Replace ✱ with coil code below)

A.C. Coil Code	Voltage Range 50 / 60 Hz ❹
J	**24V**
D	**120V**
A	240V

D.C. Coil Code	Voltage ❺
Z24	**24VDC**
Z48	48VDC
Z01	115VDC

❶ At the time of this printing CEP7-ERA does not fit CEP7-EE(HF...HH) without removing the CEP7 cover.

❷ Solenoid Reset Modules only mount on CEP7 Series C or later.

❸ See page B21 for additional details on installation and LED functions.

❹ Coil consumption of AC coils is 8VA.

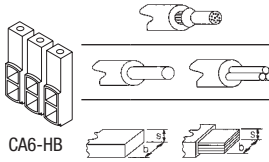
❺ Coil consumption of DC coils is 12 watts.

CEP7 Intelli-button Reset Kit with Side Mount Module (For use on CEP7(S)-EE_)

Accessory	Description	Kit includes...	Catalog Number	Price
	**Remote Reset Only**	CEP7-ERID CEP7-ERR	**CEP7-IB1**	**200**
	Jam and Remote Reset	CEP7-ERID CEP7-EJM (B)	**CEP7-IB2**	**210**
	Thermistor Relay and Remote Reset	CEP7-ERID CEP7-EPT	**CEP7-IB3**	**225**
	**Ground Fault and Remote Reset**	CEP7-ERID CEP7-EGF CEP7-CBCT1 (45A)	**CEP7-IB4**	**260**
		CEP7-ERID CEP7-EGF CEP7-CBCT2 (90A)	**CEP7-IB5**	**385**
		CEP7-ERID CEP7-EGF CEP7-CBCT3 (180A)	**CEP7-IB6**	**436**
		CEP7-ERID CEP7-EGF CEP7-CBCT4 (420A)	**CEP7-IB7**	**497**
	**Ground Fault and Jam and Remote Reset Module**	CEP7-ERID CEP7-EGJ CEP7-CBCT1 (45A)	**CEP7-IB8**	**295**
		CEP7-ERID CEP7-EGJ CEP7-CBCT2 (90A)	**CEP7-IB9**	**420**
		CEP7-ERID CEP7-EGJ CEP7-CBCT3 (180A)	**CEP7-IB10**	**471**
		CEP7-ERID CEP7-EGJ CEP7-CBCT4 (420A)	**CEP7-IB11**	**532**

Technical Information

			CEP7-ED1…B CEP7(S)-EE…B	CEP7-ED1…D CEP7(S)-EE…D	CEP7(S)-EE…E
Rated Insulation Voltage - U_i		[V]	690 AC		
Rated Insulation Strength- U_{imp}		[kV]	6 AC		
Rated Operation Voltage - U_e		[V]	690 AC (IEC) / 600 AC (UL/CSA)		
Rated Operating Frequency		[Hz]	50/60		
Terminal Cross Sections					
Terminal Type					
Terminal Screw			M5	M5	M8
 Flexible with wire end ferrule	One conductor	[mm²]	1 x (2.5...16)	1 x (2.5...16)	1 x (4...50)
	Torque	[Nm]	2.5	2.5	24
	Two conductors	[mm²]	2 x (2.5...10) ❶	2 x (2.5...10) ❶	2 x (4...25)
	Torque	[Nm]	3.4	3.4	4
 Course stranded / solid	One conductor	[mm²]	1 x (2.5...25)	1 x (2.5...25)	1 x (4...50)
	Torque	[Nm]	2.5	2.5	4
	Two conductors	[mm²]	2 x (6...16) ❶	2 x (6...16) ❶	2 x (4...35)
	Torque	[Nm]	3.4	3.4	4
 Stranded / Solid	One conductor	[AWG]	1 x (14...6)	1 x (14...6)	1 x (12...1/0)
	Torque	[lb-in]	22	22	35
	Two conductors	[AWG]	2 x (14...6) ❶	2 x (14...6) ❶	2 x (8...2)
	Torque	[lb-in]	30	30	35
Pozidrive Screwdriver Size			2	2	----
Slotted screwdriver		[mm]	1 x 6	1 x 6	---
Hexagon Socket Size		[mm]	---	---	4

			CEP7-EE_F	CEP7-EE_G	CEP7-EE_H
Rated Insulation Voltage - U_i		[V]	1000 AC		
Rated Insulation Strength- U_{imp}		[kV]	6 AC		
Rated Operation Voltage - U_e		[V]	1000 AC (IEC) / 600 AC (UL/CSA)		
Rated Operating Frequency		[Hz]	50/60		
Terminal Power					
Type			Hexagonal Bolt	Hexagonal Bolt	Hexagonal Bolt
Direct Connection 			M8 x 25	M10 x 30	M12 x 40
Recommended Torque		[Nm]	11	43	68
		[lb-in]	100	380	600
With Main Terminal Set (CA6...HB...)			**With CA6-HB2**	**With CA6-HB3**	
 CA6-HB	sm. opening	[mm²]	16...50	25...240	~
	lg. opening	[mm²]	16...120	25...240	~
	sm. opening	[mm²]	16...50	25...240	~
	lg. opening	[mm²]	16...120	25...240	~
	b max.	[mm]	20	25	~
	s. sm. opening	[mm]	3...9	6...20	~
	lg. opening	[mm]	3...14	6...20	~
Recommended Torque		[Nm]	10...12	20...25	~
Wire size per UL/CSA	sm. opening	[AWG]	#6...1 / 0	#4....600MCM	~
	lg. opening	[AWG]	#6...250MCM	#4....600MCM	~
Recommended Torque		[lb-in]	90...110	180...220	~
With Screw-type Lugs - Copper Clad (CA6-L...)					**W/CEP7-EEMH** / **W/CEP7-EEHH**
CA6-L180		[AWG]	#6...250 MCM	~	~ / ~
Recommended Torque		[lb-in]	90...110	~	~ / ~
CA6-L420		[AWG]	~	#2...350 MCM	~ / ~
Recommended Torque		[lb-in]	~	375	~ / ~
CA6-L630		[AWG]	~	~	2/0...500 MCM / ~
Recommended Torque		[lb-in]	~	~	400 / ~
CA6-L860		[AWG]	~	~	~ / 2/0...500 MCM
Recommended Torque		[lb-in]	~	~	~ / 400

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

Technical Information

Control Circuit				
Rated Insulation Voltage - U_i		[V]	690 AC	
Rated Insulation Strength- U_{imp}		[kV]	6 AC	
Rated Operation Voltage - U_e		[V]	690 AC (IEC) / 690 AC (UL/CSA)	
Rated Designation			B600	
Rated Operating Current		I_e	NO	NC
AC-15	12...120V	[A]	3	2
	220...240V	[A]	1.5	1.5
	380...480V	[A]	0.75	0.75
	500...600V	[A]	0.6	0.6
DC-13 at L/R 15ms	24V	[A]	1.1	1.1
	110V	[A]	0.4	0.4
	220V	[A]	0.2	0.2
	440V	[A]	0.08	0.08
Thermal Current - I_{the}		[A]	5	
Contact Reliability		[kV]	17V, 5mA	
Screw Terminal Cross Sections				
Terminal Screw			M3	
Flexible with wire end ferrule	One conductor	[mm2]	1 x (0.5...2.5)	
	Torque	[Nm]	0.55	
	Two Conductors	[mm2]	2 x (0.25...1.5)	
	Torque	[Nm]	0.55	
Course stranded / solid	One conductor	[mm2]	1 x (0.5...4)	
	Torque	[Nm]	0.55	
	Two conductors	[mm2]	2 x (0.22...2.5)	
	Torque	[Nm]	0.55	
Stranded / Solid	One conductor	[AWG]	1 x (24...10)	
	Torque	[lb-in]	5	
	Two conductors	[AWG]	2 x (24...12)	
	Torque	[lb-in]	5	
Pozidrive Screwdriver Size			#1	
Slotted Screwdriver Size		[mm]	0.6 x 3.5	

Heat Dissipation	Max. Heat Dissipation [Watts]
Catalog Number	
CEP7-ED1AB or CEP7-EEAB	0.03
CEP7-ED1BB or CEP7-EEBB	0.04
CEP7-ED1_B or CEP7-EE_B (other than A or B)	0.53
CEP7-EE_D	0.73
CEP7-EE_E	0.78
CEP7-EEGF	0.87
CEP7-EE_F (other than G)	3.52
CEP7-EE_G	8.94
CEP7-EE_H	15.53

Table for using Current Transformers with CEP7-EECB (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

Technical Information

Environmental Ratings

Ambient Temperature	Storage	[˚C]	-40...+85 (-40...+185 ˚F)
	Operating	[˚C]	-20...+60 (-4...+140 ˚F)
Humidity	Operating	[%]	5…95, non-condensing
	Damp Heat		per IEC 68-2-3 and IEC 68-2-30
Vibration (per IEC 68-2-6)		[G]	3
Shock (per IEC 68-2-27)		[G]	30
Maximum Altitude		[m]	2000
Pollution Environment			Pollution Degree 3
Degree of Protection			IP20
Type of Relay			Ambient compensated, time delay, phase loss sensitive
Nature of Relay			Solid-state
Trip Rating			120% FLA
Trip Class	Type ED		10
	Type EE		10, 15, 20, 30
Reset Mode	Type ED		Manual
	Type EE		Manual or Automatic

Electromagnetic Compatibility

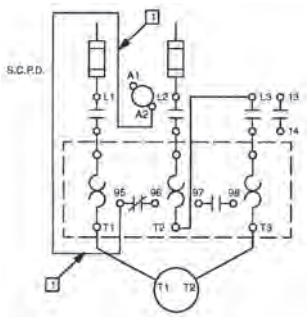
Electrostatic Discharge Immunity	Test Level	[kV]	8kV air discharge 6kV contact discharge
	Performance Level		1 ❶❷
RF Immunity	Test Level	[V/m]	10 V/m
	Performance Level		1 ❶❷
Electrical Fast Transient Burst Immunity	Test Level	[kV]	4 kV
	Performance Level		1 ❶❷
Surge Immunity	Test Level	[V/m]	2 kV (L-E) 1 kV (L-L)
	Performance Level		1 ❶❷

General

Standards			UL 508, CSA C22.2 No. 14, NEMA (ICS 2-1993 Part 4, EN 60947-4-1, EN 60947-5-1		
Approvals			CE, cULus, C-Tick, CCC		
			CEP7-ED1…B CEP7(S)-EE…B	**CEP7-ED1…D CEP7(S)-EE…D**	**CEP7(S)-EE…E**
Weights (unpackaged)		[Kg]	0.25	0.25	0.52
		[Lb]	0.55	0.55	1.06

Wiring Diagrams ❹

Typical Wiring
for Single Phase Applications



CEP7 Single Phase Overload Relay
Must be connected as shown in Fig. 1 or 2 only.

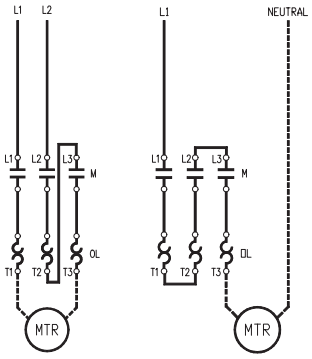


Fig. 1
Recommended connections
for CEP7S (i.e. 240V motors)

Fig. 2
Optional connections
for CEP7S (i.e. ≤120V motors)

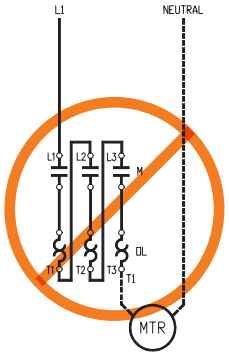


Fig. 3
❸ DO NOT USE

❶ Performance Criteria 1 requires the DUT to experience no degradation or loss of performance.

❷ Environment 2.

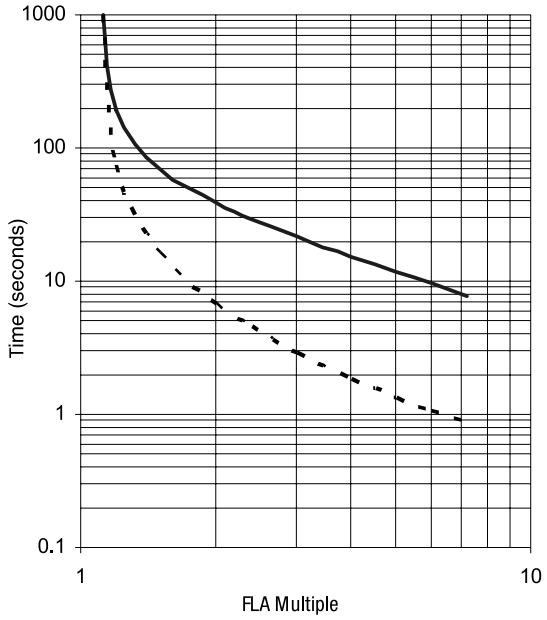
❸ If the CEP7S is connected as shown in Fig. 3 the overload will not trip! The CEP7S contains an electronic circuit board that is self powered. If connected as shown in Fig. 3, the CEP7S circuit board will not power up and the CEP7S would not trip.

❹ Connecting a CEP7S in this manner powers the electronic circuit board. Connecting a 3-phase CEP7 in this manner to handle 1-phase will NOT work.

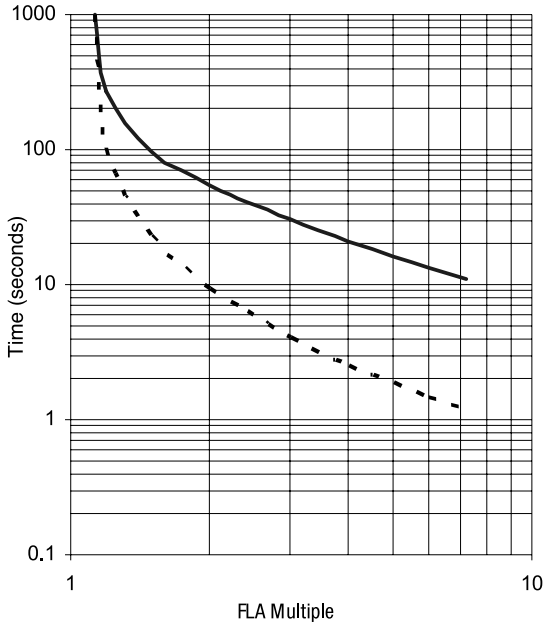
Technical Information

Trip Curves ❶

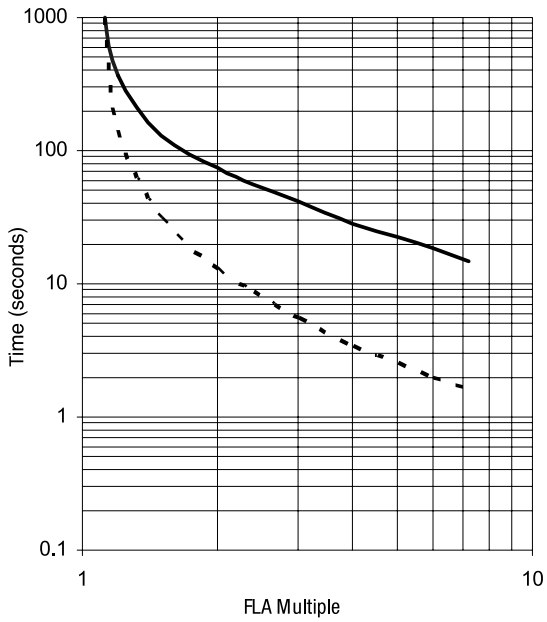
Trip Class 10



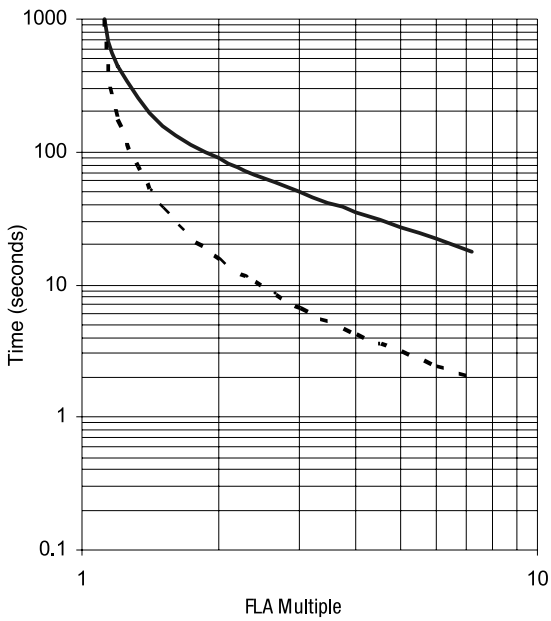
Trip Class 15



Trip Class 20



Trip Class 30



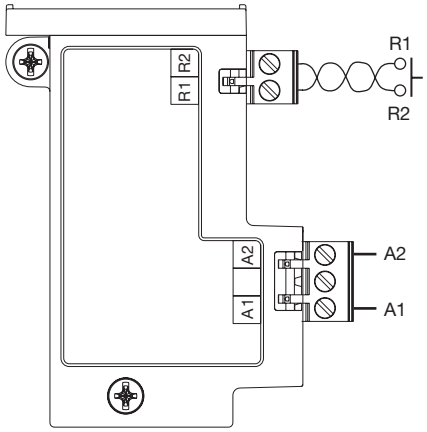
Trip Curve Legend

Cold Trip ——————

Hot Trip - - - - -

❶ Typical reset time for CEP7 Second Generation devices set to "automatic reset" mode is 120 seconds.

CEP7-ERR & CEP7-EJM Wiring Diagrams



- Apply 24 - 240V, 47 - 63HZ or DC to terminals A1 and A2 for control power.
- Connect remote reset pilot device to Terminals R1 and R2.

CEP7-ERR Operational LED

Status LED:
Steady Green- Module is powered up.

CEP7-ERR Dip Switch

Series B
Adjustment Settings

Overload Relay Remote Reset		
SW1	Manual: 1	Automatic: 0

Overload Relay Type		
SW2	3 Phase: 1	1 Phase: 0
SW3	Not Used	

CEP7-EJM Operational LED

Status LED:
Green flash- module powered
Green solid- module powered plus motor current present
Red flash- warning: Fault detected and CEP7 preparing to trip.
Red solid- hardware fault: Internal hardware fault detected and CEP7 trip attempted. Recover fault by cycling supply voltage.

CEP7-EJM Dip Switch

Adjustment Settings

Overload Relay Reset Mode		
SW1	Manual: I	Automatic: 0

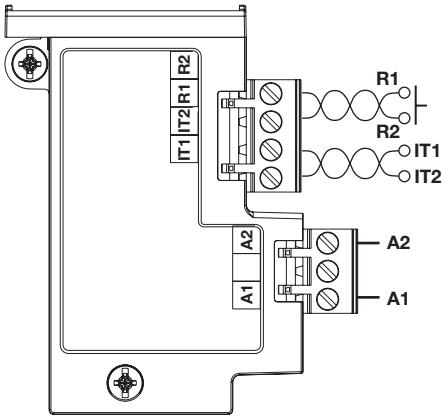
Jam Trip Delay			
	SW 2	SW 3	SW 4
0.1 sec	0	0	0
0.5 sec	0	0	1
1 sec	0	1	0
2 sec	0	1	1
3 sec	1	0	0
4 sec	1	0	1
5 sec	1	1	0
10 sec	1	1	1

Jam Trip Level			
	SW 5	SW 6	SW 7
Disable / OFF	0	0	0
100% FLA	0	0	1
125% FLA	0	1	0
150% FLA	0	1	1
200% FLA	1	0	0
300% FLA	1	0	1
400% FLA	1	1	0
600% FLA	1	1	1

SW8	3 Phase: I	1 Phase: 0

❶

CEP7-EPT Wiring Diagrams



- Apply 24 - 240V, 47 - 63HZ or DC to terminals A1 and A2 for control power.
- Connect remote reset pilot device to Terminals R1 and R2
- Connect Terminal IT1 and IT2 to PTC Chain

CEP7-EPT Operational LED

Status LED:
Steady Green - Module is powered up
Flashing LED - The number of flashes followed by a pause identifies the specific trip code as follows:
(1) Flash - overload trip
(2) Flash - phase loss trip
(3) Flash - PTC trip
(4) Flash - PTC open circuit
(5) Flash - PTC short circuit
Fast Flash - Impending trip. PTC Thermistor fault detected and CEP7 not yet capable of tripping.
Steady Red - Hardware fault. Internal hardware fault detected and CEP7 trip attempted.

CEP7-EPT Dip Switch

Adjustment Settings

Overload Relay and PTC Reset Mode		
SW1	Manual: I	Automatic: 0

PTC Protection		
SW2	Enable: I	Disable: 0

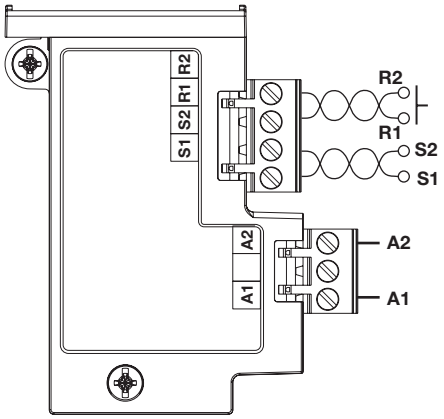
Overload Relay Type		
SW3	3 Phase: I	1 Phase: 0

❷

❶ Dynamic inhibit: Protective function is enabled after the motor current goes above 150% and then falls below 125%.

❷ The delay between the occurrence of a PTC out-of-range fault and a trip of the CEP7 varies, but is generally described by one of the following: a) 500 ms ± 250 ms, typical; or b) < 6 seconds, for a PTC out-of-range fault present at power-up of the side mount module. Under no conditions should a PTC trip take longer than 6 seconds.

CEP7-EGF & CEP7-EGJ Wiring Diagrams ❶



- Apply 24 - 240V, 47 - 63HZ or DC to terminals A1 and A2 for control power.
- Connect remote reset pilot device to Terminals R1 and R2
- Connect current sensor to Terminal S1 and S2

CEP7-EGF Operational LED

Status LED:
Steady Green - Module is powered up.
Flashing LED - The number of flashes followed by a pause identifies the specific trip code as follows:
(1) Flash - overload trip
(2) Flash - phase loss trip
(3) Flash - ground fault trip
Fast Flash - Impending trip Ground fault detected and CEP7 not yet capable of tripping.
Steady Red - Hardware fault. Internal hardware fault detected and CEP7 trip attempted.

CEP7-EGF Dip Switch

Adjustment Settings

Overload Relay Reset Mode		
SW1	Manual: I	Automatic: 0

Ground Fault Current Range	SW 2	SW3
20...100mA	0	0
100...500mA	0	I
0.2...1.0A	I	0
1.0...5.0A	I	I

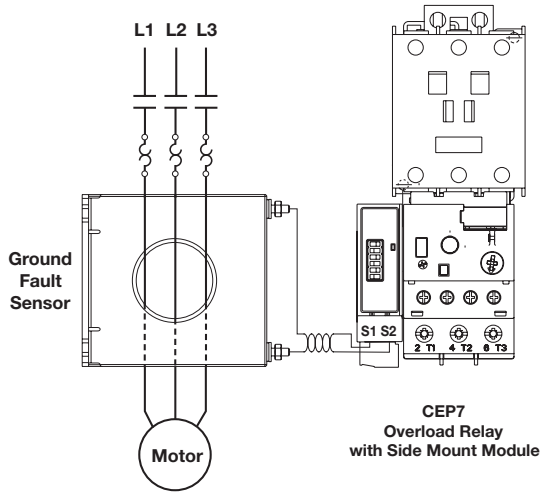
Ground Fault Trip Level	SW 4	SW 5	SW 6
Disable/Off	0	0	0
20% Max GF Current	0	0	I
35% Max GF Current	0	I	0
50% Max GF Current	0	I	I
65% Max GF Current	I	0	0
80% Max GF Current	I	0	I
90% Max GF Current	I	I	0
100% Max GF Current	I	I	I

Overload Relay Type		
SW7	3 Phase: I	1Phase: 0

SW8	Not Used

CEP7-EGF & CEP7-EGJ Installation ❶

Ground Fault Sensor Control Wiring



CEP7-EGJ Operational LED

Status LED:
Steady Green - Module is powered up.
Flashing LED - The number of flashes followed by a pause identifies the specific trip code as follows:
(1) Flash - overload trip
(2) Flash - phase loss trip
(3) Flash - ground fault trip
(4) Flash – jam trip
Fast Flash - Impending trip Ground fault detected and CEP7 not yet capable of tripping.
Steady Red - Hardware fault. Internal hardware fault detected and CEP7 trip attempted.

CEP7-EGJ Dip Switch

Adjustment Settings

Overload Relay Reset Mode		
SW1	Manual: I	Automatic: 0

Ground Fault Current Range	SW 2	SW3
20...100mA	0	0
100...500mA	0	I
0.2...1.0A	I	0
1.0...5.0A	I	I

Ground Fault Trip Level	SW 4	SW 5	SW 6
Disable/Off	0	0	0
20% Max GF Current	0	0	I
35% Max GF Current	0	I	0
50% Max GF Current	0	I	I
65% Max GF Current	I	0	0
80% Max GF Current	I	0	I
90% Max GF Current	I	I	0
100% Max GF Current	I	I	I

Overload Relay Type		
SW7	3 Phase: I	1Phase: 0

Jam Protection		
SW8	Enable: I	Disable: 0

❶ Dynamic inhibit: Protective function is enabled after the motor current goes above 150% and then falls below 125%.

Electrical Data

Power Supply Ratings:		
Rated Supply Voltage	*Us*	24V DC
Rated Operating Range	*Ue*	20.4 - 26.4
Rated Supply Current	*Ie*	0.1 A
Maximum Surge Current at Power-Up		2.5 A
Maximum Power Consumption		2.5…2.7 W
Output Relay Ratings:		
Terminals		
OUT A:		13/14
Type of Contacts		Form A SPST - NO
Rated Thermal Current	I_{the}	5 A
Rated Insulation Voltage	*Ui*	300V AC
Rated Operating Voltage	*Ue*	240V AC
Rated Operating Current	*Ie*	3 A (at 120V AC), 1.5 A (at 240V AC) 0.25 A (at 110V DC), 0.1 A (at 220V DC)
Minimum Operating Current		10 mA at 5V DC
Rating Designation		B300
Utilization Category		AC-15
Resistive Load Rating (p.f.=1.0)		5 A, 250V DC 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, 600V)
Input Ratings:		
Terminals		
IN1:		1
IN2:		2
SSV (Sensor Supply Voltage)		3
Supply Voltage (Provided my module)		20.4 - 26.4V DC
Type of Inputs		Current Sinking
Jam Protection:		
Trip Level		150…600% FLA
Trip Delay		0.1…25.0 sec.
Inhibit		0…250 sec.
Standards:		UL 508 CSA 22.2, No. 14 EN 60947-

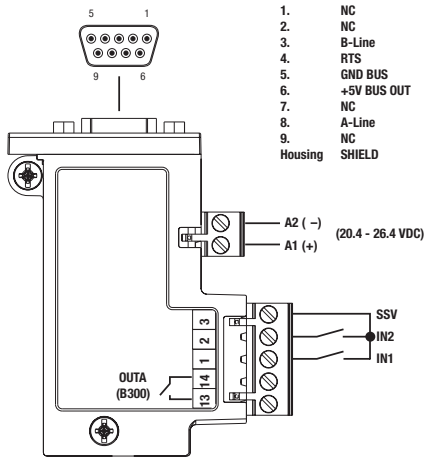
Mechanical Data

Ambient Temperature	T_{amb}	
Storage		-40…+85°C (-40…+185°F)
Operating		
(Open)		-20…+60°C (-4…+140°F)
(Enclosed)		-20…+40°C (-4…+104°F)
Humidity		
Operating		5…95% non-condensing
Damp Heat - Steady State		per IEC 68-2-3
Damp Heat - Cyclic		per IEC 68-2-30
Maximum Altitude		2000 m
Degree of Protection		IP20

PROFIBUS Communication

Baud Rate	9.6 k, 19.2 k, 45.45 k, 93.75 k, 187.5 k, 500 k, 1.5 M, 3 M, 6 M,12 M
Auto-Baud Rate identification	Yes
DP-V0 (Cyclic data exchange)	Yes
DP-V1 (Acyclic services)	Yes
DP-V2 (Acyclic services)	No
Set Slave Address (SSA) support	Yes

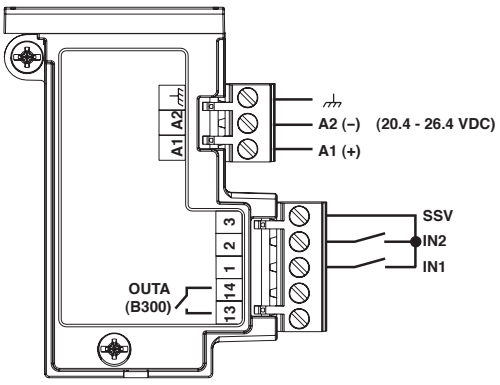
CEP7-EPRB Wiring Diagram



ETHERNET Communication

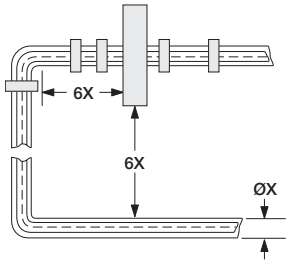
TCP Connection	150
CIP Connection	40
CIP Unconnected Messages	128
I/O Packet Rates	500/s
Explicit Packet Rates	500/s
Speed Duplex (Half/Full)	10/100
Duplicate IP Detection	Yes

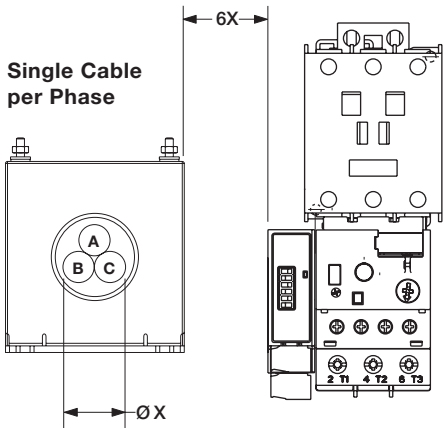
CEP7-ETN Wiring Diagram



CEP7-CBCT Installation

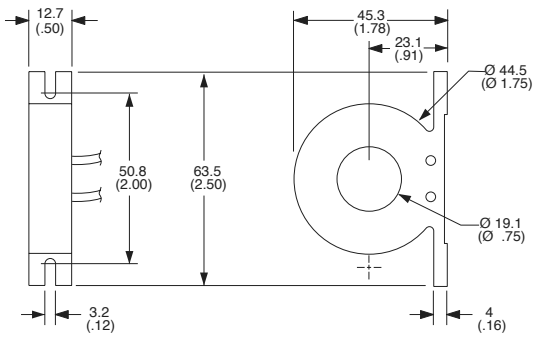
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



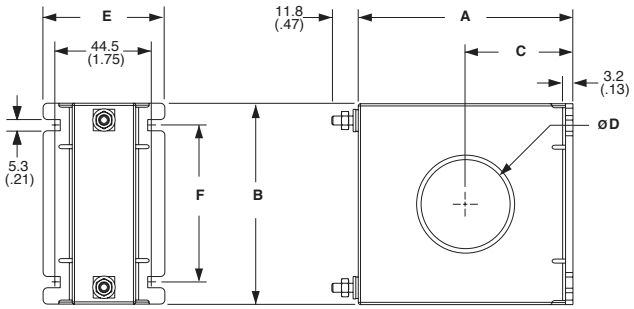


CEP7-CBCT Dimensions

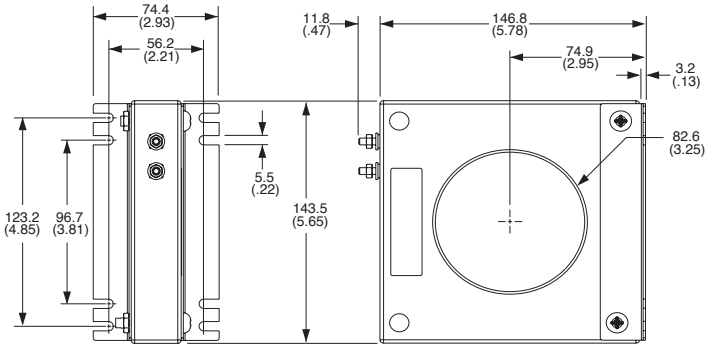
CEP7-CBCT1



CEP7-CBCT2 & 3



CEP7-CBCT4



Catalog Number	A	B	C	øD	E	F
CEP7-CBCT2	96 (3.78)	89 (3.53)	48.3 (1.90)	39.6 (1.56)	54.6 (2.15)	69.9 (2.75)
CEP7-CBCT3	122.4 (4.82)	115.9 (4.56)	59.7 (2.35)	63.5 (2.50)	54.1 (2.13)	96 (3.78)

CEP7-CBCT Ground Fault Trip Data

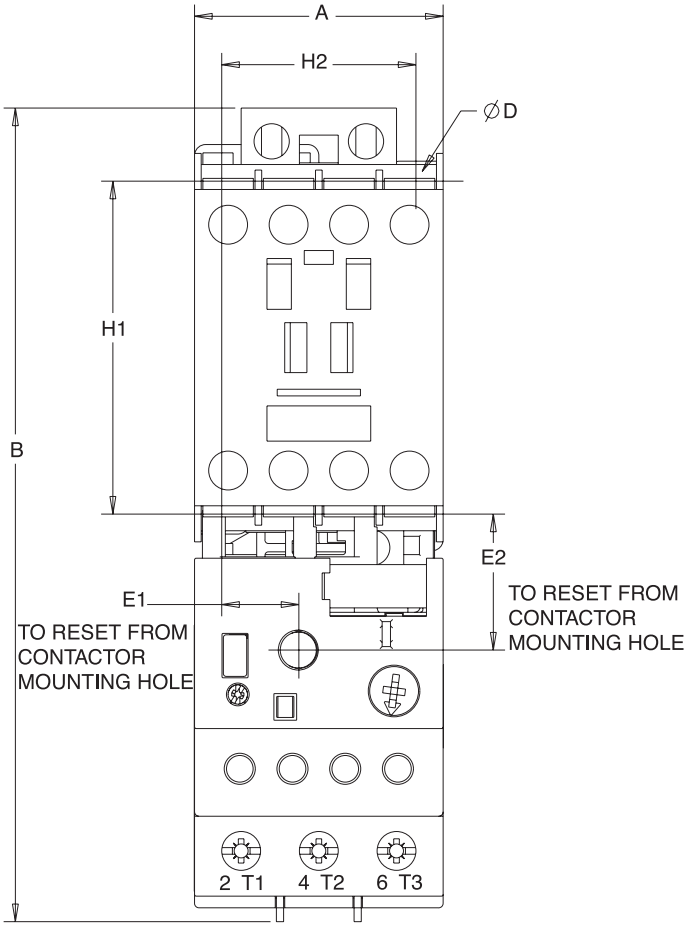
ATTENTION: The CEP7 Overload relay is not a ground fault circuit interrupter for personnel protection as defined in Article 100 of the NEC.

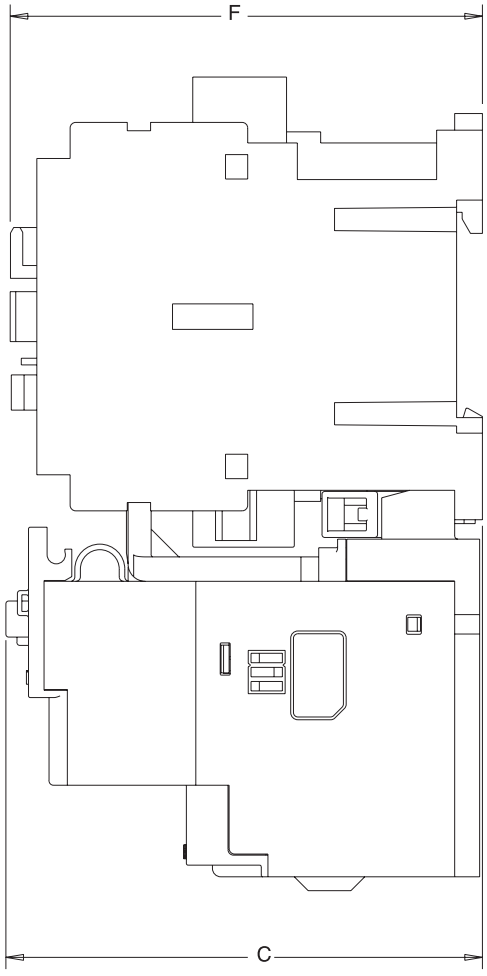
Ground fault trip delay: The delay between the occurrence of a ground fault and a trip of the CEP7 varies, but is generally described by one of the following:
50 ms ± 20 ms, typical
< 6 seconds, for a ground fault present at power-up of the side mount module
< 30 seconds, if the protection inhibit has not been cleared.

Under no conditions should a ground fault trip take longer than 31 seconds.
Dynamic inhibit: Protective function is enabled after the motor current goes above 150% and then falls below 125%.

CEP7 Mounted to CA7 Contactor

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

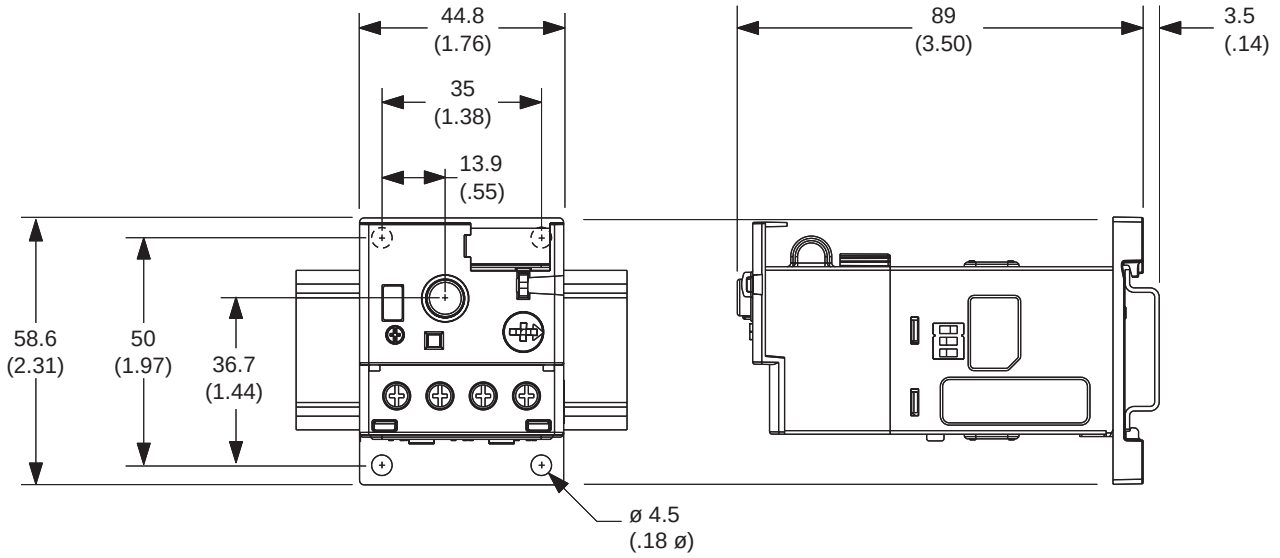




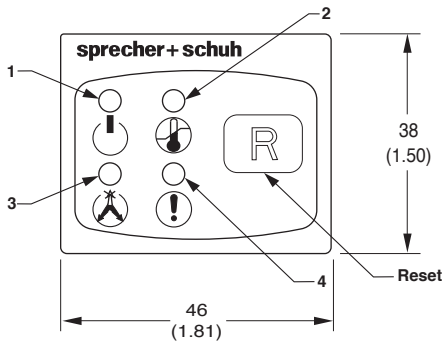
Overload	Mounted to Contactor		A Width	B Height	C Depth	D	E1	E2	F	H1	H2
CEP7-ED1…B CEP7-EE…B CEP7S-EE…B	CA7-9…23	mm (in)	45 (1-25/32)	146.6 (5-25/32)	85.2 (3-23/64)	4.5 (3/16)	13.9 (35/64)	24.5 (31/32)	86.5 (3-13/32)	60 (2-23/64)	35 (1-3/8)
CEP7-ED1…D CEP7-EE…D CEP7S-EE…D	CA7-30…37	mm (in)	45 (1-25/32)	146.6 (5-25/32)	101.2 (3-63/64)	4.5 (3/16)	13.9 (35/64)	24.5 (31/32)	104 (4-3/32)	60 (2-23/64)	35 (1-3/8)
CEP7-ED1…D CEP7-EE…D CEP7S-EE…D	CA7-43…55	mm (in)	54 (2-1/8)	146.6 (5-25/32)	101.2 (3-63/64)	4.5 (3/16)	18.9 (3/4)	24.5 (31/32)	107 (4-3/32)	60 (2-23/64)	45 (1-25/32)
CEP7-EE…E CEP7S-EE…E	CA7-60…97	mm (in)	72 (2-53/64)	192.3 (7-37/64)	120.4 (4-3/4)	5.4 (7/32)	23.8 (15/16)	29 (1-9/64)	125.5 (4-15/16)	100 (3-15/16)	55 (2-11/64)

CEP7 Pass-thru Overload

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



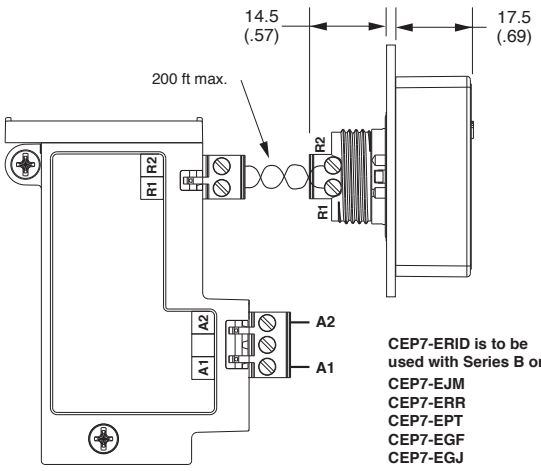
CEP7-ERID Remote Indicator



LED Indicators

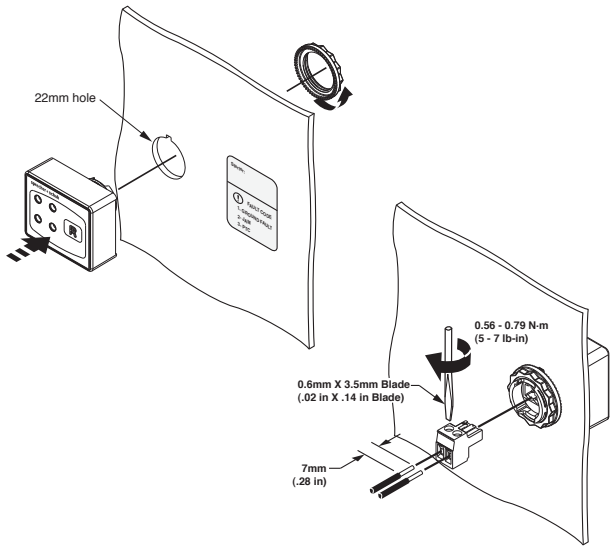
L.E.D.	Function		Fault or Status	Flash Code
1	Module Power / Status		Module Power	Green (Flash)
			Module Power + Motor Current	Green (Solid)
			Hardware Fault	Red (Solid)
2	Overload		Overload Trip	Red (Solid)
			Overload Warning (> 110%)	Yellow (Flash)
3	Phase Loss		Phase Loss Trip	Red (Solid)
4	Fault Status		Ground Fault Trip	1 Red
			Jam Trip	2 Red
			PTC Trip	3 Red
			Fault Detected	Red (Rapid)

Operating Temperatures	**-20°C … 60°C (-4°F … +140°F)**
Storage Temperatures	**-40°C … 85°C (-4°F … +185°F)**



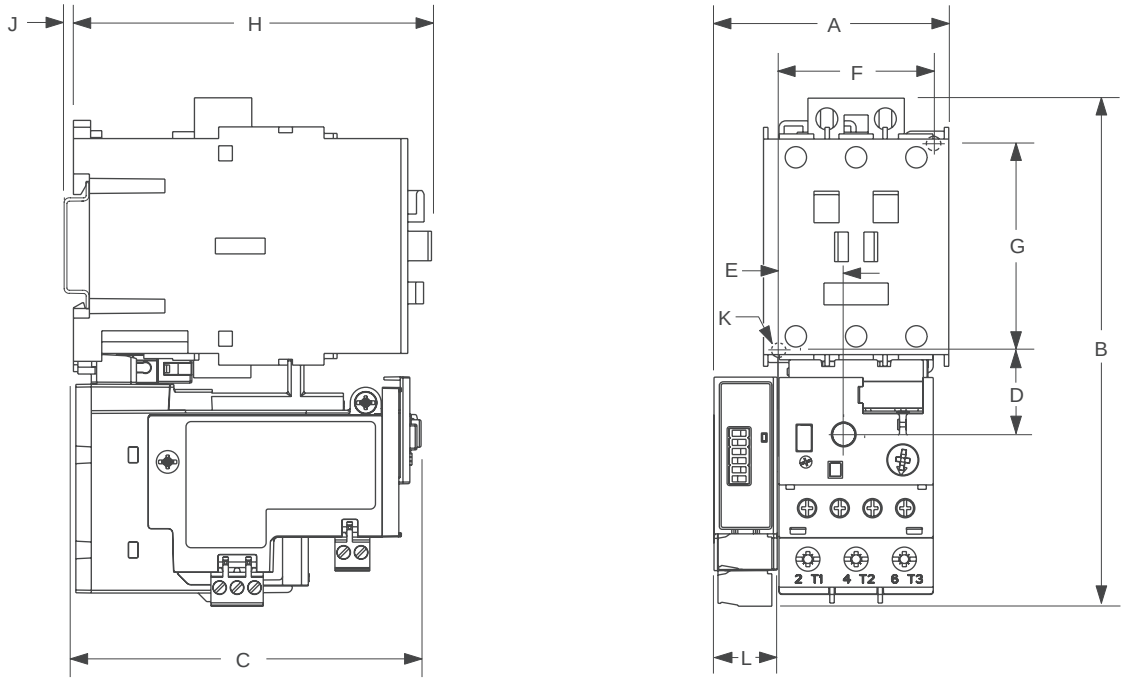
CEP7-ERID is to be used with Series B or later:

CEP7-EJM
CEP7-ERR
CEP7-EPT
CEP7-EGF
CEP7-EGJ



CEP7 Mounted to CA7 Contactor *(with side mounted module)*

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



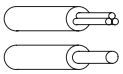
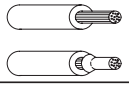
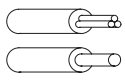
Contactor Cat. No.	Overload Cat. No.		A ❶	B	C	D	E	F	G	H	J	K	L ❶
CA7-9, CA7-12, CA7-16, CA7-23	CEP7*-EE_B	mm (in)	63 (2.48)	148 (5.83)	85.2 (3.35)	24.5 (.96)	13.9 (.55)	35 (1.38)	60 (2.38)	86.5 (3.40)	2 (0.8)	4.5 (.17)	18 (.71)
CA7-30, CA7-37	CEP7*-EE_D	mm (in)	63 (2.48)	148 (5.83)	101.2 (3.98)	24.5 (.96)	13.9 (.55)	35 (1.38)	60 (2.38)	104 (4.09)	2 (0.8)	4.5 (.17)	18 (.71)
CA7-43…55		mm (in)	67.5 (2.66)	148 (5.83)	101.2 (3.98)	24.5 (.96)	18.4 (.74)	45 (1.77)	60 (2.38)	107 (4.09)	2 (0.8)	4.5 (.17)	18 (.71)
CA7-60, CA7-72, CA7-85, CA7-97	CEP7*-EE_E	mm (in)	90 (3.54)	191.6 (7.54)	120.4 (4.74)	29 (1.14)	23.8 (.94)	55 (2.16)	100 (3.94)	126 (4.94)	2 (0.8)	5.4 (.21)	18 (.71)

* No letter indicates 3-phase; "S" indicates 1-phase

❶ Dimension shown covers all side mount modules EXCEPT CEP7-EPRB and CEP7-ETN, where "L" equals 22mm (0.86 in). Add 4mm (0.16 in) to dimension "A".

CEP7-ERR/EJM/EGE/EGJ/EPT Module Technical Information

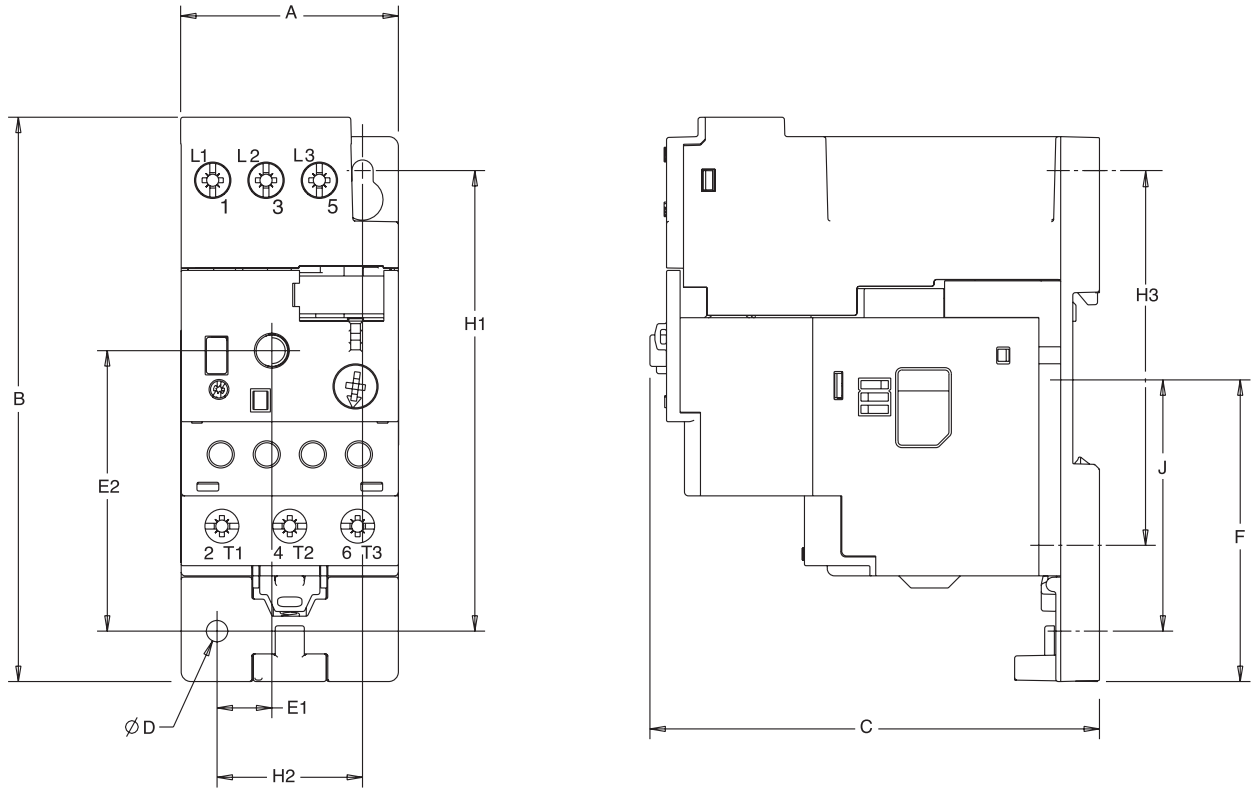
Wire Size and Torque Specifications

	1X 2X	24.....12 AWG 24.....16 AWG 5 lb-in
	1X 2X	0.2.....2.5 mm² 0.25.....1 mm² 0.55 N·m
	1X 2X	0.2.....2.5 mm² 0.2.....1 mm² 0.55 N·m

- Connect remote reset pilot device to Terminals R1 and R2.
- Do not apply external voltage to R1 and R2. Equipment damage will occur.
- Recommend use of twisted pair for remote reset, #24 AWG minimum.
- Apply 24 - 240V, 47 - 63HZ or DC to terminals A1 and A2 for control power.
- Rated Insulation Voltage (Ui) 300V
- Rated Operating Voltage (Ue) 24 - 240 VAC, 50/60 Hz
  24 - 240 VDC
- Power at Rated Operating Voltage (Typical)
  24 VAC 0.8 W
  120 VAC 0.8 W
  240 VAC 1.0 W
- Rated Impulse Withstand Voltage (U imp) 2.5 kV
- Dynamic inhibit on start. A unique circuit within the CEP7 Protection Modules monitors for motor starting inrush current. The circuit inhibits the protection feature during the motor start period and arms the protection function after the inrush current falls to motor rated current. This allows the motor to start and run, avoiding nuisance tripping during the inrush period.

CEP7 with CEP7-EP… Panel Mount Adaptor

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



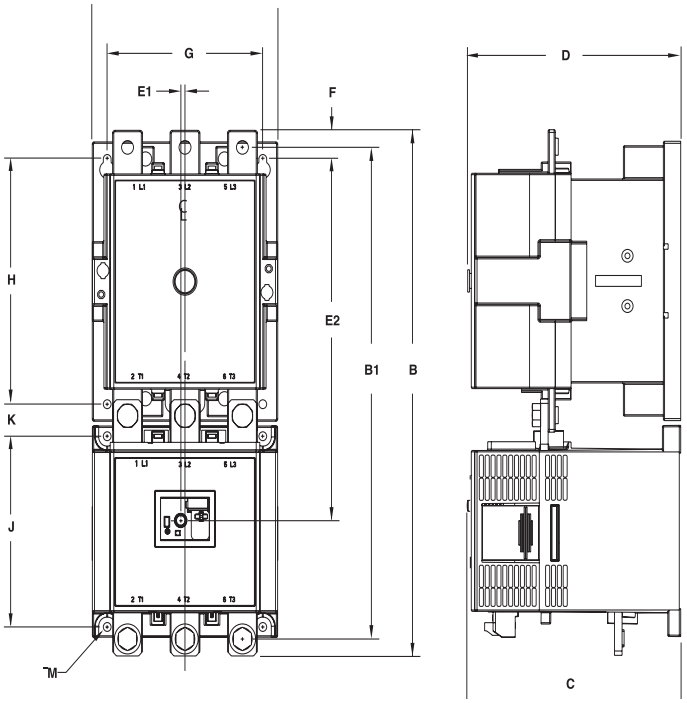
Panel Mount Adaptor	Overload Relay	A Width	B Height	C Depth	D	E1	E2	F	H1	H2	H3	J
CEP7-EPB	CEP7-ED1_B CEP7-ED_B CEP7(S)-EE_B	45 (1-25/32)	116.5 (4-9/16)	92.7 (3-21/32)	4.4 (11/64)	11.4 (29/64)	57.9 (2-9/32)	62.5 (2-15/32)	95 (3-3/4)	30 (1-3/16)	75 (2-31/32)	52.1 (2-3/64)
CEP7-EPD	CEP7-ED1_D CEP7(S)-EE_D	45 (1-25/32)	112.4 (4-7/16)	108.7 (4-9/32)	4.4 (11/64)	11.4 (29/64)	57.9 (2-9/32)	62.5 (2-15/32)	95 (3-3/4)	30 (1-3/16)	75 (2-31/32)	52.1 (2-3/64)
CEP7-EPE	CEP7(S)-EE_E	72 (2-53/64)	107.4 (4-15/64)	127 (5-1/64)	5.5 (5/32)	26.4 (3/4)	54.5 (2-9/64)	48.3 (1-29/32)	90 (3-23/64)	60 (2-23/64)	~	43.3 (1-45/64)

DIN-rail / Panel Adapter Terminal Cross Sections		CEP7-EPB ❶	CEP7-EPD ❶	CEP7-EPE
Flexible stranded with ferrule	Single conductor	1.0…4.0mm²	2.5…16mm²	4.0…35mm²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
	Two conductor	1.0…4.0mm²	2.5…10mm²	4.0…25mm²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
Course stranded / solid	Single conductor	1.5…6.0mm²	2.5…25mm²	4.0…50mm²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
	Two conductor	1.5…6.0mm²	2.5…16mm²	4.0…35mm²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
Stranded / solid	Single conductor	14…8 AWG	16…6 AWG	12…1 AWG
	Torque	16 lb-in	20 lb-in	35 lb-in
	Two conductor	14…10 AWG	16…6 AWG	12…2 AWG
	Torque	16 lb-in	20 lb-in	35 lb-in

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

CEP7 Current Transformer Models mounted to CA6 Contactor

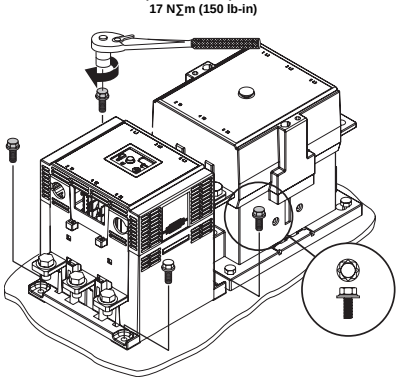
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.

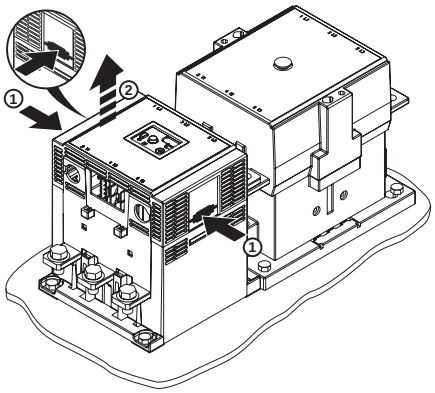


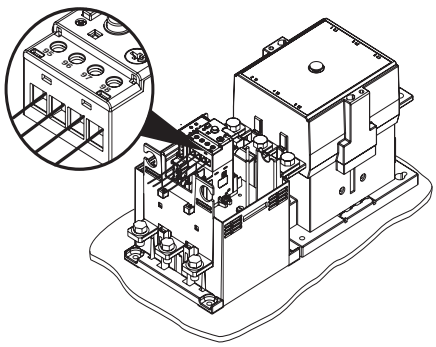
Overload Relay Cat.	Contactor Cat.	A Width	B Height		B1	C Depth	D	E1	E2	F	G	H	J	K	M
			Without Terminal Covers	With Terminal Covers		Reset									
CEP7-EEHF CEP7-EEJF	CA6-115 (EI) CA6-140 (EI) CA6-180 (EI)	120 (4.72)	339.8 (13.38)	418 (16.46)	317.8 (12.51)	152.7 (6.01)	156 (6.14)	36 (.14)	226.3 (8.91)	16 (.63)	100 (3.94)	145 (5.71)	135 (5.31)	22.3 (.88)	8 – 5.6 (8 – .22)
CEP7-EE_G	CA6-210 EI CA6-300-EI CA6-420 EI	155 (6.10)	385.8 (15.19)	487.4 (19.19)	360.8 (14.2)	176.5 (6.95)	180 (7.09)	36 (.14)	265.5 (10.44)	21 (.83)	130 (5.12)	180 (7.09)	140 (5.51)	23.5 (.93)	8 – 6.5 (8 – .26)
CEP7-EE_H	CA6-630 EI CA6-860 EI	255 (10.04)	552 (21.73)	915 (36.02)	508 (20)	269.3 (10.6)	270.7 (10.66)	36 (.14)	384.1 (15.12)	52.5 (2.07)	226 (8.90)	230 (9.06)	108 (4.25)	109 (4.29)	8 – 13 (8 – .51)

Assembly Instructions

CEP7-EE_F: (M5)
3.4 N∑m (30 lb-in)
CEP7-EE_G: (M6)
5.1 N∑m (45 lb-in)
CEP7-EE_H: (M12 Provided)
17 N∑m (150 lb-in)







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 that 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

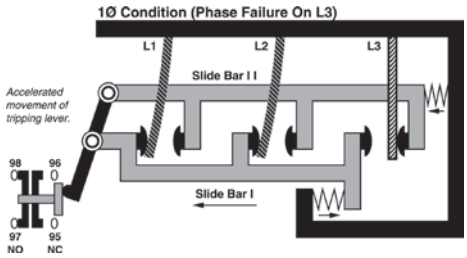
All Sprecher + Schuh thermal overload relays are temperature compensating. An additional bimetallic ambient compensation strip, built into the conductor-bimetal transmission path, ensures that the tripping characteristics of the relay remain constant over an ambient temperature range of –20°C to +60°C.

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 schematic on page C108.

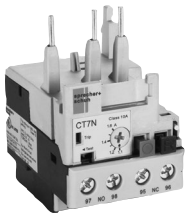
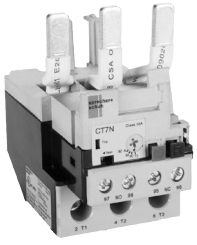
Other standard features

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

CT7N Bimetallic Overload Relays, Manual or Automatic Reset ❶❹

Overload Relay	Directly Mounts to Contactor...	Adjustment Range (A)❷❸	Trip Class 10 Catalog Number	Price	
 *CT7N-23-C16*	CA7-9…CA7-23	0.10…0.16	**CT7N-23-A16**	**82**	
		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**		
		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**		
 *CT7N-37-C30*	CA7-30…CA7-37	15…20	**CT7N-37-C20**	**124**	
		17.5…21.5	**CT7N-37-C21**		
		21…25	**CT7N-37-C25**		
		24.5…30	**CT7N-37-C30**		
		29…36	**CT7N-37-C36**		
		33…38	**CT7N-37-C38**		
 *CT7N-85-C90*	CA7-43…CA7-55	17…25	**CT7N-43-C25**	**131**	
		24.5…36	**CT7N-43-C36**		
		35…47	**CT7N-43-C47**		
		45…60	**CT7N-55-C60**	**134**	← Coming Soon!
	CA7-60…CA7-97	35…47	**CT7N-85-C47**	**149**	
		45…60	**CT7N-85-C60**		
		58…75	**CT7N-85-C75**		
		72…90	**CT7N-85-C90**	**177**	
		85…97	**CT7N-97-C97**	**181**	← Coming Soon!

❶ CT7N Bimetallic Overload Relays can be used with AC contactors, Electronic DC contactors (CA7-9E…55E) and Two-Winding DC contactors (CA7-60D…97D).

❷ 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.

❸ 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.

❹ Under phase loss condition, this 3-phase two slider bar tripping mechanism will trip in approximately 45 seconds.

CT7N Bimetallic Overload Relays, Manual or Automatic Reset ❶❹

Overload Relay	Separate Mount...	Adjustment Range (A)❷❸	Trip Class 10 Catalog Number	Price	
	Separate mounting required (Panel or DIN-Rail mounted device)	35…47	**CT7N-85-C47P**	**168**	
		45…60	**CT7N-85-C60P**	**172**	
		58…75	**CT7N-85-C75P**	**172**	
		72…90	**CT7N-85-C90P**	**257**	
		85…97	**CT7N-97-C97P**	**263**	← Coming Soon!

❶ CT7N Bimetallic Overload Relays can be used with AC contactors, Electronic DC contactors (CA7-9E…55E) and Two-Winding DC contactors (CA7-60D…97D). CT7N Overloads cannot be used with True DC contactors.

❷ 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.

❸ 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.

❹ Under phase loss condition, this 3-phase two slider bar tripping mechanism will trip in approximately 45 seconds.

Accessories

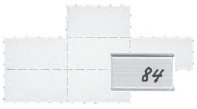
Enclosure	Description	For Use With...	Catalog Number	Price
	**DIN-rail / Panel Mount Adapter -** For separately mounting thermal overload relays	CT7N-23..37	**CT7N-37-P-A**	**16**
	**Screw Adapter -** For screw fixing of the CT7N-37-P-A panel adapter (1 required per adapter) Pkg. of 10.	CT7N-37-P-A	**Use KT7-45-AS** **See page F16**	**~**
	**Remote Reset Solenoid -** For remote resetting of the overload relay	CT7N ❸ CT8	**CMR7N-✱** *Replace ✱ with coil code below*	**81**
	**External Reset Button -** Used for manually resetting overloads mounted in enclosures	CT7N all	**Use D7 Reset**	**See page H56**
	**Adaptor External Reset -** Mounts on relay reset button and provides larger actuation surface.	CT7N ❸ CT8	**CT7N-RA3**	**6**

CMR7N Remote Reset Coil Codes

A.C. Coil Code	Voltage Range ❹		
	50 Hz	60 Hz	50 / 60 Hz
24Z	**~**	**~**	**24V**
48Z	~	~	48V
120	**110V**	**120V**	**~**
240Z	~	~	220…240V

D.C. Coil Code	Voltage ❺
24D	**24VDC**
48D	48VDC
110D	110VDC
125D	125VDC

Marking Systems ❶

Component	Description	Pkg. Qty.	Catalog Number	Price Each
	**Label Sheet –** 1 sheet with 105 self-adhesive paper labels each, 6 x 17mm	1	**CA7-FMS**	**See page A54**
	**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 ❷	**CA7-FMC**	

❶ The labeling field of the overload relay may also be written on by hand.
❷ Minimum order quantity is one package of 100. Price each x 100 = total price.
❸ CMR7N-* and CT7N-RA3 will not mount on separate mount versions of CT7N.
❹ Coil consumption of AC coils is 8VA.
❺ Coil consumption of DC coils is 12 watts.

Electrical Data

Main Circuits			**CT7N**
Rated Insulation Voltage U_i		[V]	690
Rated Impulse Strength U_{imp}			
Between main poles and between main poles & auxiliaries		[kV]	6
Between auxiliary circuits		[kV]	4
Rated Operating Voltage U_e			
	IEC	[V AC]	690
		[V DC]	440
	UL, CSA	[V AC]	600
Rated Frequencies		[Hz]	50/60
Power dissipation			
CT7N-23...37	up to 0.4 A	[W]	7
	0.5…36 A	[W]	6
	38 A	[W]	12
CT7N-43…55	25…47 A	[W]	12
CT7N-85…97	47…90 A	[W]	18
Lifespan			
Stop function, operates the release contact 95-96	Mechanical	[Mil. ops.]	0.25
	Electrical, at max. contact rating	[Mil. ops.]	0.25

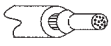
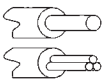
Trip Class	CT7N-23/37	CT7N-43/55/85/97
IEC/EN 60947-4-1	10A	10
UL		10

Trip Rating (ultimate tripping current)	125% FLA
Phase Loss Sensitivity: Trip rating at phase loss	115% FLA

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 ≤ 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
Type of overload relay	Bimetallic, Ambient Compensated, Phase Loss Sensitive
Compensation temperature range	–20…+60°C (–4…+140°F)
Type of Protection	IP00
in connected state	IP2X (in a connected state)
Finger Protection	Safe from touch by fingers and back of hand (VDE 0106, Part 100)
Materials	RoHS compliant
Flame Resistivity (Outer housing parts)	UL94: V0

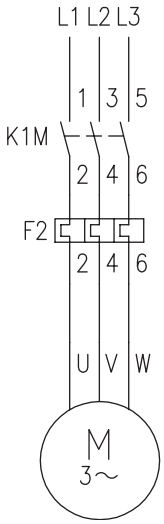
		CT7N
Environmental		
Climatic Conditions	Storage Temp. Range	-55…+80ºC
	Operating Temperature Range	-20…+60ºC
	Air moisture (Storage/Operating)	5…95% rel. humidity
Vibration	(per IEC/EN 60068-2-6), service	3g
	ICE/EN 61373 (vibration railways)	cat. 1, class B
	IEC/EN 60092-504 (vibration ships). service	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

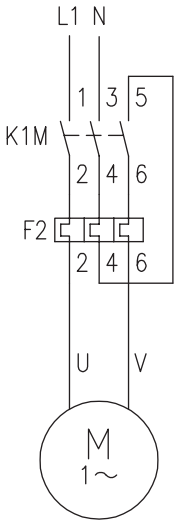
Thermal Overload Relay Maximum Fuse

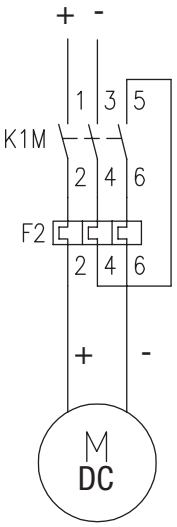
For Use With...	Catalog Number	Adjustment Range (A)	Max. Back-up fuse [A]		
			gL/gG 50 kA, 690V AC IEC/EN 60947-4-1 Coordination		UL Class K5 5 kA, 600V AC
			Type 1	**Type 2**	**UL 508**
CA7-9…CA7-23	CT7N-23-A16	0.10…0.16	50	~	1
	CT7N-23-A25	0.16…0.25		~	1
	CT7N-23-A40	0.25…0.40		2	1
	CT7N-23-A50	0.35…0.50		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		1	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
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

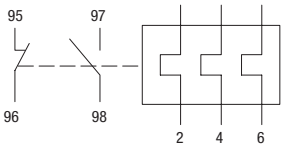
❶ Max. Back-up fuse [A], UL Class K5, 10 kA, 600V AC
❷ Only in combination with CA7 Contactors.

Connection Diagrams







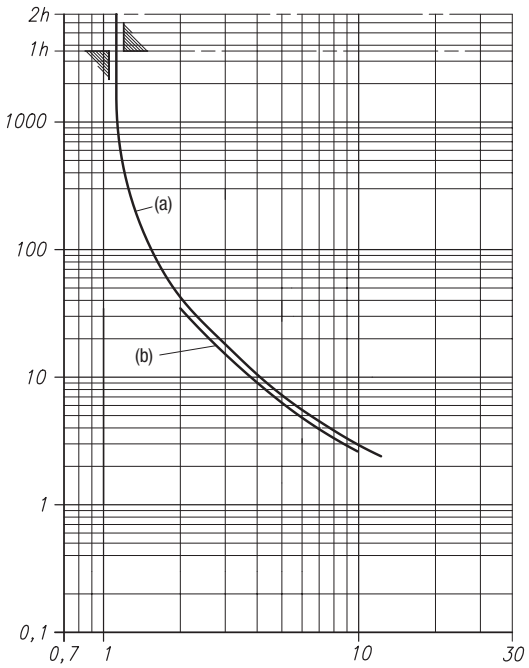


Typical IEC Wiring Schematic

Tripping Characteristics

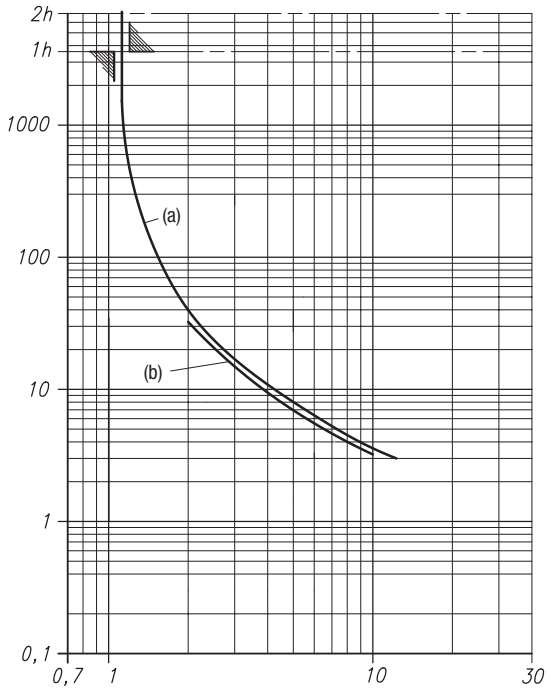
These tripping characteristics refer to IEC/EN 60947-1 and are average values from cold start at an ambient temperature of 20°C. Trip time is pictured as a function of operating current. With the device at max. operating temperature, the trip time decreases to approximately 25% of the shown value.
(a) Tripping characteristics 3-poles from the cold state
(b) Tripping characteristics 2-poles from the cold state

CT7N-23-A16…A40 Overload Relays

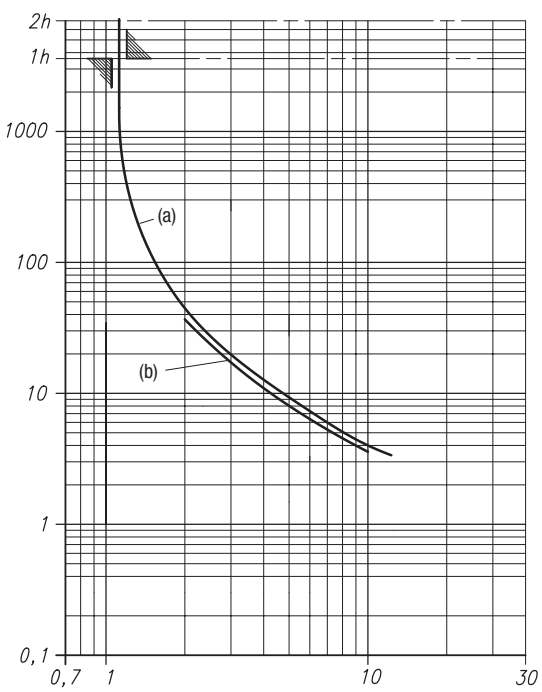


Tripping Characteristics (Continued)

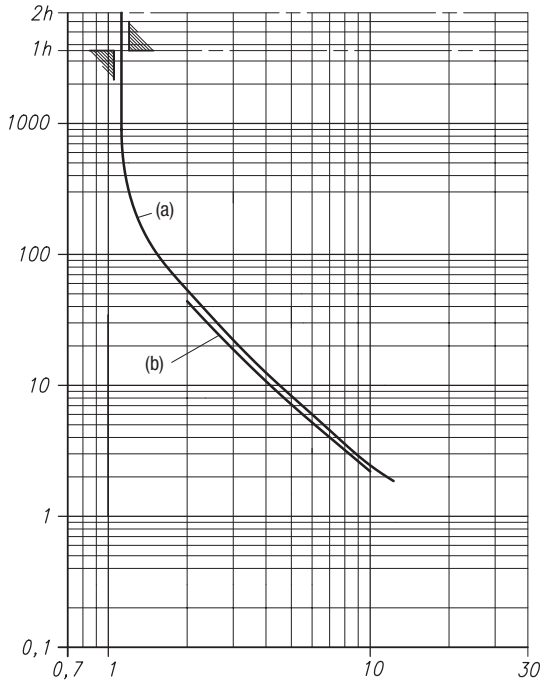
CT7N-23-A50…B40 Overload Relays



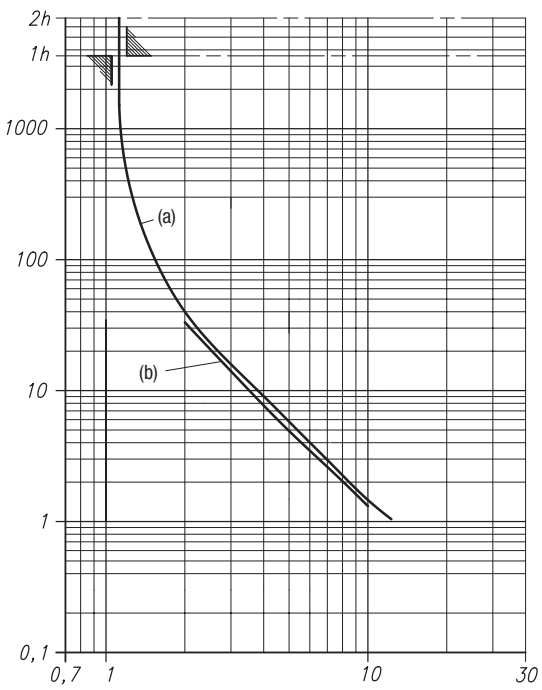
CT7N-23-B48…C25 Overload Relays



CT7N-37-C20…C25 Overload Relays

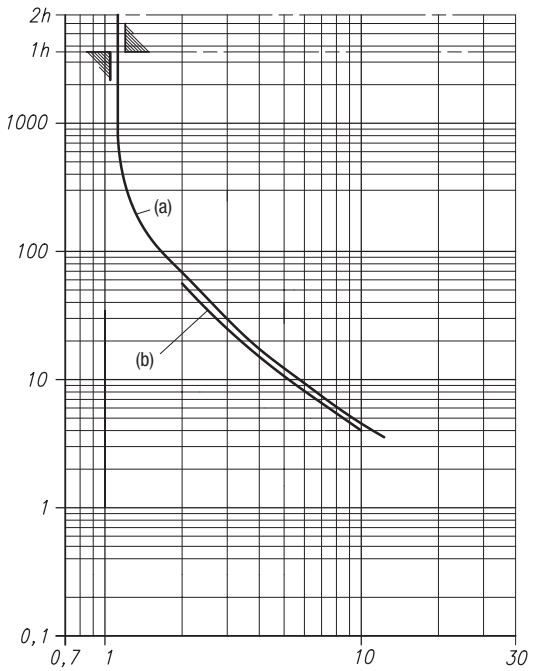


CT7N-37-C30…C38 Overload Relays

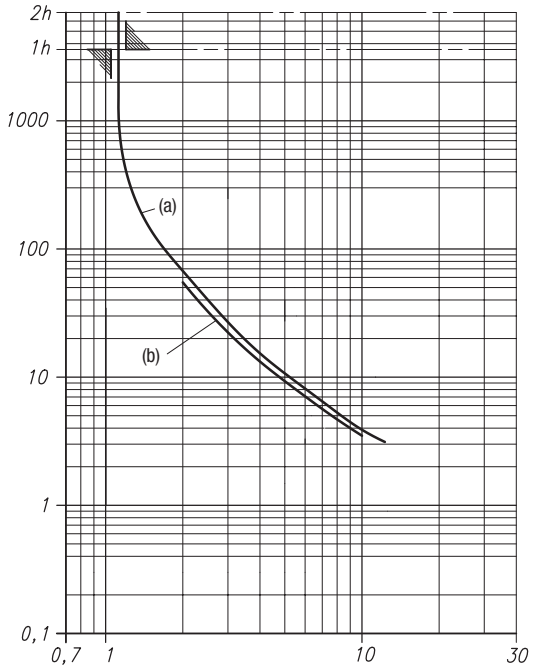


Tripping Characteristics (Continued)

CT7N-43-C25…C47 Overload Relays

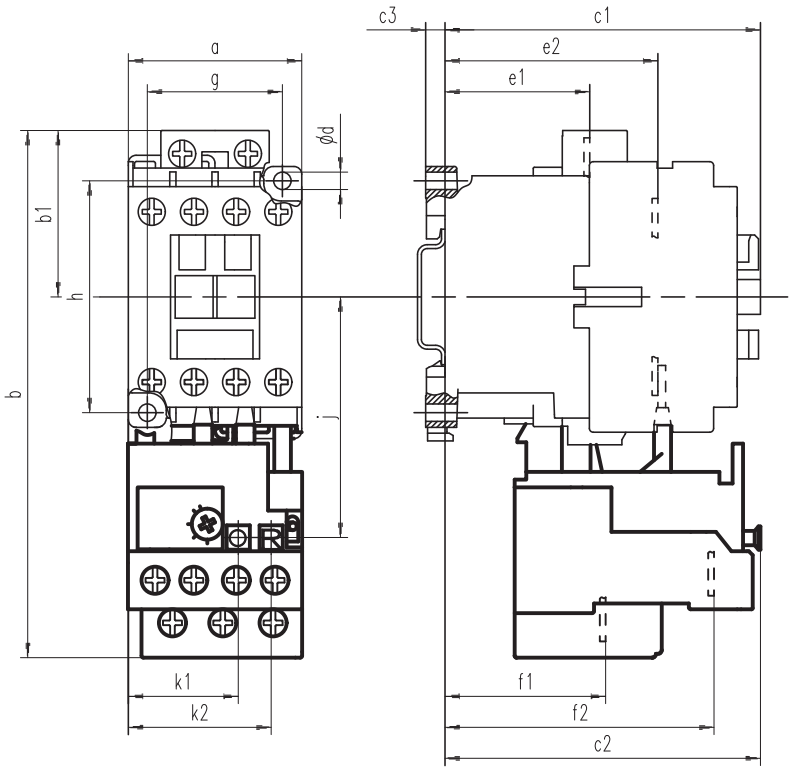


CT7N-85-C47…C90 Overload Relays



Series CT7N (Mounting to CA7 Contactors)

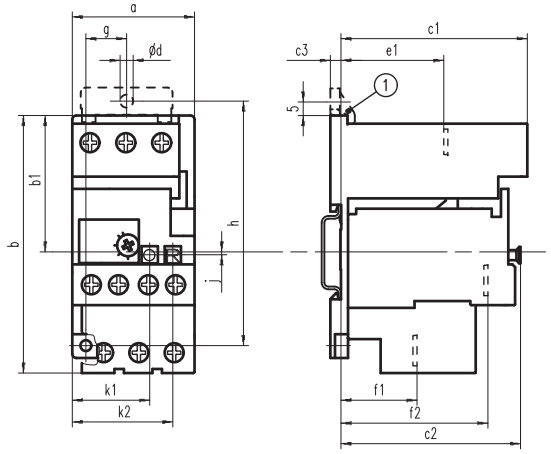
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



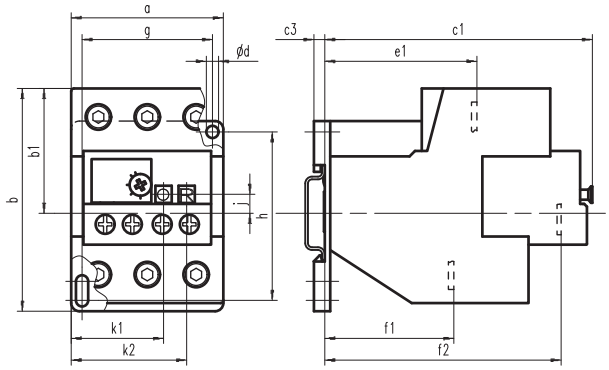
Contactor + Overload	a	b	b1	c1	c2	c3	ød	e1	e2	f1	f2	g	h	j	k1	k2
CA7-9…23 + CT7N-23-A16…C25	45 (1-25/32)	136.5 (5-3/8)	43 (1-11/16)	81.5 (3-13/64)	80.5 (3-11/64)	5 (13/64)	4.5 (3/16)	37.5 (1-15/32)	55 (2-11/64)	40.5 (1-19/32)	68.5 (2-45/64)	35 (1-3/8)	60 (2-23/64)	63.5 (2-1/2)	29 (1-9/64)	37.5 (1-15/32)
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.



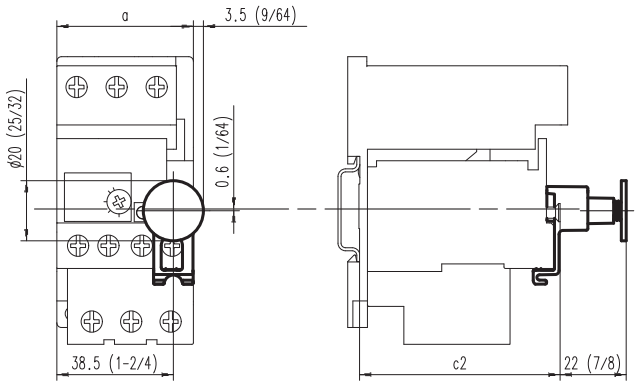
CT7N-23..37 with Panel Mount Adapter



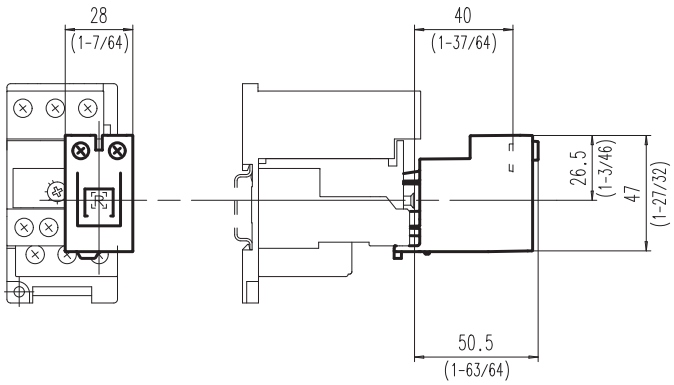
CT7N-85…97 Separate Mount

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 that 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).

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°C.

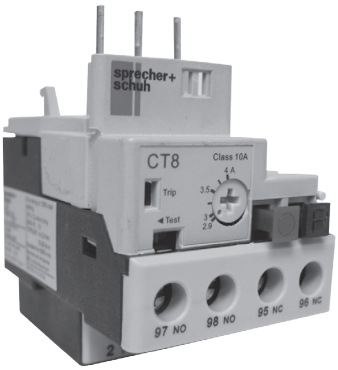
Single phase applications

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 schematic on page C108.

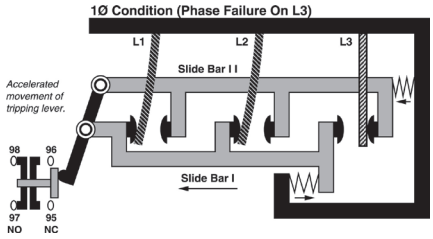
Other standard features

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.



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



CT8 Thermal Overload Relays offer accelerated tripping under single phase conditions

CT8 Thermal Overload Relays - manual or automatic reset ❶

Overload Relay	Directly Mounts to Contactor...	Adjustment Ranges [A]	Trip Class 10	
			Catalog Number	Price
 CT8	CA8-09…12	0.10…0.16	**CT8-A16**	**69**
		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**	**69**
		7.2...10	**CT8-C10**	**75**
	CA8-12	9.0...12.5	**CT8-C12**	**75**

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	Price
	**Remote Reset Solenoid -** For remote resetting of the solid state overload relay	CT7N CT8	**CMR7N-✱** *Replace ✱ with coil code below*	**See page B28**
	**External Reset Button -** Used for manually resetting overloads mounted in enclosures	CT8 all	**Use D7 Reset**	**See page H56**
	**Adaptor External Reset -** Mounts on relay reset button and provides larger actuation surface.	CT7N CT8	**CT7N-RA3**	**See page B28**

CMR7N Remote Reset Coil Codes

A.C. Coil Code	Voltage Range		
	50 Hz	60 Hz	50 / 60 Hz
24Z	~	~	**24V**
120	**110V**	**120V**	~
240Z	~	~	220…240V

D.C. Coil Code	Voltage
24D	**24VDC**
110D	110VDC
125D	125VDC

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*e			
	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*e			
	IEC/UL	[V]	690/600 AC
Rating Designation			A600/Q300
Rated Operating Current		*I*e	N.O./N.C.
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			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		CE cULus

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

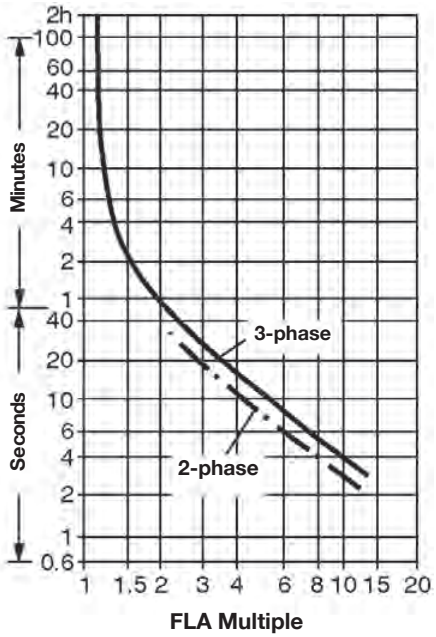
Environmental

Ambient Temperature	Storage	-55…+80 ºC (-67…+176 ºF)
	Operating	-20…+60 ºC (-4…+140 ºF)
Humidity	Operating	5…95% Non-condensing
	Damp Heat	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

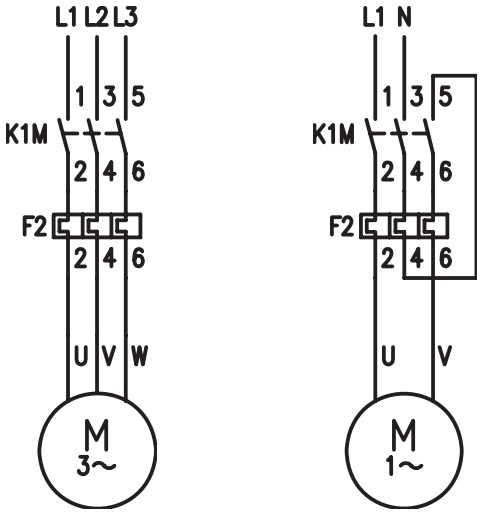
Tripping Characteristics

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

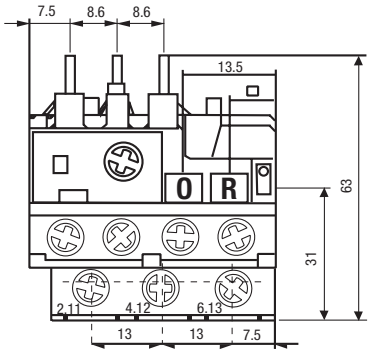


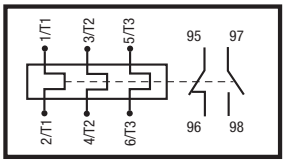
Connection Diagrams



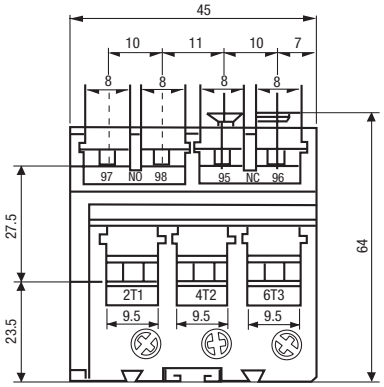
Series CT8

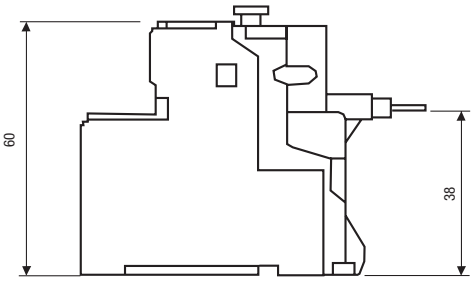
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.





Terminal Marking





Notes

Series CEP9 Electronic Overload Relays

The CEP9 Electronic Overload Relay is the next generation 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.

Choose Series CEP9 overloads for advanced communication and motor protection

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

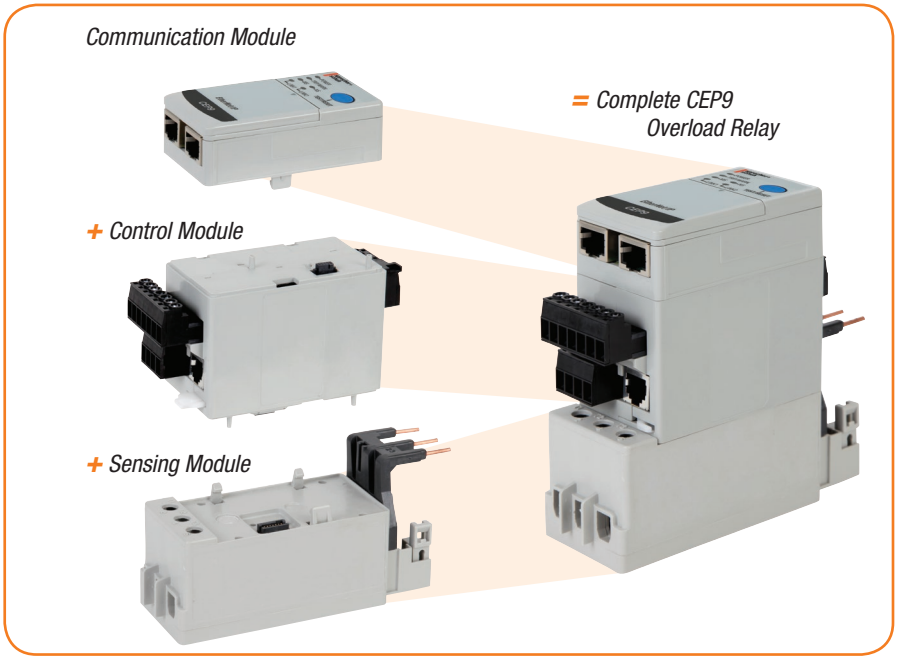
For exact application needs
- Wide Current Range
- Multiple Sensing Capabilities
- Expansion I/O
- Operator Interface

On Board Features

The newly designed CEP9 Overload Relay has incorporated the newest technologies directly into the device to help simplify installation and configuration. Simplified wiring between the CEP9 overload relay and CA7 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.

- *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*



Expansion Modules

Diagnostic Station

Thermal Overload

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 in 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 setting, 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 DeviceNet 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

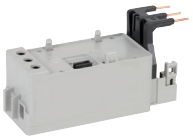
The CEP9 Electronic Overload Relay can be applied to three-phase as well as single-phase applications. A programming parameter is provided for selection between single- and three-phase operation. Straight-through wiring is afforded in both cases.

EtherNet/IP Communications

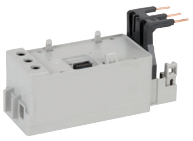
The CEP9 EtherNet/IP communication module has two RJ45 ports that act as an Ethernet switch to support a star, linear, and ring topology and supports the following:

- 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

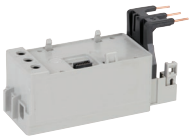
Current Sensing Module

Description	Mounting Options	For Use With	Current Range [A]	Catalog Number	Price
	IEC Contactors	CA7-9…23	0.5…30	**CEP9-ESM-I-23-30**	**149**
		CA7-30…55	0.5…30	**CEP9-ESM-I-55-30**	**149**
			6…60	**CEP9-ESM-I-55-60**	**238**
		CA7-60…97	10…100	**CEP9-ESM-I-97-100**	**315**
		CA6-115…180	20…200	**CEP9-ESM-I-180-200**	**401**
	DIN Rail Mount (to 60A) ❷	Line- and load-side power conductor terminals	0.5…30	**CEP9-ESM-I-T-30**	**144**
			6…60	**CEP9-ESM-I-T-60**	**230**
	DIN Rail Mount (10 to 200A) ❸		10…100	**CEP9-ESM-I-T-100**	**315**
			20…200	**CEP9-ESM-I-T-200**	**401**
	DIN Rail / Panel Mount	Line- and load-side power conductor terminals.	0.5…30	**CEP9-ESM-I-7T-30**	**149**
			6…60	**CEP9-ESM-I-7T-60**	**238**
			10…100	**CEP9-ESM-I-7T-100**	**315**
	DIN Rail Mount Pass-thru (to 60A) ❷	Pass-thru with power conductor apertures	0.5…30	**CEP9-ESM-I-P-30**	**115**
			6…60	**CEP9-ESM-I-P-60**	**201**
	DIN Rail Mount Pass-thru (10 to 200A) ❸		10…100	**CEP9-ESM-I-P-100**	**287**
			20…200	**CEP9-ESM-I-P-200**	**373**

Current/Ground Fault Sensing Module

	IEC Contactors	CA7-9…23	0.5…30	**CEP9-ESM-IG-23-30**	**209**
		CA7-30…55	0.5…30	**CEP9-ESM-IG-55-30**	**209**
			6…60	**CEP9-ESM-IG-55-60**	**298**
		CA7-60…97	10…100	**CEP9-ESM-IG-97-100**	**373**
		CA6-115…180	20…200	**CEP9-ESM-IG-180-200**	**459**
	DIN Rail Mount (up to 60A) ❷	Line- and load-side power conductor terminals	0.5…30	**CEP9-ESM-IG-T-30**	**201**
			6…60	**CEP9-ESM-IG-T-60**	**287**
	DIN Rail Mount (10 to 200A) ❸		10…100	**CEP9-ESM-IG-T-100**	**373**
			20…200	**CEP9-ESM-IG-T-200**	**459**
	DIN Rail / Panel Mount	Line- and load-side power conductor terminals	0.5…30	**CEP9-ESM-IG-7T-30**	**209**
			6…60	**CEP9-ESM-IG-7T-60**	**298**
			10…100	**CEP9-ESM-IG-7T-100**	**373**
	DIN Rail Mount Pass-thru (to 60A) ❷	Pass-thru with power conductor apertures	0.5…30	**CEP9-ESM-IG-P-30**	**172**
			6…60	**CEP9-ESM-IG-P-60**	**258**
	DIN Rail Mount Pass-thru (10 to 200A) ❸		10…100	**CEP9-ESM-IG-P-100**	**344**
			20…200	**CEP9-ESM-IG-P-200**	**430**

Voltage/Current/Ground Fault Sensing Module

	IEC Contactors	CA7-9…23	0.5…30	**CEP9-ESM-VIG-23-30**	**387**
		CA7-30…55	0.5…30	**CEP9-ESM-VIG-55-30**	**387**
			6…60	**CEP9-ESM-VIG-55-60**	**476**
		CA7-60…97	10…100	**CEP9-ESM-VIG-97-100**	**544**
		CA6-115…180	20…200	**CEP9-ESM-VIG-180-200**	**630**
	DIN Rail Mount (up to 60A) ❷	Line- and load-side power conductor terminals	0.5…30	**CEP9-ESM-VIG-T-30**	**387**
			6…60	**CEP9-ESM-VIG-T-60**	**476**
	DIN Rail Mount (10 to 100A) ❸		10…100	**CEP9-ESM-VIG-T-100**	**544**
			20…200	**CEP9-ESM-VIG-T-200**	**630**
	DIN Rail / Panel Mount	Line- and load-side power conductor terminals	0.5…30	**CEP9-ESM-VIG-7T-30**	**373**
			6…60	**CEP9-ESM-VIG-7T-60**	**459**
			10…100	**CEP9-ESM-VIG-7T-100**	**544**
	DIN Rail Mount Pass-thru ❷	Pass-thru with power conductor aperatures and voltage sensing	0.5…30	**CEP9-ESM-VIG-CT-30**	**344**

❶ Future expansion. Contact factory for additional information.
❷ For Panel Mount option use KT7-45-AS Screw Adaptor. See page F16.
❸ For Panel Mount option use CEP9-ESM-SA-100 Screw Adaptor. See page B48.

Control Module

Description		Rated Control Voltage [V]	No. of Inputs/Outputs	Catalog Number	Price
	I/O Module	110…120V AC, 50/60 Hz	4 In/3 Out	CEP9-EIO-43-120	417
		220…240V AC, 50/60 Hz	4 In/3 Out	CEP9-EIO-43-240	417
		24V DC	6 In/3 Out	CEP9-EIO-63-24D	417
	Ground Fault & PTC I/O Module	110…120V AC, 50/60 Hz	2 In / 2 Out	CEP9-EIOGP-22-120	401
		220…240V AC, 50/60 Hz	2 In / 2 Out	CEP9-EIOGP-22-240	401
		24V DC	4 In / 2 Out	CEP9-EIOGP-42-24D	401

Communication Module

	EtherNet/IP Communication	~	~	CEP9-ECM-ETR	476
	DeviceNet Communication	~	~	CEP9-ECM-DNT	❶
	Parameter Configuration	~	~	CEP9-ECM-PCM	❶

Expansion Modules

	Analog Expansion Module	~	3 In / 1 Out	CEP9-EXP-AIO-31	459
	Digital Expansion 120V AC	110…120V AC, 50/60 Hz	4 In / 2 Out	CEP9-EXP-DIO-42-120	238
	Digital Expansion 240V AC	220…240V AC, 50/60 Hz	4 In / 2 Out	CEP9-EXP-DIO-42-240	238
	Digital Expansion 24V DC	24V DC	4 In / 2 Out	CEP9-EXP-DIO-42-24D	238
	Expansion Power Supply	110…240V AC, 50/60 Hz	~	CEP9-EXP-PS-AC	179
		24V DC	~	CEP9-EXP-PS-DC	179

❶ Future expansion. Contact factory for additional information.

Accessories

Description		For Use With	Catalog Number	Price
	**Starter Control Station with 3 meter cable**	~	**CEP9-EOS-SCS**	**238**
	**Starter Diagnostic Station with 3 meter cable**	~	**CEP9-EOS-SDS**	**357**
	**Contactor Coil Module**	CA7-23 contactors	**CEP9-EIO-CM-23**	**24**
		CA7-55 contactors	**CEP9-EIO-CM-55**	**24**
		CA7-97 contactors	**CEP9-EIO-CM-97**	**24**
	**Expansion Module Cable** 1 Meter	~	**CEP9-EXP-CBL-1M**	**24**
	Expansion Module Cable 3 Meter	~	**CEP9-EXP-CBL-3M**	**48**
	**Replacement Connectors**	120/240V AC 2:2 Control Modules	CEP9-NCIOGP-22-CNT	❶
		120/240V AC 4:3 Control Modules	**CEP9-NCIO-43-CNT**	**36**
		24V DC 4:2 Control Modules	CEP9-NCIOGP-42-CNT	❶
		24V DC 6:3 Control Modules	**CEP9-NCIO-63-CNT**	**36**
		Digital Expansion Modules	**CEP9-NCXP-DIO-CNT**	**36**
		Analog Expansion Modules	**CEP9-NCXP-AIO-CNT**	**36**
		Expansion Power Supply	**CEP9-NCXP-PS-CNT**	**36**
	Panel Mount Screw Adaptor	CEP9-ESM-_-100	**CEP9-ESM-SA-100**	**40**
	Load Side Terminal Cover	CEP9-ESM-_-180-200 CEP9-ESM-_-T-200	**CEP9-ESM-TCT-200**	**46**
	Line Side Terminal Cover	CEP9-ESM-_-180-200	**CEP9-ESM-TCL-200**	**46**
	Contactor Side Terminal Cover	CEP9-ESM-_-180-200	**CEP9-ESM-TC-180**	**46**

❶ Future expansion. Contact factory for additional information.

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 ❶		
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 ❷
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 ❸❹
RF Immunity	
Test Level:	10V/m
Performance Criteria:	1 ❸❹
Electrical Fast Transient/Burst Immunity	
Test Level:	4kV (Power) 2kV (Control & Comm)
Performance Criteria:	1 ❸❹
Surge Immunity	
Test Level:	2kV (L-E) 1kV (L-L)
Performance Criteria:	1 ❸❹
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

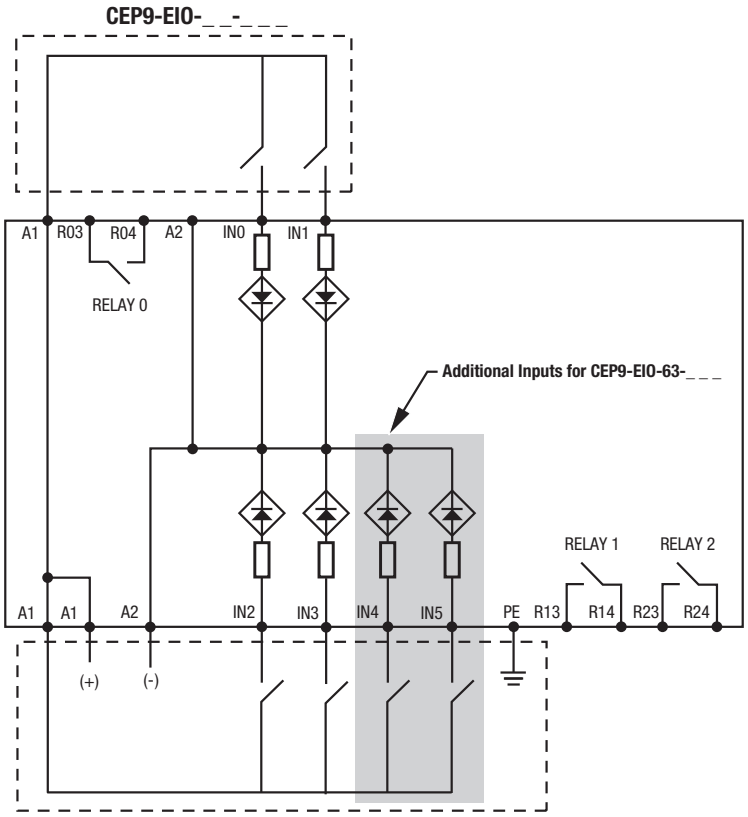
Range

Protection Timers

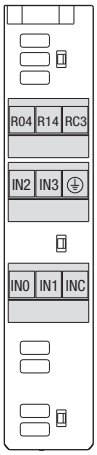
All CEP9 Electronic Overload Relay trip timers have a resolution of ±0.1 s or 0.1 s/25 s (whichever is greater).

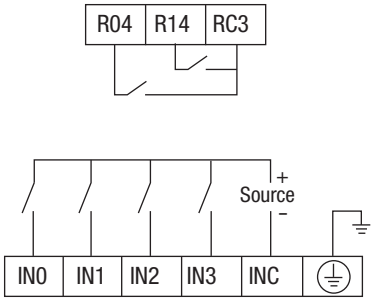
❶ The CEP9 Electronic Overload Relay expansion power supplies (CEP9-EXP-PS-AC and CEP9-EXP-PS-DC) surrounding air temperature must not exceed 55 °C (131 °F).
❷ Any CEP9 Overload Relay that uses an external ground fault sensor is limited to 50/60 Hz detection.
❸ Performance Criteria 1 requires the DUT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

CEP9 Control Module

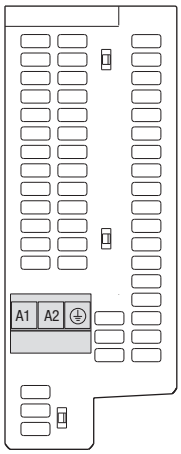


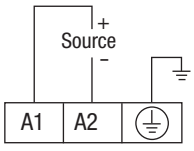
Expansion Digital I/O Modules (CEP9-EXP-DIO-_)





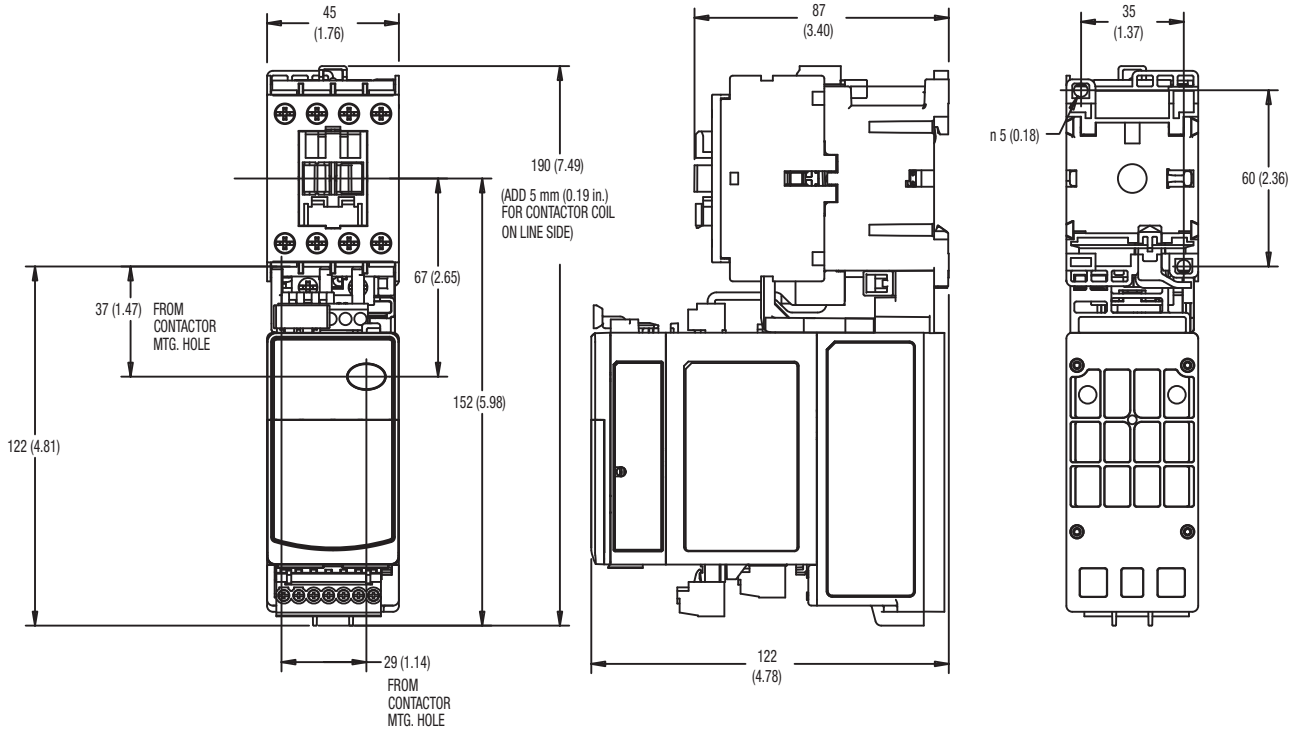
Expansion Power Supplies (CEP9-EXP-PS-_)



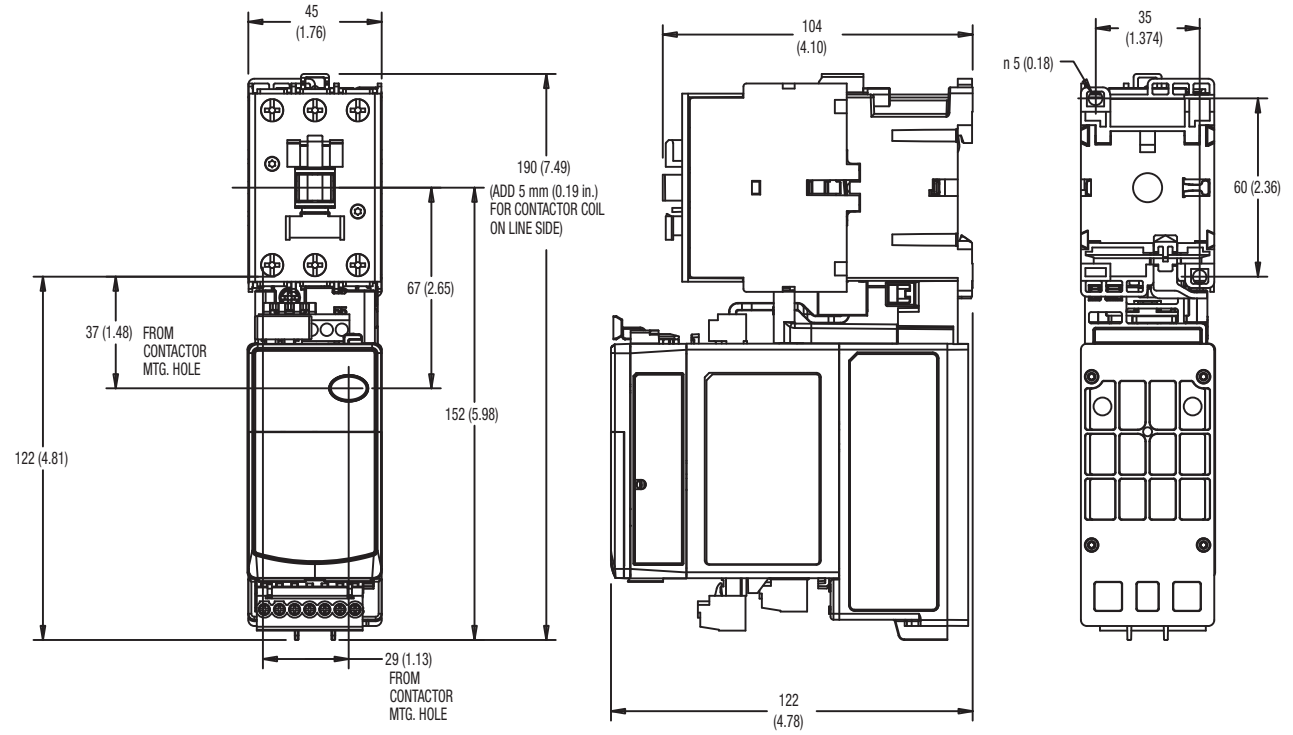


CEP9 Overload Relay Mounted on CA7-9…23 Contactor

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

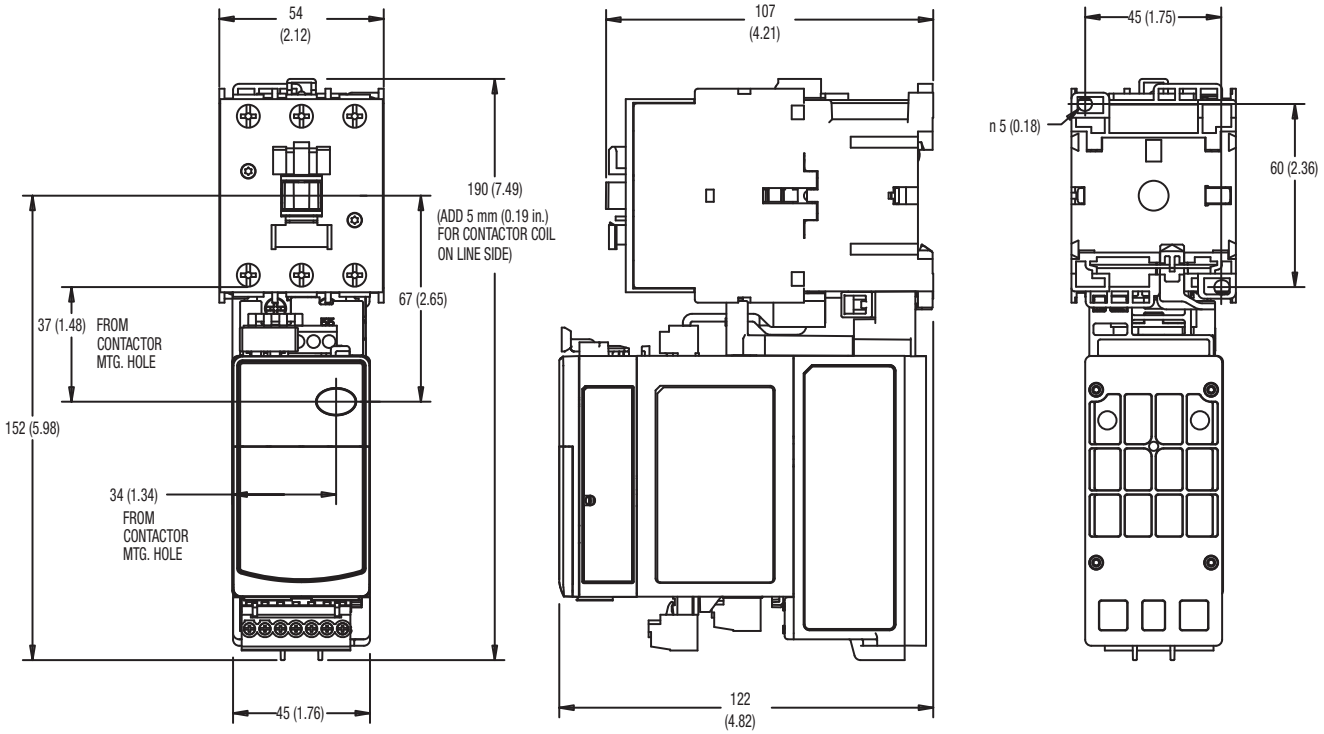


CEP9 Overload Relay Mounted on CA7-30…37 Contactor

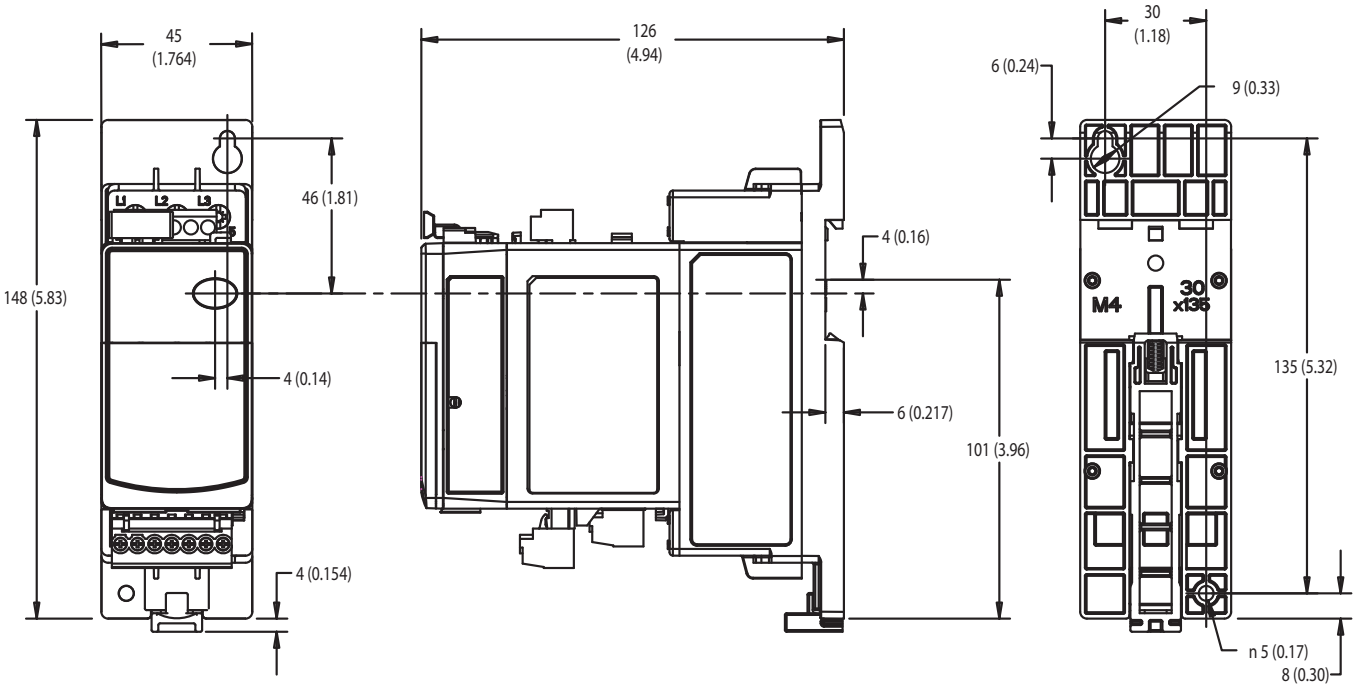


CEP9 Overload Relay Mounted on CA7-43…55 Contactor

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

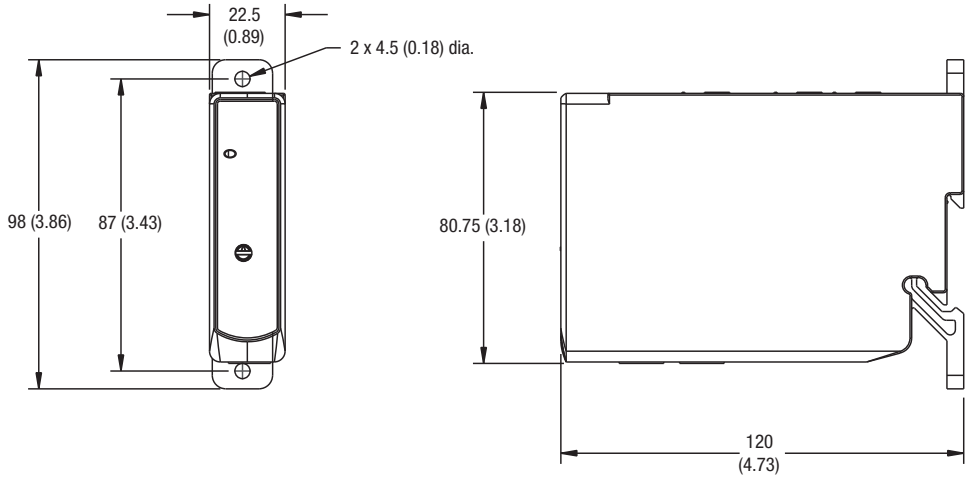


CEP9 Overload Relay DIN Rail/Panel Mounted

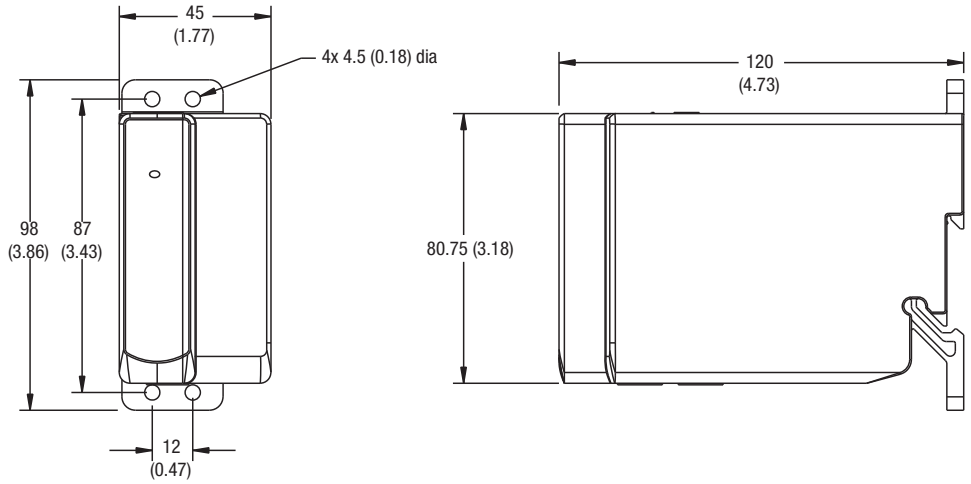


CEP9 Digital Expansion Module (CEP9-EXP-DIO-_)

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



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



CEP9 Starter Control Station (CEP9-EOS-SCS)