

Motor Protection

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Second Generation 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 bi-metallic or eutectic alloy electromechanical overload relays.

Fewer units means greater application flexibility

The new CEP7 is available in three basic models:

- CEP7-ED1 is a Class 10, manual reset model available up to 27 amperes which covers the most common horsepower motors and your every day application. This model is economically priced to be competitive with adjustable bi-metallic 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, stall 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 new 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

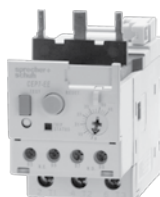


first generation of CEP7 caused the industry to take note of the flexibility when it introduced a 3.2:1 adjustment ratio. A wider adjustment range is the primary reason the industry has been turning to more specifications calling for electronic overload relay protection over thermal overload relays. 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



27A



45A

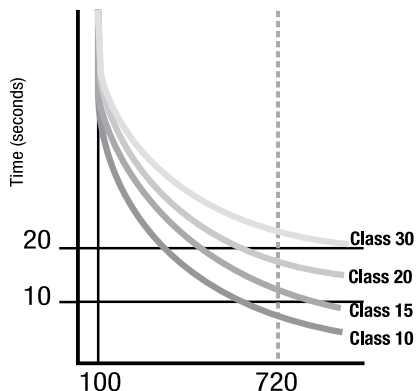


90A



30A

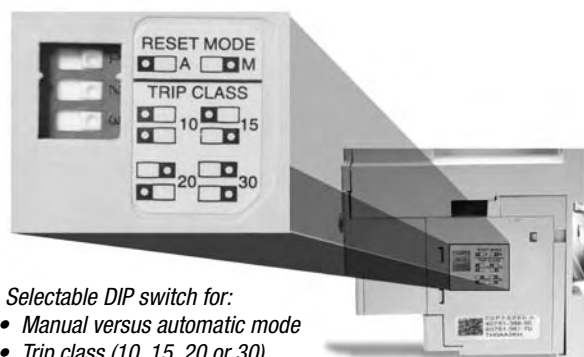
800A



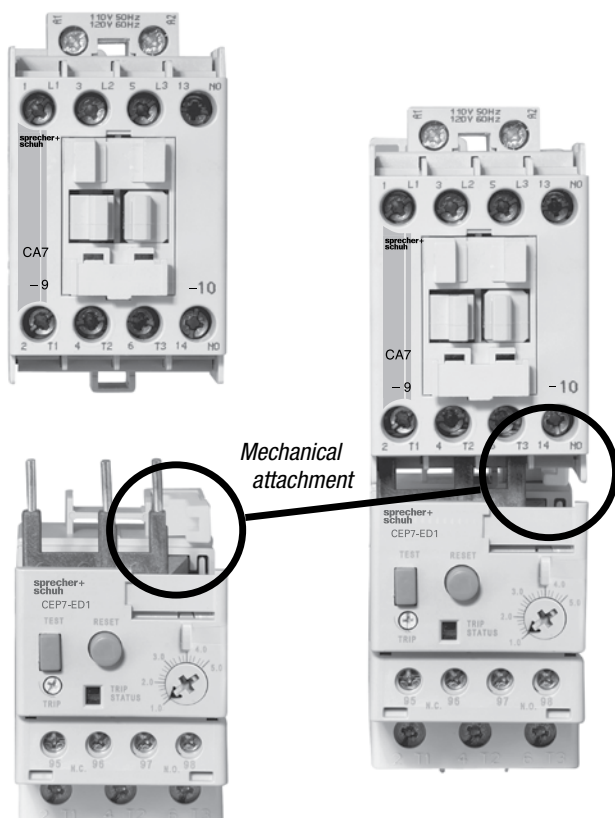
CEP7 overload relays are available with Class 10, 15, 20 or 30 tripping characteristics

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 new 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.



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



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 dip switch selectability in Manual and Automatic Reset modes.

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 insulating the electro-magnet and shielding against airborne metal particles and other potential environmental debris. The new 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.



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%.

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.

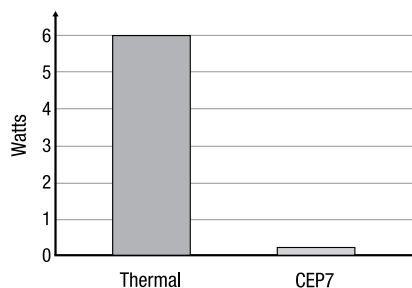
Dramatically lowered energy requirement saves money, reduces panel space

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 bi-metallic 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 150 milliwatts. 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.

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 bi-metallic overload relay. In addition, CEP7 overload relays detect a 50% phase imbalance in the same way as a phase loss.



Conventional overload relays dissipate as much as six watts of energy compared with as little as 150 milliwatts for the CEP7

Directly Mounted CEP7 Solid State Overload Relays, Manual Reset ①②④

Overload Relay	Directly Mounts to Contactor... ②	Adjustment Range (A)	Trip Class 10	
			Catalog Number	Price
Manual Reset for 30 Applications ①				
	CA7-9...CA7-23	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

Directly Mounted CEP7 Solid State Overload Relays, Automatic/Manual Reset ①②③④

Overload Relay	Directly Mounts to Contactor... ②	Adjustment Range (A)	Adjustable Trip Class 10, 15, 20 & 30	
			Catalog Number	Price
Automatic or Manual Reset for 30 Applications ①				
	CA7-9...CA7-23	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...CA7-43	1.0...5.0	CEP7-EECD	138
		3.2...16	CEP7-EEDD	138
		5.4...27	CEP7-EEED	138
		9...45	CEP7-EEFD	138
	CA7-60...CA7-85	5.4...27	CEP7-EEEE	158
		9...45	CEP7-EEFE	158
18...90		CEP7-EEGE	164	
Automatic or Manual Reset for 10 Applications ①				
	CA7-9...CA7-23	1.0...5.0	CEP7S-EEPBB	88
		3.2...16	CEP7S-EERBB	88
		5.2...27	CEP7S-EESBB	88
	CA7-30...CA7-43	9...45	CEP7S-EETD	158
	CA7-60...CA7-85	18...90	CEP7S-EEUE	164

TIP!

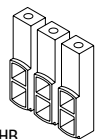
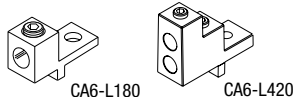
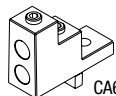
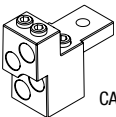
Most industrial applications usually call for an overload relay that must be manually reset in the event of a trip. This allows the cause of the overload to be identified before the motor is restarted. An overload relay that resets automatically is generally for specialized, or remote applications, such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

- ① 3-phase CEP7 units are only designed for 30 applications. Single phase CEP7S units are only designed for single phase applications.
- ② This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.
- ③ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.
- ④ CEP7 overload relays do not work with Variable Frequency Drives, DC Applications or Softstarters with braking options.
- ⑤ The mechanical trip actuator will become functional on shipments of CEP7 second generation starting April 2006. The exact date of Field availability may depend on levels of stock on-hand.

Large Amp CEP7 Solid State Overload Relays, Automatic and Manual Reset ①②③④⑤

Overload Relay	Directly Mounts to Contactor... ②	CT Ratio	Adjustment Range (A)	Selectable Trip Class (10,15,20 & 30)	
				Catalog Number	Price
Automatic or Manual Reset for 3Ø Applications ①③					
 CEP7-EEHF	CA6-95...110 ⑤	No CT	55...110	CEP7-EEVF	285
	CA6-95...-180 CA6-95-EI...-180-EI	150:5	30...150	CEP7-EEHF	508
		200:5	40...200	CEP7-EEJF	508
	CA6-210-EI...-420-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...-860-EI	600:5	120...600	CEP7-EEMH	1397
		800:5	160...800	CEP7-EENH	1397

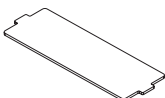
Load Side Lugs & Accessories

Lug or Accessory	Description	For Use With...	Catalog Number	Price
 CA6-HB	Main Terminal Set, ⑥ 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	200
		CEP7-EEJG CEP7-EEKG CEP7-EELG	CA6-HB3	295
 CA6-L180 CA6-L420	Screw Type Lugs - - Accepts round conductors only - Copper construction (set of 3-two sets required to wire line and load sides)	CEP7-EEHF CEP7-EEJF	CA6-L180	168
		CEP7-EEJG CEP7-EEKG CEP7-EELG	CA6-L420	250
 CA6-L630	Screw Type Lugs - - Accommodation for dual connections to each pole - Copper construction accepts round conductors only (set of 3-two sets required to wire line and load sides)	CEP7-EEMH CEP7-EENH	CA6-L630	328
 CA6-L860	Screw Type Lugs - - Accommodation for dual connections to each pole - Copper construction accepts round conductors only (set of 3-two sets required to wire line and load sides)	CEP7-EEMH CEP7-EENH	CA6-L860	490
	Main Terminal Cover - ⑦ - CA6 touch protection - Line & Load (two pieces per set) - IP10; IEC60529 & DIN 40 050 protection	CEP7-EE_F CEP7-EE_G CEP7-EE_H	CA6-TC180 CA6-TC420 CA6-TC860	46 76 103

- ① 3-phase CEP7 units are only designed for 3Ø applications.
- ② This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.
- ③ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.
- ④ CEP7 Overload relays do not work with Variable Frequency Drives or any Sprecher + Schuh Softstarter with braking options.
- ⑤ The mechanical trip actuator will become functional shipments of CEP7 second generation after April 2006. Field availability may depend on levels of stock on-hand.

- ⑥ CA6-HB1 is not applicable with CEP7.
- ⑦ Terminal covers not necessary when using CA6-HB-....
- ⑧ CEP7-EEHF...CEP7-EENH include current transformers used to monitor high amperage. CEP7-EEVF directly monitors amperage. No current transformer is necessary.
- ⑨ CEP7-EEVF not for use with CA6-95-EI or CA6-110-EI.

Accessories - CEP7 Side Mount Modules ①②

Accessory	Description	For use with...	Catalog Number	Price																				
 CEP7-ERR	Remote Reset Module 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 - 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-EGF	Ground Fault Protection and Remote Reset Module ② - 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_	CEP7-EGF	110																				
 CEP7-EGJ	Ground Fault/Jam Protection and Remote Reset Module ② - 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	Must use with CEP7-CBCT_ Current Sensor	CEP7-EGJ	145																				
 CEP7-EPT	PTC Thermistor Relay and Remote Reset Module - PTC Protection and LED Status indication<table><tr><td>Type of Control Unit</td><td>Mark A</td></tr><tr><td>Number of Sensors</td><td>6</td></tr><tr><td>Maximum Cold Resistance of Sensor Chain</td><td>1500</td></tr><tr><td>Trip Resistance</td><td>3400 ± 150</td></tr><tr><td>Reset Resistance</td><td>1600 ± 50</td></tr><tr><td>Short Circuit Trip Resistance</td><td>25 ± 10</td></tr><tr><td>Open Circuit Trip Resistance</td><td>> 20,000</td></tr><tr><td>Maximum Voltage at 1T1 / 1T2 (Rptc=4k)</td><td>< 7.5 Vdc</td></tr><tr><td>Maximum Voltage at 1T1 / 1T2 (Rptc=open)</td><td>< 30 Vdc</td></tr><tr><td>PTC Response Time</td><td>500ms...800ms</td></tr></table> - Provision for reset after trip from remote pilot device	Type of Control Unit	Mark A	Number of Sensors	6	Maximum Cold Resistance of Sensor Chain	1500	Trip Resistance	3400 ± 150	Reset Resistance	1600 ± 50	Short Circuit Trip Resistance	25 ± 10	Open Circuit Trip Resistance	> 20,000	Maximum Voltage at 1T1 / 1T2 (Rptc=4k)	< 7.5 Vdc	Maximum Voltage at 1T1 / 1T2 (Rptc=open)	< 30 Vdc	PTC Response Time	500ms...800ms	Side-mount to any CEP7-EE_ CEP7S-EE_	CEP7-EPT	125
Type of Control Unit	Mark A																							
Number of Sensors	6																							
Maximum Cold Resistance of Sensor Chain	1500																							
Trip Resistance	3400 ± 150																							
Reset Resistance	1600 ± 50																							
Short Circuit Trip Resistance	25 ± 10																							
Open Circuit Trip Resistance	> 20,000																							
Maximum Voltage at 1T1 / 1T2 (Rptc=4k)	< 7.5 Vdc																							
Maximum Voltage at 1T1 / 1T2 (Rptc=open)	< 30 Vdc																							
PTC Response Time	500ms...800ms																							
	Adjustment Cover for External Modules	All modules with DIP Switches	CEP7-EMC	6.50																				

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① Side mount modules must have 24 - 240V, 47 - 63HZ or DC applied to terminals A1 and A2 for control power.
② ATTENTION: The CEP7 Overload relay is not a ground fault circuit interruptor for personnel protection as defined in Article 100 of the NEC.
③ See page B11.1-11.3 for Technical Data, Wiring, and DIP Switch set up.

Accessories

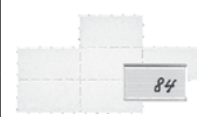
Accessory	Description	For use with...	Catalog Number	Price
	DIN-rail / Panel Adaptor For separate mounting of overload relay to backpan or top hat DIN-rail	CEP7-ED1...B CEP7-EE...B	CEP7-EPB	29
		CEP7-EE...D	CEP7-EPD	29
		CEP7-EE...E	CEP7-EPE	35
	Current Adjustment Shield Prevents inadvertent adjustment of the current setting	all CEP7-ED CEP7-EE	CEP7-BC8	13
	External Reset Button Adaptor Provides a larger "target area" for resetting the overload relay when using an External Reset Button	CEP7-EE (AB...GE) CEP7-EE (PB...GE) ❶	CEP7-ERA	14
	External Reset Button Used for manually resetting overloads mounted in enclosures	all CEP7	Use D7 Reset - See Section H.	~

CEP7 Ground Fault Sensor Selection ❹

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 ❸	CA7-9...CA7-37	CEP7-CBCT1	50
	90A	50/60 Hz	1000:1	39.6mm (1.56 in.)	2 AWG @ 600V ❸	CA7-9...CA7-85	CEP7-CBCT2	175
	180A	50/60 Hz	1000:1	63.5 mm (2.50 in.)	250MCM (120mm²) @ 600V ❸	CA7-09...CA6-180	CEP7-CBCT3	226
	420A	50/60 Hz	1000:1	82.3 mm (3.25 in.)	350MCM (185mm²) @ 600V ❸	CA7-09...CA6-420	CEP7-CBCT4	287

Marking Systems ❷

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	1.75
	Marking Tag Sheet - 1 sheet with 160 perforated paper labels each, 6 x 17mm. To be used with transparent cover.	1	CA7-FMP	1.75
	Transparent Cover - To be used with Marking Tag Sheets.	100 ❸	CA7-FMC	.17
	Tag Carrier - For marking with Series V7 Clip-on Tags.	100 ❸	CA7-FMA2	.17

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

❷ The labeling field of the overload relay may also be written on by hand.

❸ Minimum order quantity is one package of 100. Price each x 100 = total price.

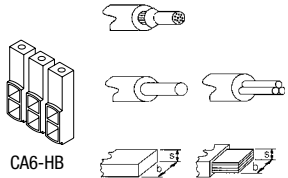
❹ See pg. B11.1-11.3 for Application Details.

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

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

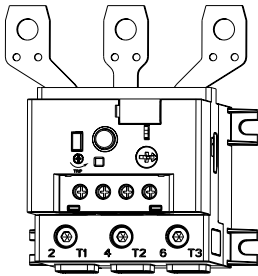
Technical Information

			CEP7-ED1...B CEP7-EE...B	CEP7-EE...D	CEP7-EE...E
Rated Insulation Voltage - U_i			690 AC		
Rated Insulation Strength- U_{imp}			6 AC		
Rated Operation Voltage - U_e			690 AC (IEC) / 600 AC (UL/CSA)		
Terminal Cross Sections					
Terminal Type			M5	M5	M8
Terminal Screw			M5	M5	M8
	One conductor	[mm ²]	1 x (2.5...16)	1 x (2.5...16)	1 x (4...35)
	Torque	[Nm]	2.5	2.5	2.4
	Two conductors	[mm ²]	2 x (2.4...10) ❶	2 x (2.4...10) ❶	2 x (4...25)
	Torque	[Nm]	3.4	3.4	4
	One conductor	[mm ²]	1 x (2.5...25)	1 x (2.5...25)	1 x (4...50)
	Torque	[Nm]	2.5	2.5	4
	Two conductors	[mm ²]	2 x (6...16) ❶	2 x (6...16) ❶	2 x (4...35)
	Torque	[Nm]	3.4	3.4	4
	One conductor	[AWG]	1 x (14...6)	1 x (14...6)	1 x (12...1)
	Torque	[lb-in]	22	22	35
	Two conductors	[AWG]	2 x (14...6) ❶	2 x (14...6) ❶	2 x (6...2)
	Torque	[lb-in]	30	30	35
Pozidrive Screwdriver Size			2	2	----
Slotted screwdriver			[mm]	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]	690 AC (IEC) / 600 AC (UL/CSA)		
Terminal Power						
Type			Hexagonal Bolt	Hexagonal Bolt	Hexagonal Bolt	
Direct Connection 			M8 x 25	M10 x 30	M12 x 40	
Recommended Torque			[Nm]	11	16	
			[lb-in]	100	140	
With Main Terminal Set (CA6...HB...)			With CA6-HB2	With CA6-HB3		
	sm. opening	[mm²]	16...35 ②	25...240	~	
	lg. opening	[mm²]	16...95 ②	25...240	~	
	sm. opening	[mm²]	16...50 ②	25...240	~	
	lg. opening	[mm²]	16...120 ②	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...300 MCM	~	~	~
Recommended Torque		[lb-in]	90...110	~	~	~
CA6-L420		[AWG]	~	2x#4...350 MCM	~	~
Recommended Torque		[lb-in]	~	130-150	~	~
CA6-L630		[AWG]	~	~	2 x 2 / 0...500 MCM 600	~
Recommended Torque		[lb-in]	~	~	~	~
CA6-L860		[AWG]	~	~	~	4 x 2 / 0...500 MCM 600
Recommended Torque		[lb-in]	~	~	~	~

❶ For multiple conductor applications the same style and size of wire must be used. ❷ Minimum 25mm² (#4 AWG) -95mm² with sleeve per DIN 46228.

Technical Information

					
				CEP7-EEVF	
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)		
Line Terminal Power					
Type				Hexagonal Bolt	
Direct Connection				M8 x 25	
Recommended Torque		[Nm]	8...10		
(Bolt supplied with contactor)		[lb-in]	70...90		
Load Terminal Cross Sections					
Terminal Type					
Terminal Screw				M8	
	Flexible with wire end ferrule	One conductor	[mm²]	1 x (4...50)	
		Torque	[Nm]	4.6	
		Two conductors	[mm²]	2 x (4...25)	
		Torque	[Nm]	4.6	
	Course stranded / solid	One conductor	[mm²]	1 x (4...50)	
		Torque	[Nm]	4.6	
		Two conductors	[mm²]	2 x (4...35)	
		Torque	[Nm]	4.6	
	Stranded / Solid	One conductor	[AWG]	1 x (12...1/0)	
		Torque	[lb-in]	40	
		Two conductors	[AWG]	2 x (8...2)	
		Torque	[lb-in]	40	
Pozidrive Screwdriver Size				----	
Slotted screwdriver				[mm]	---
Hexagon Socket Size				[mm]	4

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 Operation Current - I_e			
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	[mm ²]	1 x (0.5...2.5)
	Torque	[Nm]	0.55
	Two Conductors	[mm ²]	2 x (0.25...1.5)
	Torque	[Nm]	0.55
 Course stranded / solid	One conductor	[mm ²]	1 x (0.5...4)
	Torque	[Nm]	0.55
	Two conductors	[mm ²]	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

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 standard
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

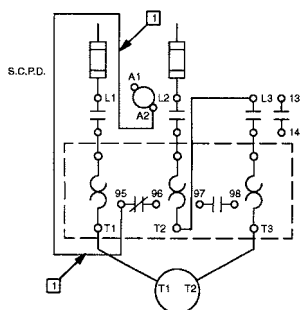
Electrostatic Discharge Immunity	Test Level	[kV]	8kV air discharge 6kV contact discharge
	Performance Level		1 ①②
RF Immunity	Test Level	[V/m]	10 V/m
	Performance Level		1 ①②
Electrical Fast Transient Burst Immunity	Test Level	[kV]	4 kV
	Performance Level		1 ①②
Surge Immunity	Test Level	[V/m]	2 kV (L-E) 1 kV (L-L)
	Performance Level		1 ①②

General

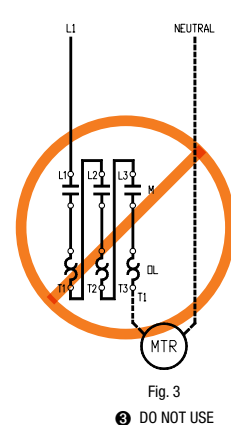
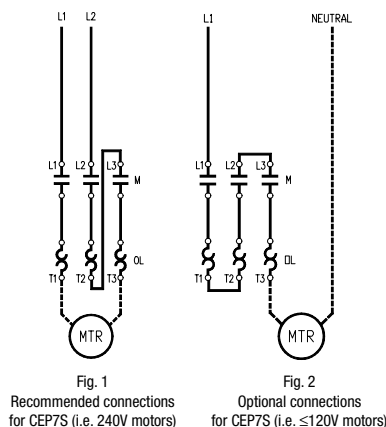
Standards	UL 508, CSA C22.2 No. 14, NEMA (CD2-1993 Part 4, EN 60947-4-1, EN 60947-5-1)		
Approvals	CSA, UL, ATEX (pending)		
	CEP7-ED1...B CEP7-EE...B	CEP7-EE...D	CEP7-EE...E
Weights (unpackaged)	[Kg]	0.25	0.25
	[Lb]	0.55	0.55
		0.25	0.52
		0.55	1.06

Wire Schematics

Typical Wiring
for Single Phase Applications



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

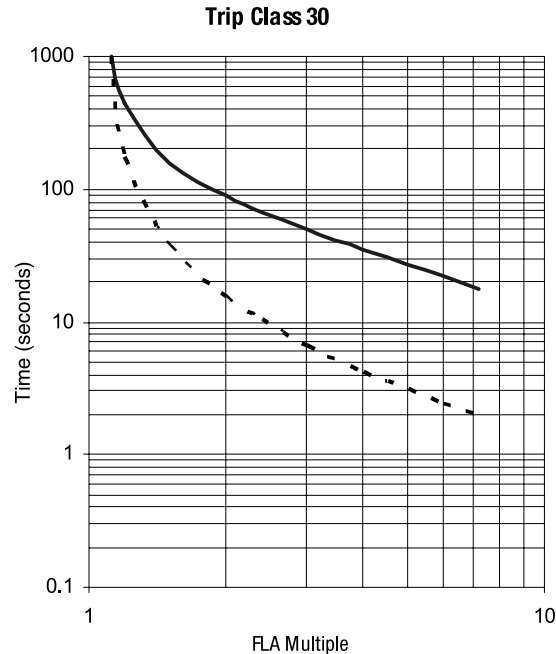
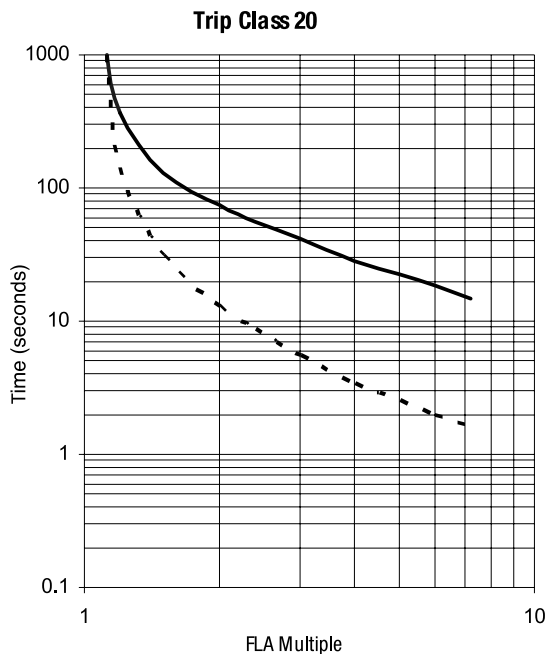
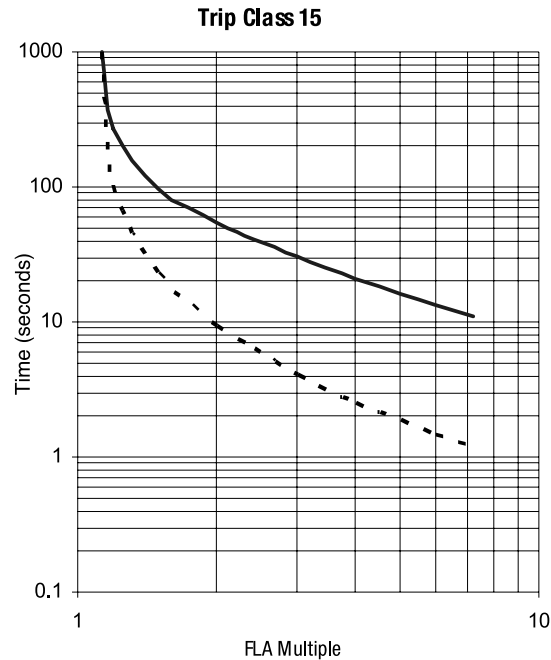
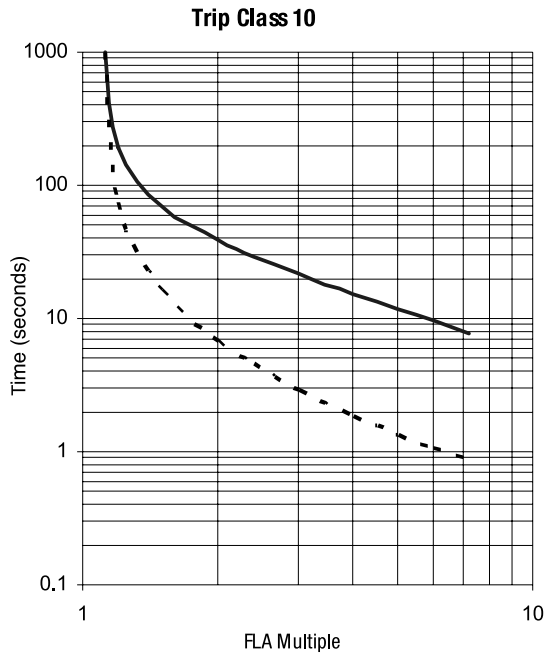


- ① Performance Criteria 1 requires the DUT to experience no degradation or loss of performance.
- ② Environment 2.

- ❗ 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.

Technical Information

Trip Curves ❶



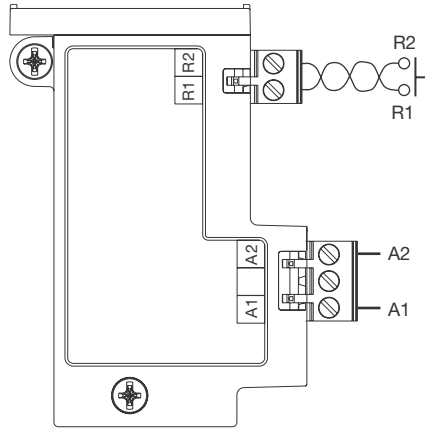
Trip Curve Legend

Cold Trip ———
Hot Trip - - - - -

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

Dimensions

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/EJM Operational LED

Status LED:
Steady Green - Module is powered up.

CEP7-EJM Dip Switch

Adjustment Settings

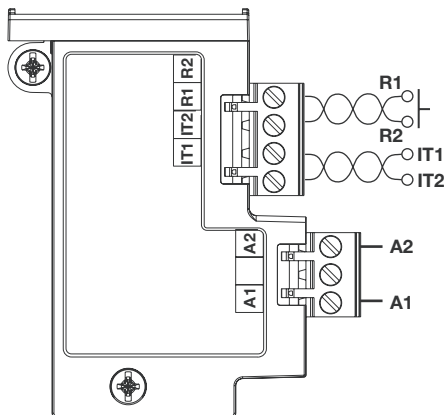
Remote Reset		
SW1	Enable: I	Disable: 0

Jam Protection		
SW2	Enable: 0	Disable: I

Jam Trip Level		
	SW 3	SW 4
150%	0	0
200%	0	I
300%	I	0
400%	I	I

Jam Trip Delay		
	SW 5	SW 6
0.5 sec	I	I
1 sec	I	0
2 sec	0	I
4 sec	0	0

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

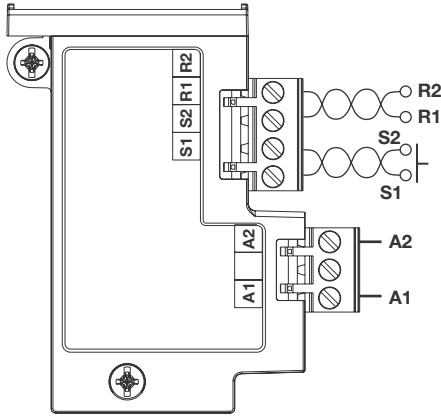
SW3	3 Phase: I	1 Phase: 0
-----	------------	------------

❶

❶ 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:
500 ms ± 250 ms, typical;
< 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.

Dimensions

CEP7-EGF & CEP7-EGJ 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 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.

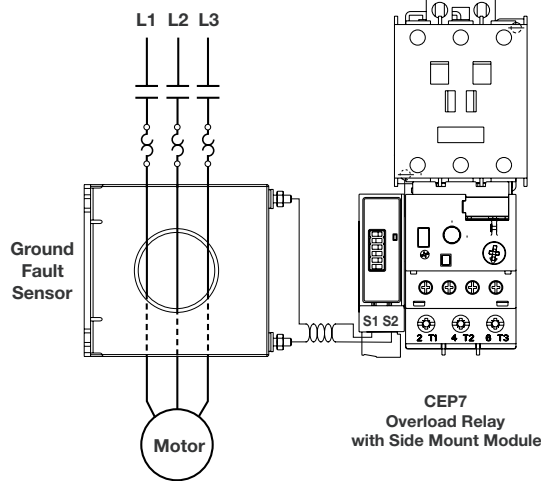
CEP7-EGF Dip Switch

Adjustment Settings

Overload Relay Reset Mode			
SW1	Manual: I	Automatic: 0	
Ground Fault Current Range			
	SW 2	SW 3	
20...100mA	0	0	0
100...500mA	0	1	0
0.2...1.0A	1	0	0
1.0...5.0A	1	1	1
Ground Fault Trip Level			
	SW 4	SW 5	SW 6
Disable/Off	0	0	0
20% Max GF Current	0	0	1
35% Max GF Current	0	1	1
50% Max GF Current	0	1	1
65% Max GF Current	1	0	0
80% Max GF Current	1	0	1
90% Max GF Current	1	1	0
100% Max GF Current	1	1	1
Overload Relay Type			
SW7	3 Phase: I	1Phase: 0	
SW8	Not Used		

CEP7-EGF & CEP7-EGJ Installation

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.

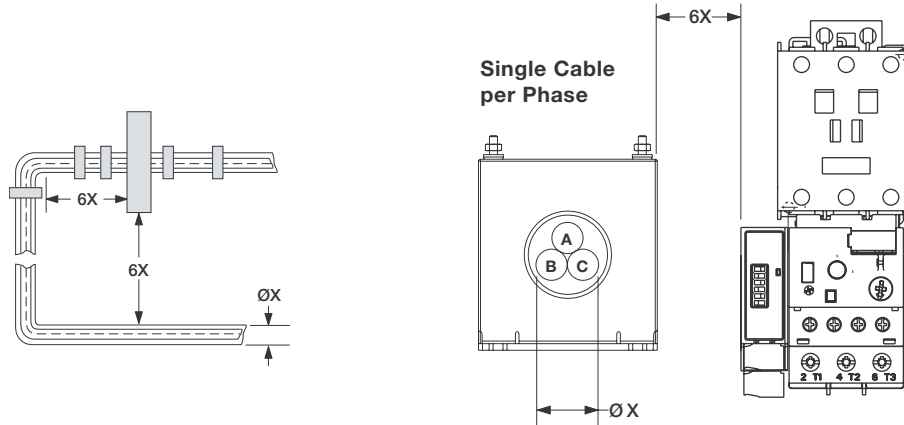
CEP7-EGJ Dip Switch

Adjustment Settings

Overload Relay Reset Mode			
SW1	Manual: I	Automatic: 0	
Ground Fault Current Range			
	SW 2	SW 3	
20...100mA	0	0	0
100...500mA	0	1	0
0.2...1.0A	1	0	0
1.0...5.0A	1	1	1
Ground Fault Trip Level			
	SW 4	SW 5	SW 6
Disable/Off	0	0	0
20% Max GF Current	0	0	1
35% Max GF Current	0	1	0
50% Max GF Current	0	1	1
65% Max GF Current	1	0	0
80% Max GF Current	1	0	1
90% Max GF Current	1	1	0
100% Max GF Current	1	1	1
Overload Relay Type			
SW7	3 Phase: I	1Phase: 0	
Jam Protection			
SW8	Enable: I	Disable: 0	

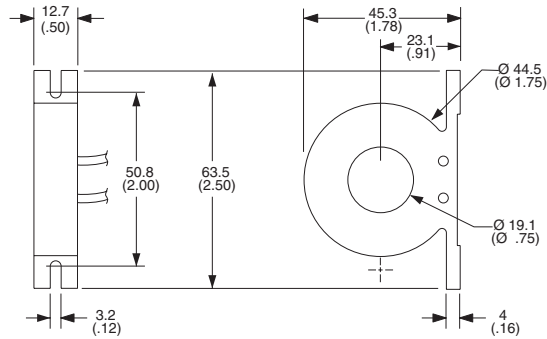
Dimensions

CEP7-CBCT Installation

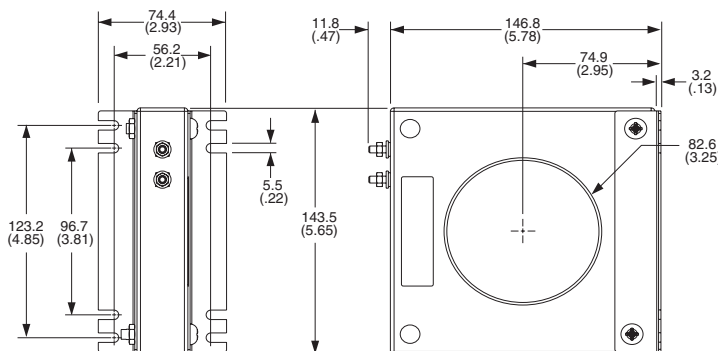


CEP7-CBCT Dimensions

CEP7-CBCT1

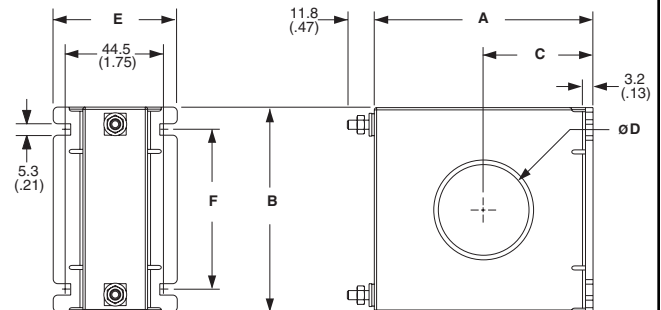


CEP7-CBCT4



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

CEP7-CBCT2 & 3



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 interruptor 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

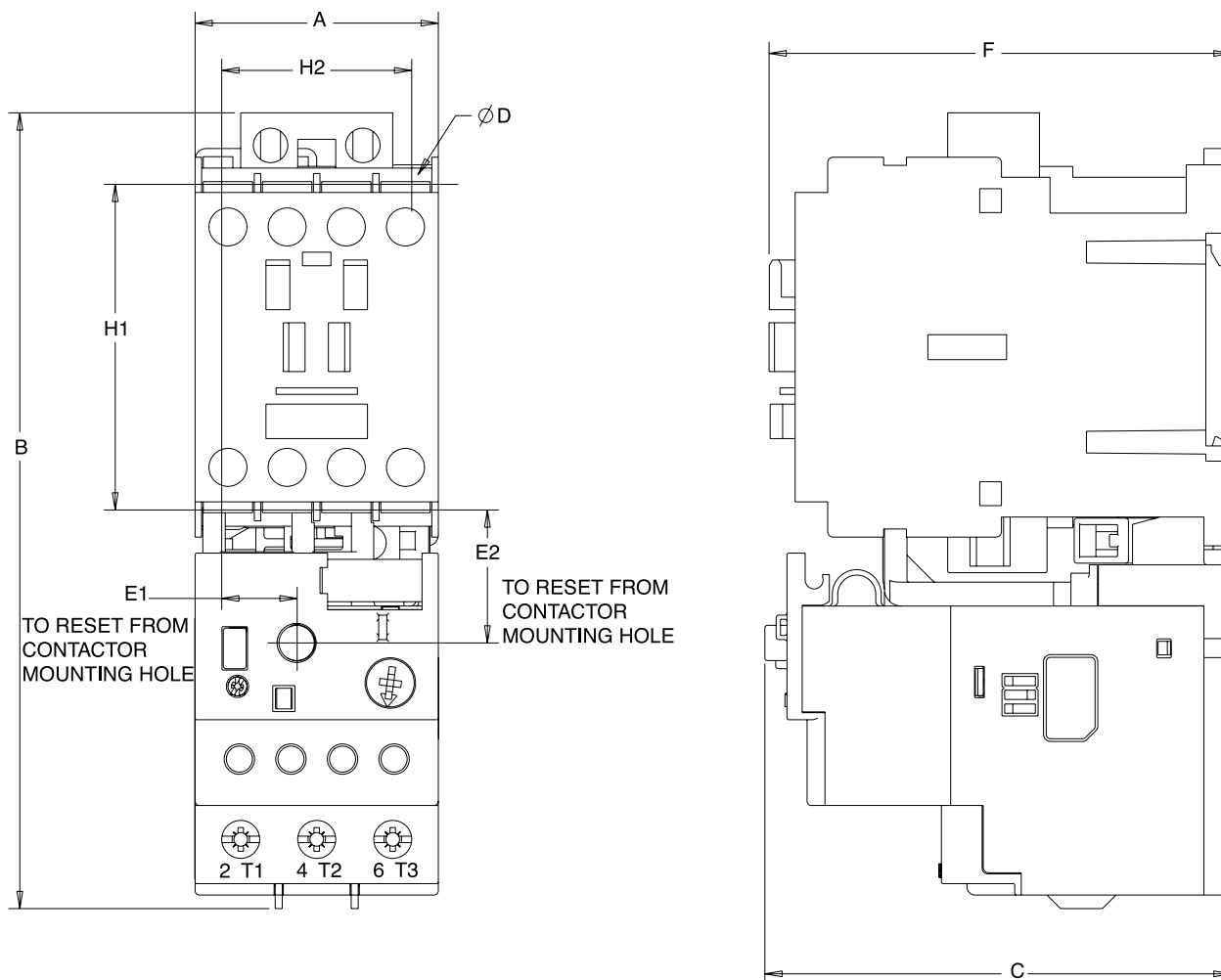
< 30 seconds, if the protection inhibit has not been cleared.

Under no conditions should a ground fault trip take longer than 31 seconds.

Dimensions

CEP7 Mounted to CA7 Contactor

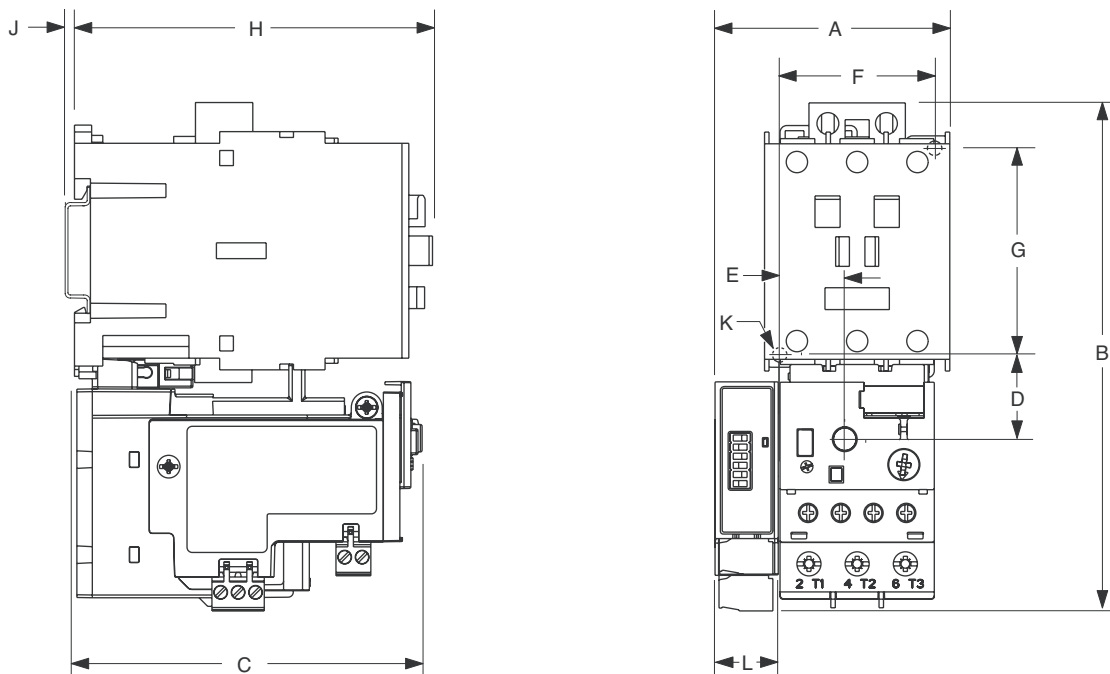
- Dimensions are in millimeters (inches)
- Dimensions not intended for manufacturing purposes



Overload	Mounted to Contactor	A Width	B Height	C Depth	D	E1	E2	F	H1	H2
CEP7-ED...B CEP7-EE...B CEP7S-EE...B	CA7-9...23	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-EE...D CEP7S-EE...D	CA7-30...37	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-EE...D CEP7S-EE...D	CA7-43	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...85	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)

Dimensions

CEP7 Mounted to CA7 Contactor (with side mounted module)



Contactor Cat. No.	Overload Cat. No.		A	B	C	D	E	F	G	H	J	K	L
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		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	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

CEP7 Module Technical Information

Wire Size and Torque Specifications

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

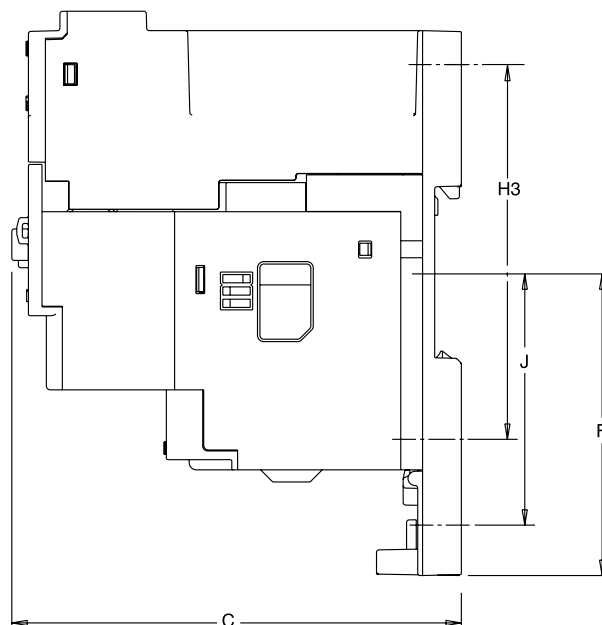
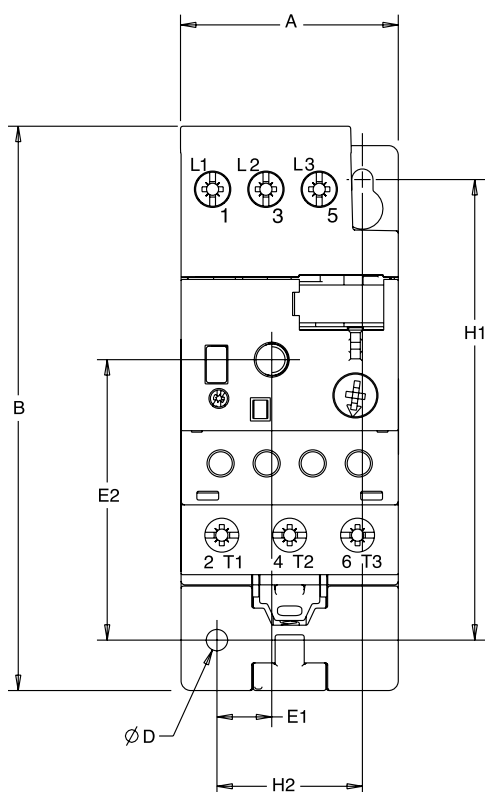
- Connect remote reset pilot device to Terminals R1 and R2.
- Do not apply external voltage to R1 and R2. Equipment damage will occur.
- Recommend use of twisted pair for remote reset, #24 AWG minimum.
- Apply 24 - 240V, 47 - 63HZ or DC to terminals A1 and A2 for control power.
- Rated Insulation Voltage (Ui) 300V
- Rated Operating Voltage (Ue) 24 - 240 VAC, 50/60 Hz
24 - 240 VDC
- Power at Rated Operating Voltage (Typical)

24 VAC	0.3 W
120 VAC	0.3 W
240 VAC	0.5 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.

Dimensions

CEP7 with CEP7-EP... Panel Mount Adaptor

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

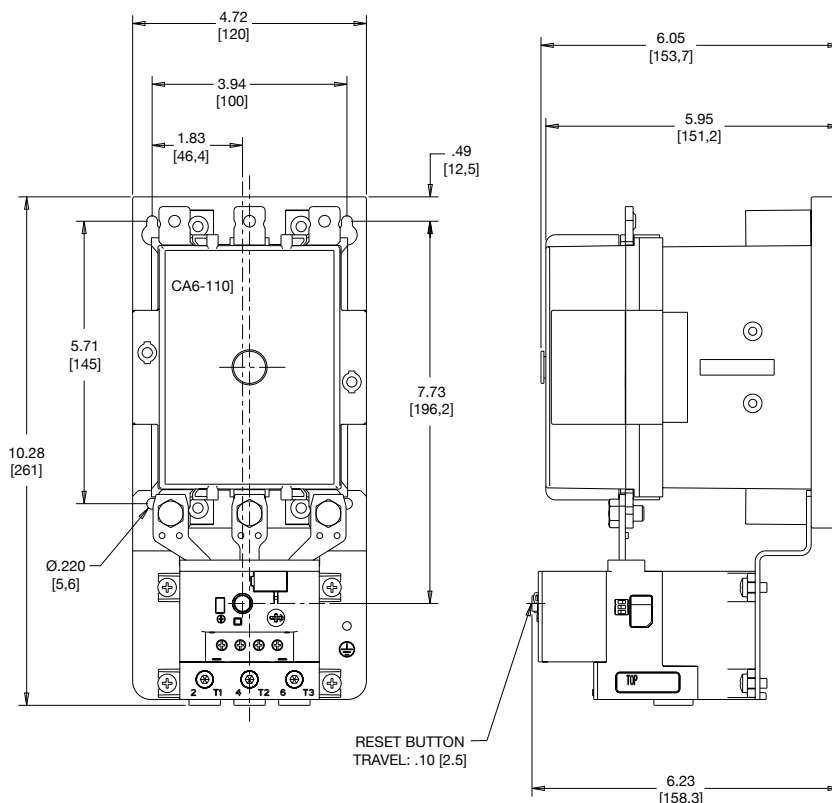


Panel Mount Adaptor	Overload Relay	A Width	B Height	C Depth	D	E1	E2	F	H1	H2	H3	J
CEP7-EPB	CEP7-ED...B CEP7-EE...B CEP7S-EE...B	45 (1-25/32)	116.5 (4-9/16)	92.7 (3-21/32)	4.4 (11/64)	11.4 (29/64)	57.9 (2-9/32)	62.5 (2-15/32)	95 (3-3/4)	30 (1-3/16)	75 (2-31/32)	52.1 (2-3/64)
CEP7-EPD	CEP7-EE...D CEP7S-EE...D	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-EE...E CEP7S-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)

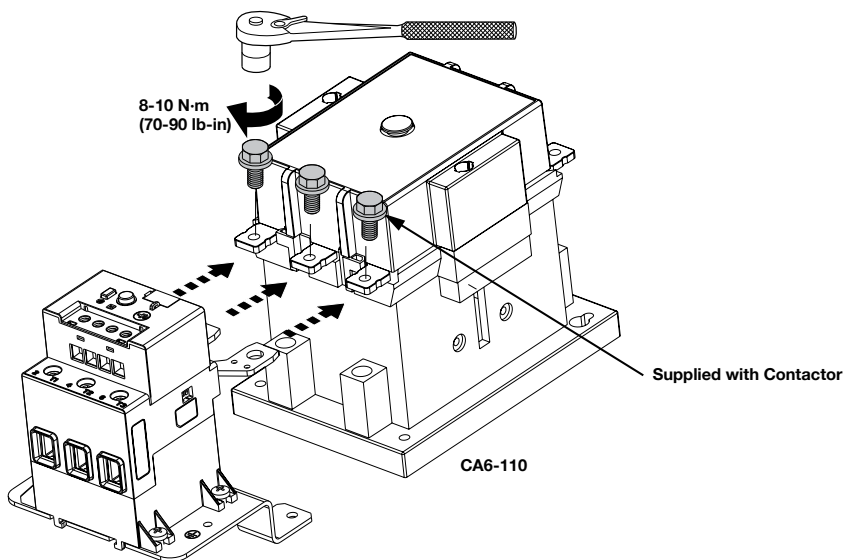
DIN-rail / Panel Adapter Terminal Cross Sections		CEP7-EPB ❶	CEP7-EPD ❶	CEP7-EPE
Flexible stranded with ferrule	Single conductor	1.0...4.0mm ²	2.5...16mm ²	4.0...35mm ²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
	Two conductor	1.0...4.0mm ²	2.5...10mm ²	4.0...25mm ²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
Course stranded / solid	Single conductor	1.5...6.0mm ²	2.5...25mm ²	4.0...50mm ²
	Torque	1.8 Nm	2.3 Nm	4.0 Nm
	Two conductor	1.5...6.0mm ²	2.5...16mm ²	4.0...35mm ²
	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.

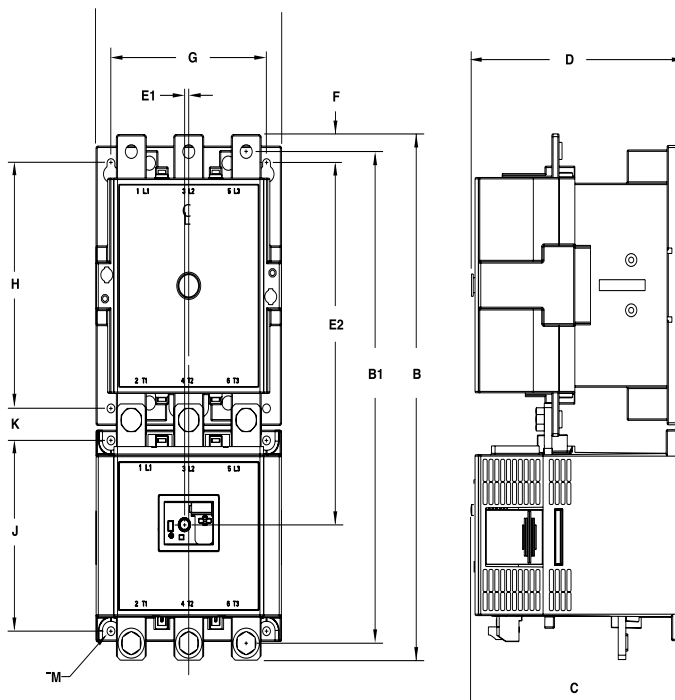
CEP7-EEVF



Assembly Instructions



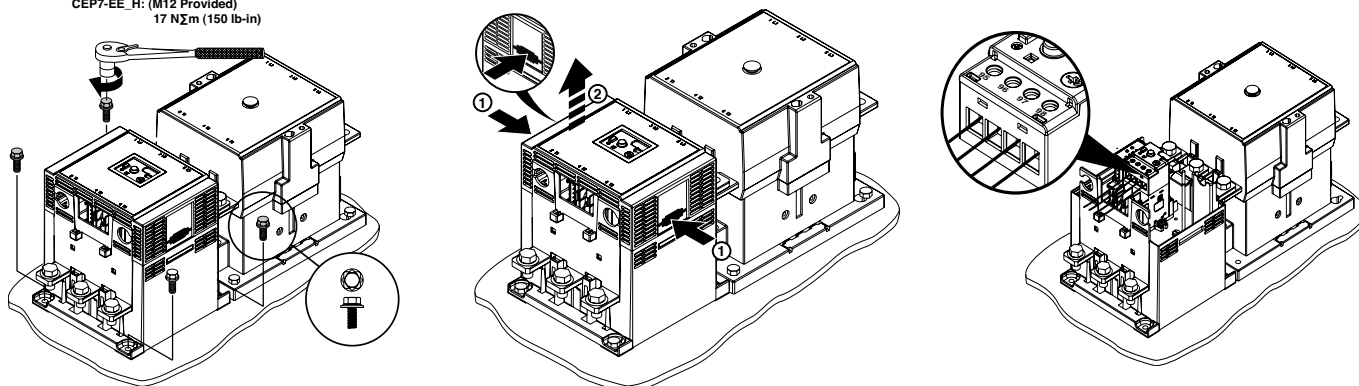
CEP7-EE_F... EE_H mounted to CA6 Contactor



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											
CEP7-EE_F	CA6-95 (EI)	120	336.3	418	311.8	152.7	156	36	226.3	12.5	100	145	135	22.3	8 - 5.6
	CA6-110 (EI)	(4.72)	(13.24)	(16.46)	(12.27)	(6.01)	(6.14)	(.14)	(8.91)	(.49)	(3.94)	(5.71)	(5.31)	(.88)	(8 - .22)
	CA6-140 (EI)	120	339.8	418	317.8	152.7	156	36	226.3	16	100	145	135	22.3	8 - 5.6
CEP7-EE_G	CA6-180 (EI)	(4.72)	(13.38)	(16.46)	(12.51)	(6.01)	(6.14)	(.14)	(8.91)	(.63)	(3.94)	(5.71)	(5.31)	(.88)	(8 - .22)
	CA6-210 EI	155	385.8	487.4	360.8	176.5	180	36	265.5	21	130	180	140	23.5	8 - 6.5
	CA6-420 EI	(6.10)	(15.19)	(19.19)	(14.2)	(6.95)	(7.09)	(.14)	(10.44)	(.83)	(5.12)	(7.09)	(5.51)	(.93)	(8 - .26)
CEP7-EE_H	CA6-630 EI	255	552	915	508	269.3	270.7	36	384.1	52.5	226	230	108	109	8 - 13
	CA6-860 EI	(10.04)	(21.73)	(36.02)	(20)	(10.6)	(10.66)	(.14)	(15.12)	(2.07)	(8.90)	(9.06)	(4.25)	(4.29)	(8 - .51)

Assembly Instructions

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



Notes

B

**Motor
Protection**

CEP7

Series CT7 Thermal Overload Relays

Choose CT7 overloads
in DC applications and
when monitoring Variable
Frequency Drives

Sprecher + Schuh has always paid particular attention to the subject of motor protection. This concern is reflected in our CT line of thermal overload relays that include many standard features not available with traditional overload protection devices.

Consistent and reliable protection

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

Superior Class 10 characteristics

Today's T-Frame motors have less copper and iron than the old U-Frame motors that were popular when traditional Class 20 overload relays were designed. For this reason, faster Class 10 overloads like the CT 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 CT7 (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 -25°C to $+50^{\circ}\text{C}$.

Single phase applications

CT 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 B29.

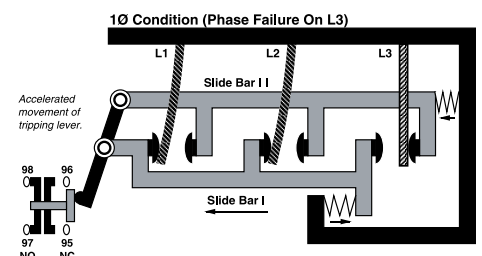
Other standard features

CT 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 reset button permits any one of three reset options to be chosen: test, manual or automatic modes.

A separate NO signal contact is also provided on CT7 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 CT7 Thermal Overload Relay



CT7 Thermal Overload Relays offer accelerated tripping under single phase conditions

CT7 Thermal Overload Relays, Manual or Automatic Reset ①②

Overload Relay	Directly Mounts to Contactor...	Adjustment Range (A)	Trip Class 10	Price
			Catalog Number	
 CT7-24-10	CA7-9...CA7-37	0.1...0.16	CT7-24-0.16	90
		0.16...0.24	CT7-24-0.24	90
		0.24...0.4	CT7-24-0.4	90
		0.4...0.6	CT7-24-0.6	90
		0.6...1.0	CT7-24-1.0	90
		1.0...1.6	CT7-24-1.6	90
		1.6...2.4	CT7-24-2.4	90
		2.4...4	CT7-24-4	90
		4...6	CT7-24-6	90
 CT7-75-75	CA7-12...CA7-37	10...16	CT7-24-16	90
	CA7-23...CA7-37	16...24	CT7-24-24	90
	CA7-30...CA7-43	18...30	CT7-45-30	127
	CA7-37...CA7-43	30...45	CT7-45-45	149
	CA7-60...CA7-85	18...30	CT7-75-30	168
		30...45	CT7-75-45	168
		45...60	CT7-75-60	185
	CA7-72...CA7-85	60...75	CT7-75-75	185
	Separate Mounting	70...90	CT7-100-90	272

Note: CT7 Thermal Overload Relays do not fit into standard "A" and "B" enclosures with standard reset assemblies. They can only be used on "Open Style" starters or custom quoted enclosures. Contact your Sprecher+Schuh representative for more information.

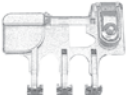
- ① Contactors noted will physically attach to the overload relays listed. This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.
- ② For separately mounted overload, purchase DIN-Rail/Panel Mount Adaptor in Accessory section (Cat.# CT7-...-P-A).

Special Note:

Wye-Delta Starters - First multiply motor full load current by 58%. Then, using this figure, select appropriate Overload Relay Code from tables above.

Part Winding Starters - First multiply motor full load current by 50%. Then, using this figure, select appropriate Overload Relay Code from tables above.

Accessories

Enclosure	Description	For Use With...	Catalog Number	Price
	DIN-rail / Panel Mount Adaptor - ❶ For separately mounting thermal overload relays	CT7-24-0.16...24	CT7-24-P-A	15
		CT7-75-30...75 ❶	CT7-75-P-A	27
	Anti-Tamper Shield - Provides protection against inadvertent adjustment of mode selector and full load current setting	CT7 all	CMS7-BC1	7
	Remote Reset - For remote resetting of the solid state overload relay	CT7 all	CMR7-* <i>Replace * with coil code below</i>	78
	External Reset Button - Used for manually resetting overloads mounted in enclosures	CT7 all	Use D7 Reset See Section H	~

CMR7 Remote Reset Coil Codes

A.C. Coil Code	Voltage Range		
	50 Hz	60 Hz	50 / 60 Hz
24Z	~	~	24V
120	110V	120V	
240	220V	230V	
240Z	~	~	240V

D.C. Coil Code	Voltage
24D	24VDC
48D	48VDC
115D	115VDC

Marking Systems ❷

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	1.75
	Marking Tag Sheet - 1 sheet with 160 perforated paper labels each, 6 x 17mm. To be used with transparent cover.	1	CA7-FMP	1.75
	Transparent Cover - To be used with Marking Tag Sheets.	100 ❸	CA7-FMC	.17
	Tag Carrier - For marking with Clip-on Tags. See Terminals Section for complete listing of Clip-on Tags.	100 ❸	CA7-FMA2	.17

❶ Panel mount adaptors are not available for CT7-45-30...45. If panel mount required, order CT7-75-30...45 Overload Relay and use CT7-75-P-A Panel Mount Adaptor.

❷ The labeling field of the overload relay may also be written on by hand.

❸ Minimum order quantity is one package of 100. Price each x 100 = total price.

Electrical Data

			CT7-24...	CT7-45...	CT7-75...	CT7- 100-90
Main Circuits						
Rated Insulation Voltage U_i						
UL	[V]		600	600	600	600
CSA	[V]		690	690	690	690
Rated Impulse Strength U_{imp}			[kV]	6	6	6
Rated Operating Voltage U_e			[V]	690	690	1000
Overvoltage Category/Degree of Contamination				III/3	III/3	III/3
Protective Separation						
Between main circuits and aux. contacts						
Per DIN, VDE 106, Part 101 and Part 101 A1			440	440	440	440
Terminal Cross-Sections						
Terminal Type						
Terminal Screws			M4	M6	M6	M8
	Flexible with Wire End Ferrule	[mm²]	2 x (1...4)	1 x 25	1 x 25	50
			2 x (1...6)	2 x (1...10)	2 x (2.5...10)	
	Solid Conductor Stranded	[mm²]	1 x (2.5...6)	2 x (1...16)	2 x (1...10)	16
		[mm²]	~	~	2 x (1...16)	50
Max. Wire Size per UL/CSA			[AWG]	14...8	14...2	2
Recommended Torque			[Nm]	1.8	3.5	6
			[lb-in]	16	31	54
Pozidrive Screwdriver			Size	2	2	~
Slotted Screwdriver			mm	1 x 6	1 x 6	~
Hexagon Socket Size			SW [mm]	~	~	4

Control Circuit

			CT7-24...	CT7-45...	CT7-75...	CT7- 100-90
Rated Insulation Voltage U_i			[V]	500	500	500
Rated Impulse Strength U_{imp}			[kV]	6	6	6
Rated Operating Voltage U_e			[V]	500	500	500
Rated Operating Current I_e				Normally Open	Normally Closed	
AC-15	220...240V	[A]		1.5	1.5	
	380...480V	[A]		0.5	0.9	
	500...600V	[A]		0.5	0.8	
	24V	[A]		0.9	0.9	
	60V	[A]		0.75	0.75	
	110V	[A]		0.4	0.4	
	220V	[A]		0.2	0.2	
Conventional Thermal Current			[A]	6	6	6
Terminations						
Terminal Type						
			M 3.5	M 3.5	M 3.5	M 3.5
	Flexible with Wire End Ferrule	[mm²]	2 x (0.75...2.5)	2 x (0.75...2.5)	2 x (0.75...2.5)	2 x (0.75...2.5)
	Solid Conductor Stranded	[mm²]	2 x (0.75...4)	2 x (0.75...4)	2 x (0.75...4)	2 x (0.75...4)
		[mm²]				
Max. Wire Size per UL/CSA			[AWG]	18...14	18...14	18...14
Recommended Torque			[Nm]	1.2	1.2	1.2
			[lb-in]	11	11	11
Pozidrive Screwdriver			Size	2	2	2
Slotted Screwdriver			mm	1 x 6	1 x 6	1 x 6

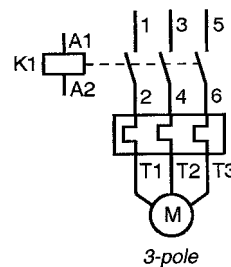
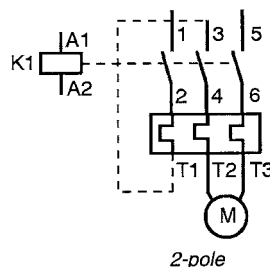
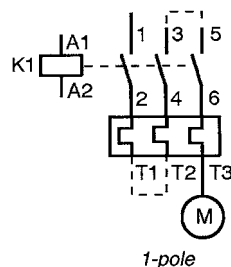
General Data

		CT7-24...	CT7-45...	CT7-75...	CT7-100-90
Weight	[kg (lb)]	0.13 (0.29)	0.21 (0.46)	0.21 (0.46)	1.3 (2.86)
Standards		IEC 947, EN 60 947, DIN VDE 0660			
Approvals		CE, UL, CSA, PTB			
Corrosion Resistance		Humid/Warm, Constant, per DIN, IEC 68, Part 2-3			
Ambient Temperature		Humid/Warm, Cyclic, per DIN, IEC 68, Part 2-30			
Open		-25...+50°C (-13...122°F)			
Enclosed		-25...+40°C (-13...104°F)			
Temperature Compensation	Continuous (Temperature Range)	-5...+40°C per IEC 947, EN60947; PTB: -5...+50°C)			
Shock Resistance					
10ms sinusoidal shock	[G]	10			
Type of Protection		IP00			
in connected state		IP2LX (in a connected state)			
Finger Protection		Safe from touch by fingers and back of hand (VDE 0106, Part 100)			

Short Circuit Coordination

Mounting on Contactor	Catalog Number	Adjustment Ranges [A]	gL Back-Up Fuses max. I _n [A]	
			Type 1 Coordination	Type 2 Coordination
CA7-9...CA7-37	CT7-24-0.16	0.1...0.16	25	0.5
	CT7-24-0.24	0.16...0.24	25	1
	CT7-24-0.4	0.24...0.4	25	2
	CT7-24-0.6	0.4...0.6	25	4
	CT7-24-1.0	0.6...1.0	25	4
	CT7-24-1.6	1.0...1.6	25	6
	CT7-24-2.4	1.6...2.4	25	10
	CT7-24-4	2.4...4	25	16
	CT7-24-6	4...6	25	20
	CT7-24-10	6...10	50	25
CA7-12...CA7-37	CT7-24-16	10...16	63	35
CA7-23...CA7-37	CT7-24-24	16...24	63	50
CA7-30...CA7-43	CT7-45-30	18...30	80	63
CA7-37...CA7-43	CT7-45-45	30...45	125	80
CA7-60...CA7-85	CT7-75-30	18...30	80	63
	CT7-75-45	30...45	125	80
	CT7-75-60	45...60	160	100
CA7-72...CA7-85	CT7-75-75	60...75	250	160
Separate Mounting	CT7-100-90	70...90	315	200

Connection Diagrams

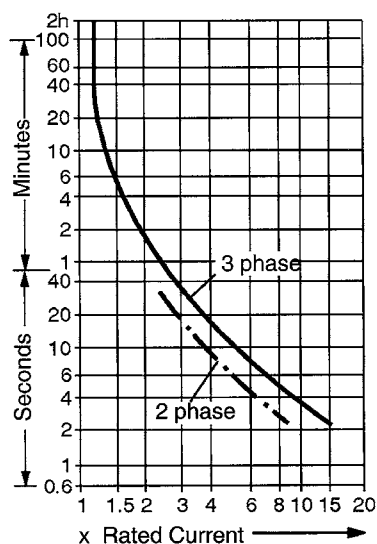


Tripping Characteristics

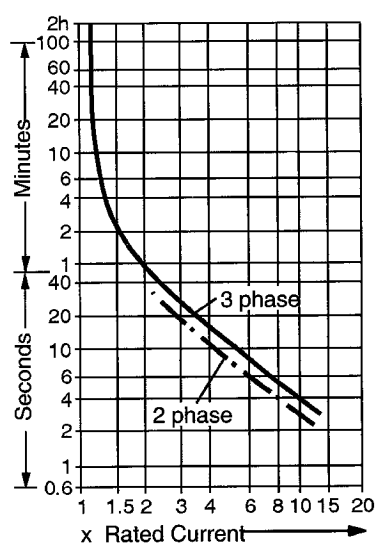
These tripping characteristics comply with IEC 947 and are the mean values of the scatter bands at 20°C ambient temperature starting from the cold state. Tripping time is

a function of operating current. In equipment at operating temperature, the tripping time of the overload relay falls to approximately 1/4 of the read value.

CT7-24, 45 & 75



CT7-100-90



CT7 Thermal Overload Relay

(thermally delayed over-current relay) with differential tripping for motor protection in the event of a phase failure.

Mean value of tolerance bands, heated in three phases.

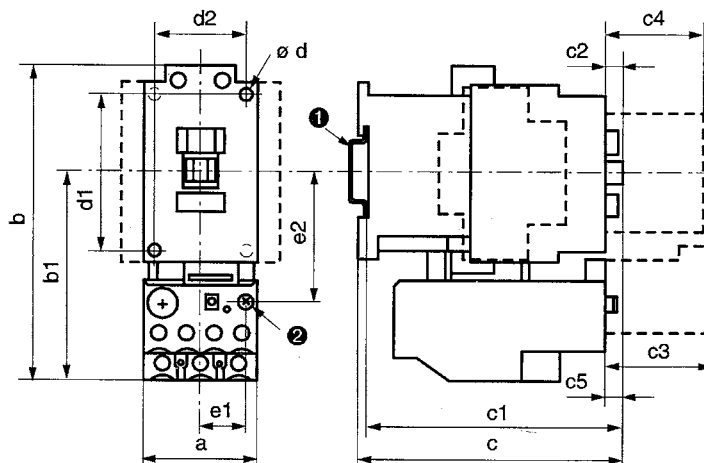
Curves: — from cold state

Curves: - · - · trip time for single phase condition.

Function Limits: -25°C...+50°C

Temperature Compensation: continuous from -5°C...+40°C.

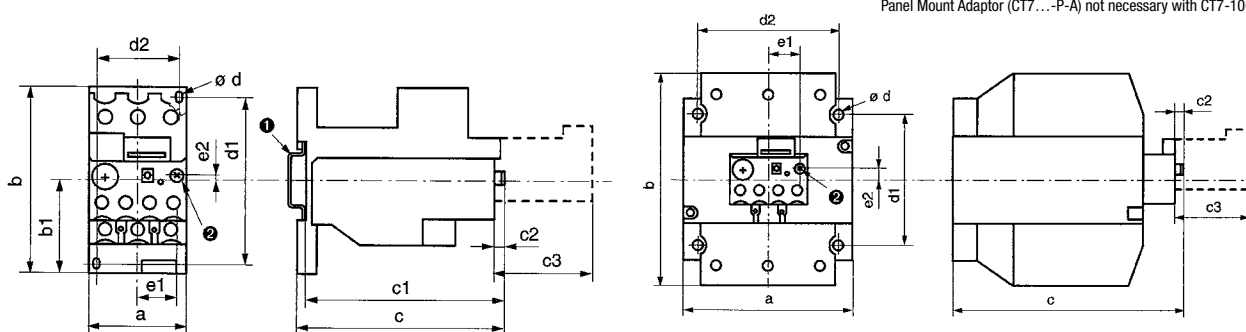
Series CT7 (Mounting to CA7 Contactors)



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

O/L Relay	Fits Contactor...	a	b	b1	c	c1	c2	c3	c4	c5	Ød	d1	d2	e1	e2
CT7-24	CA7-9...23 (1-25/32)	45	127	83	96	91	15	51	39	5	Two Ø 4.2 Two 3/16 Ø	60 (2-23/64)	35 (1-25/64)	16.5 (21/32)	51 (2)
	CA7-30...37 (1-25/32)	45	127	83	105	99	6.5	51	39	9.5	Two Ø 4.2 Two 3/16 Ø	60 (1-23/64)	35 (1-25/32)	16.5 (21/32)	51 (2)
CT7-45	CA7-30...37 (2-23/64)	60	140	97	105	99	6.5	51	39	6.5	Two Ø 4.2 Two 3/16 Ø	60 (2-23/64)	35 (1-25/32)	16.5 (21/32)	57 (2-1/4)
	CA7-43 (2-23/64)	60	140	97	107	103	6.5	51	39	8.5	Two Ø 4.2 Two 3/16 Ø	60 (2-23/64)	45 (1-25/32)	16.5 (21/32)	57 (2-1/4)
CT7-75	CA7-60...85 (2-53/64)	72	185	120	125	120	8.5	51	39	28.5	Two Ø 4.2 Four 7/32 Ø	100 (3-15/16)	55 (2-11/64)	16.5 (21/32)	82 (3-15/64)

Series CT7 (Separate Mounting Using Adaptor CT7-...-P-A)



Catalog #: CT7-24...CT7-75

Catalog #: CT7-100-90

Catalog Number	a	b	b1	c	c1	c2	c3	Ød	d1	d2	e1	e2
CT7-24	45 (1-25/32)	85 (3-11/32)	44 (1-47/64)	95 (3-47/64)	90 (3-35/64)	5 (13/64)	51 (2)	Two Ø 4.5 Two 3/16 Ø	60...74 (2-23/64...2-29/32)	35 (1-25/64)	16 (5/8)	3 (1/8)
CT7-45	60 (2-23/64)	90 (3-35/64)	44 (1-47/64)	117 (4-49/64)	112 (4-13/32)	15 (19/32)	51 (2)	Two Ø 5.4 Two 7/32 Ø	74 (19/32)	50 (1-31/32)	16 (5/8)	0 (0)
CT7-75	100 (3-15/16)	120 (4-23/32)	~	135 (5-15/16)	~	5 (13/64)	51 (2)	Four Ø 6.2 Four 1/4 Ø	74 (2-29/32)	80 (3-5/32)	16 (5/8)	7 (9/32)

- ❶ May be mounted on 35mm EN 50 022-35 DIN-rail.
- ❷ With reset rod, maintain 9mm maximum operating radius from center of reset button.
- c3 Remote reset
- c4 Auxiliary contact block

Series CT7K and CT4 Thermal Overload Relays

Simple and effective
motor protection for
applications to 10HP @
460V (15HP @ 575V)

Sprecher + Schuh's economical CT7K and CT4 Thermal Overload Relays share the same excellent protection characteristics as our full featured thermal overload relays, with the exception of differential tripping and selectable reset, yet still trip under single phase conditions at 1.25 x set current.

Consistent and reliable protection

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

Superior Class 10 characteristics

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



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 -25°C to $+60^{\circ}\text{C}$.



Single phase applications

CT 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 B29.

Convenient dial adjustment of motor FLA

Rather than changing "heaters" to set the overload to the motor's FLA, CT relays have a dial adjustment on the faceplate. This convenience offers a wide range of FLA settings and allows you to accurately set or reset the overload in seconds.

Other standard features

CT thermal overload relays feature a fail-safe "trip-free" design that prevents the device from being held closed during an overload. CT4 and CT7K overload relays feature a manual reset.

An optional NO signal contact can be added to the CT4 and CT7K in the field for use as an alarm circuit.

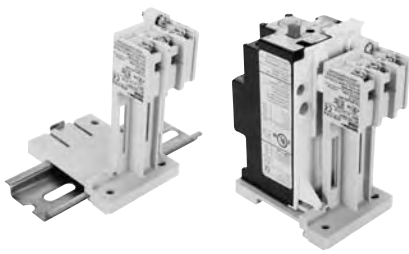
CT7K Thermal Overload Relays, Manual Reset

Overload Relay	Directly Mounts to Contactor...	Adjustment Ranges [A]	Trip Class 10	
			Catalog Number	Price
 CT7K-17	CA7-9...23	0.10...0.15	CT7K-17-0.15	72
		0.15...0.23	CT7K-17-0.23	
		0.23...0.35	CT7K-17-0.35	
		0.35...0.55	CT7K-17-0.55	
		0.55...0.8	CT7K-17-0.80	
		0.8...1.2	CT7K-17-1.2	
		1.2...1.8	CT7K-17-1.8	
		1.8...2.7	CT7K-17-2.7	
		2.7...4	CT7K-17-4.0	
		4...6	CT7K-17-6.0	
		6...9	CT7K-17-9.0	
	CA7-12...23	9...12.5	CT7K-17-12.5	76
	CA7-16...23	12.5...17.5	CT7K-17-17.5	

CT4 Thermal Overload Relays, Manual Reset ❶

Overload Relay	Directly Mounts to Contactor...	Adjustment Ranges [A]	Trip Class 10	
			Catalog Number	Price
 CT4-9	CA4-9	0.10...0.15	CT4-0.15	69
		0.15...0.23	CT4-0.23	
		0.23...0.35	CT4-0.35	
		0.35...0.55	CT4-0.55	
		0.55...0.8	CT4-0.80	
		0.8...1.2	CT4-1.2	
		1.2...1.8	CT4-1.8	
		1.8...2.7	CT4-2.7	
		2.7...4	CT4-4.0	
		4...6	CT4-6.0	
		6...7.7	CT4-7.7	
		7.5...9	CT4-9.0	
	CA4-12	8.8...10.5	CT4-10.5	75
		10.4...12	CT4-12.0	

CT7K & CT4 Thermal Overload Relay Accessories

Accessory	Description	For Use with...	Catalog Number	Price Each
	Auxiliary Contact Block - 1 N.O. alarm contact	All CT7K & CT4	CT3K-P-10	17
	DIN-Rail/Panel Mount Adaptor for separate mounting CT7K Thermal Overload.	All CT7K	CT7K-17-P-A	15

❶ Separately mounted overload not available.

Electrical Data

		CT7K	CT4-9	CT4-12
Main Circuits				
Rated Insulation Voltage U_i				
UL	[V]	~	600	600
CSA	[V]	~	690	690
CULus	[V]	600		
Rated Impulse Strength U_{imp}	[kV]	6	6	6
Rated Operating Voltage U_e	[V]	600	690	690
Overvoltage Category/Degree of Contamination				
		III/3	III/3	III/3
Terminal Cross-Sections				
Terminal Type				
				
		M3.5	M3.5	M3.5
Terminal Screws				
	Flexible with Wire End Ferrule	[mm²]	2 x (1...2.5))	2 x (1...2.5))
	Solid Conductor Stranded	[mm²]	1 x (1.5...4)	1 x (1.5...4)
		[mm²]	2 x (1...2.5)	2 x (1...2.5)
		[AWG]	2 x (14...10)	2 x (14...10)
Max. Wire Size per UL/CSA				
Recommended Torque	[Nm]	1.4...2.0	1.4...2.0	1.4...2.0
	[lb-in]	12...20	12...20	12...20
Pozidrive Screwdriver	Size	2	2	2
Slotted Screwdriver	mm	1 x 6	1 x 6	1 x 6

Control Circuit

		CT7K	CT4-9	CT4-12
Rated Insulation Voltage U_i				
	[V]	690	500	500
Rated Operating Voltage U_e				
	[V]	690	500	500
Rated Operating Current I_e				
AC-15	220...240V	[A]	3	~
	380...480V	[A]	1.6	~
Conventional Thermal Current				
	[A]	4	~	~
Terminations				
Terminal Type				
				
		M 3.5	M 3.5	M 3.5
	Flexible with Wire End Ferrule	[mm²]	2 x (0.75...2.5)	2 x (0.75...2.5)
	Solid Conductor Stranded	[mm²]	2 x (0.75...2.5)	2 x (0.75...2.5)
		[mm²]	2 x (0.75...4)	2 x (0.75...4)
		[AWG]	2 x (18...14)	2 x (18...14)
Max. Wire Size per UL/CSA				
Recommended Torque	[Nm]	1.2	1.2	1.2
	[lb-in]	11	11	11
Pozidrive Screwdriver	Size	2	2	2
Slotted Screwdriver	mm	1 x 6	1 x 6	1 x 6

General Data

CT7K / CT4-9 / CT4-12		Temperature Compensation	Continuous (Temperature Range -5...+40°C per IEC 947, EN60947; PTB: -5...+50°C)
Weight	[kg (oz)]	Shock Resistance	
	0.15 (4.8)	10ms sinusoidal shock	[G]
Standards	IEC 947, EN 60 947, DIN VDE 0660		10
Approvals	CE, UL, CSA, PTB	Type of Protection	IP00
Corrosion Resistance	Humid/Warm, Constant, per DIN, IEC 68, Part 2-3	in connected state	IP2X (in a connected state)
	Humid/Warm, Cyclic, per DIN, IEC 68, Part 2-30	Finger Protection	Finger and back of hand safe (VDE 0106, Part 100)
Ambient Temperature			
Open	-25...+60°C (-13...140°F)		
Enclosed	-25...+40°C (-13...104°F)		

Short Circuit Coordination - CT7K ①

Mounting on Contactor	Catalog Number	Adjustment Ranges [A]	gL Back-Up Fuses max. I _b [A]	
			Type 1 Coordination	Type 2 Coordination
CA7-9...CA7-23	CT7K-17-0.15	0.1...0.15	50	~
	CT7K-17-0.23	0.15...0.23	50	~
	CT7K-17-0.35	0.23...0.35	50	2
	CT7K-17-0.55	0.35... 0.55	50	2
	CT7K-17-0.8	0.55...0.8	50	2
	CT7K-17-1.2	0.8...1.2	50	4
	CT7K-17-1.8	1.2...1.8	50	4
	CT7K-17-2.7	1.8...2.7	50	6
	CT7K-17-4	2.7...4	50	10
	CT7K-17-6	4...6	50	16
CA7-12...CA7-16	CT7K-17-9	6...9	50	20
	CT7K-17-12.5	9...12.5	50	25
CA7-23	CT7K-17-17.5	12.5...17.5	50	25
	CT7K-17-12.5	9...12.5	50	25
	CT7K-17-17.5	12.5...17.5	50	35

Short Circuit Coordination - CT4 ①

Mounting on Contactor	Catalog Number	Adjustment Ranges [A]	gL Back-Up Fuses max. I _b [A]	
			Type 1 Coordination	Type 2 Coordination
CA4-9	CT4-0.15	0.1...0.15	25	1
	CT4-0.23	0.15...0.23	25	1
	CT4-0.35	0.23...0.35	25	2
	CT4-0.55	0.35... 0.55	25	2
	CT4-0.8	0.55...0.8	25	2
	CT4-1.2	0.8...1.2	25	4
	CT4-1.8	1.2...1.8	25	4
	CT4-2.7	1.8...2.7	25	6
	CT4-4	2.7...4	25	10
	CT4-6	4...6	25	~
	CT4-7.7	6...7.7	25	16 ②
	CT4-9	7.5...9	25	16 ②
CA4-9...CA4-12	CT4-10.5	8.8...10.5	25	~
	CT4-12	10.4...12	25	~

① I_q = 50kA, except as indicated.

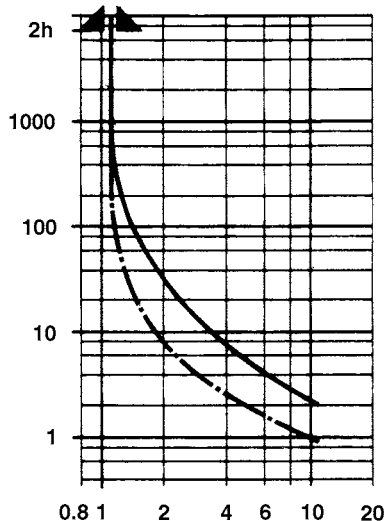
② I_q = 25kA for this test.

Tripping Characteristics

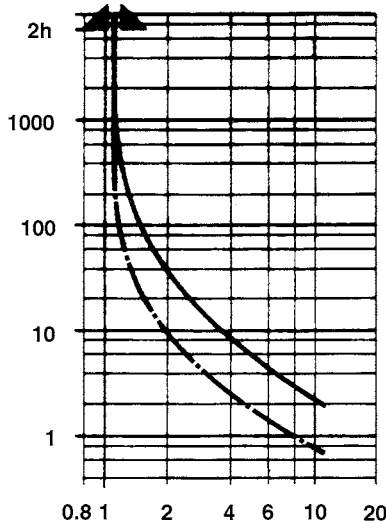
These tripping characteristics comply with IEC 947 and are the mean values of the scatter bands at 20°C ambient temperature starting from the cold state. Tripping time is

a function of operating current. In equipment at operating temperature, the tripping time of the overload relay falls to approximately 1/4 of the read value.

0.1...2.7A



2.7...17.5A



Time/Current Characteristics of CT4 & CT7K Thermal Overload Relays

Mean value of tolerance bands, heated in three phases. **Solid curves** indicate performance of cold relay. **Dashed curves** indicate performance in operationally warm state (loaded with the set current).

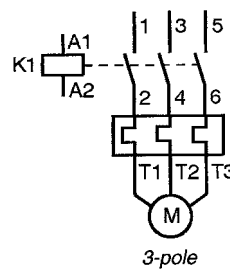
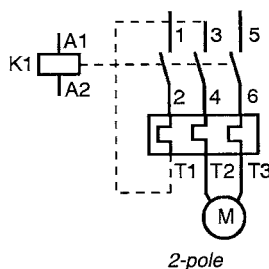
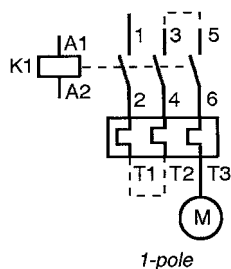
Tolerance: trip time $\pm 20\%$ (± 10 for current).

Function Limits and Temperature Compensation: from -25°C ... $+70^{\circ}\text{C}$.

Tripping Limits: specified in IEC60947-4 for -5°C ... $+40^{\circ}\text{C}$ are satisfied in range -20°C ... $+60^{\circ}\text{C}$.

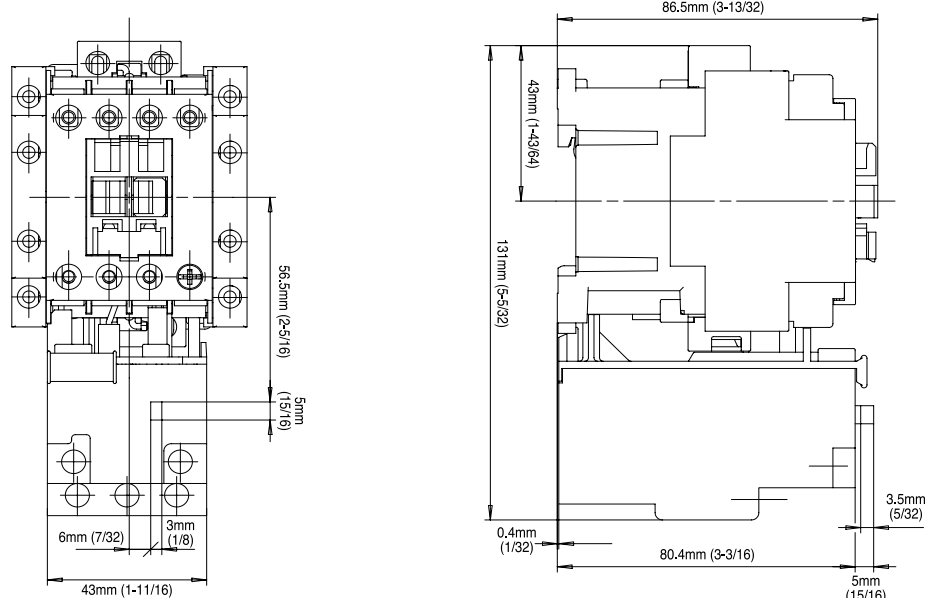
Two Phase Loading (phase failure): Trip limits 1.05...1.25 of set current I_{ef} (1.05...1.32 I_{ef} is permissible according to IEC 60947-4). For motors up to 10kW, the two-phase trip at max. 1.25 I_{ef} guarantees heat build-up limitation to the value which occurs in the event of a 3-phase trip at 1.2 I_{ef} .

Connection Diagrams

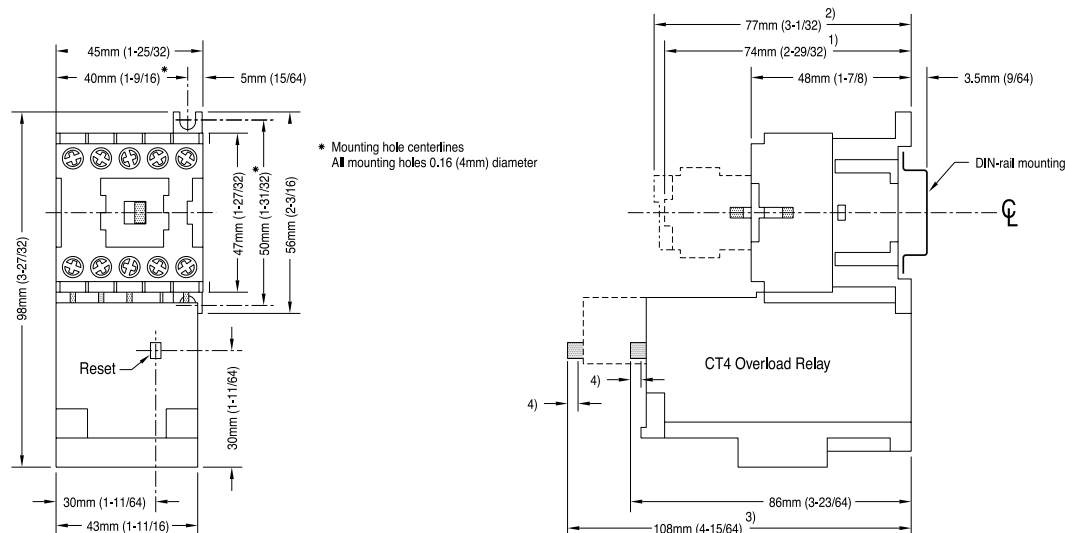


Series CT7K (Mounting to CA7 Contactor)

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

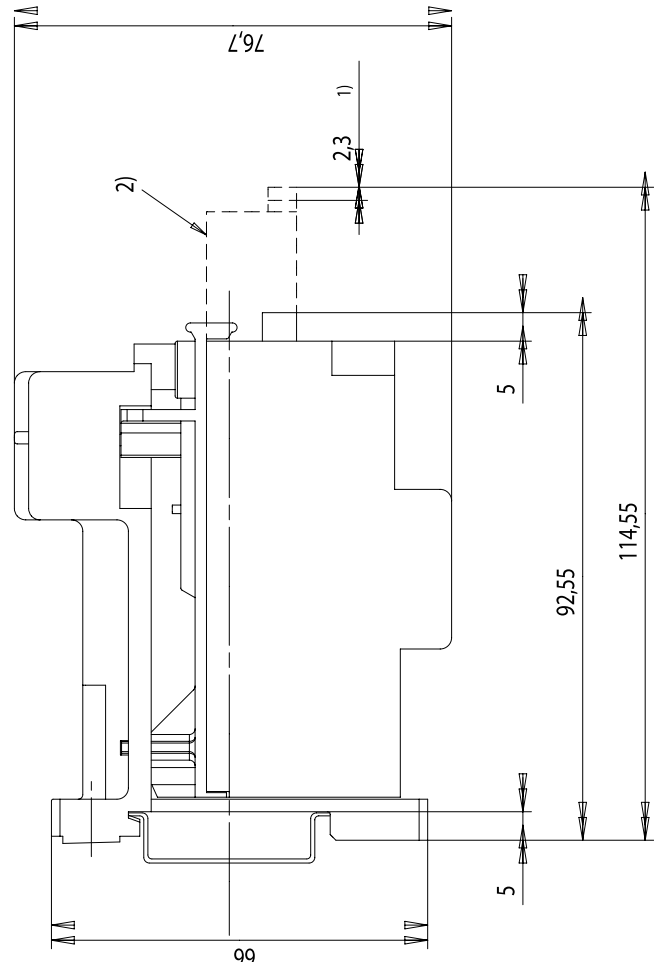
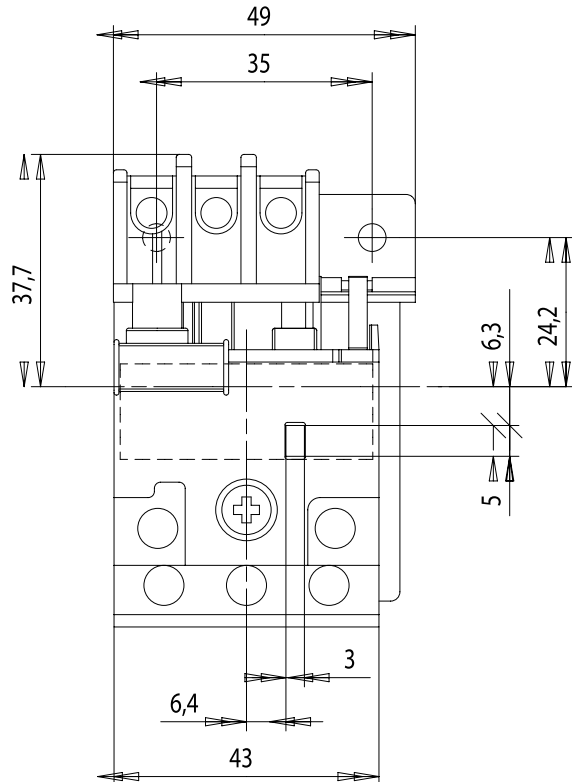


Series CT4 (Mounting to CA4 Contactor)



- 1) With aux contact block CA4-P.
- 2) With timing elements CRZE4, CRZY4.
- 3) With aux contact CT3K-P-10 on overload.
- 4) Overload reset: 0.09 (2.3mm) minimum travel.

Series CT7K (Separate mounting using adapter CT7K-17-P-A)



Notes

B
**Motor
Protection**
CT7K

Series CT8 Thermal Overload Relays

Simple and effective
motor protection
for applications to
12½ Amps

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

Consistent and reliable protection

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

Superior Class 10 characteristics

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

Protection from single phase conditions

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

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 -25°C to +50°C.

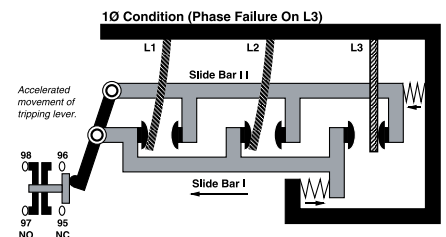
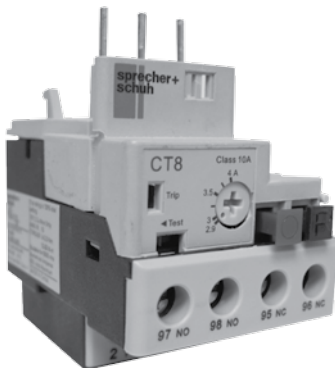
Single phase applications

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 C88.

Other standard features

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

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



CT8 Thermal Overload Relays offer accelerated tripping under single phase conditions

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	CA8-9	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	
	CA8-9 or 12	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

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_i	[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	[mm ²]	2 x (1.5...4)
 Solid or coarse stranded	[mm ²]	2 x (1.5...4)
	[AWG]	2 x (16...10)
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_i	[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 N.O./N.C.
Rated Operating Current	I_e	
AC-15	24V [A]	4
	240V [A]	2
	400V [A]	1.6
	600V [A]	0.15
DC-13	24V [A]	2
	110V [A]	0.4
	220V [A]	0.25
	440V [A]	0.08
Thermal Current	I_{the} [A]	5
Short Circuit Withstand, fuse gG	[A]	6
Contact Reliability		15V, 2mA

Terminations - Control

Terminal Type		M3.5
 Fine stranded w/ ferrule	[mm ²]	2 x (1...4)
 Solid or coarse stranded	[mm ²]	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 (oz)]	0.155 (.25)
Standards	IEC/EN 60947-1, -4-1, -5-1; UL508; CSA C22.2 NO. 14	
Approvals	 	

Temperature Compensation	Continuous (Temperature Range -5...+40°C per IEC 60947-4-1, EN60947; PTB: -20...+60°C)	
Vibration Resistance	(PER IEC 68-2-6) [G]	3
Shock Resistance	(PER IEC 68-2-27) [G]	30
Type of Protection	IP2X	

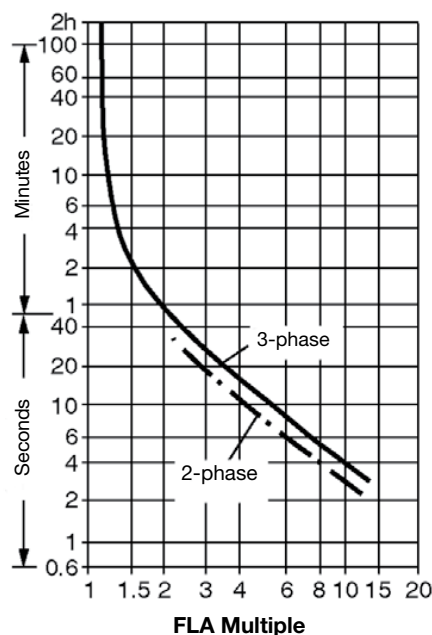
Environmental

Ambient Temperature	Storage	-55...+80 °C (-67...+176 °F)
	Operating	-20...+60 °C (-4...+140 °F)
Humidity	Operating	5...95% Non-condensing
	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	120% 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

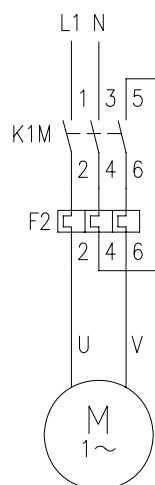
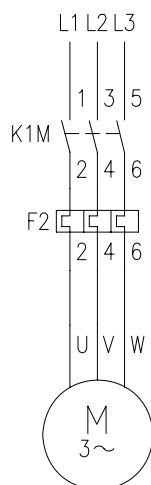
Tripping Characteristics

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.

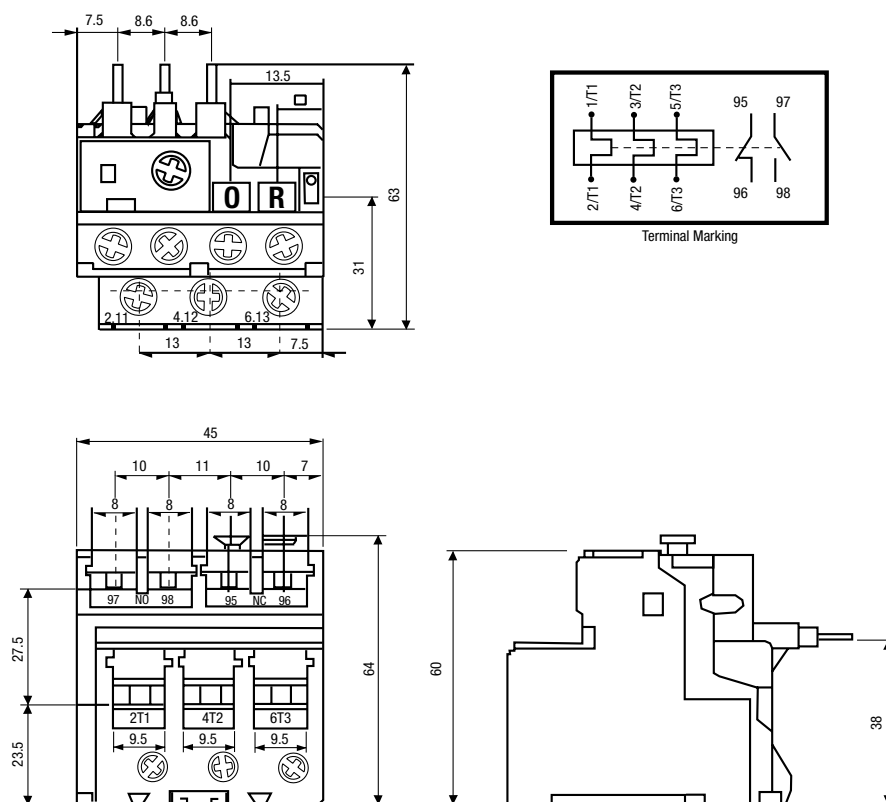
Trip Class 10A



Connection Diagrams



Series CT8



B

Motor
Protection

CT8

Notes

B

**Motor
Protection**

CT8

RT7

Thermistor

Protection Relays



Investment Protection

Electric motors are significant investments, and losing them to overheating just is not an option. Sprecher + Schuh's RT7-E1 and RT7-E2 Thermistor Protection Relays are designed to keep that from happening. The RT7 is not a replacement for an overload relay. Instead, it is additional protection from damaging heat build-up in the motor.

If you have thermistors...

Installed in many of today's electric motors are thermistors, which sense heat levels produced in the stator windings. If thermal levels exceed safe standards, thermistors send that information to the relay, which trips and switches off the motor. The RT7-E1 and RT7-E2 display a red LED to indicate a fault. The RT7-E1 and RT7-E2 also trip because of a short or open in the sensor measuring circuit. Each relay displays an open circuit alert with a 2 Hz red LED and a short circuit warning with a blinking red LED. The RT7-E2 stores a motor's switching status in memory during power failures – a critical safeguard.



When exact motor temperature sensing is critical

Compatibility and Convenience

These relays and their microprocessor technology provide very accurate and repeated protection. Neither requires adjustment, and their broad supply voltage rating (24...240V AC/DC) makes them ideal for a wide variety of applications. Up to six PTC thermistors can be connected in series.

Automatic Reset

The RT7-E1 and RT7-E2 automatically reset if the sensor measuring circuit's resistance drops below the reset value. To keep a motor from restarting after automatic reset, provide three-wire momentary control. The RT7-E2 also has a manual reset button, as well as a terminals for remote reset.

Feature comparison

Model	RT7-E1	RT7-E2
Thermal overload protection	●	●
Short-circuit/open-circuit protection in the sensor measuring circuit	●	●
Trip indication (red LED)	●	●
Automatic reset	●	●
Manual reset		
Remote reset (external button)		●
Storage of switching status in memory		●
Test button		●
Power-on indication (green LED)	●	●

Relay Configuration

	RT7-E1	RT7-E2
	13 ₁₄ 21 ₂₂	13 ₁₄ 21 ₂₂
Normal		
Tripped		
Power off		

RT7 Pricing

RT7 Series	Price
RT7-E1	176
RT7-E2	247

Power/Trip Identification

Indication	LED	Resistance
Power On	Green	
Trip Overtemp	Red	3600 ohms
Trip Open Sensor Circuit	Red 2 Hz	>18000 ohms
Trip Shorted Sensor Circuit	Red Flashing	<20 ohms

Technical Information (Electrical)

Supply

Rated Supply Voltage (Us)	24...240V AC/DC
Operating Range	AC: 0.8...1.1 Us DC: 0.9...1.1 Us
Maximum Power Consumption	1.5 VA

Output Relay

Type of Contacts	Type E1: (2) Form A, one relay Type E2: (2) Form A, independent relays
Rated Thermal Current	5 A @ 250V AC 4 A @ 24V DC
Rated Insulation Voltage	250V AC
Rated Operating Voltage	250V AC
Utilization Category	AC15/DC13

Technical Information (Mechanical)

Environmental

Ambient Temperature	-40°C...+80°C; (storage) -25°C...+60°C; (operating)
Humidity	5...95% noncondensing
Maximum Altitude	2000 m
Pollution Environment	Pollution Degree 2
Degree of Protection	IP 20

PTC Sensor Circuit

Type of Control Unit	Mark A
PTC Sensor Characteristic	IEC 34-11-2
Max. Number of Sensors	6
Max. Cold Resistance of Sensor Chain	1500 ohm
Trip Resistance	3600 ohm (± 300 ohm):
Reset Resistance	1580 ohm (± 60 ohm):
Short Circuit Trip Resistance	<20 ohm (-5 ohm, +0 ohm):
Short Circuit Reset Resistance	24 ohm (-0 ohm, +6 ohm)
Open Circuit Trip Resistance	>18000 ohm:

Terminal Cross-Sections

Terminal Screwdriver Blade	M3
Conductor Size	0.5...2.5 mm ² 20...12 AWG

Measuring Line

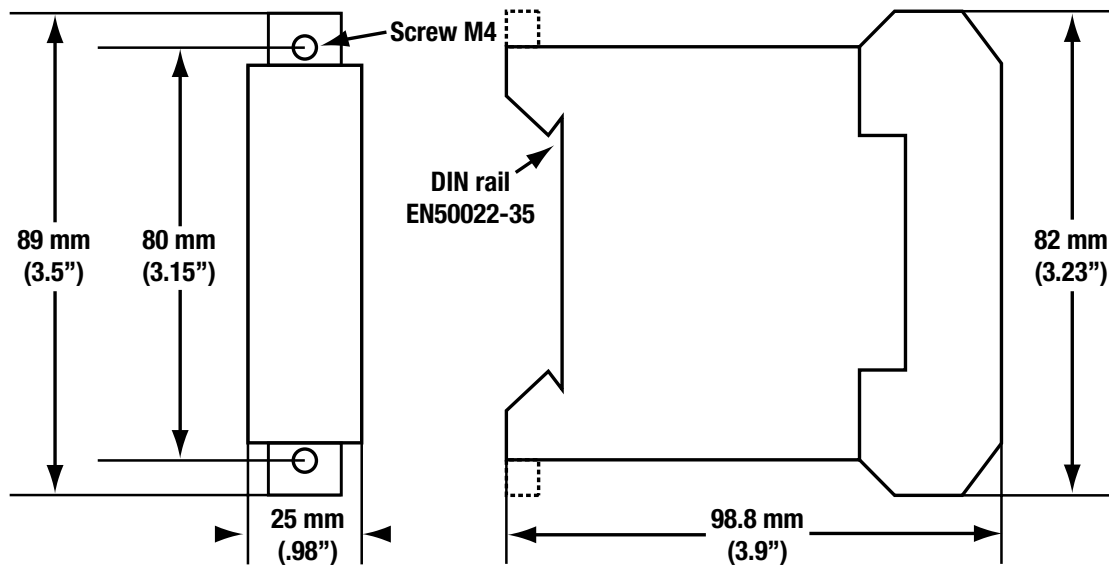
Minimum Cross Section (mm ²)	0.5	0.75	1	1.5
Maximum Length (m)	200	300	400	600
	200...600m: twisted pair, shielded shield connection at T1			

Remote Reset

Maximum Line Length	200...600m: twisted pair, shielded shield connection at r1
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RT7

Dimensions mm (inches)



B

Motor
Protection

RT7

Obsolete

**CEF1
CEP7 First Generation**

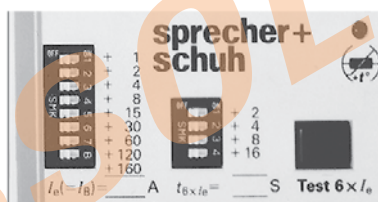
OBSOLETE

CEF1 Electronic Motor Protector

Sprecher + Schuh's CEF1 Electronic Motor Protection Relay utilizes solid state technology to provide accurate thermal overload protection, even under the most rigorous starting conditions. This economical unit shares many of the same features as our CET4 Electronic Motor Protector, such as adjustable degree of inertia, single-phase protection and individual LED fault indication. The CEF1-12, 42 and 52 also offer thermistor over-temperature protection and overcurrent warning.

Many standard features

Only three relay sizes provide a wide application range from 0.5 to 630 amperes. Digital slide switches provide very precise setting of both motor full load amps and desired trip time.



Many other features are standard, including phase-unbalance protection and a test button that functionally simulates an actual overload. All fault protection functions possess a memory that retain the occurrence of a fault for a period of time even in the event of a loss of supply voltage.



Precise thermal overload protection

Where a conventional thermal overload relay mechanically simulates the heat build-up in the motor (using bi-metal elements), the CEF1 electronically simulates heat build-up using more precise and reliable solid state technology.

The CEF1 monitors actual motor current through integrated current transformers. By combining the elements of time and current, the solid state electronics provide a very accurate simulation of heat build-up in the motor. Consequently, shutdown of the motor occurs when the maximum allowable time/current limits have been reached.

Because of the non-intrusive way in which the CEF1 measures motor current, even high short-circuit currents do not effect its performance. Tripping characteristics remain totally unaffected.

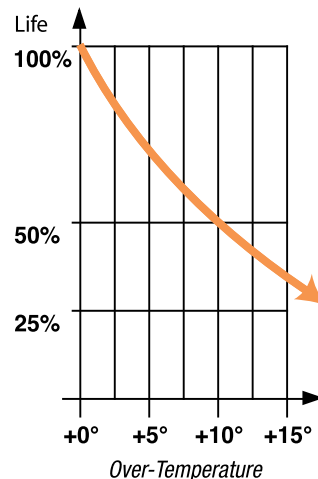


The CEF1-42 provides all available protection functions in applications from 160 to 400 amperes. The CEF1-52 is available for applications up to 630 amperes.

Overloads halve motor life

Motor manufacturers state that an increase of only 10°C above the motor's maximum recommended temperature cuts the motor's life in half each time it occurs. Accurate thermal overload protection is critical for every motor.

Digital slide switches and solid state technology give the CEF1 an extremely accurate time/current characteristic curve that guarantees reliable thermal overload protection.



Adjustable degree of inertia

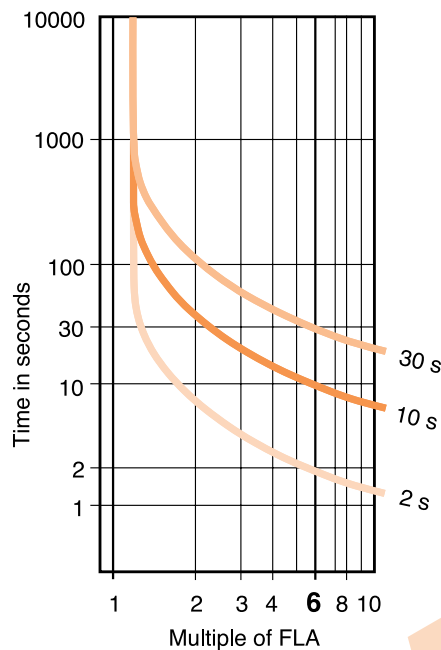
Tripping time is adjustable in 2 second increments, from 2 to 30 seconds. The graph to the right shows the time/current curve for the longest (30 seconds), normal (10 seconds) and shortest (2 seconds) tripping times that may be chosen on the CEF1. This makes the device very adaptable to protecting special motors under maximum loading conditions, including:

Low inertia applications -

Submersible pumps and hermetically sealed refrigeration compressors.

High inertia applications -

Rock crushing, centrifugal drives, flywheels, etc.



Choose the right CEF1 for your application

Six CEF1 versions provide the following protection functions.

CEF1-11 (0.5 to 180A range) and CEF1-41 (160 to 400A range)

- Thermal overload protection
- Single-phase and phase-unbalance protection

CEF1-12 (0.5 to 180A range) & CEF1-22*, CEF1-42 (160 to 400A range) and CEF1-52 (160 to 630A range)

- Thermal overload protection
- Overcurrent indication (flashing)
- Single-phase and phase-unbalance protection
- Thermistor overtemperature protection

* CEF1-22 is used in special applications where separate mounting is required.

Protection functions – Theory of operation

All protection functions provide high speed disconnection of the load, and utilize individual LED's to swiftly detect the source of the problem.

Single-phase/Phase-unbalance Protection

- In the event of a 40% (or greater) phase-unbalance, the CEF1 trips within 1.5 seconds on start-up or within 3 seconds during normal operation (independent of motor load). Of course, the CEF1 also trips during single-phase conditions (a 100% phase-unbalance). The built-in delay prevents nuisance tripping due to brief, yet harmless, supply network fluctuations.

Overcurrent Warning - During operation, the CEF1 continuously monitors

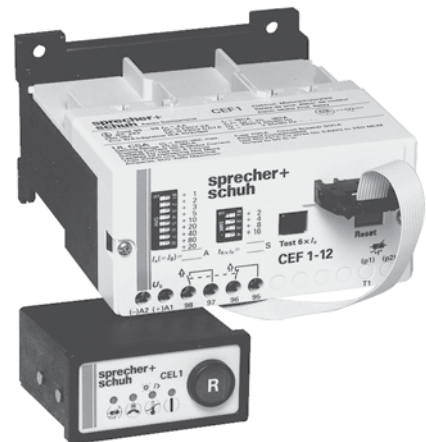
the motor current. When 110% of the preset value is reached, the CEF1 responds with a blinking LED to warn of a potential overload. This provides the user an opportunity to avoid a shutdown by reducing the load on the motor. This feature allows full motor utilization since the motor can be loaded to its full rated capacity as indicated by the overload warning light.

Thermistor Overtemperature Protection

- This function utilizes thermistor temperature sensors which may be built into the motor. On reaching the admissible rated response temperature of the sensor (or in the event of a short or open in the thermistor circuit), the motor is shut down. This function can be disabled by the user.

Convenient options

Automatic reset after a thermal overload trip is an available option on all CEF1's. Most units may also utilize the CEL1 remote reset module for manual reset of a trip.



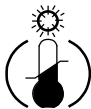
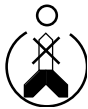
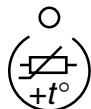
Other features

Indication of Operation - The green LED indicates that voltage is present and that the output relay is in its ready state. In the event of a supply failure or a trip condition, the output relay drops out and the green LED goes out. The cause of the trip is then displayed by one of the red LED's.

Application comments

Output relay circuitry - In the standard arrangement, the output relay is energized during normal operation and de-energized with the occurrence of a fault (closed circuit). Therefore it is not possible for an unprotected motor to continue operating with a loss of CEF1 supply voltage.

The CEF1-12, 22, 42 and 52 can be outfitted with the CEL1 remote indicator, that can be installed in the front of a control panel, MCC or in some other convenient location away from the CEF unit itself. The remote unit includes all status LEDs and a remote reset button.

CEF1 Operation		
 Reset	Reset After Trip All protection functions can be reset manually by pressing the reset button. Specially configured CEF1-12, 42 & 52 devices can be reset remotely with the CER1 remote reset module. Automatic reset is available for the thermal overload and thermistor overtemperature functions. Manual reset is necessary after a phase-unbalance or single-phase condition since it is imperative that the cause of the fault is first removed.	Current Setting The current setting is digitally set by means of eight slide switches. Note that the base values of 20A (for the CEF1-11 and CEF1-12) and 160A (for the CEF1-41, 42 and 52) are built in. The switch values are added to this value until the correct ampere rating is reached.  +1 +2 +3 +5 +10 +20 +40 +80 +200 120A Example #1: Motor full load amperes = 120 FLA CEF1 Model: CEF1-11 or CEF1-12 Setting: $120A = 20A \text{ (Given)} + 80A + 20A$ Slide +80 and +20 switches to the right.
	Test Button For Thermal Overload Function Functionally tests the tripping of the thermal overload protection function, as well as the tripping time. With supply voltage applied, the test button is pressed until the relay trips. This will occur after the expiration of the Degree of Inertia trip time setting. The red thermal overload protection LED lights up and simultaneously the green LED goes out. Resetting can take place following a cooling down period of approximately 6 times the Degree of Inertia trip time setting (for example, 60 seconds for a time setting of 10 seconds).	 +1 +2 +4 +8 +15 +30 +60 +120 +160 350A Example #2: Motor full load amperes = 350 FLA CEF1 Model: CEF1-42 Setting: $350A = 160A \text{ (Given)} + 120A + 60A + 8A + 2A$ Slide +120, +60, +8 and +2 switches to the right.
 The green LED indicates that voltage is present and that the output relay is in its energized operationally ready state. In the event of supply failure or a trip condition, the output relay drops out and the green LED goes out.	Operation Readiness Indicator The green LED indicates that voltage is present and that the output relay is in its energized operationally ready state. In the event of supply failure or a trip condition, the output relay drops out and the green LED goes out.	Applications under 20 FLA require looping the supply cables through the current evaluation ports. In this way the FLA of the motor is effectively multiplied so that the CEF1-11 or CEF1-12 can properly monitor the current. Looping requirements (see explanation on page B27): 20 - 180A: Feed cable straight through (no looping required) 10 - 20A: Loop cable through 2 times 5 - 10A: Loop cable through 4 times 2.5 - 5A: Loop cable through 8 times 0.5 - 2.5A: Loop cable through 40 times
 In the event of a thermal overload condition, the unit trips and the red LED lights. The CEF1-12, 42 & 52 devices also provide overcurrent indication. If the motor current exceeds 110% of the set FLA, the red thermal overload LED starts to flash. As soon as the current falls below 110% of FLA, the red flashing LED goes out. The red LED also flashes during motor starting and locked rotor conditions.	Thermal Overload & Overcurrent Indication In the event of a thermal overload condition, the unit trips and the red LED lights. The CEF1-12, 42 & 52 devices also provide overcurrent indication. If the motor current exceeds 110% of the set FLA, the red thermal overload LED starts to flash. As soon as the current falls below 110% of FLA, the red flashing LED goes out. The red LED also flashes during motor starting and locked rotor conditions.	
 In the event of a 40% (or greater) phase-unbalance, the CEF1 trips and the red LED lights within 1.5 seconds on start-up or within 3 seconds during normal operation (independent of motor load). Of course, the CEF1 also trips during single-phase conditions (100% phase-unbalance).	Single-phase & Phase-unbalance Indication In the event of a 40% (or greater) phase-unbalance, the CEF1 trips and the red LED lights within 1.5 seconds on start-up or within 3 seconds during normal operation (independent of motor load). Of course, the CEF1 also trips during single-phase conditions (100% phase-unbalance).	 +1 +2 +3 +5 +10 +20 +40 +80 +200 35A Example #3: Motor full load amperes = 8.7 FLA CEF1 Model: CEF1-11 or CEF1-12 Required loops: 4 Setting: $8.7A \times 4 \text{ (loops)} = 34.8A$ $34.8A = 20A \text{ (Given)} + 10A + 5A$ Slide +10 and +5 switches to the right.
 CEF1-12, 42 & 52 devices provide this sensing function for use with thermistor temperature sensors (PTC). PTC's are built into the motor to be protected. On reaching the admissible rated response temperature of the sensor (or in the event of a short-circuit or open-circuit in the thermistor circuit), the CEF1 trips and the red LED lights.	Thermistor Overtemperature Indication CEF1-12, 42 & 52 devices provide this sensing function for use with thermistor temperature sensors (PTC). PTC's are built into the motor to be protected. On reaching the admissible rated response temperature of the sensor (or in the event of a short-circuit or open-circuit in the thermistor circuit), the CEF1 trips and the red LED lights.	Degree Of Inertia Setting (Tripping time at 6 x FLA) Trip time is set digitally, in seconds, with four slide switches. Tripping time is determined in accordance with the admissible locked rotor time of the motor and the time/current characteristic curve (page C17). Example: To set time at 24 seconds, slide switches +8 and +16 to the right ($8 + 16 = 24$ seconds).  +2 +4 +8 +16 24s

CEF1 Electronic Motor Protector

Motor Protector	Description	For use with...	Catalog Number	Price
 CEF1-11  CEF1-41	CEF1 Electronic Motor Protector (basic) - ❶ With protection functions: • Thermal Overload Protection • Single-phase / Phase unbalance Protection Ampere Range: 0.5 to 180 FLA ❷ 160 to 400 FLA ❸	CA6-95(-EI)...180(-EI) CA6-210-EI...420-EI	CEF1-11-* CEF1-41-* (replace "*" with Supply Voltage Code from table below)	590 1030
 CEF1-12  CEF1-22  CEF1-42  CEF1-52	CEF1 Electronic Motor Protector (advanced) - ❶ With protection functions: • Thermal Overload Protection • Single-phase / Phase unbalance Protection • Overcurrent Indication • Thermistor Overtemperature Protection Ampere Range: 0.5 to 180 FLA ❷ 160 to 400 FLA ❷ 160 to 400 FLA ❸ 160 to 630 FLA ❹	CA6-95(-EI)...180(-EI) Separate Mount CA6-210-EI...420-EI CA6-420-EI	CEF1-12-* CEF1-22-* CEF1-42-* CEF1-52-* (replace "*" with Supply Voltage Code from table below)	735 1325 1325 1590

Supply Voltage Codes ❹

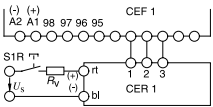
Voltage Code (replace "*")	Voltage Range			Price Adder
	50 Hz	60 Hz	VDC	
24V50/60	24V	24V	~	~
24VDC	~	~	24V	162
36V50/60	36V	36V	~	~
48V50/60	48V	48V	~	~
48VDC	~	~	48V	162
110V50/60	110V	110V	~	~
240V50/60	240V	240V	~	~
380V50/60	380V	380V	~	❶
415V50/60	415V	415V	~	❶
440V50/60	440V	440V	~	❶

Factory Modifications

Description	Catalog Num. Suffix	Price Adder
Automatic Reset - Resets CEF1 after thermal overload trip or trip from thermistor overtemperature protection.	-R	360
Remote Reset Terminal Connections - Order CER1 Remote Reset separately.	-F	207
Special Supply Voltage	Contact Factory	~
Extend Max. Tripping Time to 60 seconds @ 6 FLA - Standard is 24 secs.	Contact Factory	~

- ❶ Output relay connected in closed circuit arrangement. Manual reset.
- ❷ Obtain 0.5 to 20 FLA by looping supply cables through current evaluation ports. See example on page B36.
- ❸ Integral bus bars mount directly to a CA6-210-EI...420-EI contactor.
- ❹ UL label only available on devices with control voltage of 240V or less.

Universal CEF1 Accessories

Accessory	Description	Catalog Number	Price
	Remote Indication Unit - Front mounts onto control panel. Provides status indication of all CEF1 functions. Trips and alarms can be reset. Includes 3 meter cable. For CEF1-12; 22; 42 and 52	CEL1	419
	Remote Reset Module - ❶❷ Shown with CR4-P adaptor for mounting on DIN-rail. • Actuation voltage = 24...48 VAC/DC • Other voltages possible with series resistor - 8.2 kΩ, 4W = 110...220 VAC/DC - 22 kΩ, 10W = 240...440 VAC/DC 	CER-1	209
	DIN-Rail Adaptor for Remote Reset Module -	25.950.207-01	5
	Terminal Cover - Provides touch protection (also see CA6 contactor accessories) For CEF1-11 / 12 For CEF1-11 / 12 For CEF1-52	CA6-HA1 ❸ CA6-HA2 CA6-HA3	31 39 46
	Transparent Faceplate Cover - Inhibits access to controls and DIP switches.	CEF1-PA	50

- ❶ CEF1 unit must have Remote Reset Terminal connection modification to use CER-1 Remote Reset Module.
 ❷ To mount the CER-1 remote reset module on DIN rail, order adaptor 25.950.207-01 separately.
 ❸ Not for use with CA6-105-HU lugs.

CEF1-11 & CEF1-12 Accessories

Accessory	Description	Current Rating [A]	Catalog Number	Price
	Connection Terminals - Provides support of cable end when looping through current evaluation ports. Includes set of three (3) terminals and fixing screws.		CEF1-HD	12
	Main Terminal Set (Dual conductor, touch safe) - Priced as a complete set with two blocks, six lugs. Fits CWE4-VM / VS conductor bars Fits CWE4-VM2 / VS2 conductor bars Fits CEF1-52 integral conductor bars	125 180	CA6-HB1 CA6-HB2 CA6-HB3	64 80 118
	Conductor Bars (set of three for CEF1-11 & CEF1-12) - Universal connectors for separate mounting with line and load connections; M8 terminals; 4 x 16 x 100 mm Universal connectors for separate mounting with line and load connections; M8 terminals; 4 x 20 x 117 mm	125 180	CWE4-VM CWE4-VM2	101 148
	Lower Conductor Bars (set of three for CEF1-11 & CEF1-12) - For mounting to CA6-95 & 110 contactors; M6 terminals For mounting to CA6-110-EI, 140(-EI) & 180(-EI) contactors and contactor combinations; M8 terminals	125 180	CWE4-VS CWE4-VS2	101 201

Conductor Bar to CA6 Contactor - Lug Compatibility Table ❶

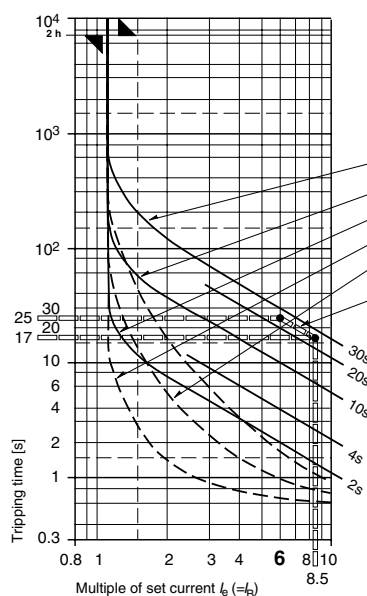
If using...	With contactor...	Use Conductor Bar...	With lug... ❶
CEF1-11...CEF1-12	CA6-95(-EI)...110	CWE4-VS	CA6-105-HU or CA6-HB1
CEF1-11...CEF1-12	CA6-110-EI; 140(-EI); 180(-EI)	CWE4-VS2	CA6-170-HU or CA6-HB2
CEF1-11...CEF1-12	Separate Mounting	CWE4-VM	CA6-105-HU or CA6-HB1
CEF1-11...CEF1-12	Separate Mounting	CWE4-VM2	CA6-170-HU or CA6-HB2
CEF1-22	Separate Mounting (only)	(Integral to CEF)	Line - Bus Bar with M12 bolt only Load - Bus Bar with M10 bolt only Can add CA6-420HU lugs
CEF1-41...CEF1-42	CA6-210-EI...CA6-300-EI	(Integral to CEF)	CA6-420-HU
CEF1-52	CA6-420-EI	(Integral to CEF)	CA6-420-HU or CA6-HB3

❶ See CA6 Accessories in the "Contactors" section of this catalog for information on CA6 lugs.

Technical Information - General Data

Rated Voltage		[V]	
Motor circuit (to UL & CSA)			600
Control circuit			
Maximum	[V]		440
To UL & CSA	[V]		240
Supply Voltage			
Alternating Current (AC) 50/60Hz	[V]		24, 36, 48, 110, 220, 240, 380, 415 or 440
Direct Current (DC)	[V]		24 or 48
Permissible fluctuation			
AC 50/60Hz			0.80 to 1.10 of rated supply voltage
DC			0.90 to 1.20 of rated supply voltage
Power Consumption			AC: 2.5 VA (2 Watt) DC: 2 Watt
Max Total Power Loss			
CEF1-11 & CEF1-12			AC: 4.5 VA (4 Watt) DC: 4 Watt
CEF1-22, CEF1-41 & CEF1-42			AC: 18.5 VA (18 Watt) DC: 18 Watt
Output Relay			
Contact arrangement			1 N.O. & 1 N.C.
Continuous thermal current	[A]		4
Rated operating current (AC)			24-110V/4A, 220-240V/3A, 380-415V/2A, 440V/1.5A
Rated operating current (DC)			24V/0.6A, 48V/0.3A, 60V/0.25A, 110V/0.15A, 220-240V/0.05A
Ambient Temperature			
Normal operation	[°C]		-5°C to +60°C
Short time operation (a few days)	[°C]		-20°C to +70°C
For transport	[°C]		-50°C to +85°C
For storage	[°C]		-50°C to +60°C
Climatic Resistance			
Humid heat			40°C @ 92% relative humidity (56 days)
Alternating climate (20 cycles)			23°C @ 83% relative humidity/40°C @ 93% relative humidity
Protection Class			
Unit (except terminals)			IP40 (CEL1 rated IP54)
Terminals			IP20
Current Rating			
CEF1-11 & CEF1-12	[A]		0.5 to 180A (0.5 to 20A by looping cables through ports)
CEF1-22, CEF1-41 & CEF1-42	[A]		160 to 400A
CEF-52	[A]		160 to 630A

Thermal Overload Protection



Time/Current Characteristics

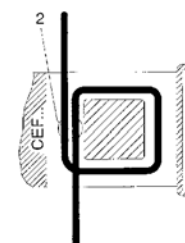
- a** Time/current characteristic curve from cold state with highest possible setting of the tripping time (30 seconds).
- b** Time/current characteristic curve from cold state with normal setting of the tripping time (10 seconds).
- c** Time/current characteristic curve from cold state with lowest possible setting of the tripping time (2 seconds).
- d** Time/current characteristic curve with previous loading at FLA with lowest/highest possible setting of the tripping time (30 seconds/2 seconds).
- e** Time/current characteristic curve with previous loading at FLA with normal setting of the tripping time (10 seconds).
- f** Interpolation example:
Locked rotor current (from cold state) = 8.5 x FLA
Admissible locked rotor time = 17 seconds
By parallel movement of the time/current characteristic curve through the point 17 seconds at 8.5 x FLA, a setting time is obtained at the point where the curve crosses the 6 x FLA line of 25 seconds.
Setting: 24 seconds

Motor Supply Cables: Setting the Rated Currents of 0.5...20A

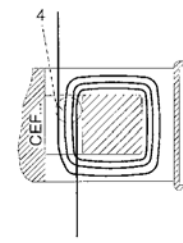
For motor currents smaller than 20A, the motor supply cables must be looped through the current measuring device (current transformers) on the CEF1 an appropriate number of times. This “amplifies” the motor current, allowing the CEF1 to measure and protect the motor. The current setting on the CEF1 is the product of:

$$I_e [A] \times \text{number of loops}$$

For example, to double the apparent rated current of the motor (the current “seen” and measured by the CEF1, the motor supply cables are looped through the current transformers twice. To quadruple the apparent rated current of the motor, the supply cables are looped four times. See the figure below.



Motor supply cables looped twice



Motor supply cables looped four times

Recommended for I_b [A]	Motor Supply Cables	Cable cross-section Motor (Flexible strand)	
		UL, CSA [AWG]	IEC [mm ²]
20...180	straight thru	10...10000	4...95
10...20	loop twice	14...10	2.5...25
5...10	loop 4x	14	1...6
2.5...5	loop 8x	14	0.75...2.5
0.5...2.5	loop 40x	①	0.5...0.75

① UL / CSA: for $I_b = 0.5...2.5A$, we recommend that you purchase fully looped devices from the factory (40 turns). Contact your Sprecher + Schuh representative for more information.

Electronic Overload Protection (continued)

Analog simulation of motor temperature rise. Trips when the maximum allowable time/current limits have been reached.

Ultimate Tripping Current (-20°C to +70°C)	1.05 to 1.15 FLA
Tripping @ 6 x FLA	
Setting range (standard configuration)	2 to 30 seconds (adjustable in 2 second stages)
Setting range (special request)	4 to 60 seconds (adjustable in 4 second stages)
Accuracy	
2 to 6 seconds	±0.5 seconds
8 to 30 seconds	±0.10%
Trip Indication	Red LED
Trip Memory w/ Loss of Supply Voltage	Yes (30 min @ 25°C; 5 min @ 60°C; 1 min @ 70°C)
Available Reset	
All CEF1 models	Manual or automatic (after cooling for ≈ 6x trip time setting)

Overcurrent Indication

Provides indication of overcurrent situation.

Accuracy	±2%
Indication	Red flashing LED
Indication Point	110% of FLA (also during motor starting and locked rotor conditions)
Red LED goes off when current falls below 110% of FLA setting.	
Red LED lights continuously when ultimate tripping current is reached.	

Single-phase and Phase-unbalance Protection

Monitors wave of the motor current and trips with a phase-unbalance or single-phase condition. This function is independent of motor current.

Tripping Point	40% phase-unbalance (20% or 60% available on request)
Tripping Time	
On start-up	1.5 seconds (±0.5 seconds)
Normal operation	3.0 seconds (±1.0 seconds)
Trip Indication	Red LED
Trip Memory w/ Loss of Supply Voltage	Yes (30 min @ 25°C; 5 min @ 60°C; 1 min @ 70°C)
Available Reset	Manual

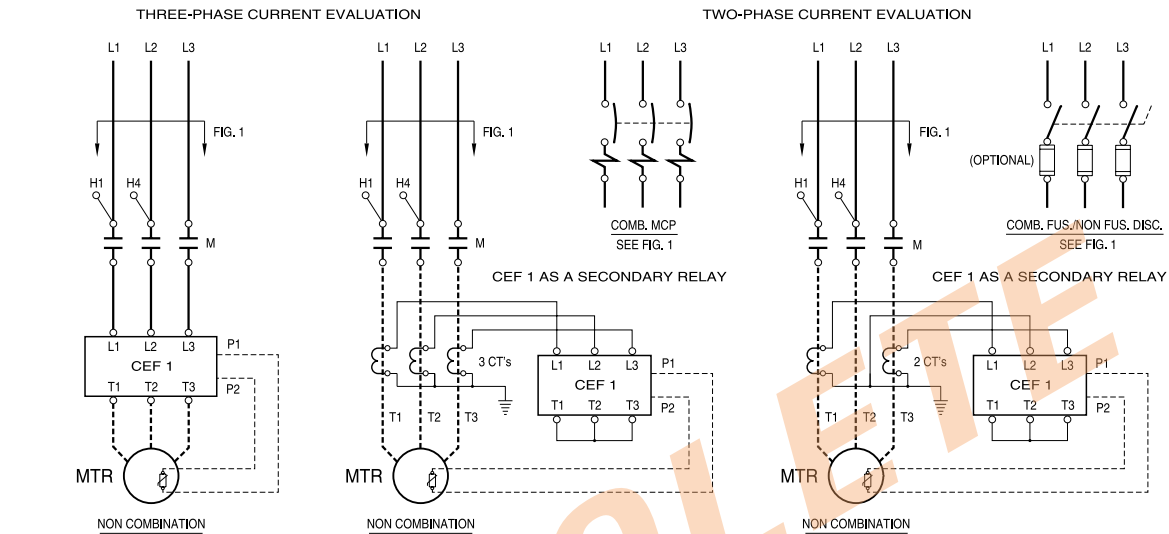
Thermistor Overtemperature Protection

Provides sensing function for use with thermistor temperature sensors (PTC).

Sensor Measuring Circuit

Maximum cold resistance of PTC sensor chain	1500 Ω
Max. number of series connected PTC sensors	6
Response level (-20°C to +70°C)	3300 Ω (±300 Ω)
Release level (-20°C to +70°C)	1800 Ω (±300 Ω)
Response level with short circuit in sensor circuit	≤ 15 Ω (-20°C to +70°C)
Measuring voltage	< 2.5 VDC
Measuring Line	
Minimum cross-section (mm²)	0.5 0.75 1 1.5 2.5
Maximum length (m)	200 300 400 600 1000
Trip Indication	Red LED
Trip Memory w/ Loss of Supply Voltage	Yes
Available Reset	Manual or automatic

Two and Three Phase Current Evaluation



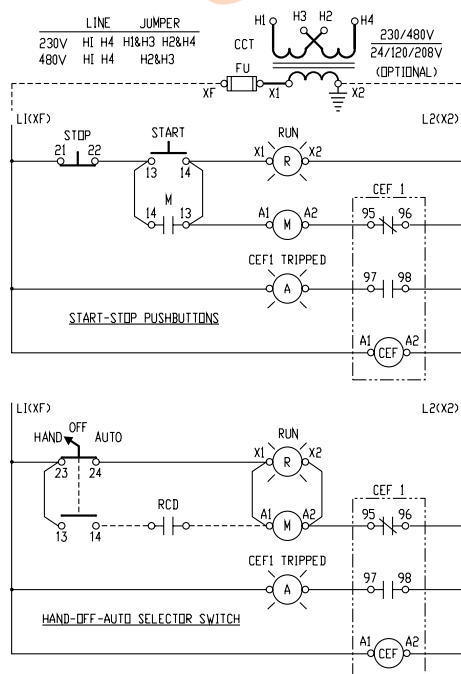
CEF 1-11 Detectable Faults

- Thermal Overload
- Single Phasing and Phase Asymmetry

CEF 1-12, CEF 1-42 Detectable Faults and CEF1- 52

- Thermal Overload
- Overcurrent
- Single Phasing and Phase Asymmetry
- Overtemperature With Thermistor

Control Wiring and Terminal Arrangement



A1 } Control Supply

A2 } Control Supply

95 } NC Trip Contact With

96 } Power Applied To CEF 1

97 } NO Trip Contact With

98 } Power Applied To CEF 1

P1 } Thermistor Over

P2 } Temp. Protection

RESISTOR

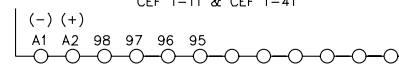
24-48V = NOT REQUIRED

110-220V = 8.2K OHMS 4 WATTS

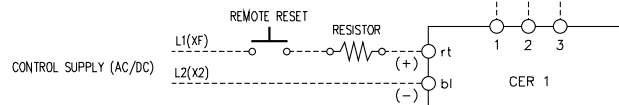
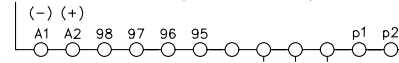
240-440V = 22K OHMS 10 WATTS

Terminal Arrangement

CEF 1-11 & CEF 1-41



CEF 1-12, 22 & CEF 1-42, 52



TYPICAL CONNECTION FOR REMOTE RESET MODULE

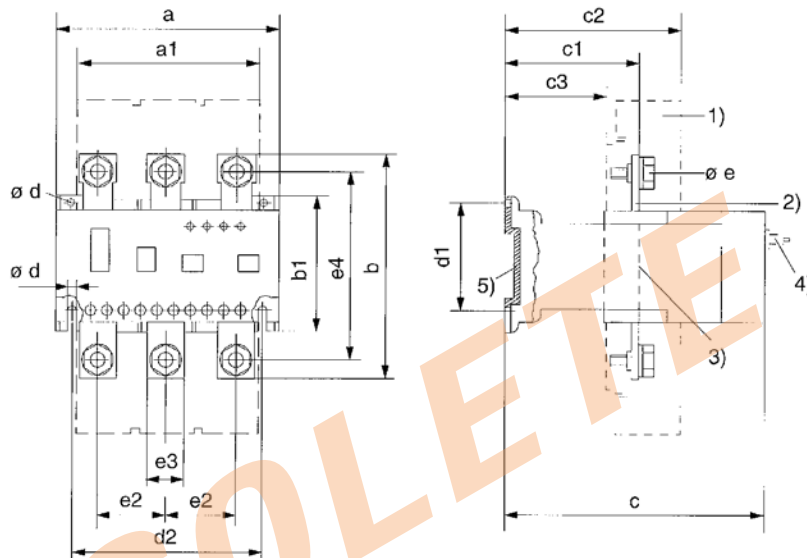
THE CEF 1 CONTACTS ARE SHOWN IN THE READY STATE WITH CONNECTED SUPPLY VOLTAGE SO AS TO MATCH THOSE OF A NORMAL AND OPERATIONALLY READY THERMAL OVERLOAD RELAY.

NOTES:

1. RCD STANDS FOR REMOTE CONTROL DEVICE BY CUSTOMER.
2. X2 TERMINAL GROUNDED AS STANDARD, REMOVE IF NOT REQUIRED.

CEF1-11 & CEF1-12

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

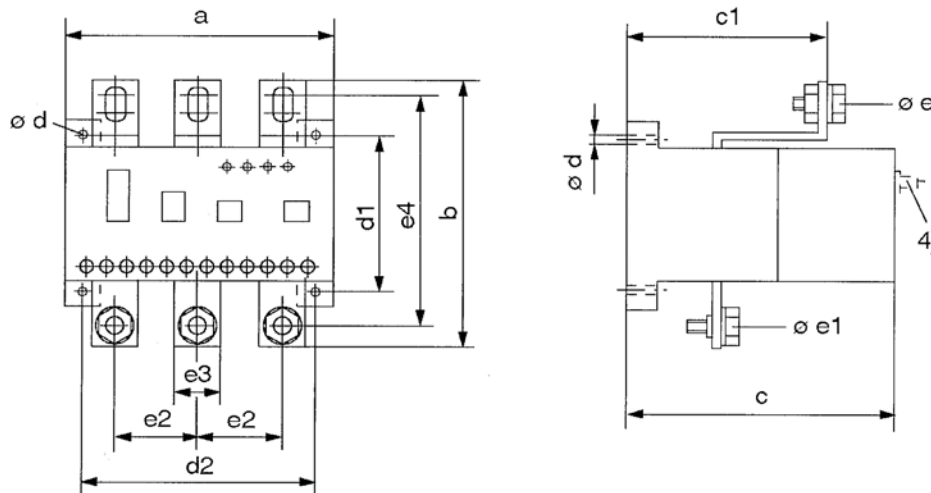


- 1) Touch protection
- 2) Bus bar for universal application (CWE4-VM)
- 3) Loop-through openings 19 x 19mm
- 4) With indication module CEL1; $c = c + 29\text{mm}$
- 5) Provision for mounting on a top-hat rail EN 50 022-35
- 6) CWE4-VM2

Cat. Num.	a	a1	b	b ⁶⁾	b1	Ød	d1	d2	Øe	Øe1	e2	e3	e4	e4 ¹⁾	c	c1	c2	c3
CEF1-11/12	120 (4-23/32)	105 (4-1/8)	100 (3-15/16)	119 (4-11/16)	73 (2-7/8)	5.4 (7/32)	55...60 (2-5/32...2-3/8)	100 (3-15/16)	M8 x 12	~	38.5 (1-17/32)	16 (5/16)	82 (3-7/32)	99 (3-29/32)	143 (1-11/16)	72 (2-27/32)	93.5 (3-11/16)	53.5 (2-1/8)

CEF1-41 & CEF1-42

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

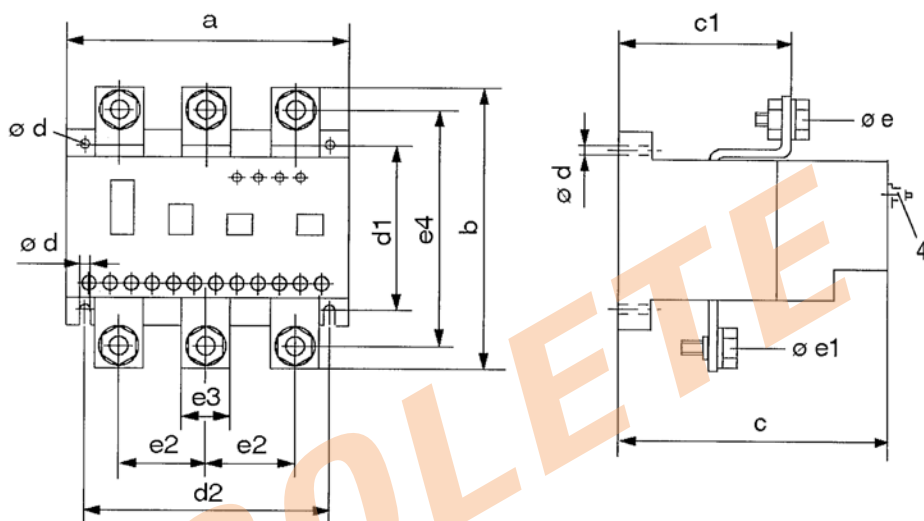


- 4) With indication module CEL1; $c = c + 29\text{mm}$
- 6) CWE4-VM2

Cat. Num.	a	a1	b	b ⁶⁾	b1	Ød	d1	d2	Øe	Øe1	e2	e3	e4	e4 ¹⁾	c	c1	c2	c3
CEF1-11/12	140 (5-17/32)	~	142 (5-20/32)	~	~	5.8 (1/4)	75 (2-31/32)	125 (4-29/32)	M10 x 25	M10 x 35	48 (1-29/32)	25 (1)	117 (4-7/32)	117 (4-7/32)	148 (5-13/16)	117 (4-7/32)	~	~

CEF1-52

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

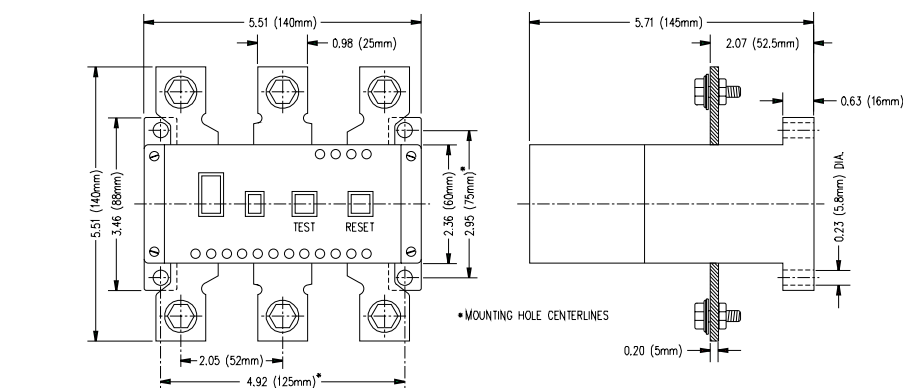


- 4) With indication module CEL1; $c = c + 29\text{mm}$
6) CWE4-VM2

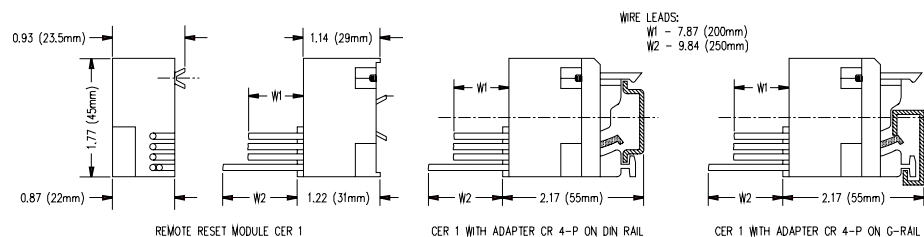
Cat. Num.	a	a1	b	b ⁶⁾	b1	Ød	d1	d2	Øe	Øe1	e2	e3	e4	e4'	c	c1	c2	c3
CEF1-52	155 (6-1/8)	~	143 (5-5/8)	~	~	6.5 (7/32)	90...93 (3-17/32...3-11/16)	135 (5-5/16)	M10 x 25	M10 x 25	48 (1-29/32)	25 (1)	118 (4-14)	113 (4-1/16)	178 (7)	118 (4-1/4)	~	~

CEF1-22 *(Separate Mount)*

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

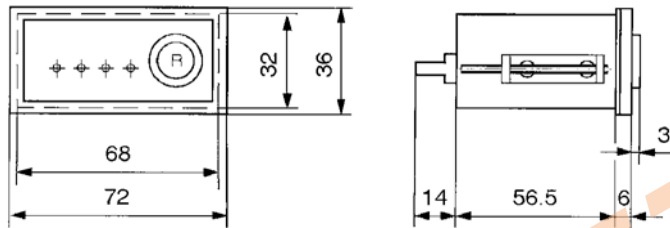


CEF 1-22 WITH PRIMARY CONDUCTOR BARS AND SCREW TYPE TERMINALS



CEL1 Remote Indicating Unit

- Dimensions are in millimeters
- Dimensions not intended for manufacturing purposes



OBSOLETE

First Generation CEP7 Solid State Overload Relays

Advanced solid state
motor protection at
electromechanical prices

Sprecher + Schuh is at the leading edge of technology developing affordable solid state overload relays that utilize the latest Application Specific Integrated Circuits (ASICs) in their construction. This gives our new CEP7 overload relay many features that are simply not possible with traditional bi-metallic or eutectic alloy electromechanical overload relays.

Increased accuracy and improved motor protection

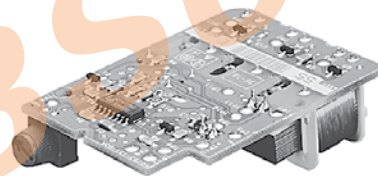
Unlike traditional overload relays that simulate heat build-up in the motor by passing current through a heater element, CEP7 solid state overload relays measure motor current directly through integrated current transformers. The transformers, in turn, create a magnetic field that induces DC voltage onto the ASIC board. The electronics identify excessive current or

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 traditional overloads and some other competitive electronic overload relays. Since the CEP7 is self-powered and a typical 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 100% loaded motor, it will trigger in 2 seconds; and from 2 – 3 seconds on a lightly loaded motor. If the 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 electromechanical overload relay. In addition, CEP7 overload relays detect a 50% phase imbalance in the same way as a phase loss



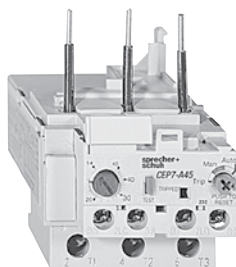
Microelectronics provide flexible and accurate motor overload protection



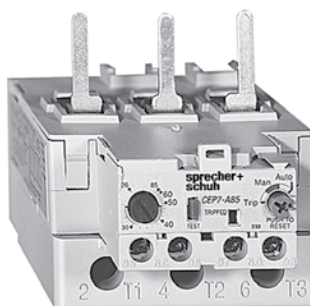
loss of phase more accurately, and react to the condition with greater speed and reliability, than traditional overload relays. In addition, CEP7 solid state relays offer setting accuracies from 2.5 – 5% and repeat accuracy of 1%.



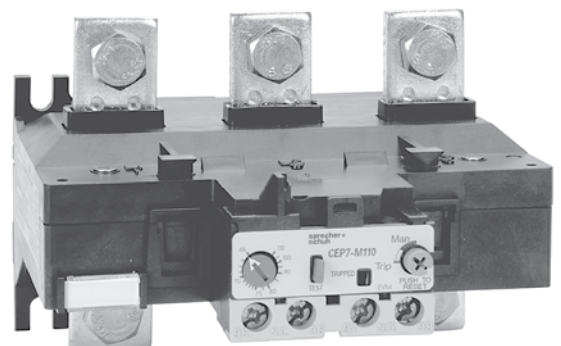
32A



45A



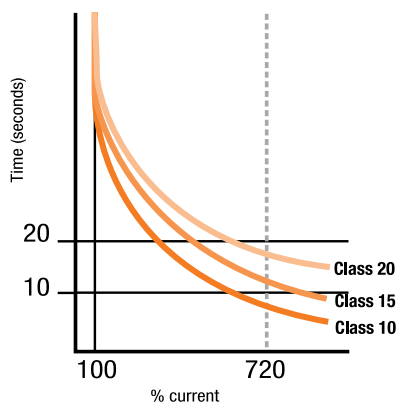
85A



110A
180A

Choice of tripping classes...

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, Class 15 and 20 versions of the CEP7 are also available in all amp ranges.



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

Choice of reset options

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. In specialized cases,



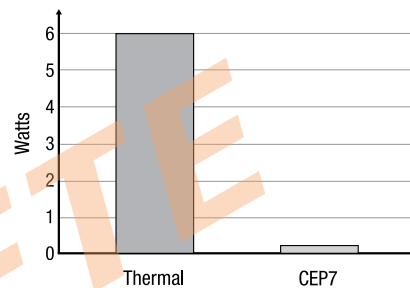
however, such as rooftop AC units or where restarting the motor will not harm people or equipment, automatic reset may be desired. CEP7 overload relays are available with either Manual Reset exclusively, or Manual and Automatic Reset models which can be toggled to the desired mode.

Dramatically reduced energy requirement saves money and 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 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 150 milliwatts. 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.



Conventional overload relays dissipate as much as six watts of energy compared with as little as 150 milliwatts for the CEP7

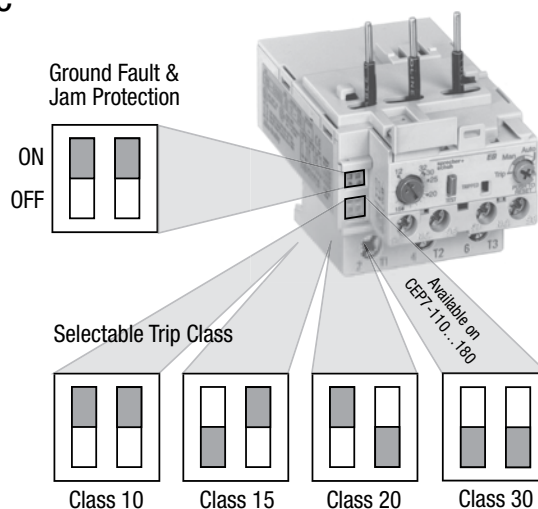
Wide current adjustment range

Bi-metallic overload relays typically have a small current adjustment range of 1.5 to 1, meaning that the maximum setting is generally 1.5 times

the lower setting. CEP7 relays, on the other hand, have an adjustment setting of 3.2 to 1. This reduces relay stocks over 50% and helps assure the correct relay is always on hand.

Ground fault and jam protection also available

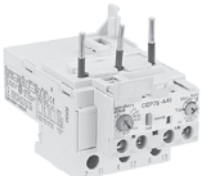
Our new CEP7-B solid state overload relay is the **ultimate motor protection relay** in this price class. DIP-switches provide Trip Class selection of 10, 15, 20 or 30 seconds. This ability allows you to closely match the Trip Class with the run-up time of the motor. Ground Fault and Jam Protection are also included. Ground Fault protection trips at 50% of FLA setting, while Jam / Stall Protection trips at 400% of FLA (after inrush).



Directly Mounted CEP7 Solid State Overload Relays, Manual Reset ①②⑤

Overload Relay	Directly Mounts to Contactor... ②	Adjustment Range (A)	Trip Class 10		Trip Class 20	
			Catalog Number	Price	Catalog Number	Price
Manual reset for 3Ø Applications ①						
 CEP7-M32	CA4-9...CA7-23 ③	0.1...0.32	CEP7-M32-0.32-10	Refer to Factory	CEP7-M32-0.32-20	Refer to Factory
		0.32...1.0	CEP7-M32-1.0-10		CEP7-M32-1.0-20	
		1.0...2.9	CEP7-M32-2.9-10		CEP7-M32-2.9-20	
		1.6...5.0	CEP7-M32-5-10		CEP7-M32-5-20	
		3.7...12	CEP7-M32-12-10		CEP7-M32-12-20	
		12...32	CEP7-M32-32-10		CEP7-M32-32-20	
	CA7-30...37	3.7...12	CEP7-M37-12-10		CEP7-M37-12-20	
		12...37	CEP7-M37-37-10		CEP7-M37-37-20	
	CA7-43	14...45	CEP7-M45-45-10		CEP7-M45-45-20	
	CA7-60...85	26...85	CEP7-M85-85-10		CEP7-M85-85-20	
Manual reset for 1Ø Applications ①						
 CEP7S-M32	CA4-9...CA7-23 ③	2.0...7.0	CEP7S-M32-7-10	Refer to Factory	CEP7S-M32-7-20	Refer to Factory
		5.0...15	CEP7S-M32-15-10		CEP7S-M32-15-20	
		12...32	CEP7S-M32-32-10		CEP7S-M32-32-20	
	CA7-30...37	5...15	CEP7S-M37-15-10		CEP7S-M37-15-20	
		12...37	CEP7S-M37-37-10		CEP7S-M37-37-20	
	CA7-43	14...45	CEP7S-M45-45-10		CEP7S-M45-45-20	
	CA7-60...85	26...85	CEP7S-M85-85-10		CEP7S-M85-85-20	

Directly Mounted CEP7 Solid State Overload Relays, Automatic/Manual Reset ①②④⑤

Overload Relay	Directly Mounts to Contactor... ②	Adjustment Range (A)	Trip Class 10		Trip Class 20	
			Catalog Number	Price	Catalog Number	Price
Automatic or Manual reset for 3Ø Applications ①④						
 CEP7S-A45	CA4-9...CA7-23 ③	0.1...0.32	CEP7-A32-0.32-10	Refer to Factory	CEP7-A32-0.32-20	Refer to Factory
		0.32...1.0	CEP7-A32-1.0-10		CEP7-A32-1.0-20	
		1.0...2.9	CEP7-A32-2.9-10		CEP7-A32-2.9-20	
		1.6...5.0	CEP7-A32-5-10		CEP7-A32-5-20	
		3.7...12	CEP7-A32-12-10		CEP7-A32-12-20	
		12...32	CEP7-A32-32-10		CEP7-A32-32-20	
	CA7-30...37	3.7...12	CEP7-A37-12-10		CEP7-A37-12-20	
		12...37	CEP7-A37-37-10		CEP7-A37-37-20	
	CA7-43	14...45	CEP7-A45-45-10		CEP7-A45-45-20	
	CA7-60...85	14...45	CEP7-A85-45-10		CEP7-A85-45-20	
	26...85	CEP7-A85-85-10	CEP7-A85-85-20			
Automatic or Manual reset for 1Ø Applications ①④						
 CEP7S-A45	CA4-9...CA7-23 ③	2.0...7.0	CEP7S-A32-7-10	Refer to Factory	CEP7S-A32-7-20	Refer to Factory
		5.0...15	CEP7S-A32-15-10		CEP7S-A32-15-20	
		12...32	CEP7S-A32-32-10		CEP7S-A32-32-20	
	CA7-30...37	5...15	CEP7S-A37-15-10		CEP7S-A37-15-20	
		12...37	CEP7S-A37-37-10		CEP7S-A37-37-20	
	CA7-43	14...45	CEP7S-A45-45-10		CEP7S-A45-45-20	
	CA7-60...85	26...85	CEP7S-A85-85-10		CEP7S-A85-85-20	

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.

① 3-phase CEP7 units are only designed for 3Ø applications. Single phase CEP7S units are only designed for 1Ø applications.

② 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.

③ CEP7 overload relays are shipped with a CA4 wiring adaptor (labeled "A") in the box which replaces the CA7 wiring adaptor (labeled "B") that is installed on the overload as standard.

④ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.

⑤ CEP7 Overload relays do not work with Variable Frequency Drives or any PN Soft-starter with braking options.

Separate Mount CEP7 Solid State Overload Relays, Manual Reset ①②④

Overload Relay	Adjustment Range (A)	Trip Class 10		Trip Class 20	
		Catalog Number	Price	Catalog Number	Price
Manual Reset for 3Ø Applications ①					
	0.1...0.32	CEP7-M32-0.32-10-P-A	Refer to Factory	CEP7-M32-0.32-20-P-A	Refer to Factory
	0.32...1.0	CEP7-M32-1.0-10-P-A		CEP7-M32-1.0-20-P-A	
	1.0...2.9	CEP7-M32-2.9-10-P-A		CEP7-M32-2.9-20-P-A	
	1.6...5.0	CEP7-M32-5-10-P-A		CEP7-M32-5-20-P-A	
	3.7...12	CEP7-M32-12-10-P-A		CEP7-M32-12-20-P-A	
	12...32	CEP7-M32-32-10-P-A		CEP7-M32-32-20-P-A	
	3.7...12	CEP7-M37-12-10-P-A		CEP7-M37-12-20-P-A	
	12...37	CEP7-M37-37-10-P-A		CEP7-M37-37-20-P-A	
	14...45	CEP7-M45-45-10-P-A		CEP7-M45-45-20-P-A	
	26...85	CEP7-M85-85-10-P-A		CEP7-M85-85-20-P-A	
CEP7-M37					
Manual Reset for 1Ø Applications ①					
	2.0...7.0	CEP7S-M32-7-10-P-A	Refer to Factory	CEP7S-M32-7-20-P-A	Refer to Factory
	5.0...15	CEP7S-M32-15-10-P-A		CEP7S-M32-15-20-P-A	
	12...32	CEP7S-M32-32-10-P-A		CEP7S-M32-32-20-P-A	
	12...37	CEP7S-M37-37-10-P-A		CEP7S-M37-37-20-P-A	
	14...45	CEP7S-M45-45-10-P-A		CEP7S-M45-45-20-P-A	
	26...85	CEP7S-M85-85-10-P-A		CEP7S-M85-85-20-P-A	
CEP7S-M85					

Separate Mount CEP7 Solid State Overload Relays, Automatic/Manual Reset ①②③④

Overload Relay	Adjustment Range (A)	Trip Class 10		Trip Class 20	
		Catalog Number	Price	Catalog Number	Price
Automatic or Manual Reset for 3Ø Applications ①③					
 					

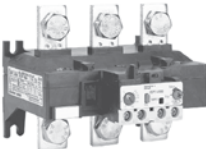
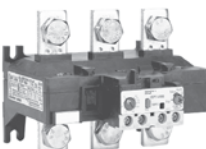
TIP!

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.

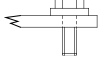
- ① 3-phase CEP7 units are only designed for 3Ø applications. Single phase CEP7S units are only designed for 1Ø applications.
- ② This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.

- ③ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.
- ④ CEP7 Overload relays do not work with Variable Frequency Drives or any PN Soft-starter with braking options.

Large Amp CEP7 Solid State Overload Relays, Automatic and Manual Reset ①②③④

Overload Relay	Used with Contactor...	Adjustment Range (A)	Trip Class 10		Trip Class 20	
			Catalog Number	Price	Catalog Number	Price
Manual Reset for 3Ø Applications ❶						
 CEP7-M110	CA6-95(-EI)...CA6-110(-EI)	66...110	CEP7-M110-10	Refer to Factory	CEP7-M110-20	Refer to Factory
	CA6-140(-EI)...CA6-180(-EI)	57...180	CEP7-M180-10		CEP7-M180-20	
Manual Reset for 3Ø Applications ❶❸						
 CEP7-A180	CA6-95(-EI)...CA6-110(-EI)	66...110	CEP7-A110-10	Refer to Factory	CEP7-A110-20	Refer to Factory
	CA6-140(-EI)...CA6-180(-EI)	57...180	CEP7-A180-10		CEP7-A180-20	

Connection Hardware for Large Amp CEP7 Overload Relays

Lug or Accessory	Connection	Description	Catalog Number	Price
	• Hex head bolts 	Flexible Conductors (priced as complete set, containing 3 conductors and 6 washers) For CEP7-M(A)110... For CEP7-M(A)180...	CEP7-110-PCE1 CEP7-180-PCF1	Refer to Factory
	• Single connections to each pole • Accepts round conductors only • #8...#1/0 AWG (for CEP7-110) • #6...#250 MCM (for CEP7-180) 	Screw Type Lugs ⑤ (set of 3 - two sets required to wire line and load sides) For CEP7-M(A/B)110... For CEP7-M(A/B)180...	CEP7-110-LE1 CEP7-180-LF1	
		Terminal Covers - Provides touch protection to IP20. Includes both line and load side. For CEP7-M(A, B)110... For CEP7-M(A, B)180...	CEP7-110-HA CEP7-180-HA	

① 3-phase CEP7 units are only designed for 3Ø applications.

② This reference is not intended to be a guide for selecting contactors. Size overload relays using the full load current of the motor.

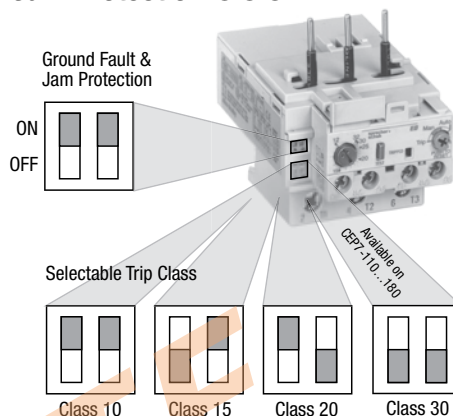
③ The reset time of a CEP7 set in the automatic mode is approximately 180 seconds.

④ CEP7 Overload relays do not work with Variable Frequency Drives or any Sprecher + Schuh PN Softstarter with braking options.

⑤ If connecting the CEP7 directly to a CA6 contactor with flexible conductors, order one set of lugs from this page for the CEP7 (load side) and one set of lugs from the CA6 section for the CA6 (line side). CA6-HB and HU lugs will not work with the CEP7.

Directly Mounted CEP7-B Solid State Overload Relays with Ground Fault & Jam Protection ①③⑤

Overload Relay	Directly Mounts to Contactor... ②	Adjustment Range (A)	Trip Class 10, 15, or 20	
			Catalog Number	Price
Automatic or Manual reset for 30 Applications ①④				
 CEP7-B32...	CA4-9...CA7-23	0.1...0.32	CEP7-B32-0.32	Refer to Factory
		0.32...1.0	CEP7-B32-1.0	
		1.0...2.9	CEP7-B32-2.9	
		1.6...5.0	CEP7-B32-5	
		3.7...12	CEP7-B32-12	
		12...32	CEP7-B32-32	
	CA7-30...37	14...45	CEP7-B37-45	
	CA7-43	5.0...15	CEP7-B45-15	
		14...45	CEP7-B45-45	
	CA7-60...85	26...75	CEP7-B85-75	
		60...85	CEP7-B85-85	



Includes:

- Automatic or manual reset ④
- Adjustable trip class; 10, 15 or 20 seconds (30 seconds also available for CEP7-B110...180).
- Jam / Stall protection (after inrush, trips at 400% FLA)
- Ground fault protection (trips at 50% of FLA setting) ③
- Setting selections via DIP switches
- Panel Mount Adaptor available for separate mounting ⑥

Large Amp CEP7-B Solid State Overload Relays with Ground Fault & Jam Protection ①③⑤⑦

Overload Relay	Used with Contactor...②	Adjustment Range (A)	Trip Class 10, 15, or 20	
			Catalog Number	Price
Automatic or Manual reset for 30 Applications ①④				
 CEP7-B110	CA6-95(-EI)...CA6-110(-EI)	66...110	CEP7-B110	Refer to Factory
	CA6-140(-EI)...CA6-180(-EI)	57...180	CEP7-B180	

See Connection Hardware for Large Amp CEP7-B on opposite page.

- ① CEP7-B devices are only designed for 3Ø applications.
- ② 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.
- ③ Ground fault tripping and jam/stall protection is inhibited for approximately 30 with a trip time of 0.5 seconds to eliminate the possibility of nuisance tripping during motor starting.
- ④ The reset time of a CEP7-B set in the automatic mode is approximately 180 seconds.

- ⑤ CEP7-B overload relays do not work with Variable Frequency Drives or any PN Softstarter with braking options.
- ⑥ To separately mount CEP7-B32...85 overload relays, use DIN-rail / Panel Mount Adaptor, catalog # CEP7-45-P-A (\$18) for all CEP7-B32...B45 models and Panel Mount Adaptor CEP7-85-P-A (\$21) for all CEP7-B85 models.
- ⑦ If connecting the CEP7 directly to a CA6 contactor with flexible conductors, order one set of lugs from the opposite page for the CEP7 (load side) and one set of lugs from the CA6 section for the CA6 (line side). CA6-HB and HU lugs will not work with the CEP7.

Accessories

Enclosure	Description	For Use With...	Catalog Number	Price
	DIN-rail / Panel Mount Adaptor - ❶ For separately mounting CEP7 solid state overload relays	CEP7(S)-M/A32...and CEP7(S)-M/A37...	CEP7-37-P-A	Refer to Factory
		CEP7(S)-M/A45... CEP7-B32/37/B45	CEP7-45-P-A	
		CEP7(S)-M/A85...	CEP7-85-P-A	
	Anti-Tamper Shield - Provides protection against inadvertent adjustment of mode selector and full load current setting	CEP7 all	CMS7-BC4	
	Current Adjustment Shield - Provides protection against inadvertent adjustment of full load current setting	CEP7 all	CMS7-BC5	
	Remote Reset - For remote resetting of the solid state overload relay	CEP7 all	CMR7-* <i>Replace * coil code below</i>	
	External Reset Button - Used for manually resetting overloads mounted in enclosures	CEP7 all	Use D5 Reset See Section H	Refer to Factory
	External Reset Button Adaptor - Provides a larger "target area" for resetting the overload relay when using an External Reset Button	CEP7 all	CEP7-RA1	

Marking Systems ❷

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	Refer to Factory
	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 ❸	CA7-FMC	
	Tag Carrier - For marking with Clip-on Tags. See Terminals Section for complete listing of Clip-on Tags.	100 ❸	CA7-FMA2	

CMR7 Remote Reset Coil Codes

A.C. Coil Code	Voltage Range		
	50 Hz	60 Hz	50 / 60 Hz
24Z	~	~	24V
120	110V	120V	
240	220V	230V	
240Z	~	~	240V

D.C. Coil Code	Voltage
24D	24VDC
48D	48VDC
115D	115VDC

- ❶ To install CEP7-xx-P-A, the CA7 close-couple adaptor must be removed, while maintaining conductor separation, as panel mount adaptor is pushed into position.
- ❷ The labeling field of the overload relay may also be written on by hand.
- ❸ Minimum order quantity is one package of 100. Price each x 100 = total price.

Electrical Data

		CEP7-A/B/M/ S-32	CEP7-A/B/M/ S-37	CEP7-A/B/M/ S-45	CEP7-A/B/M/ S-85	CEP7-A/B/M/ S-110	CEP7-A/B/M/ S-180
Main Circuits							
Rated Insulation Voltage U_i							
UL	[V]				600		
CSA	[V]				600		
Rated Impulse Voltage U_{imp}							
	[kV]				6		
Rated Operating Voltage U_e							
	[V]				690		
Terminal Cross-Sections							
Terminal Type							
							
Terminal Screws							
Combination screw head; cross, slotted, pozidrive							
 Flexible with Wire End Fernule [mm²]							
		1 x (2.5...4)		1 x (2.5...16)	1 x (4...35)	1 x (1...50)	1 x (1...120)
		2 x (2.5...4)		2 x (2.5...10)	2 x (4...25)	When using LE1 lugs	When using LF1 lugs
 Solid Conductor [mm²]							
		1 x (2.5...6)					
 Stranded [mm²]							
		2 x (2.5...6)					
Max. Wire Size per UL/CSA							
	[AWG]	14...8					
Recommended Torque							
	[Nm]	1.8					
	[lb-in]	16					
Pozidrive Screwdriver							
	Size	2			2	~	~
Slotted Screwdriver							
	mm	1 x 6			~	~	~
Hexagon Socket Size							
	SW [mm]	—			4	6	8

Control Circuit

		CEP7-A/B/M/ S-32	CEP7-A/B/M/ S-37	CEP7-A/B/M/ S-45	CEP7-A/B/M/ S-85	CEP7-A/B/M/ S-110	CEP7-A/B/M/ S-180
Rated Insulation Voltage U_i							
	[V]				600		
Rated Impulse Strength U_{imp}							
	[kV]				6		
Rated Operating Voltage U_e							
	[V]				690		
Rated Operating Current I_e							
AC-15							
12...120V	[A]				3 ❶		
220...240V	[A]				1.5		
380...480V	[A]				0.75		
500...600V	[A]				0.6		
24V	[A]				1.1		
110V	[A]				0.4		
220V	[A]				0.2		
440V	[A]				0.08		
Conventional Thermal Current							
	[A]				5		
Terminations							
Terminal Type 							
 Flexible with Wire End Fernule [mm²]							
					M3.5		
 Solid Conductor [mm²]							
					2 x (0.75...2.5)		
 Stranded [mm²]							
					2 x (0.75...4)		
Max. Wire Size per UL/CSA							
	[AWG]				18...12		
Recommended Torque							
	[Nm]				1.4		
	[lb-in]				12		
Pozidrive Screwdriver							
	Size				2		
Slotted Screwdriver							
	mm				1 x 6		

❶ 2A for Normally Closed contact

General Data

		CEP7-A/B/M/ S-32	CEP7-A/B/M/ S-37	CEP7-A/B/M/ S-45	CEP7-A/B/M/ S-85	CEP7-A/B/M/ S-110	CEP7-A/B/M/ S-180
Weight	[kg (lb)]	0.14 (0.31)	0.17 (0.37)	0.21 (0.46)	0.36 (0.84)	1.13 (2.5)	1.13 (2.5)
Standards		IEC 947, EN 60 947, DIN VDE 0660					
Approvals		CE, UL, CSA, PTB					
Corrosion Resistance		95% relative humidity without condensation, 30...60°C					
Ambient Temperature							
Open		-20...+60°C (-4...122°F)					
Enclosed		-20...+40°C (-4...104°F)					
Temperature Compensation		Continuous					
Shock Resistance							
10ms sinusoidal shock	[G]	30					
Type of Protection							
in connected state		IP2LX IP00					

CEP7 Application with (3) Current Transformers — Engineering Information

CEP7 Solid State Overload Relays may be used with Current Transformers (CT's) in applications where the motor Full Load Amps (FLA) are greater than the largest available CEP7 overload relay (or in lieu of the CEF1 or CET4 Electronic Motor Protector).

Installation

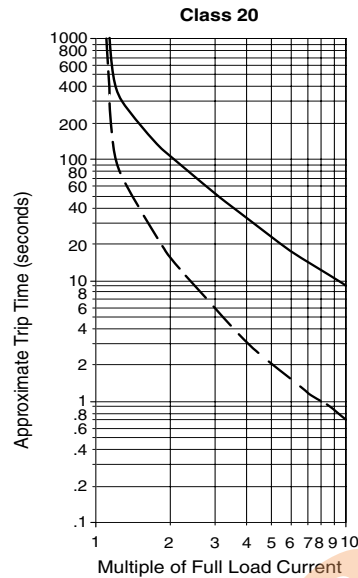
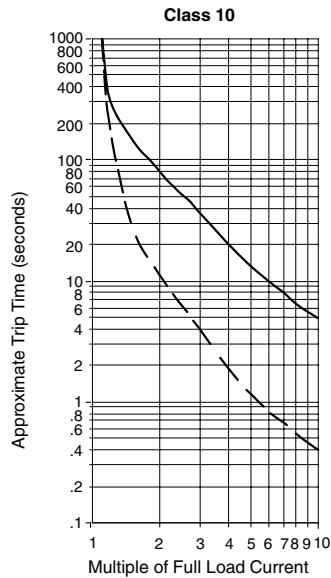
1. The Overload Relay and CT's should be wired in accordance with the tables below.
2. The Current Transformers must have a minimum thermal continuous current rating of 1.2 x FLA.

Setting the Overload Relay

1. Select Table-1, -2, -3 or -4, depending on the Current Transformer (CT) ratio being utilized.
2. Select the "Equivalent FLA", which most closely matches the motor FLA, then set the overload relay dial to the corresponding "Dial Set Position". Note: the motor FLA may not exactly match the value in the Equivalent FLA column.
3. The overload relay dial settings are calculated as: **Set Value = Dial Set Position / 1/(CT Ratio) = Equivalent FLA**.
Example: CT Ratio is 500:5, motor FLA is 240A, set overload Dial Set Position @ 2.4; **Set Value = 2.4 / (1/100) = 240**

Table-1 CT Ratio = 500:5 (100:1)		Table-2 CT Ratio = 600:5 (120:1)		Table-3 CT Ratio = 1000:5 (200:1)		Table-4 CT Ratio = 1500:5 (300:1)	
Overload = CEP7-A32-5-10 Range 1.6...5.0 (amps)		Overload = CEP7-A32-5-10 Range 1.6...5.0 (amps)		Overload = CEP7-A32-5-10 Range 1.6...5.0 (amps)		Overload = CEP7-A32-5-10 Range 1.6...5.0 (amps)	
Dial Set Position	Equivalent FLA	Dial Set Position	Equivalent FLA	Dial Set Position	Equivalent FLA	Dial Set Position	Equivalent FLA
1.6	160	1.6	192	1.6	320	1.6	480
1.7	170	1.7	204	1.7	340	1.7	510
1.8	180	1.8	216	1.8	360	1.8	540
1.9	190	1.9	228	1.9	380	1.9	570
2.0	200	2.0	240	2.0	400	2.0	600
2.1	210	2.1	252	2.1	420	2.1	630
2.2	220	2.2	264	2.2	440	2.2	660
2.3	230	2.3	276	2.3	460	2.3	690
2.4	240	2.4	288	2.4	480	2.4	720
2.5	250	2.5	300	2.5	500	2.5	750
2.6	260	2.6	312	2.6	520	2.6	780
2.7	270	2.7	324	2.7	540	2.7	810
2.8	280	2.8	336	2.8	560	2.8	840
2.9	290	2.9	348	2.9	580	2.9	870
3.0	300	3.0	360	3.0	600	3.0	900
3.5	350	3.5	420	3.5	700	3.5	1050
4.0	400	4.0	480	4.0	800	4.0	1200

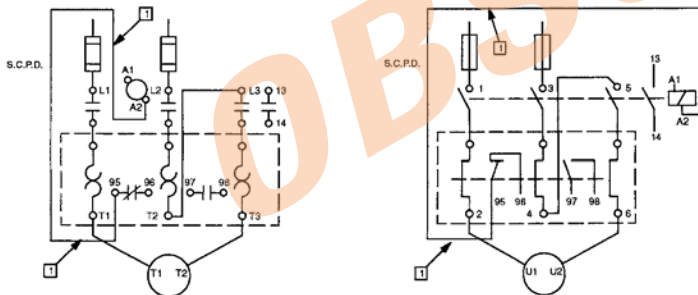
Trip Curves for 1-phase Applications (CEP7-S...)



Approximate trip time for 3-phase balanced condition from cold start.

Approximate trip time for 3-phase balanced condition from hot start.

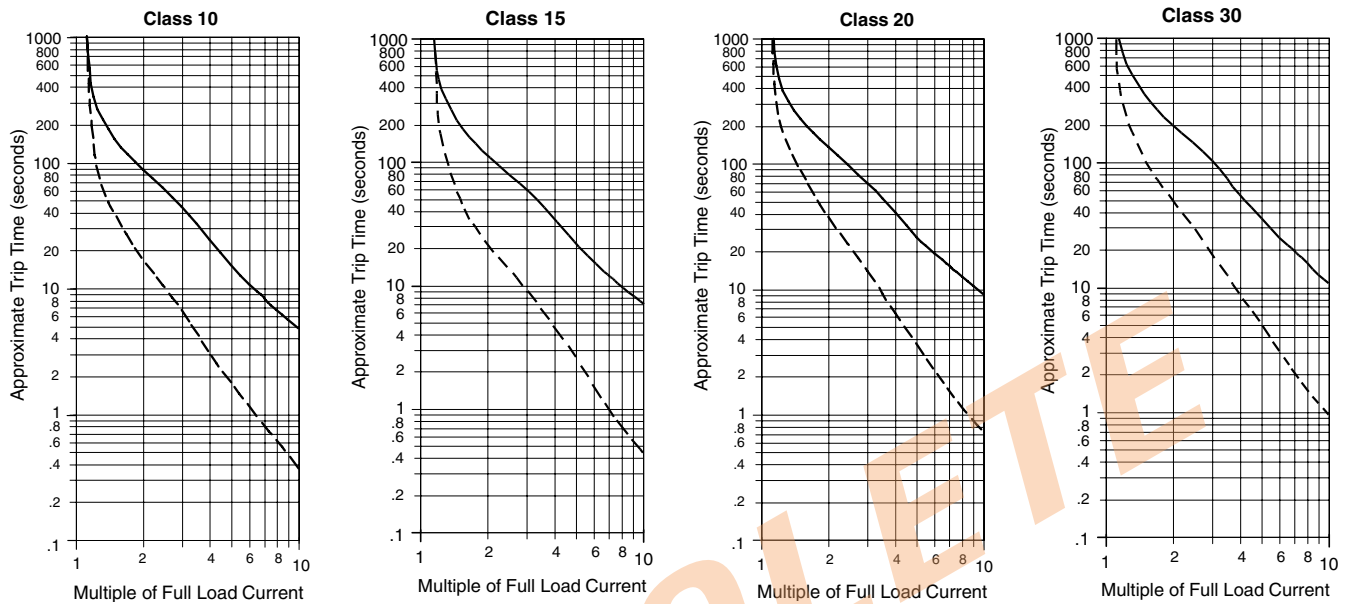
Single Phase Wiring Schematics



The CEP7S must be wired as indicated to provide "self-powering" of the overload relay.

1 Must be supplied by the user

Trip Curves for 3-phase Applications (CEP7-A / B / M...)



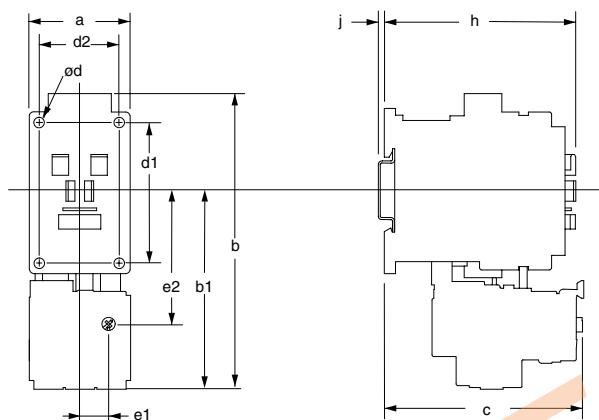
Approximate trip time for 3-phase balanced condition from cold start.

Approximate trip time for 3-phase balanced condition from hot start.

NOTE: The CEP7-A / B / M trip time under single-phase conditions (loss of 1-phase on a 3-phase system) varies according to the percentage of motor load. Estimate 2–3 seconds if phase loss occurs during running condition. If single phase condition is present when the motor is started, estimate 3–8 seconds for motor loads $\geq 80\%$. Trip times may be extended for motor loads 65–80% due to cold start CT saturation. Single-phase protection will not function for motor loads $< 65\%$.

The reset time of a CEP7 set in the automatic mode is approximately 180 seconds. A cooling time of 20 minutes is required to return to a “cold curve” state.

Series CEP7 (Mounting to Contactors CA7 & CA4)

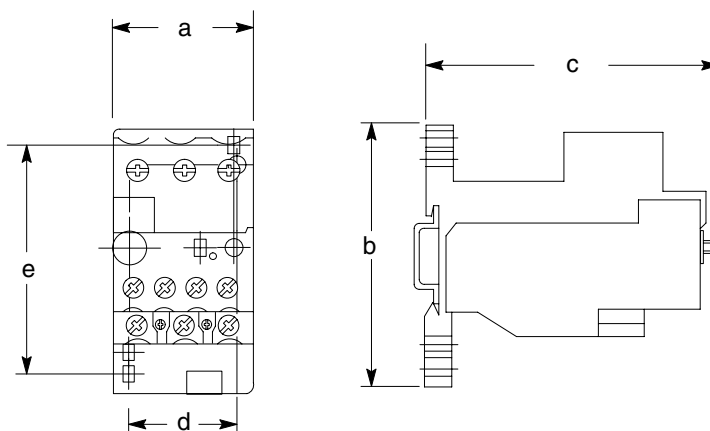


- Dimensions are in millimeters (inches)
- Dimensions not intended for manufacturing purposes

Dimensions with the following
contactor / overload combinations...

	a Width	b Height	b1	c Depth	e1	e2	d1	d2	h	j	Ød
CA4-9, 12 with CEP7-A/M/S	45 (1-25/32)	107 (4-13/64)	83 (3-17/64)	66.6 (2-5/8)	—	50 (1-61/64)	50 (1-61/64)	—	48.2 (1-29/32)	2 (5/64)	Two Ø 4.2 Two 11/64 Ø
CA7-9, 12, 16, 23 with CEP7-A/M/S	45 (1-25/32)	131 (5-11/64)	86 (3-25/64)	88.5 (3-1/2)	16.5 (21/32)	69 (3-25/32)	60 (2-23/64)	35 (1-3/8)	86.5 (3-13/32)	2 (5/64)	Two Ø 4.2 Two 11/64 Ø
CA7-9, 12, 16, 23 with CEP7-B	54 (2-1/8)	137 (5-3/8)	93.4 (3-43/64)	90.7 (3-37/64)	22.6 (57/64)	59 (2-21/64)	60 (2-23/64)	35 (1-3/8)	85.1 (3-23/64)	2 (5/64)	Two Ø 4.2 Two 11/64 Ø
CA7-30, 37 with CEP7-A/M/S	45 (1-25/32)	136.5 (5-3/8)	93.4 (3-43/64)	92 (3-39/64)	18.2 (23/32)	59 (2-21/64)	60 (2-23/64)	35 (1-3/8)	104.7 (4-1/8)	2 (5/64)	Two Ø 4.2 Two 11/64 Ø
CA7-30, 37 with CEP7-B	54 (2-1/8)	137 (5-3/8)	93.4 (3-43/64)	92.1 (3-5/8)	22.6 (57/64)	59 (2-23/64)	60 (2-23/64)	35 (1-3/8)	104.7 (4-1/8)	2 (5/64)	Two Ø 4.2 Two 11/64 Ø
CA7-43 with CEP7-A/M/S/B	54 (2-1/8)	136.5 (5-3/8)	93.4 (3-43/64)	92.1 (3-5/8)	22.6 (57/64)	59 (2-21/64)	60 (2-23/64)	45 (1-49/64)	104.7 (4-1/8)	2 (5/64)	Two Ø 4.2 Two 11/64 Ø
CA7-60, 72, 85 with CEP7-A/M/S/B	72 (2-53/64)	188.5 (7-27/64)	125 (4-15/16)	120.4 (4-3/4)	18 (23/32)	83.5 (3-9/32)	100 (3-15/16)	55 (2-11/64)	123.9 (4-7/8)	2 (5/64)	Four Ø 5.5 Four 7/32 Ø

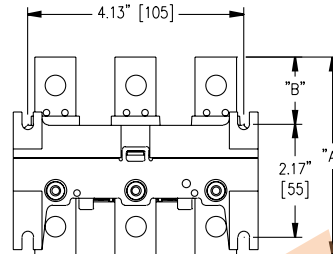
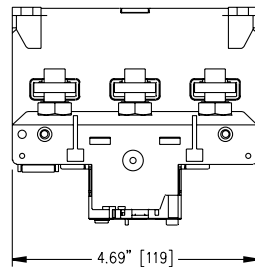
Series CEP7 (Separate Mounting Using Adaptor CEP7-...-P-A)



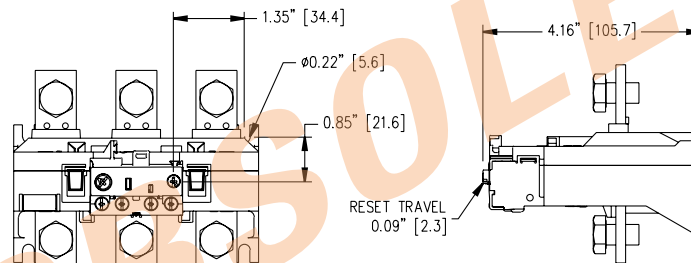
Catalog Number	a Width	b Height	c Depth	d	e
CEP7-37-P-A	45 (1-25/32)	90 (3-35/64)	75 (2-61/64)	30 (1-3/16)	75 (2-61/64)
CEP7-45-P-A	55 (2-11/64)	90 (3-35/64)	96.5 (4-29/32)	40 (1-37/64)	75 (2-61/64)
CEP7-85-P-A	70 (2-49/64)	120 (4-23/32)	110 (4-11/32)	55 (2-11/64)	110 (4-21/64)

Series CEP7-...-110 & 180

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

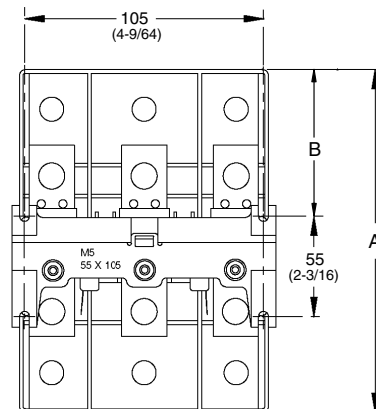
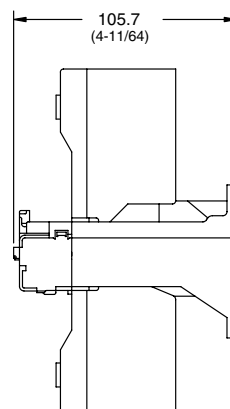
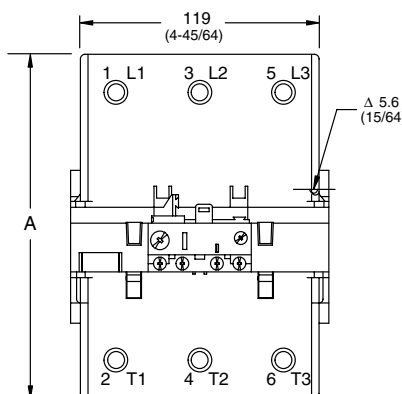


	DIM "A"	DIM "B"
CEP7-M110	3.27" [83]	1.04" [26.5]
CEP7-M180	3.79" [96.3]	1.28" [32.5]



Series CEP7-...-110 & 180 (with terminal covers)

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



Catalog Number	a Height	b Height
CEP7-M/A/B-110	123 (4-7/8)	46.8 (1-55/64)
CEP7-M/A/B-180	154 (6-1/16)	61.5 (2-7/16)