				
Bulletin	**193-ED**	**193-EE**	**193-EC1**	**193-EC2/EC3**
Type	E1 Plus Electronic Overload Relay	E1 Plus Electronic Overload Relay	E3 Electronic Overload Relay	E3 Plus Electronic Overload Relay
Rated Current (Range)	0.1…27 A	0.1…800 A	0.4…5000 A	0.4…5000 A
NEMA Operating Voltage, Nominal	—	600V		
IEC Operating Voltage, Nominal	690V	690/1000V	690/1000V	
Overload Type	Solid-State	Solid-State	Microprocessor-Based	Microprocessor-Based
Trip Class (Fixed)	10	—	—	—
Trip Class (Adjustable)	—	10, 15, 20, 30	5…30	5…30
Ambient Temperature Compensated	✓	✓	✓	✓
Reset Type	Manual only	Automatic and Manual	Automatic and Manual	Automatic and Manual
Adjustment Range	5:1	5:1	5:1	5:1
Phase Loss	3 s	3 s	Adjustable Delay	Adjustable Delay
Ground (Earth) Fault	—	Optional	—	Sensitive
Overcurrent (Jam) Detection	—	Optional	✓	✓
Stall Detection	—	—	✓	✓
Underload Detection	—	—	✓	✓
Current Imbalance	—	—	✓	✓
PTC Thermistor Monitoring	—	Optional	—	✓
Warning Settings	—	—	✓	✓
N.C. Trip Contact	✓	✓	✓	✓
N.O. Alarm Contact	✓	✓	—	—
No. of Outputs	—	—	1	2
No. of Inputs	—	—	2	4
ODVA (DeviceNet) Conformance	—	Optional	✓	✓
Variable Frequency Drive (VFD) Compatible	—	—	✓	✓
Product Selection	**Page 2-174**	**Page 2-174**	**Page 2-187**	**Page 2-187**

			
Bulletin	**193-K**	**193-T1**	**825-P**
Type	Bimetallic Overload Relay		Modular Protection System
Rated Current (Range)	0.1…12.5 A	0.1…90 A	0.5…5000 A
Operating Voltage, Nominal	600V		120…240V AC/DC, 24…48V DC
Overload Type	Bimetallic		Microprocessor based
Trip Class (Fixed)	10	10	—
Ambient Temperature Compensated	✓	✓	✓
Reset Type	Automatic and Manual	Automatic and Manual	Automatic and Manual
Adjustment Range	1.5:1	1.5:1	—
Phase Loss	Normal Sensing	Normal Sensing	Adjustable delay
N.C. Trip Contact	✓	✓	✓
N.O. Alarm Contact	✓	✓	✓
Variable Frequency Drive (VFD) Compatible	—	—	✓
Product Selection	**Page 2-209**	**Page 2-204**	**Page 2-214**

E1 Plus Solid-State Overload Relays

Overview

E1 Plus Solid-State Overload Relays

- Self-powered
- Phase loss protection
- Wide adjustment range (5:1)
- Over-molded power connections
- 1 N.O. and 1 N.C. isolated auxiliary contacts (B600 Rated)
- Low energy consumption (150 mW)
- Ambient temperature compensation
- Visible trip indication

193-ED version offers:

- 0.1…27 A current range
- Fixed Trip Class 10
- Manual reset

193-EE version offers:

- 0.1…800 A current range
- Selectable Trip Class (10, 15, 20, or 30)
- Selectable manual/auto-manual reset
- Single- and three-phase devices
- Optional cage clamp control terminals (Bul. 193R-EE only)

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Standards Compliance

- IEC/EN 60947-4-1
- IEC/EN 60947-5-1
- CSA 22.2 No. 14
- UL 508

Certifications

- CE
- cULus Listed
- ATEX (pending)
- C-Tick
- CCC

Your order must include 1) the Cat. No. of overload relay selected, and 2) if required, Cat. No. of any accessories.

Product Overview

Accurate, Reliable Performance

Current measurement-based protection

While electromechanical overload relays pass motor current through heating elements to provide an indirect simulation of motor heating, the E1 Plus Overload Relay directly measures motor current. Current measurement-based overload protection more accurately models a motor's thermal condition. Furthermore, ambient temperature does not impact the performance of current measurement-based designs over the specified temperature operating range.

Electronic design

Thermal modeling is performed electronically with precision solid-state components, where at the heart of the E1 Plus Overload Relay is an application-specific integrated circuit (ASIC). The ASIC continually processes motor current data to accurately maintain the time-current status of the motor thermal capacity utilization value.

Thermal memory

A thermal memory circuit allows the E1 Plus Overload Relay to model the heating and cooling effects of motor on and off periods. This ensures accurate protection for both hot and cold motors.

Enhanced phase loss protection

A separate phase loss detection circuit incorporated into the E1 Plus Overload Relay allows it to respond quickly to phase loss conditions; typical reaction time is 3 seconds.

Easy to Select and Apply

Straightforward installation

The self-powered design means that the E1 Plus Overload Relay installs in the same manner as traditional overload relays. Device setup is accomplished by simply dialing the setting potentiometer to the motor FLA rating. The low energy consumption of the electronic design minimizes temperature rise issues inside control cabinets.

Wide adjustment range

A wide 5:1 adjustment range results in the need for half as many catalog numbers as the bimetallic alternative in order to cover the same current range. This helps to reduce inventory carrying costs and affords greater installation flexibility for dual voltage machines. Evenly spaced setting tick marks enhance the ease of installation setup.

Rugged Construction

Over-molded power connections

The unique line-side over-molded power connections make for a sturdy two-component starter assembly that is unmatched in the industry. The pre-formed power connections allow easy starter assembly — every time.

Current transformers

The current transformers are secured separately in the overload housing to ensure the greatest degree of resistance to shock and vibration conditions. Varnished laminations ensure consistent performance and provide additional protection against corrosion.

Latching relay

The robust design of the bi-polar latching relay provides reliable trip and reset performance for the most demanding of applications. The self-enclosed relay offers additional environmental protection for use in industrial applications.

Application Flexibility

Isolated Contacts

The isolated contact configuration allows the N.C. and N.O. contacts to be applied in circuits operating at different voltage levels and without polarity restrictions. The B600 contact rating affords application in circuits rated to 600V.

DIP switch settings

193-EE devices offer DIP switch settings to select the trip class (10, 15, 20 or 30) and the reset mode (manual or automatic), making these devices extremely versatile.

Side-Mount Expansion Modules

Through the use of optional side-mounted accessory modules, functionality of the E1 Plus overload relays can be cost effectively expanded and machine operation and protection enhanced. Direct mounting to the left side of the 193-EE and 592-EE E1 Plus overload relays means that only 18 mm is added to the overall product width. The side-mounted modules electronically interface with the E1 Plus overload relay so that all control circuit connections are made at the E1 Plus overload relay terminals.

E1 Plus DeviceNet™ Communication Module

The Bul. 193-EDN DeviceNet Communication Side-Mount Module provides a cost-effective, seamless deployment of motor starters onto the Integrated Architecture™ as an accessory for the E1 Plus electronic overload relay. The DeviceNet module provides Integrated I/O (2 inputs and 1 output) providing local connection of motor starter-related I/O. The DeviceNet module offers expanded protective functions including overload warning, jam protection, and underload warning. The DeviceNet module also allows access to average motor current (percentage of FLA setting), percentage of thermal capacity usage, device status, trip & warning identification, and trip history which allows continual monitoring of motor performance.

E1 Plus Remote Reset Module

The Bul. 193-ERR Remote Reset Module is available for applications that require remote reset of the E1 Plus overload relays after a trip occurs.

E1 Plus Jam Protection Module with Remote Reset

The Bul. 193-EJM Jam Protection Module provides front-accessible DIP switches which offers flexibility to provide jam protection to match application requirements. Selections are available for enabling or disabling the jam protection function and remote reset operation. Jam trip level settings are available at 150%, 200%, 300%, and 400% of full load current setting. Trip delay settings of 1/2, 1, 2, and 4 seconds are available to minimize nuisance tripping in applications where intermittent short-duration overloading is permissible.

E1 Plus Ground Fault Module with Remote Reset

The Bul. 193-EGF Ground Fault Protection Module offers front-accessible DIP switches providing flexibility to configure ground fault protection to match application requirements. Selections are available for enabling or disabling the ground fault protection function and remote reset operation. Ground fault trip level settings are available in four ranges: 20…100 mA (resistive loads only, for motor loads consult your local Allen-Bradley distributor), 100…500 mA, 0.2…1 A, and 1…5 A. Within each range, the specific ground fault trip level can be set (20%, 35%, 50%, 65%, 80%, 90%, or 100% of the maximum ground fault setting). Trip delay is fixed at 50 ms ± 20 ms.

E1 Plus Ground Fault/Jam Module with Remote Reset

The Bul. 193-EGJ Ground Fault/Jam Protection Module offers front-accessible DIP switches to provide flexibility to configure ground fault and jam protection to match application requirements. The ground fault selections are the same as the Bul. 193-EGF Ground Fault Protection Module. In addition to ground fault, this module offers selectable fixed jam protection. The user can enable or disable jam protection from the DIP switches. The jam protection is fixed at 400% of the full load current setting with a 0.5 second trip delay.

E1 Plus PTC Module with Remote Reset

The Bul. 193-EPT PTC Side-Mount Module provides two terminals for the connection of positive temperature coefficient (PTC) thermistor sensors. PTC sensors are commonly embedded in the motor stator windings to monitor winding temperature. PTC sensors react to actual temperature, so enhanced motor protection can be provided to address conditions like obstructed cooling and high ambient temperature.

E1 Plus Solid-State Overload Relays

Catalog Number Explanation/Product Selection

Catalog Number Explanation

193	–	EE	C	B
		a	*b*	*c*	*d*

a

Bulletin Number	
Code	Description
193	IEC Three-Phase
193R	IEC Three-Phase, Cage Clamp
193S	IEC Single-Phase
592	NEMA Three-Phase
592S	NEMA Single-Phase

b

Type	
Code	Description
ED1	Fixed Trip Class 10
EE	Selectable Trip Class

c

Adjustment Range [A]			
Three-Phase		Single-Phase	
Code	Description	Code	Description
A	0.1…0.5	P	1.0…5.0
B	0.2…1.0	R	3.2…16
C	1.0…5.0	S	5.4…27
D	3.2…16	T	9…45
E	5.4…27	U	18…90
F	9…45	—	—
G	18…90	—	—
H	30…150	—	—
J	40…200	—	—
K	60…300	—	—
L	100…500	—	—
M	120…600	—	—
N	160…800	—	—

d

Bulletin 100 Contactor Size	
Code	Description
B	C09…C23
D	C30…C43
E	C60…C85
F	D95…D180
G	D210…D420
H	D630…D860
Bulletin 500 NEMA Contactor Size	
Code	Description
T	Size 00
C	Size 0…2
D	Size 3
Panel/DIN Rail Mount	
Code	Description
P	Integrated panel mount and pass-through wiring
Z	Panel mount with external current transformers

Product Selection

Bulletin 193-ED – Three-Phase Devices

- Fixed Trip Class 10
- Manual reset
- Screw-type control terminals

Mounts to Contactor	Adjustment Range [A]	Cat. No.
100-C09…100-C23	0.1…0.5	**193-ED1AB**
	0.2…1.0	**193-ED1BB**
	1.0…5.0	**193-ED1CB**
	3.2…16	**193-ED1DB**
	5.4…27	**193-ED1EB**
Integrated panel/DIN Rail mount and pass-through wiring	1.0…5.0	**193-ED1CP**
	3.2…16	**193-ED1DP**
	5.4…27	**193-ED1EP**

Bulletin 193-EE – Three-Phase Devices

- Selectable Trip Class (10, 15, 20, 30)
- Selectable manual/auto-manual reset
- Screw-type control terminals

Mounts to Contactor	Adjustment Range [A]		Cat. No.
100-C09…100-C23	0.1…0.5	‡	**193-EEAB**
	0.2…1.0	‡	**193-EEBB**
	1.0…5.0	‡	**193-EECB**
	3.2…16	‡	**193-EEDB**
	5.4…27	‡	**193-EEEB**
100-C30…100-C43	5.4…27	‡	**193-EEED**
	9…45	‡	**193-EEFD**
100-C60…100-C85	18…90	‡	**193-EEGE**
100-D95…100-D180	18…90	❄	**193-EEGF**
	30…150	❄	**193-EEHF**
	40…200	❄	**193-EEJF**
	55…110	❄	**193-EEVF**
100-D210…100-D420	40…200	❄	193-EEJG
	60…300	❄	**193-EEKG**
	100…500	❄	193-EELG
100-D630…100-D860	120…600	❄	193-EEMH
	160…800	❄	193-EENH
Integrated panel/DIN Rail mount and pass-through wiring	1.0…5.0	‡	**193-EECP**
	3.2…16	‡	**193-EEDP**
	5.4…27	‡	**193-EEEP**

Bulletin 193S-EE – Single-Phase Devices

- Selectable Trip Class (10, 15, 20, 30)
- Selectable manual/auto-manual reset
- Screw-type control terminals

Mounts to Contactor	Adjustment Range [A]	Cat. No.
100-C09…100-C23	1.0…5.0	**193S-EEPB**
	3.2…16	**193S-EERB**
	5.4…27.0	**193S-EESB**
100-C30…100-C43	9…45	**193S-EETD**
100-C60…100-C85	18…90	**193S-EEUE**
Integrated panel/DIN Rail mount and pass-through wiring	1.0…5.0	**193S-EEPP**
	3.2…16	**193S-EERP**
	5.4…27.0	**193S-EESP**

Bulletin 193 Panel Mount Devices for use with External Current Transformers §♣

- Selectable Trip Class (10, 15, 20, 30)
- Selectable manual/auto-manual reset

CT Ratio	Adjustment Range [A]	Cat. No.
150:5	30…150	**193-EEHZ**
200:5	40…200	**193-EEJZ**
300:5	60…300	**193-EEKZ**
400:5	80…400	193-EEWZ
500:5	100…500	193-EELZ
600:5	120…600	193-EEMZ
800:5	160…800	193-EENZ

♣ Current Transformers supplied by customer.
§ Order panel adapter, **Cat. No. 193-EPB**, separately.

‡ **Cage Clamp Control Terminals** – To order, change the Bulletin number in the listed cat. no. from 193 to 193R (Example: **Cat. No. 193-EEFD** becomes **Cat. No. 193R-EEFD**).
❄ Does not include terminal lugs. See Accessories.

Visit our website: www.ab.com/catalogs
Preferred availability cat. nos. are printed in **bold**

Accessories

	Description	For Use With	Pkg. Quantity	Cat. No.
	**DIN Rail/Panel Adapter** For separate mounting – can be mounted to top-hat rail EN 50 022-35.	193-ED1_B, 193-EE_B, 193-EE_Z	1	**193-EPB**
		193-EE_D		**193-EPD**
		193-EE_E		**193-EPE**
	**Current Adjustment Shield** Prevents inadvertent adjustment of the current setting. Must be ordered in multiples of package quantities.	193-ED (all) 193-EE (all) 592-EE (all)	10	**193-BC8**
	**External Reset Adapter** For enclosed, through-the-door reset applications. Use with external reset button.	193-ED (all) 193-EE_B, 193-EE_D, 193-EE_E 193-EE_Z	1	**193-ERA**
	**External Reset Button for Enclosed Devices**	193-E all	1	**800FM-R611**Button
				800F-ATR08Rod
	**Terminal Lugs** Set of 2 Protection class IP2X per IEC 60529 and DIN 40050	100-D140, 100-D180, 100-D95E…D180E, 193-EC_F, 193-EE_F	2	**100-DTB180**
		100-D210...100-D420, 193-EC_G, 193-EF2C, 193-EE_G	2	**100-DTB420**
	**Terminal Lugs, Copper Frame** Set of 3	100-D95E, 100-D110E, 193-EC_F, 193-EE_F	3	**100-DLE110**
			3	**100-DL180**
		100-D210…100-D420, 193-EC_G, 193-EE_G	3	**100-DL420**
		100-D630, 100-D860, 193-EC_H, 193-EE_H	3	100-DL630
			3	100-DL860
	**Terminal Covers** Protection class IP20 per IEC 60529 and DIN 40 050 For direct-on-line, reversing, two-speed, and wye-delta/star-delta assemblies	100-D95…100-D180, 193-EC_F, 193-EE_F	1	**100-DTC180**
		100-D210...100-D420, 193-EC_G, 193-EE_G	1	**100-DTC420**
		100-D630…100-D860, 193-EC_H, 193-EE_H	1	100-DTC860
	**Phase Barriers** Set of 4	100-D630…D860, 193-EC_H, 193-EE_H	4	100-DPB860
	**DeviceNet Configuration Terminal** Used to interface with objects on a DeviceNet network. Includes 1 m communications cable (193-CB1).	193-EC (all), 592-EC (all); 280/281/283/284 ArmorStart	1	**193-DNCT**
	1 meter communication cable, color-coded bare leads	193-DNCT	1	**193-CB1**
	1 meter communication cable, microconnector (male)	193-DNCT	1	**193-CM1**
	Panel Mount Adapter/Door Mount Bezel Kit	193-DNCT	1	**193-DNCT-BZ1**

E1 Plus Solid-State Overload Relays

Accessories, Continued

	Description	Size	For Use With	Pkg. Quantity	Cat. No.
	**Core Balanced Ground Fault Sensor** • Required when using either an E1 Plus Ground Fault Protection or Ground Fault/Jam Module • Required for ground fault protection with the Cat. No. 193-EC3_ _ overload relay	20 mm (0.79 in.)	100-C09…100-C37 NEMA size 00…2	1	**193-CBCT1**
		40 mm (1.57 in.)	100-C09…100-C85 NEMA size 00…3	1	**193-CBCT2**
		63 mm (2.5 in.)	100-C09…100-C85, 100-D95…100-D180 NEMA size 00…4	1	193-CBCT3
		82 mm (3.25 in.)	100-C09…100-C85, 100-D95…100-D420 NEMA size 00…5	1	193-CBCT4

Side-Mount Expansion Modules∗

Function		E1 Plus‡ (Cat. No. 193/592-EE_)	E1 Plus w/ Jam Module (Cat. No. 193-EJM)	E1 Plus w/ Ground Fault Module∗ (Cat. No. 193-EGF)	E1 Plus w/ Ground Fault/Jam Module∗ (Cat. No. 193-EGJ)	E1 Plus w/ PTC Module (Cat. No. 193-EPT)	E1 Plus w/ Remote Reset Module (Cat. No. 193-ERR)
Manual/Automatic Reset		X	X	X	X	X	X
Selectable Trip Class		10	X	X	X	X	X
		15	X	X	X	X	X
		20	X	X	X	X	X
		30	X	X	X	X	X
Jam Protection	On or Off	—	X	—	X	—	—
	Trip Level	—	Adjustable 150/200/300/400%	—	Fixed @ 400%	—	—
	Trip Delay	—	Adjustable 0.5/1.0/2.0/4.0 s	—	Fixed @ 0.5 s	—	—
	Inhibit	—	Dynamic Inhibit‡	—	Dynamic Inhibit‡	—	—
Ground Fault Protection	Type	—	—	Core-Balanced Ground Fault Protection∗	Core-Balanced Ground Fault Protection∗	—	—
	On or Off	—	—	X	X	—	—
	Trip Level	—	—	Adjustable 20 mA…5 A§	Adjustable 20 mA…5 A§	—	—
	Trip Delay	—	—	Fixed @ 50 ms ± 20 ms	Fixed @ 50 ms ± 20 ms	—	—
	Inhibit	—	—	Dynamic Inhibit‡	Dynamic Inhibit‡	—	—
PTC Protection	PTC Overtemperature Trip	—	—	—	—	X	—
	PTC Open Circuit	—	—	—	—	X	—
	PTC Short Circuit	—	—	—	—	X	—
Remote Reset Capability		—	X	X	X	X	X
Fault Indication		—	—	X	X	X	—

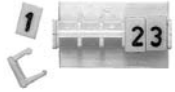
‡ Dynamic Inhibit: Protective function is enabled after the motor current goes above 150% and then falls to below 125%.
∗ Requires use of an external ground fault sensor, **Cat. No. 193-CBCT_**.
§ From 20…100 mA for resistive loads only.

	Description	For Use With	Pkg. Quantity	Cat. No.
	**E1 Plus DeviceNet Module** Provides motor diagnostics and device status information, as well as integrated I/O to allow the simplification of the network architecture.	193-EE (all), 592-EE (all), 193S-EE (all), 592S-EE (all)	1	**193-EDN**
	**E1 Plus Jam Protection Module** Provides Jam protection with adjustable trip level and trip delay setting. The module also provides an input to allow remote reset of a trip.∗	193-EE (all), 592-EE (all), 193S-EE (all), 592S-EE (all)	1	**193-EJM**
	**E1 Plus Ground Fault Module** Provides adjustable 20 mA…5 A ground fault protection. The module also provides an input to allow remote reset of a trip.	193-EE (all), 592-EE (all), 193S-EE (all), 592S-EE (all)	1	‡ 193-EGF
	**E1 Plus Ground Fault/Jam Module** Provides adjustable 20 mA…5 A ground fault and fixed jam protection. The module also provides an input to allow remote reset of a trip.	193-EE (all), 592-EE (all), 193S-EE (all), 592S-EE (all)	1	‡ 193-EGJ
	**E1 Plus PTC Module** Provides terminals for connection of up to 6 PTC thermistor sensors. These sensors react to actual temperature and therefore provide enhanced motor protection. The module also provides an input to allow remote reset of a trip.	193-EE (all), 592-EE (all), 193S-EE (all), 592S-EE (all)	1	193-EPT
	**E1 Plus Remote Reset Module** Provides an input to allow remote reset of a trip.	193-EE (all), 592-EE (all), 193S-EE (all), 592S-EE (all)	1	193-ERR
	Module Adjustment Cover Prevents inadvertent adjustment of setting. Must be ordered in multiples of package quantity.	193-EJM	25	193-EMC

∗ Only one module may be added at a time.
‡ Requires use of an external ground fault sensor (**Cat. No. 193-CBCT_**).

Marking Systems

Uniform labeling materials for contactors, motor starting equipment, timing relays and circuit breakers

	Description	Pkg. Qty.❄	Cat. No.
	**Label Sheet** 105 self-adhesive paper labels each, 6 x 17 mm	10	**100-FMS**
	**Marking Tag Sheet** 160 perforated paper labels each, 6 x 17 mm To be used with a transparent cover	10	**100-FMP**
	Transparent Cover To be used with marking tag sheets	100	**100-FMC**
	**Marking Tag Adapters** To be used with marking tag:	100	100-FMA2

❄ Must be ordered in multiples of package quantities.

E1 Plus Solid-State Overload Relays

Specifications

		Cat. No. 193-ED1_B, 193-EE_B, and 592-EE_T	Cat. No. 193-EE_D, and 592-EE_C	Cat. No. 193-EE_E, and 592-EE_D	Cat. No. 193-EE_F‡	Cat. No. 193-EE_G	Cat. No. 193-EE_H
Main Circuits							
Rated Insulation Voltage (U_i)		690V AC			1000V AC		
Rated Impulse Strength (U_{imp})		6 kV AC			6 kV AC		
Rated Operating Voltage (U_e) IEC/UL		690V AC/600V AC			1000V AC/600V AC		
Rated Operating Frequency		50/60 Hz (sinusoidal)			50/60 Hz (sinusoidal)		
Terminal Cross-Sections	Terminal Type						 
	Terminal Screws	M5		M8	Lug		
Flexible-Stranded with Ferrule	Single Conductor Torque	2.5…16 mm² 2.5 N•m	2.5…16 mm² 2.5 N•m	4…35 mm² 24 N•m	—	—	—
	Two Conductor Torque	2.5…10 mm²❄ 3.4 N•m	2.5…10 mm²❄ 3.4 N•m	4…25 mm² 4 N•m	—	—	—
Coarse-Stranded/Solid	Single Conductor Torque	2.5…25 mm² 2.5 N•m	2.5…25 mm² 2.5 N•m	4…50 mm² 4 N•m	16…150 mm² 28 N•m	—	—
	Two Conductor Torque	6…16 mm²❄ 3.4 N•m	6…16 mm²❄ 3.4 N•m	4…35 mm² 4 N•m	—	25…185 mm2 28 N•m	70…240 mm2 45 N•m
	Four Conductor Torque	6…16 mm²❄ 3.4 N•m	6…16 mm²❄ 3.4 N•m	4…35 mm² 4 N•m	—	—	70…240 mm2 45 N•m
Stranded/Solid	Single Conductor Torque	14…6 AWG 22 lb-in.	14…6 AWG 22 lb-in.	12…1 AWG 35 lb-in.	6…300 MCM 250 lb-in.	—	—
	Two Conductor Torque	14…6 AWG❄ 30 lb-in.	14…6 AWG❄ 30 lb-in.	6…2 AWG 35 lb-in.	—	4…350 MCM 250 lb-in.	2/0…500 MCM 400 lb-in.
	Four Conductor Torque	14…6 AWG❄ 30 lb-in.	14…6 AWG❄ 30 lb-in.	6…2 AWG 35 lb-in.	—	—	2/0…500 MCM 400 lb-in.
Pozidriv Screwdriver Size		2	2	—	—	—	—
Slotted Screwdriver (mm)		1 x 6	1 x 6	—	—	—	—
Hexagon Socket Size (mm)		—	—	4	8	8	8
Control Circuits							
Rated Insulation Voltage (U_i)		690V AC					
Rated Impulse Strength (U_{imp})		6 kV AC					
Rated Operating Voltage (U_e) IEC/UL		690V AC / 600V AC					
Rating Designation		B600					
Rated Operating Current I_e		**N.O./N.C.**					
AC-15	12…120V	3/2					
	220…240V	1.5/1.5					
	380…480V	0.75/0.75					
	500…600V	0.6/0.6					
Thermal Current I_{the}		5 A					
Contact Reliability		17V, 5 mA					
Screw Terminal Cross Sections	Terminal Screw	M3					
Flexible-Stranded with Ferrule	Single Conductor Torque	0.5…2.5 mm² 0.55 N•m					
	Two Conductor Torque	0.25…1.5 mm² 0.55 N•m			0.2…0.75 mm² 0.55 N•m		
Coarse-Stranded/Solid	Single Conductor Torque	0.5…4 mm² 0.55 N•m					
	Two Conductor Torque	0.2…2.5 mm² 0.55 N•m			0.2…1.5 mm² 0.55 N•m		
Stranded/Solid	Single Conductor Torque	24…10 AWG 5 lb-in.					
	Two Conductor Torque	24…12 AWG 5 lb-in.			22…16 AWG 5 lb-in.		
Screwdriver Size (mm)		#1 Pozidriv/0.6 x 3.5 slotted					
Cage Clamp Cross-Sections							
Flexible-Stranded with Ferrule		0.25…1 mm²					
Coarse-Stranded/Solid		0.2…1.5 mm²					
Stranded/Solid		24…14 AWG					

❄ For multiple conductor applications, the same style and size of wire must be used.
‡ Cat. Nos. 193-EEGF and 193-EEVF follow Cat. No. 193-EE_E specifications.

3-Pole Terminal Blocks

Cat. No. 100-DTB180	Cat. No. 100-DTB420
(A) 6…1/0 AWG, 16…50 mm² (B) 6 AWG…250 MCM, 16…120 mm² 90…110 lb•in., 10…12 N•m	(2) 4 AWG…600 MCM, 25…240 mm² 180…220 lb•in., 20…25 N•m

Terminal Lug Kits

Cat. No. 100-DLE110	Cat. No. 100-DL180	Cat. No. 100-DL420	Cat. No. 100-DL630	Cat. No. 100-DL860
Lug: 6…2/0 AWG, 16…70 mm^2 90…110 lb•in., 10…12 N•m Terminal: 13/32 in., 10 mm 150 lb•in., 17 N•m	Lug: 6 AWG…250 MCM, 16…120 mm^2 90…110 lb•in., 10…12 N•m Terminal: 1/2 in., 13 mm 275 lb•in., 16 N•m	Lug: 2 AWG…350 MCM, 375 lb•in., 42 N•m Terminal: 11/16 in., 17 mm 140 lb•in., 16 N•m	Lug: 2/0 AWG…500 MCM, 70…240 mm^2 400 lb•in., 45 N•m Terminal: 3/4 in., 19 mm 600 lb•in., 68 N•m	Lug: 2/0 AWG…500 MCM, 70…240 mm2 400 lb•in., 45 N•m Terminal: 3/4 in., 19 mm 600 lb•in., 68 N•m

Environmental Ratings		
Ambient Temperature	Storage Operating	-40…+85 °C (-40…+185 °F) -20…+60 °C (-4…+140 °F)
Humidity	Operating Damp Heat	5…95% Non-condensing per IEC 68-2-3 and IEC 68-2-30
Vibration (per IEC 68-2-6)		3 G
Shock (per IEC 68-2-27)		30 G
Max. Altitude		2000 m
Pollution Environment		Pollution Degree 3
Degree of Protection		IP20
Protection		
Type of Relay		Ambient Compensated, Time Delay, Phase Loss Sensitive
Nature of Relay		Solid-State
Trip Rating		120% FLA
Trip Class	Type ED	10
	Type EE	10, 15, 20, 30
Reset Mode	Type ED	Manual
	Type EE	Automatic or Manual
Electromagnetic Compatibility		
Electrostatic Discharge Immunity	Test Level	8 kV Air Discharge, 6 kV Contact Discharge
	Performance Level	1 ‡❄
RF Immunity	Test Level	10 V/m
	Performance Level	1 ‡❄
Electrical Fast Transient/Burst Immunity	Test Level	4 kV
	Performance Level	1 ‡❄
Surge Immunity	Test Level	2 kV (L-E), 1 kV (L-L)
	Performance Level	1 ‡❄

‡ Performance Criteria 1 requires the device under test (DUT) to experience no degradation or loss of performance.
❄ Environment 2.

General

	Cat. No. 193-ED1_B, 193-EE_B	Cat. No. 193-EE_D	Cat. No. 193-EE_E
Standards	UL508, CSA C22.2 No. 14, NEMA ICS 2-1993 Part 4, EN 60947-4-1, EN 60947-5-1		
Certifications	CE, cULus, ATEX (pending), C-Tick, CCC		
Approximate Weights (unpackaged)	0.25 kg (0.55 lb)	0.25 kg (0.55 lb.)	0.52 kg (1.06 lb.)

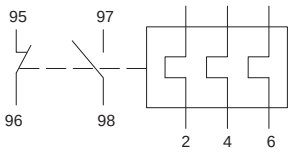
External Current Transformers (for use with cat. nos. 193-EE_Z)

The user shall provide one current transformer (CT) for each motor phase,and shall connect the CT's secondary leads to the appropriate E1 Plus overload relay power terminals, as shown in current transformer's wiring diagrams. The CT shall have the appropriate ratio (refer to the product nameplate or product description). Additionally, the CT shall be selected to be capable of providing the required VA to the secondary load, which includes the E1 Plus overload relay burden at the rated secondary current and the wiring burden. Finally, the CT shall be rated for protective relaying to accomodate the high inrush currents associated with motor startup, and shall have an accuracy of <±2% over its normal operating range. Typical CT ratings include (Instrument Transformers, Inc. — Model #23 or equivalent):

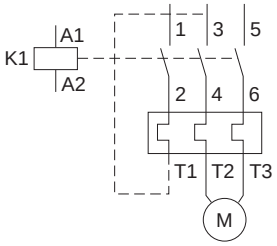
ANSI (USA)	**Class C5B0.1**
CSA (Canada)	**Class 10L5**
IEC (Europe)	**5 VA Class 5P10**

2

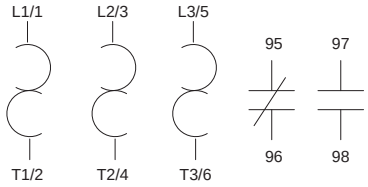
Wiring Schematic



Typical IEC Wiring Schematic



Typical Wiring for 1-Phase Applications

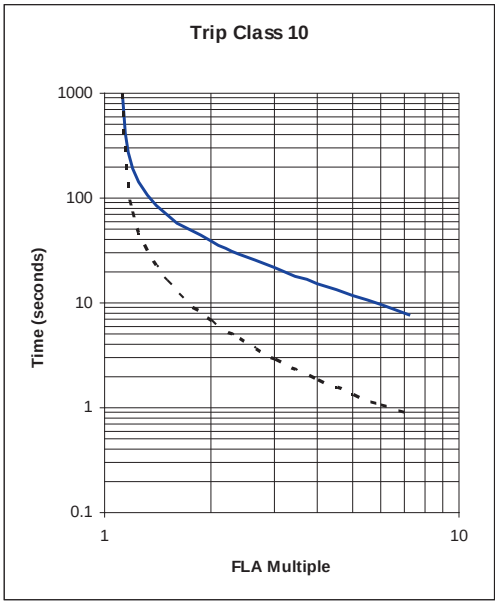


Typical NEMA Wiring Schematic

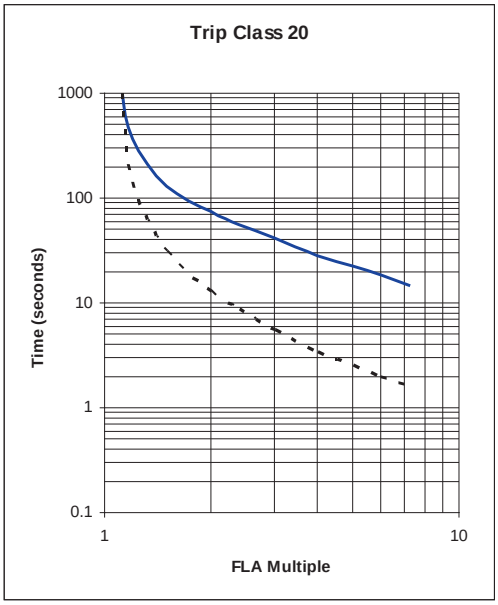
Trip Curves

Typical reset time for 193-EE devices set to automatic reset mode is 120 seconds.

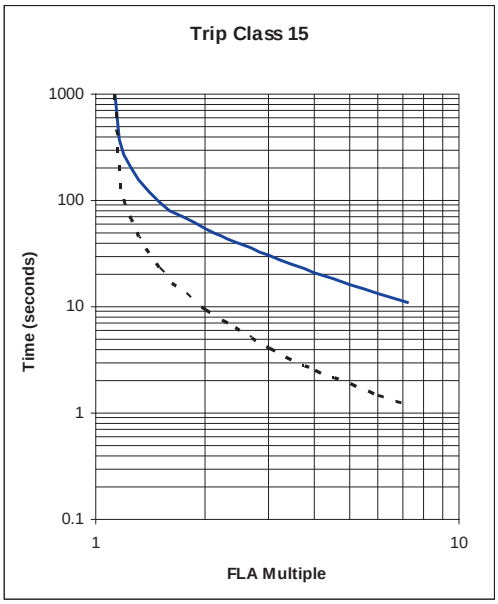
Trip Class 10



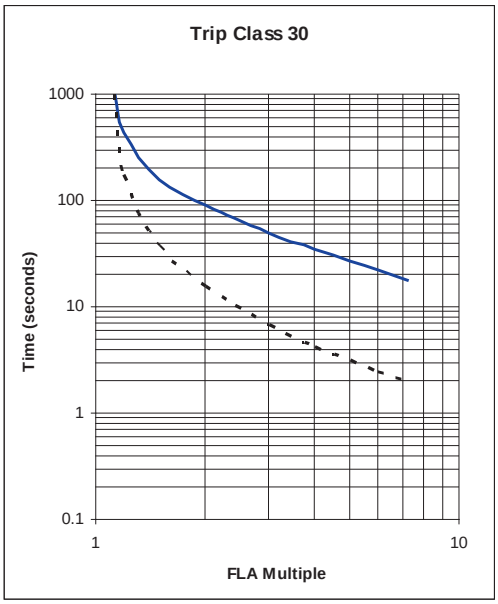
Trip Class 20



Trip Class 15



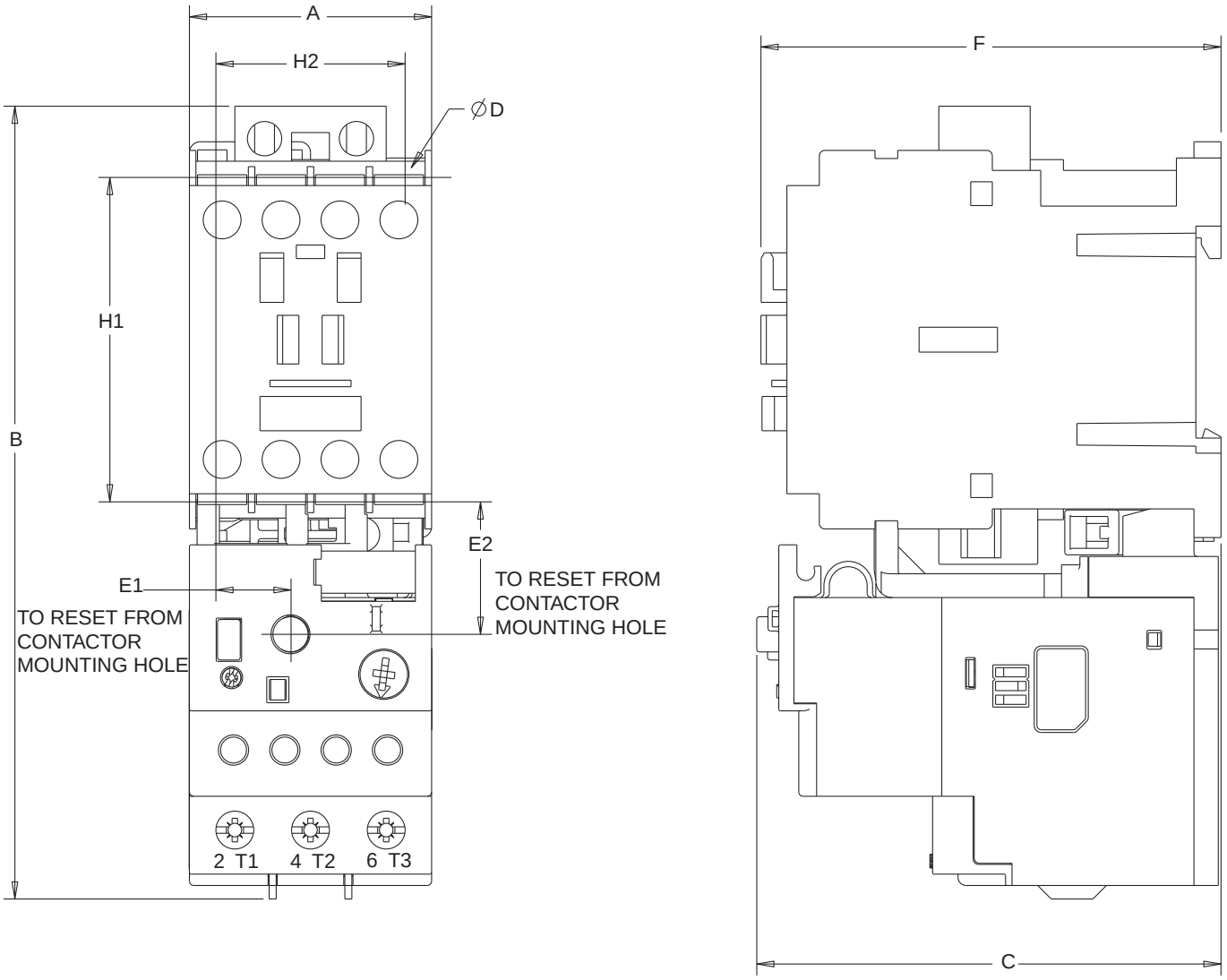
Trip Class 30



Trip Curve Legend: Cold Trip ——————
Hot Trip – – – – – – – – –

Approximate dimensions are shown in millimeters (inches). Dimensions are not to be used for manufacturing purposes.

Bulletin 100-C Contactor Mounted



Overload Cat. No.	Contactor Cat. No.	Width A	Height B	Depth C	D	E1	E2	F	H1	H2
193-ED__B 193-EE__B 193R-EE__B 193S-EE__B	100-C09, -C12, -C16, -C23	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)
193-EE__D 193R-EE__D 193S-EE__D	100-C30, -C37	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)
193-EE__D 193R-EE__D 193S-EE__D	100-C43	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)	104 (4-3/32)	60 (2-23/64)	45 (1-25/32)
193-EE__E 193R-EE__E 193S-EE__E	100-C60, -C72, -C85	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)