Allen-Bradley

E3 and E3 Plus Overload Relay Specifications

Bulletin Number 193, 592

Topic	Page
Product Overview	2
Standards Compliance and Certifications	2
Features	3
Catalog Number Explanation	6
General Specifications	6
Trip Curves	11
Wiring Diagrams	12
Approximate Dimensions	14

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Catalog Number Explanation

193 – EC1 (a) B (b) B (c)

a

Type	
Code	Description
EC1	E3
EC2	E3 Plus with internal ground fault sensor
EC3	E3 Plus with external ground fault sensor
EC4	E3 Plus current monitor relay with external ground fault sensor
EC5♦	E3 Plus with voltage monitoring

b

Adjustment Rating [A]	
Code	Description
P	0.4…2.0
A	1…5
B	3…15
C	5…25
D	9…45
E	18…90
F	28…140
G	42…210
H	60…302
J	84…420
K	125…630
L	172…860
Z	9…5000

c

Bulletin 100 Contactor Size	
Code	Description
B	C09…C23
D	C30…C43
E	C60…C85
F	D95…D180
G	D210…D420
H	D630…D860
Z	Panel mount★

★ Only available for Cat. Nos. 193-EC1ZZ, 193-EC3ZZ, and 193-EC4ZZ. For all other cat. nos., order Cat. No. 193-ECPM_ separately.

♦ Voltage input module and ribbon cable are included with Cat. No. 193-EC5.

CT Ratio to FLA Setting Range Correlation

CT Ratio	FLA Setting Range (A)	CT Ratio	FLA Setting Range (A)	CT Ratio	FLA Setting Range (A)
50:5	9…45	300:5	60…302	1200:5	240…1215
100:5	18…90	500:5	84…420	2500:5	450…2250
150:5	28…140	600:5	125…630	5000:5	1000…5000
200:5	42…210	800:5	172…860	—	—

3-Pole Terminal Blocks

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

Terminal Lug Kits

Cat. No. 100-DL110	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

Maximum Heat Dissipation (Watts)

	Cat. No. 193-EC_B, 193-EC_D	Cat. No. 193-EC_E	Cat. No. 193-EC_F	Cat. No. 193-EC_G	Cat. No. 193-EC_H
E3	3.83	4.43	10.67	22.52	35.36
E3 Plus	4.53	5.13	11.37	23.22	36.06

Environmental Ratings

Ambient Temperature Storage Operating	 -40…+85 °C (-40…+185 °F) -20…+55 °C (-4…+131 °F)
Humidity Operating Damp Heat – Steady-State (per IEC 68-2-3) Damp Heat – Cyclic (per IEC 68-2-30)	 5…95% Non-condensing 92% r.h., 40 °C(104 °F), 56 days 93% r.h., 25 °C/40 °C(77 °F/104 °F), 21 cycles
Vibration (per IEC 68-2-6)	3 G
Shock (per IEC 68-2-27)	30 G
Pollution Environment	Degree 2
Degree of Protection 193-ECxxx 592-ECxxx	 1P1X 1P0

Current Reporting Accuracy

Phase Currents: 100% min. FLA Setting Value … 720% max. FLA Setting Value 50%…100% min FLA Setting Value	 +/- 5% +/- 10%
Ground Current (0.5…9.0 A)	+/- 10%

External Current Transformers (for use with Cat. Nos. 193-EC1ZZ1, 193-EC3ZZ, 193-EC4ZZ, and 193-EC5ZZ)

The user shall provide one current transformer (CT) for each motor phase,and shall connect the CT's secondary leads to the appropriate E3 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 E3 overload relay burden of 0.1 VA 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**

General

	Cat. No. 193-EC_B, 193-EC_D, 193-EC_Z	Cat. No. 193-EC_E	Cat. No. 193-EC_F	Cat. No. 193-EC_G	Cat. No. 193-EC_H
Approximate Weights	0.80 kg (1.77 lb)	1.23 kg (2.71 lb)	2.95 kg (6.5 lb)	4.43 kg (9.75 lb)	8.63 kg (19.0 lb)
Standards	CSA C22.2 No.14, DIN VDE 0660, EN 60 947, UL 508, UL 1053				
Certifications	CE, C-tick, cUL, CCC (pending)				

Protection and Warning Summary

Protective Function	Trip Enable	Warning Enable	Trip Level Settings		Trip Delay Settings		Warning Level Settings		Inhibit Time Settings‡	
	Factory Default	Factory Default	Range	Default	Range [s]	Default [s]	Range	Default	Range [s]	Default [s]
Thermal Overload	Enabled	Disabled	0.4…5000 A	—	Trip Class 5…30	Trip Class 10	0…100 %TCU	85%	—	—
Phase Loss	Enabled	—	§	§	0.1…25.0	1.0	—	—	0…250	0
Ground (Earth) Fault	Disabled	Disabled	1.0…5.0 A	2.5 A	0.1…25.0	0.5	1.0…5.0 A	2.0 A	0…250	10
Stall (High Overload During Start)	Disabled	—	100…600 % FLA ♣	600 % FLA ♣	0…250 ♣	10♣	—	—	—	—
Jam (High Overload During Run)	Disabled	Disabled	50…600 % FLA	250 % FLA	0.1…25.0	5.0	50…600 % FLA	150 % FLA	0…250	10
Underload	Disabled	Disabled	10…100 % FLA	50 % FLA	0.1…25.0	5.0	10…100 % FLA	70 % FLA	0…250	10
PTC	Disabled	Disabled	—	—	—	—	—	—	—	—
Current Imbalance (Asymmetry)	Disabled	Disabled	10…100%	35%	0.1…25.0	5.0	10…100%	20%	0…250	10
Comm Fault	Enabled	Disabled	—	—	—	—	—	—	—	—
Comm Idle	Disabled	Disabled	—	—	—	—	—	—	—	—

♣ Inhibit time settings are used for both trip and warning functions.
§ Phase loss trip level is set at a current imbalance greater than or equal to 100% and is not user adjustable.
‡ Stall protection is only applicable to the motor starting sequence.

Programming and Control Terminal

Display	
Display type	128x64 LCD with yellow-green backlighting
Viewing area	57 x 30 mm (2.24 x 1.18 in.)
Keypad	
Keypad type	Tactile embossed, domed keys, sealed membrane
Operation force	453 g (16 oz.)
Operational life	1 million operations
Communications	
Communication protocol	DeviceNet™ (125, 250, 500 Kbaud selectable)
Electrical	
Input voltage range	11…25V DC
Input power, typical	1.7 W
Input current	70 mA @ 24V DC
Environmental	
Operating temperature	0…50 °C (32…122 °F)
Storage temperature	-40…+85 °C (-40…+185 °F)
Humidity	5…95%, non-condensing
Operating shock	30 g
Non-operating shock	50 g
Operating vibration	2.5 g @ 5 Hz…2 kHz
Non-operating vibration	5 g @ 5 Hz…2 kHz
Dimensions	
Height	116 mm (4.57in.)
Width	70 mm (2.76 in.)
Depth	15.5 mm (0.67 in.)
Weight	85 g (3 oz.)
Certifications	
cULus	UL 508, C22.2, No. 14
CE	EN61000-6-2:2005 EN61000-6-4:2001
RoHS	This product meets the material restrictions of the European Union RoHS Directive

AC Input Interface Module

Electrical	
Number of inputs	4
Voltage category	110/120V AC
Operating voltage range	79…132V AC
Frequency range	47…63 Hz
Off-state voltage (max.)	20V AC
On-state voltage (min.)	79V AC
On-state current	2.0 mA @ 79V AC (min.), 10.0 mA @ 132V A (max.)
Inrush current (max.)	150 mA
Off-state current (max.)	1.0 mA
Heat dissipation (max.)	0.10 W/input
IEC input compatibility	Type 1
Environmental	
Operating temperature	-20…+55 °C (-4…+131 °F)
Storage temperature	-40…+85 °C (-40…+185 °F)
Humidity	5…95%, non-condensing
Vibration (IEC 68-2-6)	3 G
Shock (IEC 68-2-27)	30 G
Environmental	
Maximum altitude	2,000 m
Pollution environment	Pollution degree 2
Terminal marking	EN50012
Degree of protection	IP2LX
Electromagnetic Compatibility	
ESD Immunity (IEC 10000-4-2)	6 kV contact, 8 kV air
Radiated Immunity (IEC 10000-4-3)	10V/m
Fast transient burst (IEC 10000-4-4)	4 kV (Power), 2 kV (Control)
Surge immunity (IEC 10000-4-5)	2 kV common mode, 1 kV differential mode
Radiated and conducted emissions	Class A
Physical	
Weight	60 g (2.1 oz.)
Certifications	UR, cUR, CE