

# THE INTELLIGENT CONCEPT FROM ALLEN-BRADLEY FOR PROTECTION, WARNING, DIAGNOSTIC AND CONTROL.

## Motor Protection Concept

### Two basic evaluation principles are employed in Rockwell Automation's motor protection concept:

**(A)** Indirect evaluation of the motor temperature rise by measuring motor currents and simulating the motor thermal characteristic in the tripping device.

**(B)** Direct evaluation by sensing the motor winding temperature. The tripping device responds to the thermistors fitted in the windings.

### Bulletin 193-T1, 193-K Overload Relays and Bulletin 140M Circuit Breakers

For basic protection requirements, including phase loss protection, for standard applications like pumps, fans, conveyors, etc.

For motor duty modes like plugging or inching, high switching frequency or heavy-duty starting, choose one of the high sophisticated electronic motor protection relays.

### Bulletin 193-E

Relays provide efficient phase loss protection, wide current setting range and have minimal power consumption and high tripping accuracy.

The optional DeviceNet and EtherNet Communication Modules features enhanced control, protection, and diagnostics capabilities for improved operating efficiency.

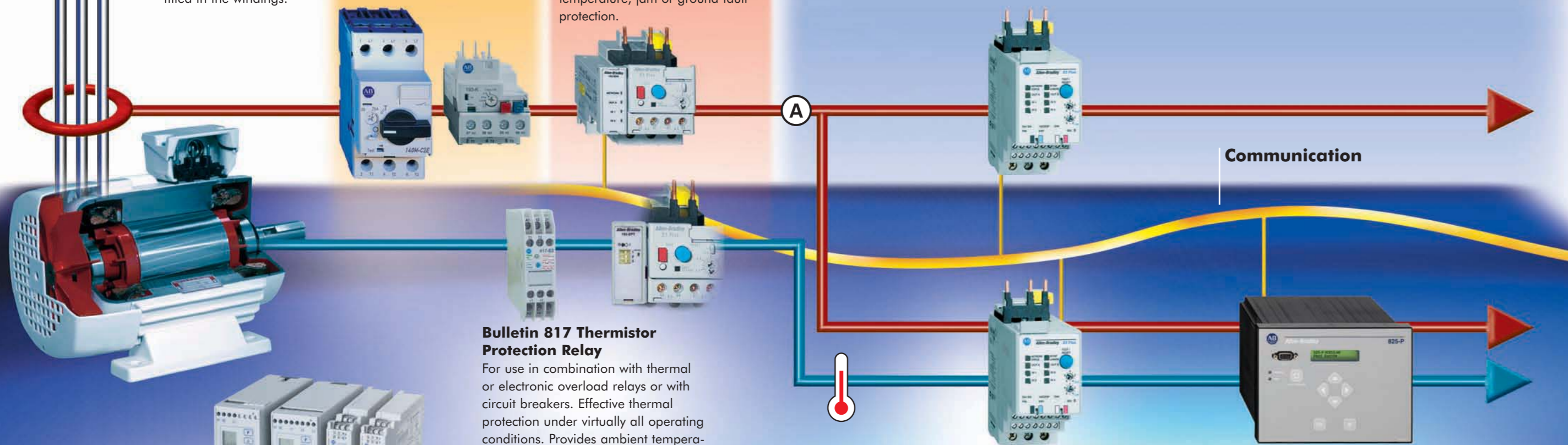
Bulletin 193-E side-mount modules enhance the 193-EE overload relays with specific protective features like temperature, jam or ground fault protection.

### Bulletin 193-EC1 Electronic Overload Relay with Integrated Communication Interface

The efficient and intelligent motor protection! Up to 860 A, the 193-EC Electronic Overload Relays can be directly installed on the relevant 100-C and 100-D Contactor. All essential protective, control, alarm, and diagnostic functions as well as the most important motor data such as motor currents and thermal load are always available via the integrated DeviceNet communication interface. The 193-EC1 also includes 2 inputs and 1 output relay.

### Bulletin 825-P Modular Protection System

Offers an optimum of control and protection for motors and systems. An exact thermal image of the motor permits maximum equipment utilization in spite of load fluctuation, temporary overload, heavy duty starting and asymmetry. Reports potential failures at an early stage, keeping downtimes to a minimum. Current, voltage, power, temperature and operating data can be displayed directly on the device and/or via communication interface. Options include scanner for RTD temperature sensors, voltage input card, I/O cards with analogue output and communication cards.



### Bulletin 817 Thermistor Protection Relay

For use in combination with thermal or electronic overload relays or with circuit breakers. Effective thermal protection under virtually all operating conditions. Provides ambient temperature compensation and protection against blocked or damaged motor ventilation.

### Bulletin 193-EC2 and 193-EC3 Electronic Overload Relay with Integrated Communication Interface

Identical to the 193-EC1 in functionality and size. Additional motor and system protection with the integrated (193-EC2) or external (193-EC3) core balanced transformer for detecting earth fault currents and overtemperature protection via the built-in thermistor relay. The additional inputs and outputs (4 inputs and 2 outputs) simplify and optimise control wiring. The built-in DeviceLogix™ technology supports local control of inputs and outputs while reducing network traffic.

### The MachineAlert

family of dedicated function electronic motor protection relays offers state-of-the-art supplementary protective functions that are easily added and applied to motor control circuits. A full range of products exists to allow selective addition of motor-protective enhancing functions to meet specific application requirements. The product portfolio includes current-, voltage-, PTC- and rotation monitoring devices.

## MOTOR PROTECTION FOR BEST PERFORMANCE MOTOR PROTECTION OVERVIEW



WITH ESSENTIAL COMPONENTS IT'S A CHILD'S PLAY TO SELECT THE RIGHT BUILDING BLOCKS FOR YOUR CONTROLS.

LISTEN.  
THINK.  
SOLVE.™

Simply use the NEW Rockwell Automation Essential Components Catalogue.

Inside you'll find the newest and most popular components to suit your needs.

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Allen-Bradley • Rockwell Software

Rockwell  
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**KLINKMANN**

www.klinkmann.com

**Riga**  
tel. +371 6738 1617  
klinkmann@klinkmann.lv

**Helsinki**  
tel. +358 9 540 4940  
automation@klinkmann.fi

**Yekaterinburg**  
tel. +7 343 376 5393  
yekaterinburg@klinkmann.spb.ru

**Vilnius**  
tel. +370 5 215 1646  
post@klinkmann.lt

**St. Petersburg**  
tel. +7 812 327 3752  
klinkmann@klinkmann.spb.ru

**Samara**  
tel. +7 846 273 95 85  
samara@klinkmann.spb.ru

**Tallinn**  
tel. +372 668 4500  
klinkmann.est@klinkmann.ee



**Moscow**  
tel. +7 495 641 1616  
moscow@klinkmann.spb.ru

**Kiev**  
tel. +38 044 495 33 40  
klinkmann@klinkmann.kiev.ua


**Minsk**  
tel. +375 17 200 0876  
minsk@klinkmann.com

# THE COMPLETE PROGRAMME FOR ALL REQUIREMENTS: MOTOR PROTECTION, ADVANCED WARNING, DIAGNOSTIC FUNCTIONS AND CONTROL OPERATIONS SUITED TO YOUR APPLICATIONS.


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Electronic Overload Relays		Adjustment range [A]																						
	<b>Bulletin 193-ED</b>	Manual Reset, Phase Loss Protection, Trip class 10	Screw terminals, 3 phases	0.1 ... 0.5	0.2 ... 1.0	1.0 ... 5.0	3.2 ... 16	5.4 ... 27	5.4 ... 27	9 ... 45														
				Cat. No.	193-ED1AB	193-ED1BB	193-ED1CB	193-ED1DB	193-ED1EB	193-ED1ED	193-ED1FD													
				Mount to contactor 100-Pass-through version	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C30 ... C43	C30 ... C43													
	<b>Bulletin 193-EE</b>	Selectable Manual/Automatic Reset, Phase loss Protection, selectable Trip Class 10, 15, 20 or 30	Screw terminals, 3 phases	0.1 ... 0.5	0.2 ... 1.0	1.0 ... 5.0	3.2 ... 16	5.4 ... 27	5.4 ... 27	9 ... 45	18 ... 90	18 ... 90	30 ... 150	40 ... 200	55 ... 110	40 ... 200	60 ... 300	100 ... 500	120 ... 600	160 ... 800				
				Cat. No.	193-EEAB	193-EEBB	193-EECB	193-EEDB	193-EEEB	193-EEEE	193-ED1ED	193-EEGE	193-EEGF	193-EEHF	193-EEJF	193-EEVF	193-EEJG	193-EEKG	193-EELG	193-EEMH	193-EENH			
				Mount to contactor 100-Pass-through version	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C60 ... C85	C60 ... C85	C60 ... C85	D95 ... D180	D95 ... D180	D95 ... D180	D95 ... D180	D210 ... D420	D210 ... D420	D210 ... D420	D630 ... D860	D630 ... D860			


Optional Side Mount Modules for 193 -EE	
Function	Cat. No.
• EtherNet Communication	193-ETN
• DeviceNet Communication	193-EDN
• PROFIBUS Communication	193-EPB
• Jam Protection	193-EJM
• Ground Fault Protection	193-EGF
• Ground Fault and Jam protection	193-EGJ
• Remote Reset	193-ERR
• PTC protection	193-EPT
• Remote Indicator Module	193-ERID


Advanced Electronic Overload Relays		Adjustment range [A]																			
	<b>Bulletin 193-EC1, EC2 &amp; EC3</b>	Programmable Protection-, Warning- and Diagnostic Functions, Underload-, Jam / Stall- and Asymmetry Protection, Trip Class 5 ... 30, DeviceNet-Communication	2 Inputs & 1 Outputs	0.4 ... 2.0	1 ... 5	1 ... 5	3 ... 15	3 ... 15	5 ... 25	5 ... 25	9 ... 45	9 ... 45	18 ... 90	28 ... 140	42 ... 210	42 ... 210	60 ... 302	84 ... 420	125 ... 630	172 ... 860	9 ... 5000
			internal GroundFault sensor	193-EC1PB	193-EC1AB	193-EC1AD	193-EC1BB	193-EC1BD	193-EC1CB	193-EC1CD	193-EC1DD	193-EC1DE	193-EC1EE	193-EC1FF	193-EC1GF	193-EC1GG	193-EC1HG	193-EC1JG	193-EC1KH	193-EC1LH	193-EC1ZZ
			external Ground Fault sensor	193-EC2PB	193-EC2AB	193-EC2AD	193-EC2BB	193-EC2BD	193-EC2CB	193-EC2CD	193-EC2DD	193-EC2DE	193-EC2EE	193-EC3FF	193-EC3GF	193-EC3GG	193-EC3HG	193-EC3JG	193-EC3KH	193-EC3LH	193-EC3ZZ

Ground Fault sensor for 193-EG and 193-EC3		
Max. Current [A]	Ø window [mm]	Cat. No.
45	20	193-CBCT1
90	40	193-CBCT2
180	62	193-CBCT3
420	82	193-CBCT4

Motor Protection Systems		Bulletin 825-P						Bulletin 825-MCM Converter Modules		Comprehensive Protection									
		Programmable Protection-, Warning-, Diagnostic-, and Control Functions	Function	Basic Unit	RTD Scanner Module	Voltage Input Card	Expansion I/O Cards	Communication Card	Ground Fault Sensor	• Thermal Overload	• Undervoltage	• PTC Thermistor	• Underpower	• Starts per hour	• Current Elements				
		Adjustable trip class 1 ... 600	Cat. No.	825-PD	825-PR12D	825-PVS	825-PIOD 825-PIOR	825-PDN 825-PMB	825-CBCT	• Current Imbalance / Phase Loss	• Overvoltage	• Stator RTD	• Power Factor	• Starts Time Monitoring	• Voltage Elements				
		PTC Input	Features	2 Relay Outputs	12 RTD input channels, Fibre optic connection to basic unit	Enables voltage and Power Monitoring	120V Inputs 24VDC Inputs	DeviceNet with Modbus RTU	Ratio 100:1	• Ground Fault	• Phase Reversal	• Bearing RTD	• Reactive Power	• Speed Switch Monitoring	• Power Elements				

MachineAlert Dedicated Function Motor Protection Relays		Bulletin 8095 Current Monitors				Bulletin 8135 Phase Monitors				Bulletin 817 Thermistor Monitors				Bulletin 819 Motor Rotation Monitors			
		Two versions available	Control Voltage	24 VDC	230 VAC	Independent programmable trip for undervoltage, overvoltage, and phase imbalance	Control Voltage	24 VDC	230 VAC	Connection of up-to six PTC thermistors in series	Control Voltage	24 ... 240 VAC/DC	Zero speed monitoring through evaluation of the feedback voltage of a decelerating motor	Control Voltage	24 VDC	230 VAC	
		Programmable relay trip and reset level settings	0.5 ... 5 A AC/DC (1-phase)	Cat. No.	809S-E1ZJ 809S-E1A	Automatic reset	813S-E2BZJ50 813S-E2BA50	Automatic Reset	817-E1	Open and short circuit detection	817-E2	Standstill monitoring by means of a pulse generator, tachometer, etc	Monitored Voltage	400 VAC max (IEC), 300 VAC max (CSA/UL) Frequency or Back-EMF	819-E1ZJ 819-E1A		
		Programmable relay trip and reset delay settings	2.0 ... 24.9	24 VDC 230 VAC	Phase loss, under-/ overvoltage, phase imbalance, phase sequence	813S-E2CZJ50 813S-E2CA50	Automatic, manual or remote reset, test button, status storage	24 ... 240 VAC/DC	Frequency monitoring for signals of any curve from in the range of 16 ... 100 V p-p	690 VAC max (IEC), 600 VAC max (CSA/UL) Back-EMF							

Bimetallic Overload Relays		Bulletin 193-T1																																				
		Ambient Temperature Compensation	Adjustment range [A]	0.1 ... 0.16	0.16 ... 0.25	0.25 ... 0.40	0.35 ... 0.50	0.45 ... 0.63	0.55 ... 0.80	0.75 ... 1.0	0.90 ... 1.3	1.1 ... 1.6	1.4 ... 2.0	1.8 ... 2.5	2.3 ... 3.2	2.9 ... 4.0	3.5 ... 4.8	4.5 ... 6.3	5.5 ... 7.5	7.2 ... 10	9.0 ... 12.5	11.3 ... 16	15 ... 20	17.5 ... 21.5	21 ... 25	15 ... 20	17.5 ... 21.5	21 ... 25	24.5 ... 30	29 ... 36	33 ... 38	17 ... 25	24.5 ... 36	35 ... 47	35 ... 47	45 ... 60	58 ... 75	72 ... 90
		Trip Class 10A	Cat. No.	193-T1AA16	193-T1AA25	193-T1AA40	193-T1AA50	193-T1AA63	193-T1AA80	193-T1AB10	193-T1AB13	193-T1AB16	193-T1AB20	193-T1AB25	193-T1AB32	193-T1AB40	193-T1AB48	193-T1AB63	193-T1AB75	193-T1AC10	193-T1AC12	193-T1AC16	193-T1AC20	193-T1AC21	193-T1AC25	193-T1BC20	193-T1BC21	193-T1BC25	193-T1BC30	193-T1BC36	193-T1BC38	193-T1CC25	193-T1CC36	193-T1CC47	193-T1DC47	193-T1DC60	193-T1DC75	193-T1DC90
		Reset Manual / Automatic selectable	Mounts to Contactor	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C09 ... C23	C12 ... C23	C16 ... C23	C16 ... C23	C23	C23	C30 ... C37	C30 ... C37	C30 ... C37	C30 ... C37	C30 ... C37	C30 ... C37	C43	C43	C43	C60 ... C85	C60 ... C85	C72 ... C85	C85

Circuit Breakers		Bulletin 140M																											
		Thermal Motor Protection	Adjustment range [A]	0.1 A	Bulletin 140M-C, Size 1, High Break																25 A	Bulletin 140M-I				205 A			
		Short circuit Protection	Cat. No.	140M-C2E-A16	140M-C2E-A25	140M-C2E-A40	140M-C2E-A63	140M-C2E-B10	140M-C2E-B16	140M-C2E-B25	140M-C2E-B40	140M-C2E-B63	140M-C2E-C10	140M-C2E-C16	140M-C2E-C20	140M-C2E-C25	40 A	40 ... 80	80 ... 100	100 ... 160	160 ... 205								
		Auxiliary contacts	Adjustment range [A]	1.6 A	Bulletin 140M-D, Size 2, High Break PLUS																25 A	Bulletin 140M-J				250 A			