CIRCUIT BREAKERS

SAFRAN

SAFRAN ELECTRICAL & POWER

SMARTER ELECTRICAL SOLUTIONS FOR A BETTER FLIGHT

At Power we innovate to provide greener, reliable and cost-effective electrical solutions. We are one division "Powering-On" to be a world class trusted supplier.

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Find Information Fast

- **Have a Safran Electrical & Power part number and need more information?** Use the part number to page index on this page to get the exact page of the full product listing.

- **Have a Military part number and need applicable Safran Electrical & Power part number?** Use the Military part number Index in the back of this catalog.

- **Know the type of product you want, but not a specific part number?** Use the detailed Index on the facing page to find the section with those products or use the Product Overview for a quick side by side comparison.

- **Looking for a specific feature or attribute?** Use the Descriptive Index or Product Overview to quickly determine which products fit your application.

- **Need additional information not contained in this catalog?** For technical questions, application assistance, or the name of your local authorized distributor call 1-800-955-7254.

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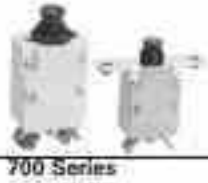
CIRCUIT BREAKER PRODUCT OVERVIEW

PLEASE CONSULT DETAILED PRODUCT DESCRIPTIONS FOR MORE INFORMATION

SINGLE PHASE



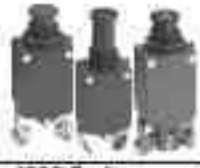
	160 Series	170 Series	700 Series	1500 Series	4001 Series
Catalog Location	pgs. 12-13	pgs. 14-15	pgs. 16-17	pgs. 18-19	pgs. 20-21
MS Qualified	MS25381	MS25007[4]	MS26244 (MS25070)[4]	MS22074[4]	MS22073
Description	Heavy-Duty, High Current Ratings	Heavy-Duty, Very High Current Ratings	Miniature, High Interrupting Capacity, Rugged Performer	Miniature, Fast-trip, Ambient Temperature	Subminiature, Precision, Lightweight
Current Rating	50 to 100 Amperes	125 to 200 Amperes	5 to 50 Amperes	Compensated	1 to 25 Amperes
Voltage rating (For Interrupting Capacity)	120VAC, 400 Hz 30VDC	115VAC, 400 Hz, 28VDC	120 VAC, 400 Hz, 30 VDC	0.5 to 10 Amperes 120VAC, 400 Hz	120VAC, 400 Hz, 30VDC
Calibration @25° C (percent of amperage rating)	105% Hold 135% within one hour	100% Hold 135% within one hour	115% Hold 135% within one hour	30 VDC 110% Hold 135% within one hour	115% Hold 150% within one hour
Trip Time (in seconds at 25° C)	All amperages	All amperages	All amperages		All amperages
200% Overload	15.0 to 65.0	15.0 to 70.0	15.0 to 90.0	0.5-3A / 4.5-10A	2.0 to 20.0
500% Overload	1.3 to 6.0[2]	1.5 to 6.0[2]	1.4 to 6.0[2]	0.4 to 3.0 / 0.5 to 3.6	0.16 to 2.0
1000% Overload	0.5 to 2.0[3]	0.9 to 2.0[3]	0.5 to 1.5[3]	0.09 to 0.4 / 0.08 to	0.040 to 0.5
Interrupting Capacity (Rating Dependent)	3500A @ 120V AC 6,000A @ 30V DC	3500A @ 115V AC 3,000A @ 28V DC	3500A @ 120V AC 6,000A @ 30V DC	0.5[1] 0.02 to 0.18 / 0.02 to 0.2[1]	500 to 3500A @ 120V AC 2,000 to 6,000A @ 30V DC
Weight g (lb.)	110g (.2426)	130g (.2869)	43g (.0946)	65G to 100A @ 120V AC 6,000A @ 30V DC	33g (.0730)
Major Dimensions (L/W/H (inches)	2.250 x 1.812 x 0.750	2.250 x 1.812 x 1.00	1.960 x 1.094 x 0.750	45g (.099 lb)	1.862 x 0.719 x 0.880
Notes	MIL spec approved high vibration model	Mounting dimensions compatible with Military Standard Drawing requirements of MS25007 or MIL-C-5809	Available with auxiliary switch. Bracket allows variation of mounting. 40 & 50 amperes ratings not MIL spec approved	1.843 x 1.137 x 0.750 Meets requirements for use as an RCCB 103 (Fr function is per specification)	Available in MIL spec approved high vibration and random vibration models and variations in termination and mounting. 25 amperes rating not MIL spec approved

[1] Balanced, Unbalanced max 140%
[2] 400% Overload information available in detailed product listing
[3] 600% Overload information available in detailed product listing
[4] Designed to requirements of applicable specification. Contact Business Unit for details.

FOR CONFIGURATIONS NOT NOTED, CONTACT BUSINESS UNIT

PLEASE CONSULT DETAILED PRODUCT DESCRIPTIONS FOR MORE INFORMATION.

THREE PHASE



	4200 Series	4310 Series	940 Series	1526 Series	1536 Series	4330 Series
Catalog Location	pgs. 22-23	pgs. 24-31	pgs. 26-27	pgs. 28-29	pgs. 30-31	pgs. 32-33
MS Qualified	MS3180R	MS3320 (MS3320I)	NA	NA	NA	MS14154
Description	Sub-miniature, High Performance, Lightweight	Sub-miniature, Lightweight, Ambient Temperature Compensated	Heavy Duty, High Capacity Protection	Panel mp, Hot-wire Ambient Temperature Compensated	Miniature, Lightweight, Ambient Temperature Compensated	Sub-miniature, Lightweight, Ambient Temperature Compensated
Current Rating	0.5 to 25 Amperes	1 to 25 Amperes	50 to 200 Amperes	1 to 15 Amperes	5 to 50 Amperes	1 to 25 Amperes
Voltage rating (For Interrupting Capacity)	120 VAC, 400 Hz 28 VDC	120 VAC, 400 Hz 28 VDC	120 VAC, 400 Hz	120 VAC, 400 Hz	120 VAC, 400 Hz	120 VAC, 400 Hz
Calibration @ 25 C (percent of amperage rating)	135% Hold 150% within one hour	135% Hold 135% within one hour	135% Hold 138% [1] within one hour	115% Hold 135% within one hour	135% Hold 138% [1] within one hour	110% Hold 145% within one hour
Trip Time (in seconds at 25 C)	All amperages	All amperages	All amperages	1-25A / 10-15A	All amperages	All amperages
200% Overload	2.0 to 20.0	5.0 to 20.0	16.0 to 70.0	0.38 to 40 / 30 to 100	30.0 to 70.0	4.0 to 20.0
500% Overload	0.16 to 1.2	0.5 to 2.0	1.2 to 6.0 [1]	0.08 to 0.46 / 0.4 to	1.4 to 6.0 [1]	0.40 to 2.00
1000% Overload	0.045 to 0.35	0.12 to 0.50	0.4 to 2.0 [1]	0.02 [1]	0.35 to 1.4 [1]	0.10 to 0.50
Interrupting Capacity (Rating Dependent)	500A @ Unrated @ 120V AC 2000A @ Unrated @ 28V DC	2000 to 3000A @ 120V AC 6,000A @ 28V DC	1200A @ 120V AC	0.02 to 0.15 / 0.15 to 0.5 [1] 300A @ 120V AC	1000A @ 120V AC	2000A @ 120V AC
Weight g (lb.)	22g (.048 lb)	31g (.068lb)	388g (.856 lb)		139g (.306 lb)	48g (.106 lb)
Major Dimensions LxWxH (inches)	1.525 x 0.750 x 0.593	1.343 x 0.781 x 0.688	2.437 x 2.187 x 2.031	154g (.340lb) 1.875 x 2.063 x 1.300 For additional amperage ratings consult business unit	2.170 x 2.160 x 1.312	1.381 x 1.640 x 0.781
Notes	MIL spec approved tandem vibration and long button models. Available with auxiliary switch and variations in termination and mounting. 0.5 and 25 ampere rating not MIL spec approved.	MIL spec approved long button and high vibration models. Available with auxiliary switch and variations in termination and mounting. 1.5 & 2½ ampere ratings not MIL spec approved.	All data listed is applicable to the 940 Series. Consult Safran Electrical & Power for details on the 150, 550, 930, 950, and 970 Series devices.		Single hole mount and small size facilitates easy installation.	MIL spec approved high vibration and long button models. 25 ampere rating is not MIL spec approved. Single Hole mount. Variation in termination and mounting available.

Market Trends

Aircraft Original Equipment Manufacturers (OEM) are continuously pursuing efficiencies associated with the design and manufacture of aircraft platforms. Additionally, the OEM's are working on increasing the functionality of components while reducing operating and life cycle costs. These activities are leading to the migration of engineering and system design activities to Tier 1 system integrators and their supply partners such as Safran Electrical & Power. By optimizing relays, circuit breakers, and power distribution panel performance to satisfy application requirements: cost, size, weight can be minimized while enhancing performance.

What Problem Does Safran Electrical & Power Solve?

Aircraft OEM's have already discovered outsourcing power distribution management requirements to Tier 1 system integrators and their vendor base is an effective alternative that mitigates risk and leverages the subsystem and component manufacture expertise. The success of such outsourcing efforts benefits the OEM and leads to more reliance on qualified Tier 1-system integrators for electrical systems. Safran Electrical & Power's objective is to be the logical candidate for the supply of aerospace components as well as subsystems that address power distribution and circuit protection.

Safran Electrical & Power offers Integrated Circuit Breaker Panels as a Line Replaceable Unit that reduce the OEM production installation time and eliminates component compatibility / interface issues. This can shorten design to market cycle time and reduce costs by outsourcing subsystems to qualified suppliers with the requisite engineering skill and manufacturing capabilities.

The Safran Electrical & Power Solution

Safran Electrical & Power is an attractive partner in the design and development of integrated circuit breaker components and subsystem panels. Our development process employs sound methodology to identify, assess, and manage program risk. The components of this approach include Phase-Gate Reviews, Project Management, and Six Sigma for Design and Development. This process in conjunction with Safran Electrical & Power's extensive Product Portfolio and Capabilities enable Safran Electrical & Power to be a single source supplier for power protection, distribution, and switching components. The Systems Integrators have the option of sourcing pedigree circuit breakers for their panel designs or subcontracting the entire Integrated Circuit Breaker Panel to Safran Electrical & Power.

Phase-Gate Reviews

This process organizes product development activities from the idea through product launch into a series of phases. The activities within each phase are multifunctional, and are designed to provide information that progressively reduces risk. Consistent application of the process promotes successful on-time product development efforts.

Project Management

Product development projects involve the iterative planning, execution and control of project team activities in order to meet the competing demands of scope, timing, cost, risk and quality. Project management methodology affords the application of knowledge, skills, tools and techniques to meet these requirements.

Six Sigma for Design and Development

Six Sigma for Design and Development is a methodology using normal Six Sigma tools, but applies them early in the design process. This methodology instills the product development process with the same Six Sigma process rigor found in Safran manufacturing to create successful products in a competitive marketplace.

Product Portfolio

SafranElectrical&Power's complete product portfolio allows flexibility to partner with customers having a variety of circuit breaker subsystem and component needs. SafranElectrical& Power's engineers design additional value into traditional thermal circuit breaker components and subsystems through electronics, while balancing customer concerns for size, weight, cost, and complexity. Arc Fault Interrupt Technology is an example of value add engineering. A proven design package (i.e. thermal circuit breaker) is modified so its functionality addresses emerging airline carrier and Federal Aviation Administration needs to protect the aging aircraft fleet and satisfy SSAR (iii) requirements.

The Safran Electrical & Power product portfolio is recognized in the aerospace industry as MIL qualified for performance rated switching products. These components support the design and manufacture of primary power distribution panels and circuit breaker panels as well. The Safran Electrical & Power product portfolio includes:

- Electro-mechanical thermal circuit breakers (0.5 to 300 amperes) - single phase or three phase thermally actuated devices offered in conventional design or with integrated Arc Fault Circuit Interrupt technology.
- Remote Control Circuit Breakers (5 to 125 amperes) - single phase or three phase devices sold separately or as a subsystem when combined with a necessary indicator control unit (0.5 ampere circuit breaker).
- Electro-mechanical Remote Power Controllers (125 to 200 amperes) – single phase devices sold separately or as a subsystem when combined with a necessary indicator control unit (0.5 ampere circuit breaker).
- Smart Contactors with current sensing protection or Arc Fault Circuit Interrupt technology.

- 28 VDC Contactors (50 to 1000 amperes)
- 270 VDC Contactors (28 to 350 amperes)
- 115/230 VAC 400 Hz Contactors (30 to 400 amperes)
- 750 VDC Contactors (100 to 600 amperes)
- A variety of aerospace switches (rocker, toggle, pushbutton and limit)

Safran Electrical & Power Capabilities

- Proven excellence in component and subsystem design, development, testing, qualification, and production for both military and commercial aerospace applications.
- A manufacturing organization that emphasizes customer satisfaction by focusing on cost, quality, and delivery of the product portfolio.
- Altitude / temperature testing chambers simulating altitudes to 80,000 feet and temperatures from -85°F to 257°F (-65°C to 125°C).
- Test capabilities of 115/200 VAC 400Hz to 3600 amps, 28 VDC to 10,000 amps, 270/350/475 VDC to 11500 amps.
- Environmental tests for Sand and Dust, Shock, and Vibration.
- Latest CAD/CAM finite element analysis, stereolitho- graphic techniques, and PRO E design.
- Model Shop flexibility to respond to design changes and the rapid turn around of prototypes.

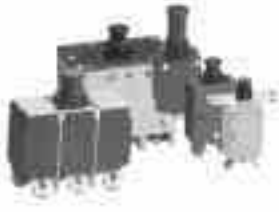
The Safran Electrical & Power Difference

There are a number of circuit breaker suppliers in the aerospace market. However, none of them possess the vertical integration needed to engineer and manufacture both circuit breaker components and subsystems that include both primary power distribution panels and circuit breaker panels.

Safran Electrical & Power affords its customers the following difference:

- Strong brand recognition, customer loyalty, and demonstrated market presence for over 80 years.
- Ability to leverage the company's size, financial strength, and scope to drive superior results. Safran Electrical & Power has the ability to leverage the engineering resources of a multi-billion dollar company.
- An extensive product portfolio that compliments integrated sub-system design competency.
- A flat organizational structure that allows for the optimal blend of best value technical approach and test support within budget and schedule constraints.
- Dedicated program managers that understand and communicate "voice of the customer".
- Design software that promotes concurrent engineering and the exchange of customer data.
- Co-located engineering, manufacturing, and development resources promote robust product development and product support.

Safran Electrical & Power's unique product portfolio, it's ability to design and manufacture components and subsystems, and customer centric strategy, mitigates the risk associated with new aircraft circuit protection systems. Safran Electrical & Power is an ideal candidate to consider for engineering and manufacturing collaboration on all future commercial, General Aviation, and military programs.



The Aging Aircraft Dilemma

Today, in the United States there are more than 22,000 civil and military aircraft in operation. Many are over 20 years old. To maintain airworthiness, many have been retrofitted with new engines, new avionics, improved hydraulic systems and even new interiors. However, one element in older aircraft that will not change is the miles and miles of electrical wiring buried within the aging airframe. Over time these wire bundles and their protective insulation can deteriorate, providing the perfect environment for an electrical short and a potential fire hazard.

Until recently, aircraft circuit breakers were considered the first line of defense against electrical hazards. However, research has shown that arc faults, with temperatures as high as 6000°C, can go completely undetected by circuit breakers developed over 30 years ago. The unfortunate roll call of recent aircraft accidents blamed on explosions or fires suspected to have been triggered by electrical wire arcing is familiar. And the potential for additional incidents may be even more sobering. Safety reports show numerous, non-fatal incidents of smoke in the cockpit and electrical faults attributed to wire arcing.

Navy Statistics show 64 in-flight electrical fires between July 1995 and December 1997. On the civil side, Federal Aviation Administration (FAA) data from 1989 through July 1998 show 622 reports of smoke in the cockpit or cabin.

"No-Fault Design" By Rick DeMeis, Design News Sept 4, 2000

Why Don't Aircraft Circuit Breakers Provide Protection from Arcing Faults?

Aerospace circuit breakers are designed to protect wiring from thermal damage that occurs during an over-current situation. They are able to do this by deploying a bi-metallic element that mimics that thermal effect of current on a wire's insulation.
The reason circuit breakers do not provide protection from arcing events is that they are not designed to. The characteristics of an arcing event include fault currents that are sporadic or sputtering, have values several times the breakers rating, and the arc event is of such a short duration that the circuit breaker has little time to react.

Safran Electrical & Power's Arc-Fault Circuit Interrupt (AFCI) Technology - The Next Generation of Circuit Protection

"Present commercial airplane circuit breakers do not detect and react to arcing faults associated with the chafing and subsequent intermittent arcing when bare wires contact metal airplane structure or other bare conductors..."

FAA Aging Transport Non Structural Systems Plan, July 1998, page 17 incorporating AFCI into Thermal Protection Devices

Safran Electrical & Power's AFCI protective device recognizes the unique signatures of arcing faults and acts to interrupt the circuit. Safran Electrical & Power's Arc-Fault Circuit Interrupt technology utilizes microelectronics to monitor and analyze a circuit's current waveform. This logic circuit utilizes algorithms developed over the last 10 years. These algorithms "look" directly for the randomness in the 400Hz current signal to determine if an arcing event has occurred. If the logic circuit determines an arc fault exists, a signal is sent to the circuit protection device, which will safely shut down the circuit in question.

Recognizing An "Acceptable Arc": From An "Unacceptable Arc" - Elimination of the "Nuisance" Trip

Safran Electrical & Power's unique AFCI technology monitors the reaction of the current waveform to an arcing incident to ensure that the AFCI circuitry can discriminate between an unacceptable arc and an acceptable arc. An unacceptable arc would be any situation such as two wires or a wire to ground electrical arc due to exposed conductors. An acceptable arc could be the power surge in the starting of a hydraulic pump or another electrically driven, primary or auxiliary support component.

In order to distinguish an acceptable arc from an unacceptable arc, sophisticated arc fault algorithms employ various statistical methods that are capable of identifying the degree of chaos or randomness in the current signal. This prevents the chance of nuisance tripping even in situations where the switching of devices involves in-rush transients resulting from motor or pump start-ups.

Integrating the AFCI circuitry into the standard aerospace circuit breaker required the miniaturization of the present mechanism to make room for the necessary electronics and to provide a way to power the logic circuit. As a result of this effort, Safran Electrical & Power's AFCI circuit breaker has many added benefits:

- Offer same size as current circuit breakers listed in MS24671 and MS14105.
- Provides separate visible indication of an arc fault vs. over-current fault.
- Include independent operation of the electro-mechanical portion of circuit breaker so that the circuit breaker remains operational even with an AFCI electronics failure.

The AFCI technology can be packaged into a form / fit line replaceable unit (LRU) such as a thermal circuit breaker. Safran Electrical & Power's AFCI solution builds added safety into the LRU without the need to modify the existing electrical architecture of the aircraft.

AFCI technology is easily tailored to an application or device. Safran Electrical & Power's product portfolio of thermal circuit breakers, relays, and Remote Control Circuit Breakers can provide the required arc fault protection to address every platform electrical protection.

Standard

Single-Pole High Performance

Qualified

To MIL-C-5809 and MS25361

Protection For Heavy-Duty Systems

Protects circuits from 50 to 100 amperes.

Heavy-Duty Construction

Breaker features large contacts and wide terminals.

Not Sensitive To Frequency

May be used on either AC or DC circuits.

Performance Rated Circuit Breaker

The 160 series has the recognition of being the most specified heavy-duty aircraft type circuit breaker in the 50 to 100 ampere rating range.

Designed to protect heavy-duty aircraft and non-aircraft electrical systems, this trip-free breaker features separate, durable, overload and mechanical latches. In addition, the overload latch is designed for precise operation. Extra heavy contacts are spring-loaded to maintain high contact pressure and assure long life. Contact material has high resistance to arcing and the corrosive action of moisture —thus assuring low voltage drop throughout the life of the breaker.

PERFORMANCE DATA

Interrupting Capacity	0.0009 at 32V DC, 2.920A at 120V 400 Hz, AC
Endurance	At 120VAC, 400 Hz, inductive load — 5,000 cycles; resistive load — 5,000 cycles at 32V DC, inductive load — 2,500 cycles; resistive load — 5,000 cycles; mechanical cycling, no load — 5,000 cycles
Overload Cycling	100 operations at 200% rated current and rated voltage
Dielectric Strength	At sea level, 28VC 1,000V AC, At 70,000 ft., 71°C 350V AC
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	0.15V maximum
Vibration	Meets specification MIL-STD-202, Method 204, Condition A-104, 10-2000 Hz
Shock	Exceeds 30G's, 11 Milliseconds (sphere pulse) MIL-STD-202, Method 213 Test J
Acceleration	Exceeds 10G's
Weight	112 grams (0.25 lbs.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C		@ -40°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	100	—	100	—	100	—	% For 1 Hour
Must Trip	—	135	—	135	—	135	% Within 1 Hour
200% Overload	10	60	—	—	—	—	Seconds
400% Overload	2	10	—	—	—	—	Seconds
600% Overload	1	4	—	—	—	—	Seconds

Trip curve available

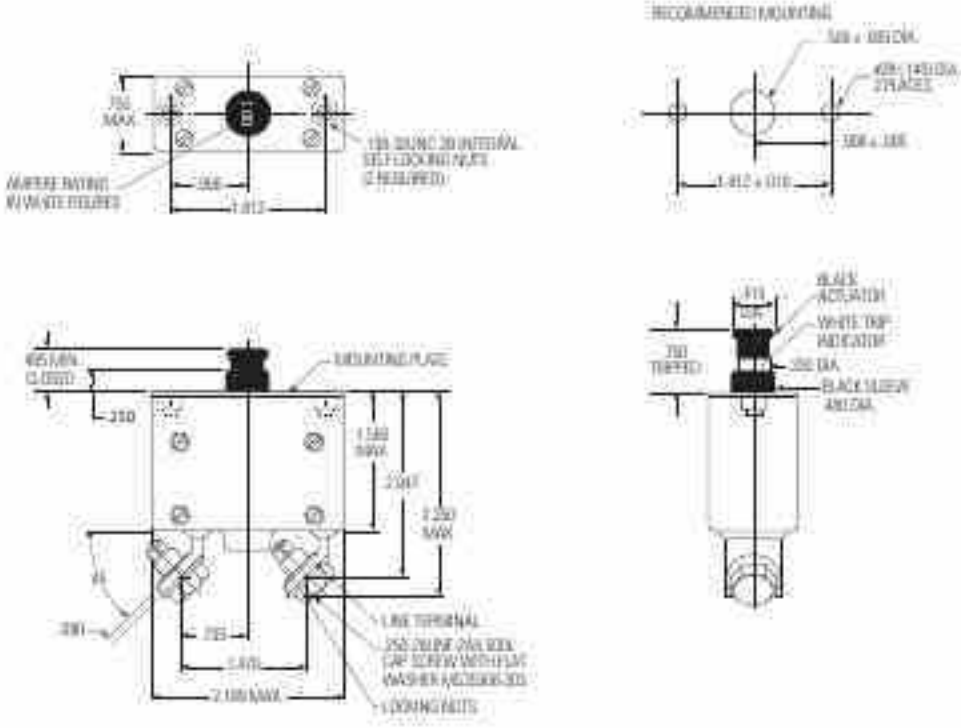
ORDERING INFORMATION

			STANDARD		HIGH VIBRATION	
MIL APPROVAL STATUS	AMPERE RATING	VOLTAGE DROP MAX. *	MS P/N	SAFRAN MP P/N	MS P/N	SAFRAN MP P/N
MS Approved	50	0.15	MS25361-50	160-312-50	MS25361-50V	160-340-50
MS Approved	60	0.15	MS25361-60	160-312-60	MS25361-60V	160-340-60
MS Approved	70	0.15	MS25361-70	160-312-70	MS25361-70V	160-340-70
MS Approved	75	0.15	MS25361-75	160-312-75	MS25361-75V	160-340-75
MS Approved	80	0.15	MS25361-80	160-312-80	MS25361-80V	160-340-80
MS Approved	90	0.15	MS25361-90	160-312-90	MS25361-90V	160-340-90
MS Approved	100	0.15	MS25361-100	160-312-100	MS25361-100V	160-340-100

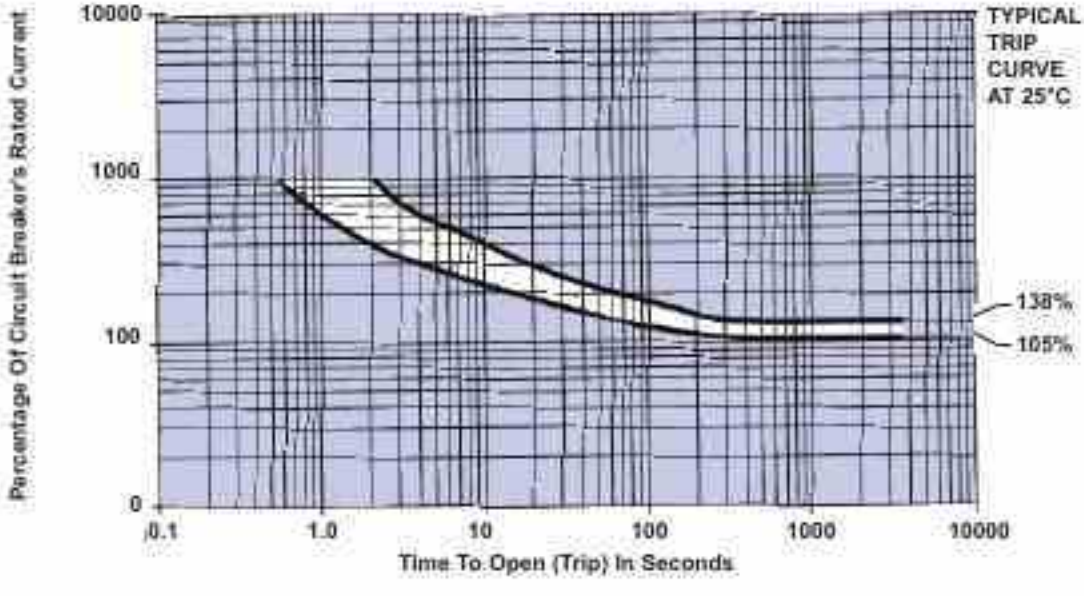
* AT RATED FLOWING CURRENT
1 Plate versions are available in a 168 Series

For other amperage ratings and configurations, consult the Business Unit.

DIMENSIONS



TRIP CURVE



Single-Pole High Performance

Protection For Very High Current Rated Circuits

Protects circuits from 125 to 200 amperes

Meets MS Mounting Dimensions

Has mounting dimensions compatible with Military Standard Drawing requirements of MS25017 of MIL-C-5809

Heavy-Duty Components

Extra heavy contacts and wide sturdy terminals

Trouble-Free Contact Life

Contacts mounted on spring-loaded pivots to maintain high contact pressure and to improve arc quenching capability

Performance Rated Circuit Breaker

The 170 series is the only compact, reliable, heavy-duty aircraft-type circuit breaker available in the 125 to 200 ampere range. It is the only device in this range that has mounting dimensions compatible with Military Standard Drawing MS25017. Designed to protect heavy-duty aircraft electrical systems, the breaker features separate overload and mechanical latches. The unit's trip-free design prevents it from being held closed manually against any overload that would ordinarily cause it to open. The breaker may be used on either AC or DC circuits.

PERFORMANCE DATA

Interrupting Capacity	3,000A at 28V DC, 2,500A at 115V AC
Endurance	At 120V, 400 Hz (inductive load — 2,500 cycles, resistive load — 5,000 cycles at 28V DC, inductive load — 1,200 cycles, resistive load — 5,000 cycles mechanical cycles, no load — 5,000 cycles
Overload Cycling	100 operations at 200% rated current and rated voltage
Dielectric Strength	1,500V minimum
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	0.1 volt maximum at rated current
Vibration	Exceeds MIL-STD-202, Method 204, Condition A
Shock	Exceeds 300G's, 11 Milliseconds half sine pulse MIL-STD-202, Method 213 Test J
Acceleration	Exceeds 300G's
Weight	120 grams (0.265 lbs.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C		@ -40°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	100	—	90	—	110	—	% For 1 Hour
Must Trip	—	135	—	125	—	150	% Within 1 Hour
200% Overload	10	30	—	—	—	—	Seconds
400% Overload	2	10	—	—	—	—	Seconds
600% Overload	1	5	—	—	—	—	Seconds

ORDERING INFORMATION

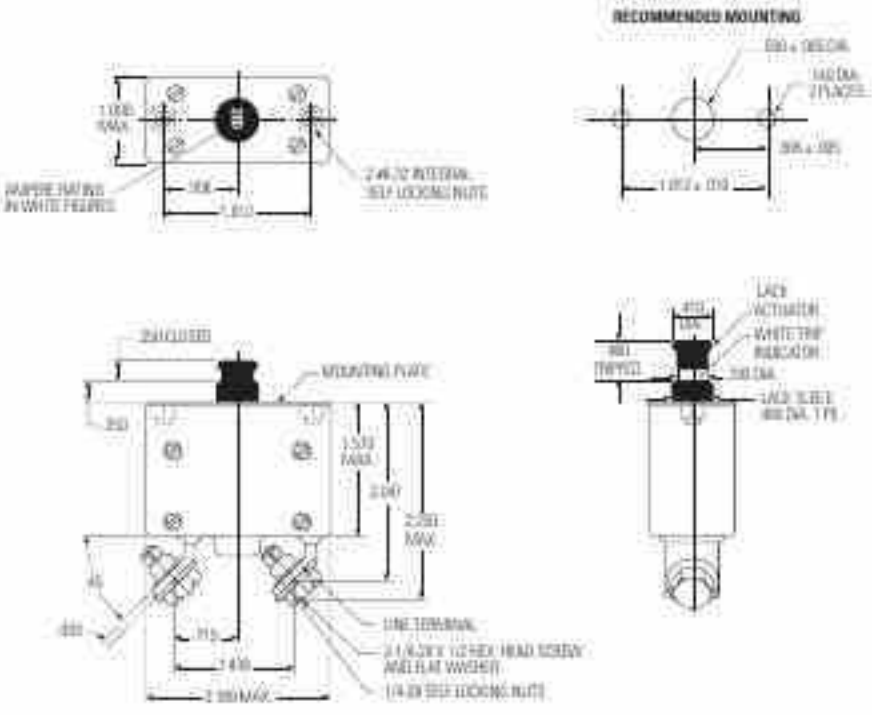
Ampere Rating	Voltage Drop Max.*	Part Number
125	200	170-001-125
140	200	170-001-140
150	200	170-001-150
160	200	170-001-160
180	200	170-001-180
200	200	170-001-200

* At rated nominal current

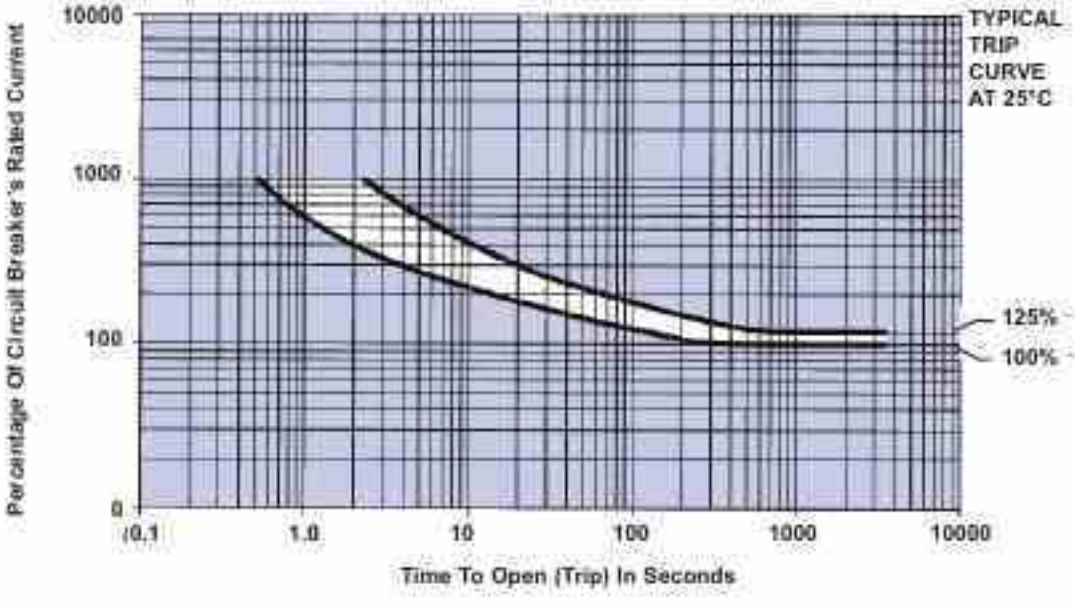
Three pole variants are available in a 170 Series. Also available in a 180 Series series for ratings up to 200 amperes.

For other amperage ratings and configurations, consult the Sales Office.

DIMENSIONS



TRIP CURVE



Standard (Bushing Mounting)

High/Random Vibration (Flush Mounting)

Single-Pole High Performance

Qualified

To MS25244, MS25244-P and MS25244-PT of MIL-C-5809 (MS25244PT is a substitute for MS25017)

Lightweight

Circuit breaker weighs only 43 grams.

High Interrupting Capacity

Interrupts a 6,000A circuit at 30V, DC; 3,500A circuit at 120V, 400 Hz, AC.

Performance Rated Circuit Breaker

Exceeds military specification requirements for durability, vibration, mechanical shock, and acceleration. The 700 is a miniature push-pull breaker offering fast trip and high interrupting capacity. Its trip-free design prevents the breaker from being held closed manually on overloads.

A feature of the breaker is separate overload and mechanical latches. Separated in this way, the mechanical latch assures maximum endurance for the thousands of cycles of manual on-off operation, while the thermal latch combines both precise operation and durability.

Bushing and Flush Mounting Options

PERFORMANCE DATA

Interrupting Capacity	6,000A at 30V DC; 3,500A at 120V, 400 Hz, AC
Endurance	At 120V, 400 Hz, AC or 30V DC: inductive load — 2,000 cycles; resistive load — 5,000 cycles; mechanical cycling, no load — 5,000 cycles
Overload Cycling	100 operations at 200% rated current and rated voltage
Dielectric Strength	At sea level, 25°C, 1,000V AC; at 80,000 ft., 70°C 300V AC, 1,000V maximum
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration	Exceeds MIL-STD-202, Method 204, Condition A Random Curve
Shock	Exceeds 300%, 11 Milliseconds (Half-sine pulse MIL-STD-202, Method 213 Test J)
Acceleration	Exceeds Test 9
Weight	700-001: 43 grams (1.5 oz.); 700-006: 48 grams (1.7 oz.)
Altitude Maximum	80,000 ft.

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C				@ -40°C				Test Time Parameters
			0.5 – 7 1/2A		10 – 50A		0.5 – 7 1/2A		10 – 50A		
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	110	—	90	—	110	—	100	—	140	—	% for 1 Hour
Must Trip	—	135	—	105	—	114	—	170	—	170	% within 1 Hour
200% Overload	15	60.0	—	—	—	—	—	—	—	—	Seconds
400% Overload	2	10	—	—	—	—	—	—	—	—	Seconds
600% Overload	1	3.5	—	—	—	—	—	—	—	—	Seconds

Trip curve available.

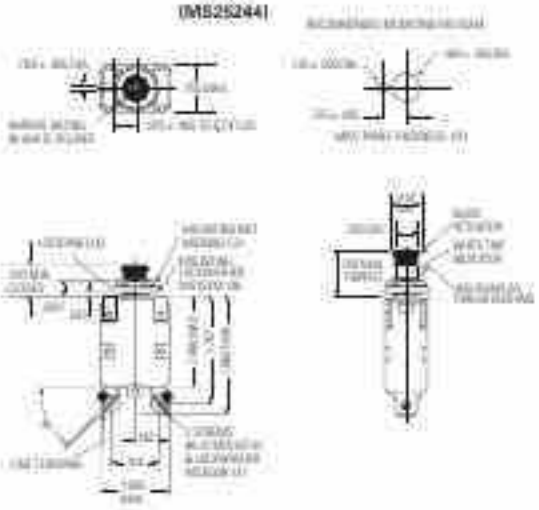
ORDERING INFORMATION

			STANDARD		ADAPTER FLUSH MOUNTING PLATE: BASE & TERMINAL CONFIGURATION STYLE "P"		ADAPTER FLUSH MOUNTING PLATE: ALTERNATE BASE & TERMINAL CONFIGURATION STYLE "PT"	
MIL APPROVAL STATUS	AMPERE RATING	VOLTAGE DROP MAX.*	MS P/N	SAFRAN MP P/N	MS P/N	SAFRAN MP P/N	MS P/N	SAFRAN MP P/N
MIL Approved	5	0.35	MS25244-5	700-001-5	MS25244-P5	700-006-5	MS25244-PT5	700-006-5
MIL Approved	7 1/2	0.35	MS25244-7 1/2	700-001-7R	MS25244-PT 1/2	700-006-7R	MS25244-PT7 1/2	700-006-7R
MIL Approved	10	0.25	MS25244-10	700-001-10	MS25244-P10	700-006-10	MS25244-PT10	700-006-10
MIL Approved	15	0.25	MS25244-15	700-001-15	MS25244-P15	700-006-15	MS25244-PT15	700-006-15
MIL Approved	20	0.25	MS25244-20	700-001-20	MS25244-P20	700-006-20	MS25244-PT20	700-006-20
MIL Approved	25	0.25	MS25244-25	700-001-25	MS25244-P25	700-006-25	MS25244-PT25	700-006-25
MIL Approved	30	0.25	MS25244-30	700-001-30	MS25244-P30	700-006-30	MS25244-PT30	700-006-30
MIL Approved	35	0.25	MS25244-35	700-001-35	MS25244-P35	700-006-35	MS25244-PT35	700-006-35
Not MIL Approved	40	0.25		700-001-40		700-006-40		700-006-40
Not MIL Approved	50	0.25		700-001-50		700-006-50		700-006-50

* AT RATED NOMINAL CURRENT
Three phase versions are available as a 600 Series.
For other amperage ratings and configurations, consult the factory.

DIMENSIONS

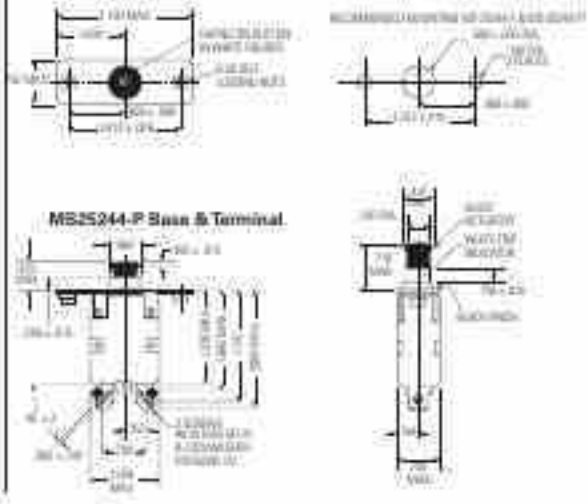
700-001
(MS25244)



700-089
(MS25244-P)

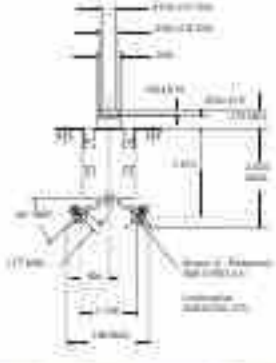
700-092
(MS25244-PT)

Dimensions Different Base & Terminal

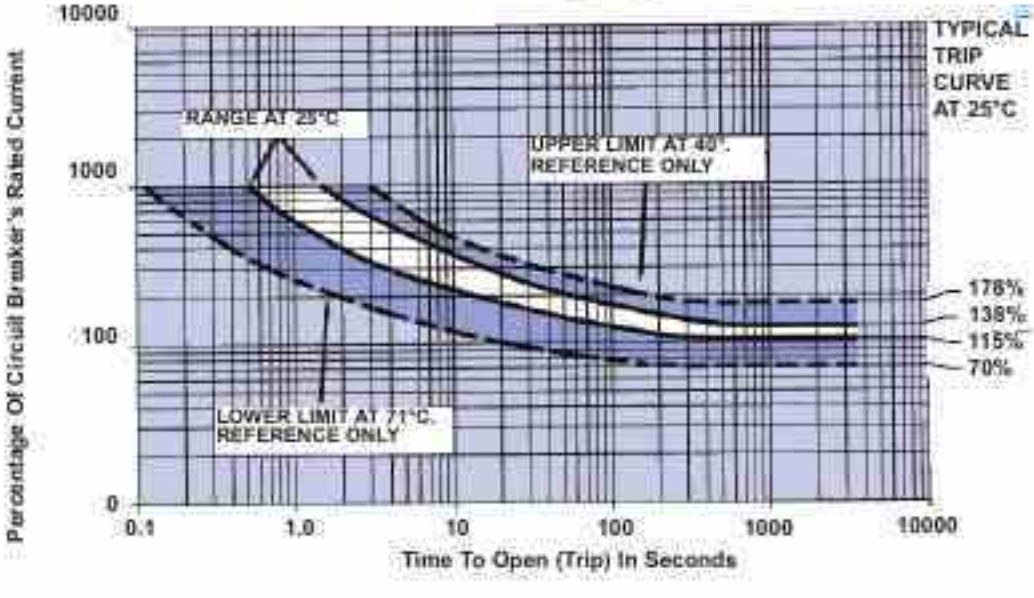


MS25244-P Base & Terminal

MS25244-PT Base & Terminal



TRIP CURVE



FAST TRIP PROTECTION FOR LOW-CURRENT EQUIPMENT

Single-Pole High Performance

Qualified

Designed to M22200/4 for MIL-C-5809.

Fast Trip

Operates on a hot-wire principle, much faster than bimetal breakers.

Fail-Safe Operation

Fault cannot cause breaker to fuse closed.

Ambient-Compensated

No appreciable change in trip time from -40°C to +71°C.

Low Resistance

Silver alloy contacts maintain low resistance for life of circuit breaker.

Load Protection

The fast tripping circuit breaker is ideal for protecting sensitive loads such as avionics and fuel pumps where rapid detection and fault clearing are desired.

Performance Rated Circuit Breaker

It is the only thermal hot wire type available in ratings from one-half amperes.

The 1500 is a circuit breaker that features fast trip for quick response. Designed for the protection of both wiring and equipment, the unit provides trip indication, trip-free protection, and the convenience of manual on-off operation. Excellent temperature stability is assured by the hot-wire design. The breaker has a high resistance to shock and vibration. Its "Fail Safe" design eliminates the danger of the breaker fusing closed on overload.

ICU Application

This circuit breaker meets the requirements of MIL-C 83383 for use as a RCCB (CU) Indicator Control Unit. Its IZ function is per specification.

PERFORMANCE DATA

Interrupting Capacity	1/2 to 3A: 1000A at 120V AC, 400 Hz; 0.1000A at 300 DC 3.1 to 6A: 1,000A at 120V AC 400 Hz; 0.1000A at 300 DC 6 to 10A: 800A at 120V AC 400 Hz; 0.500A at 300 DC
Endurance	At 120VAC, 400 Hz, or at 300 DC, inductive load — 2,000 cycles; resistive load — 5,000 cycles; mechanical cycling, no load — 5,000 cycles
Overload Cycling	100 operations at 200% rated current and rated voltage
Dielectric Strength	1 min. minimum
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration	Exceeds MIL-STD-202, Method 204, Condition A
Shock	Exceeds 300G's, 11 Milliseconds, half sine pulse MIL-STD-202, Method 213 Test J
Acceleration	Exceeds 100G's
Weight	36 grams (1.25 oz.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C 0.5 – 3A MIN	MAX	4.5 – 10A MIN	MAX	@ +71°C MIN	MAX	@ -40°C MIN	MAX	Test Time Parameters
Must Hold	110	—	110	—	110	—	110	—	% for 1 Hour
Must Trip	—	135	—	135	—	135	—	135	% within 1 Hour
200% Overload	400	3.0	800	3.00	—	—	—	—	Seconds
400% Overload	080	0.6	140	0.70	—	—	—	—	Seconds
800% Overload	0.02	0.3	100	0.30	—	—	—	—	Seconds

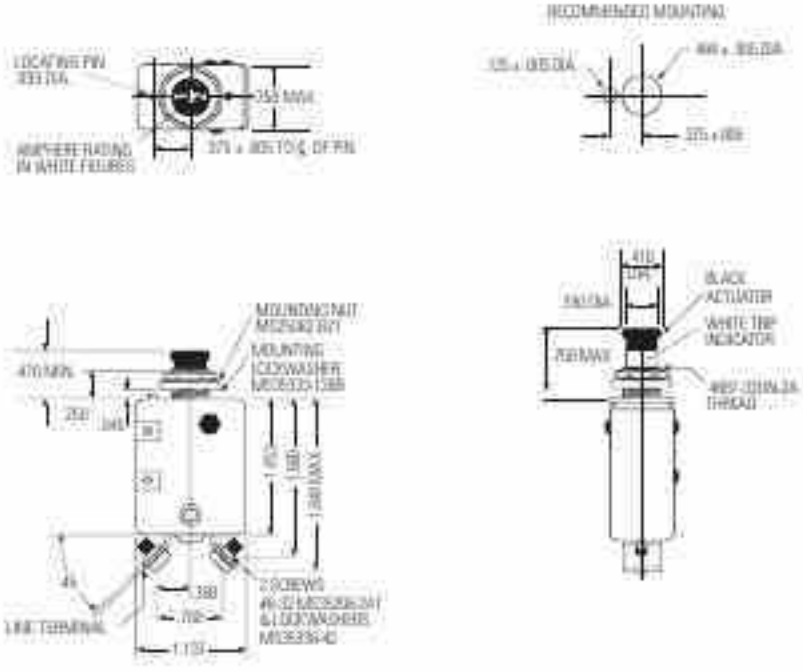
* As ordered available

ORDERING INFORMATION

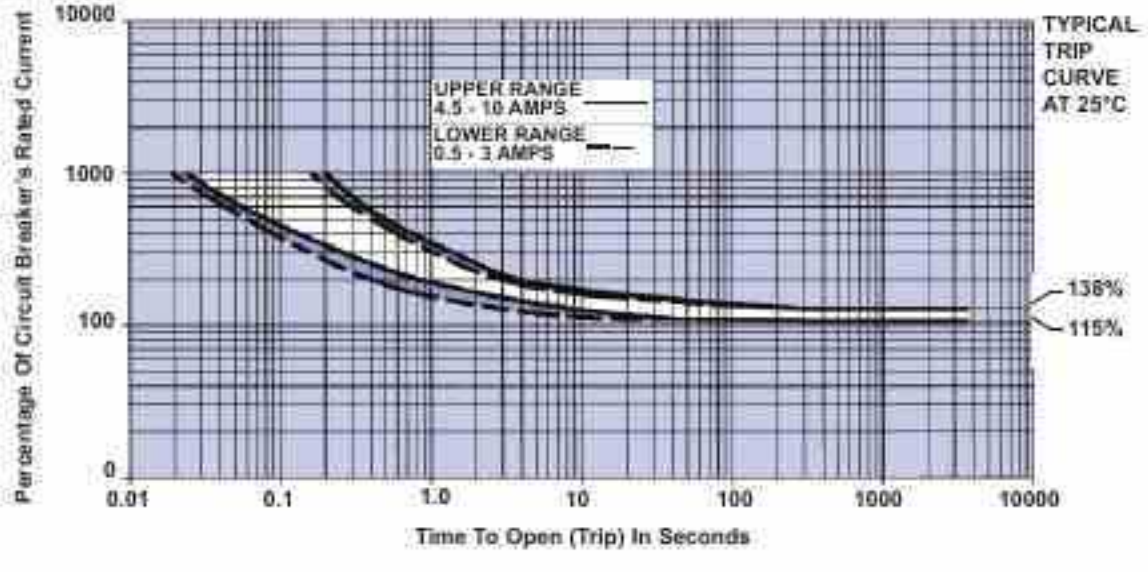
Ampere Rating	Voltage Drop Max *	Part Number
1/2	1.21	1500-0X2-08
3/4	1.21	1500-0X2-0F6
1	1.20	1500-0X2-1
1 1/2	1.10	1500-0X2-1F5
2	0.98	1500-0X2-2
2 1/2	0.85	1500-0X2-2F5
3	0.81	1500-0X2-3
4	0.73	1500-0X2-4
5	0.65	1500-0X2-5
6	0.55	1500-0X2-6

* At rated ambient current.
For other amperage ratings and configurations, contact the Business Unit.

DIMENSIONS



TRIP CURVE



Single-Pole High Performance

Qualified

To MS22073 of MIL-C-5809

Lightweight

Under 33 grams (.073 lbs)

High Interrupting Capacity

Interrupts up to 6,000A circuit at 30V, DC; and up to 3,500A circuit at 120V, 400 Hz, AC

Not Sensitive To Frequency Or Voltage

Breaker may be used on either AC or DC circuits.

Performance Rated Circuit Breaker

Meets or exceeds military specification requirements for durability, vibration, mechanical shock, and acceleration.Precision internal design provides a time-temperature characteristic capable of protecting either wire or equipment. With a case 1 1/2 inches long, the breaker weighs less than 33 grams, and is ideal for today's demanding design requirements.

PERFORMANCE DATA

Interrupting Capacity	1 to 15A: 6,000A at 30V DC; 1 1/2 to 25A: 2,000A at 32V DC; 1A: 3,500A at 120V, 400 Hz, AC; 2 to 5A: 800A at 120V, 400 Hz, AC; 1 1/2 to 25A: 3,000A at 120V, 400 Hz, AC
Endurance*	At 120V, 400 Hz, AC, or 28V DC inductive load — 5,000 cycles; resistive load — 5,000 cycles; mechanical cycling, no load — 5,000 cycles
Thermal Cycling	100 operations at 200% rated current and rated voltage
Dielectric Strength	1,500V minimum
Insulation Resistance	100 MΩ min. (at megohm at 500V DC)
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration*	Meets specification MIL-STD-202, Method 204, Condition A, Rev. 10-55 Hz MIL "V" type 4001-0001 meets Condition B, 15G, 10-2,000 Hz, and Condition C, 30G, 10-2,000 Hz MIL "D" type 4001-0111 meets Random Vibration levels
Shock*	Exceeds 200 G, 11 msec. sawtooth pulse (on and off test, example 2 of table 1)
Acceleration	Exceeds 50G
Weight	33 grams max. (1.2 oz)

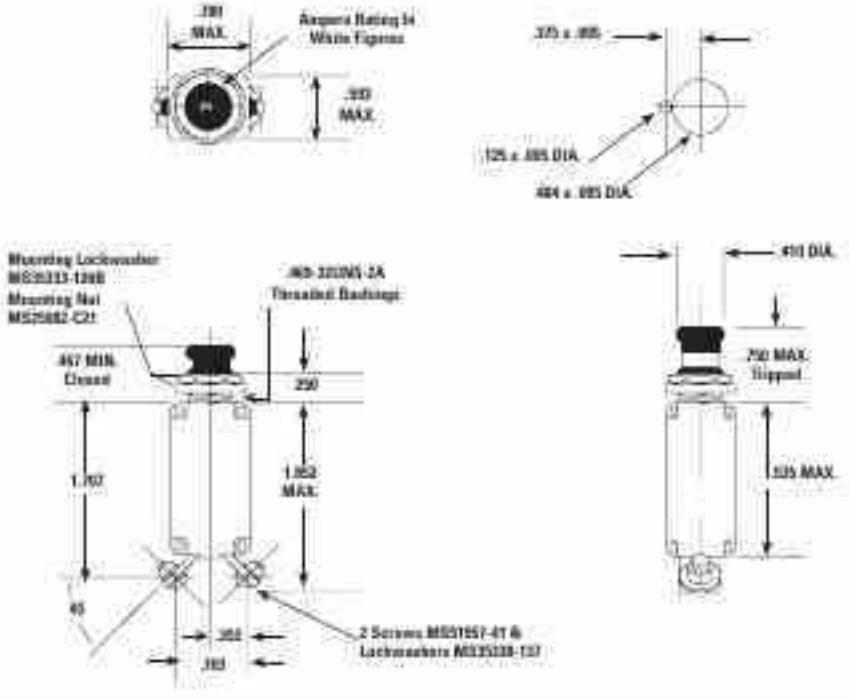
* Versions of these circuit breakers are capable of exceeding the standard MIL specifications for endurance, vibration, and shock. Consult the business unit for more information.

OVERLOAD CALIBRATION DATA

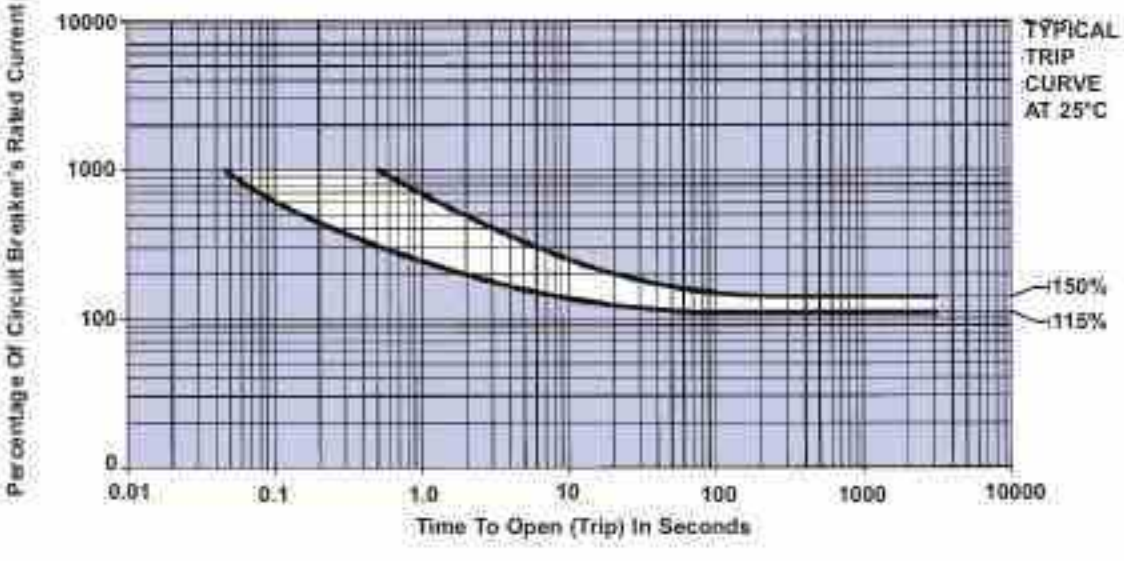
Specification Table	@ 25°C		@ +71°C		@ -55°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must trip	115	—	100	—	125	—	% For 1 hour
Must flip	—	100	—	100	—	100	% Within 1 hour
200% Overload	2.000	30.0	—	—	—	—	Seconds
500% Overload	0.100	3.0	—	—	—	—	Seconds
1000% Overload	0.040	0.8	—	—	—	—	Seconds

*Trip curve available

DIMENSIONS



TRIP CURVE



Standard

Longbutton

Auxiliary Terminal

Single-Pole High Performance

Qualified

To MS26574 of MIL-C-83820

Lightweight

22 grams (.048 lbs)

High Interrupting Capacity

High Vibration and Shock Resistance

Sub-Miniature Size

Performance Rated Circuit Breaker

The 4200 is a sub-miniature lightweight, trip free, single phase circuit breaker, which combines its compact size with a proven technological track record. A modification of the popular 4310 series, its reliability has been long established. Options such as long button, high vibration resistance, and hardware variations will enhance its versatility. The 4200 reacts consistently in extreme fluctuations of temperature, high shock, vibration, or humidity.

Auxiliary Switch And Terminals

The 4200 Series is also available in an Auxiliary Switch version (4200-0041) to provide a remote indication of a trip condition. In a trip condition, the contacts in the auxiliary switch are in a closed position.

PERFORMANCE DATA

Interrupting Capacity	1 to 5A: unlimited at 28V DC; 7.10 to 25A: 2,000A at 28V DC 1 to 7.10A: unlimited at 120V 400 Hz., AC 2 to 5A: 800A at 120V, 400 Hz., AC 7.10 to 25A: 800 amps at 120V, 400 Hz., AC
Endurance*	At 120V, 400 Hz., AC or at 28V DC, inductive load — 2,000 cycles; resistive load — 5,000 cycles Mechanical cycling, no load — 5,000 cycles
Overload Cycling	Minimum of 500 cycles at 200% rated current
Dielectric Strength	At sea level: 1500 V RMS AC; At 80,000 ft: 375 V RMS AC
Insulation Resistance	No less than 100 megohms at 500V DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration*	Meets specification MIL-STD-202, Method 204, Condition A (10-57 Hz. at 0.15" Displacement Double Amplitude, and 57-500 Hz. at 10G's) (Random vibration test also available)
Shock*	Exceeds 300G, 11 Millisec Half-Sine pulse MIL-STD-202, Method 213A Test A
Acceleration	Exceeds 10G's
Weight	22 grams (0.048 lbs.)

* Versions of these circuit breakers are capable of exceeding the standard MIL specification for endurance, vibration, and shock. Consult the factory unit for more information.

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ -47°C		@ -55°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	110	—	90	—	135	—	% For 1 Hour
Must Trip	—	100	—	100	—	100	% Within 1 Hour
200% Overload	2.000	20.0	—	—	—	—	Seconds
300% Overload	0.100	1.2	—	—	—	—	Seconds
1000% Overload	0.040	0.8	—	—	—	—	Seconds

Trip curve available

ORDERING INFORMATION

			STANDARD			LONG BUTTON		RANDOM VIBRATION		AUXILIARY TERMINAL		LONG BUTTON	
MIL-APPROVAL STATUS	AMPERE RATING	VOLTAGE DROP MAX.*	MS P/N	SAFRAN/ BP P/N	MS P/N	SAFRAN/ BP P/N	MS P/N	SAFRAN/ BP P/N	MS P/N	SAFRAN/ BP P/N	MS P/N	SAFRAN/ BP P/N
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* AT RATED NOMINAL CURRENT

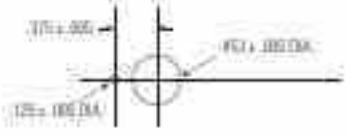
For other amperage ratings and voltage drop, consult the Sales Office.

DIMENSIONS

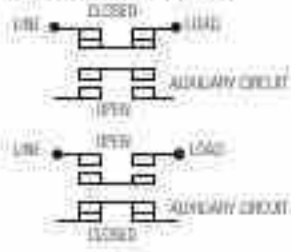
Part No.	A*Max.	B*Min.
4200-001	0.759	0.407
4200-003	1.134	0.782
4200-004	0.759	0.407
4200-006	0.759	0.407
4200-007	1.0134	0.782

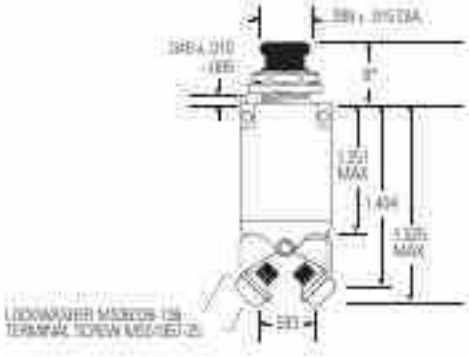
Min. Panel Thickness .025
Max. Panel Thickness .100

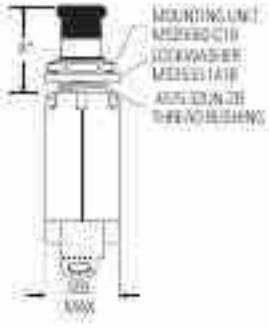
RECOMMENDED MOUNTING

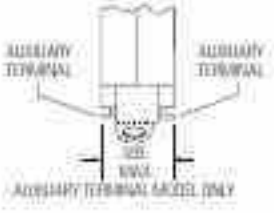


AUXILIARY SWITCH OPERATION

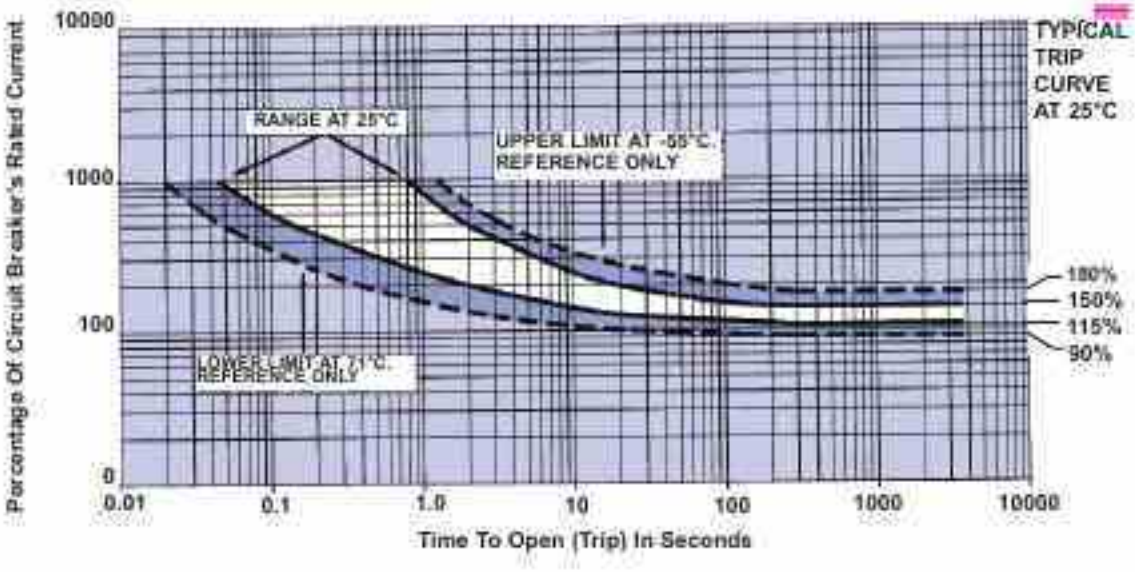








TRIP CURVE



Standard

Sub-Miniature Size — High Performance

Qualified

To MS3320 of MIL-C-5809. Meets performance specification of MS14105 of MIL-C-5809.

High Interrupting Capacity

Interrupts 6,000A fault at 28V DC, up to 3,500A fault at 120V 400 Hz., AC (ampere rating dependent).

Vibration Resistance

Vibration resistance and mechanical life exceed MIL Specs — including random vibration.

Temperature-Compensated

Ambient temperature-compensated from -55°C to +121°C.

Performance Rated Circuit Breaker

The lightweight, single-phase circuit breaker, Series 4310, allows high density packaging for all aircraft and aerospace needs.

The 4310 series reflects the latest advancements in circuit breaker design — plus other proven features (e.g., self-wiping contacts).

Tight tolerances in design and stringent manufacturing standards are key factors in the reliable operation of the 4310 under severe environmental conditions of high temperature, high humidity, extreme vibration, and shock. It is also fungus- and corrosion-proof.

Calibration integrity is maintained through wide variations in ambient temperature and altitude, making this circuit breaker ideal for applications where temperature is not controlled.

Multiple Options

This series is available in many optional configurations.

It is powered by Safran Electrical & Power with THE 15/32 and metal mounting flange. Many versions of different personal, barriers, and bolt case are current production items. Several different versions which provide our customers with additional flexibility.

PERFORMANCE DATA

Interrupting Capacity*	1 to 25A: 6,000A at 28V DC, 1A: 2,000A at 120V, 400 Hz., AC 1 1/2 to 5 1/2A: 3,500A at 120V, 400 Hz., AC; 6 1/2 to 2,000A at 120V, 400 Hz., AC; 20 to 25A: 2,000A at 120V, 400 Hz., AC
Endurance*	At 120V, 400 Hz., AC or at 28V DC resistive load — 2,500 cycles, inductive load — 5,000 cycles Mechanical cycling, no load — 10,000 cycles
Overload Cycling	Minimum of 100 cycles at 200% rated current
Dielectric Strength	At sea level, 28V: 1,500V AC. At 70,000 ft. 121°C 500V AC
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	Same with rating (see "Ordering Information")
Vibration*	Meets specification MIL-STD-202, Method 204, Condition A, 10-2000 Hz MIL "V" type 4310-038 meets Condition B, 10-2,000 Hz and Condition C 10-2,000 Hz
Shock*	Exceeds 50Gs, 11 MS sec. half sine pulse MIL-STD-202, Method 213 Test A
Acceleration	Exceeds 10Gs
Weight	30 grams (1.05 oz.)

* Versions of these circuit breakers are capable of exceeding the standard MIL specifications for maximum vibration, shock, and interrupting capacity. Consult the Business Unit for more information.

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +121°C		@ -55°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Blue Line	110	—	100	—	110	—	% Rat > Hour
Blue Top	—	135	—	135	—	160	% Rated 1 Hour
200% Overload	5.00	20.00	1.500	12.00	5.00	40.00	Seconds
300% Overload	0.50	3.00	0.100	1.50	0.50	3.00	Seconds
1000% Overload	0.10	0.50	0.025	0.30	0.10	0.80	Seconds

Trip curves available.

ORDERING INFORMATION

			STANDARD			LONG BUTTON		HIGH VIBRATION		LONG BUTTON VIBRATION	
MIL Approved Status	AMPERE RATING	VOLTAGE (MAX/MAX.)*	MS P/N	SAFRAN MP P/N	MS P/N	SAFRAN MP P/N	MS P/N	SAFRAN MP P/N	MS P/N	SAFRAN MP P/N
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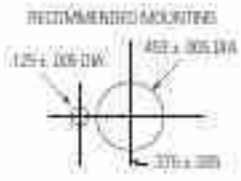
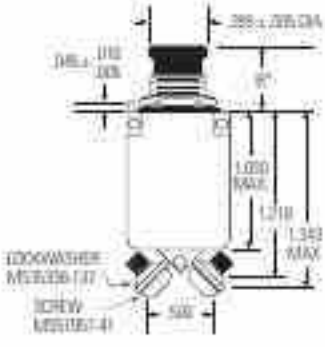
Not MIL Approved	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]

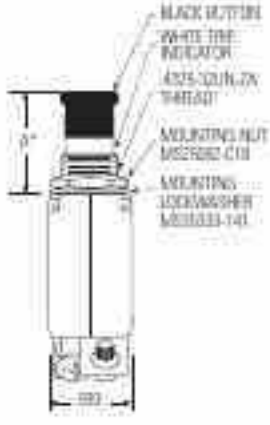
DIMENSIONS

MIL Spec	Part No.	A*Max.	B*Min.
MS3320	4310-001	0.750	0.470
MS3320L	4310-005	1.125	0.845
MS3320V	4310-019	0.750	0.470
MS3320VL	4310-024	1.125	0.845

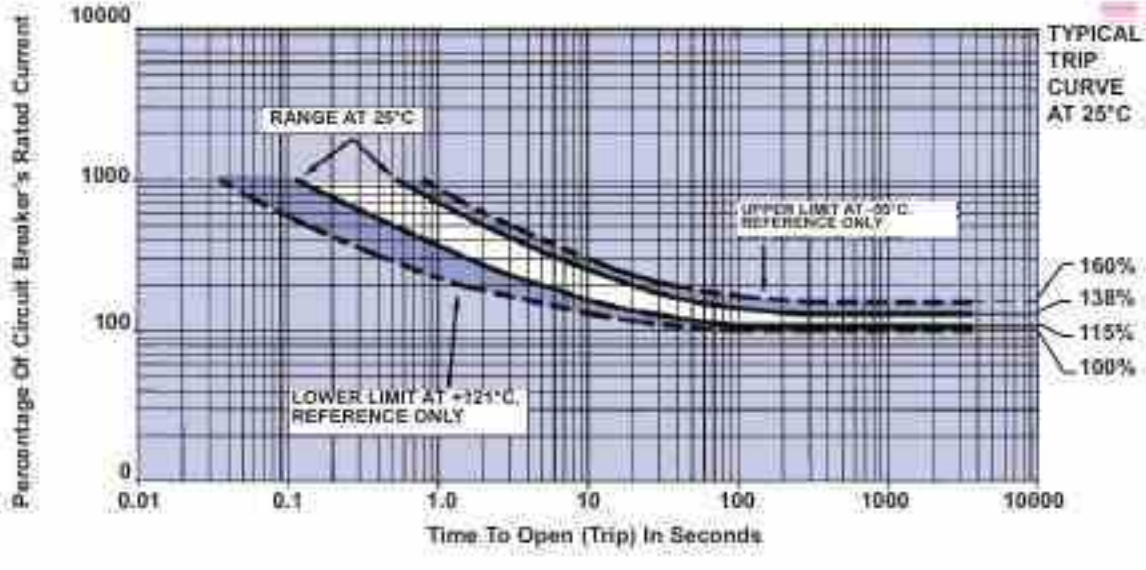
Min. Panel Thickness .020
Max. Panel Thickness .100







TRIP CURVE



Heavy-Duty Three-Pole High Performance

Three-phase protection of circuits from 50 to 100 amperes.

Interphase Insulation

Insulating interphase barriers separate adjacent terminals.

Common Trip Bar

One bar connects the three operating mechanisms for simultaneous trip action. Trip bar is removable for installation.

Performance Rated Circuit Breaker

The 940 series is the only three-pole heavy-duty aircraft type circuit breaker available in the 50 to 100 ampere range and consists of three specially built 193-012 breakers with insulating interphase barriers separating adjacent terminals. This unit has a common trip bar connecting the three operating mechanisms so that an overload tripping one pole will simultaneously trip the remaining two poles.

PERFORMANCE DATA

Interrupting Capacity	1,000A at 115V 400 Hz, AC
Endurance	At 115VAC, 400 Hz, capacitive load — 5,000 cycles; inductive load — 5,000 cycles; mechanical cycling, no load — 5,000 cycles
Overload Cycling	101 cycles minimum at 200% rated current and rated voltage
Dielectric Strength	1,500V, minimum
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration	Exceeds MIL-STD-202, Method 204, Condition A (when 75 psig)
Shock	Exceeds 200G's, 11 MSec half-sine pulse (MIL-STD-202, Method 213 Test J)
Acceleration	Exceeds 100G's
Weight	360 grams (.795 lbs.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C		@ -40°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	100	—	90	—	110	—	% For 1 Hour
Must Trip	—	135	—	110	—	170	% Within 1 Hour
200% Overload	15	70	—	—	—	—	Seconds
400% Overload	2	8	—	—	—	—	Seconds
600% Overload	1	4	—	—	—	—	Seconds

Trip curve available

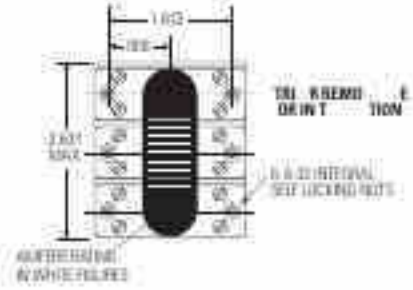
ORDERING INFORMATION

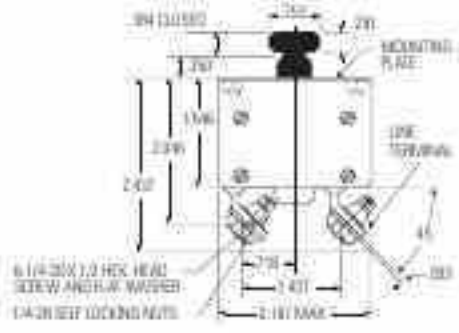
Ampere Rating	Voltage Drop Max.*	Part Number
50	0.15	940-006-50
60	0.15	940-006-60
70	0.15	940-006-70
75	0.15	940-006-75
80	0.15	940-006-80
90	0.15	940-006-90
100	0.15	940-006-100

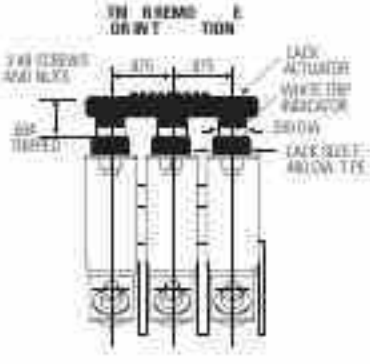
* At rated nominal current

Data applicable for the 940 Series. Also available in units are 520, 530, 550, and 570 Series devices.
For other amperage ratings and configurations, contact the Business Line.

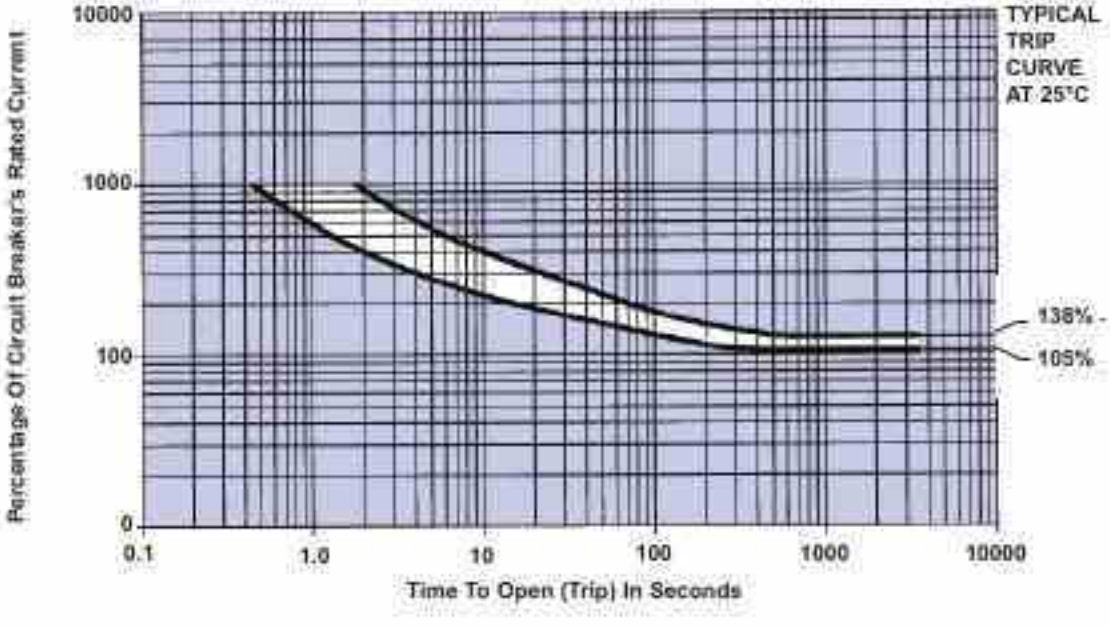
DIMENSIONS







TRIP CURVE



Three-Pole High Performance

Common trip mechanism trips all three phases, regardless of which phase is overloaded.

Low-Current Protection

Protects circuits in ratings from 1 to 15 amperes.

Ambient-Compensated

Effects of temperature on trip times are minimal.

Fast Trip

Operates on a hot-wire principle, much faster than bimetal breakers.

Low Resistance

Contacts are made from a silver alloy that maintains low resistance throughout the life of the breaker.

Load Protection

The fast tripping circuit breaker is ideal for protecting sensitive loads such as avionics and fuel pumps where rapid detection and fault clearing are desired.

Performance Rated Circuit Breaker

The 1526 Series is the only hot wire, fast-trip, three-pole circuit breaker in ratings from 1 - 15 amperes. A single actuator controls all three poles, so that the breaker can be easily operated manually. There is only one overload latch, thus an overload on one pole will open all three poles simultaneously, regardless of which pole is overloaded. Long contact life is assured through the use of a low-resistance silver alloy.

PERFORMANCE DATA

Interrupting Capacity	300A at 120V 400Hz, AC, three phase
Endurance	6,000 cycles at 100% load
Overload Cycling	100 cycles minimum at 200% load
Dielectric Strength	1,000V minimum
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration	Exceeds MIL-STD-202, Method 204, Condition A
Shock	Exceeds 30Gs, 11 Milliseconds half-sine pulse MIL-STD-202, Method 213 Test I
Acceleration	Exceeds 30Gs
Weight	104 grams (3.66 oz.)

OVERLOAD CALIBRATION DATA

Specification	@ 25°C				@ +71°C		@ -40°C		Test Time
	1 - 25A		10 - 15A						
Table	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**Parameters**
Must Hold	110	—	110	—	110	—	110	—	% for 1 Hour
Must Trip	—	135	—	135	—	135	—	135	% Within 1 Hour
200% Overload	20	40	3.0	10.0	—	—	—	—	Seconds
400% Overload	10	3.7	0.6	1.4	—	—	—	—	Seconds
800% Overload	.04	0.2	0.2	0.6	—	—	—	—	Seconds

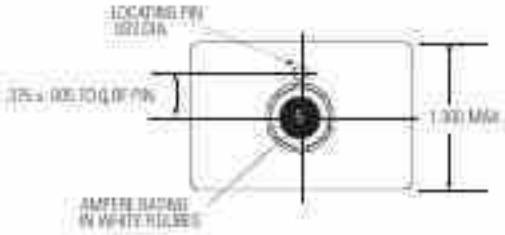
Trip curve available.

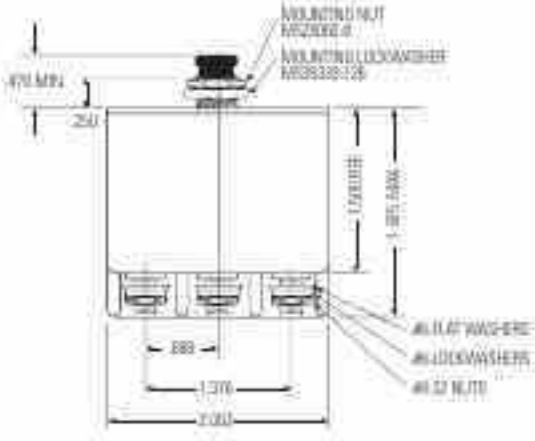
ORDERING INFORMATION

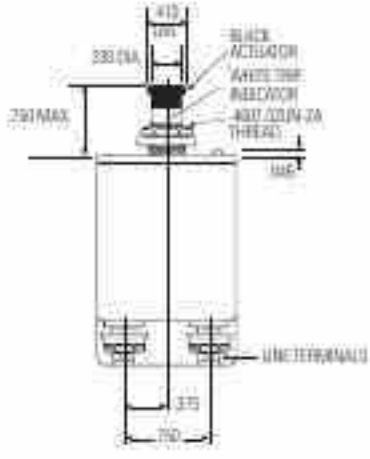
Ampere Rating	Voltage Drop Max.*	Part Number
1	1.20	1526-005-1
1 1/2	1.20	1526-005-1/2
2	0.95	1526-005-2
2 1/2	0.95	1526-005-2/2
3	0.95	1526-005-3
3 1/2	0.75	1526-005-3/2
4	0.70	1526-005-4
5	0.65	1526-005-5
7 1/2	0.60	1526-005-7/2
10	0.55	1526-005-10
15	0.50	1526-005-15

* At rated nominal current.
For other voltage ratings and configurations, consult the factory.

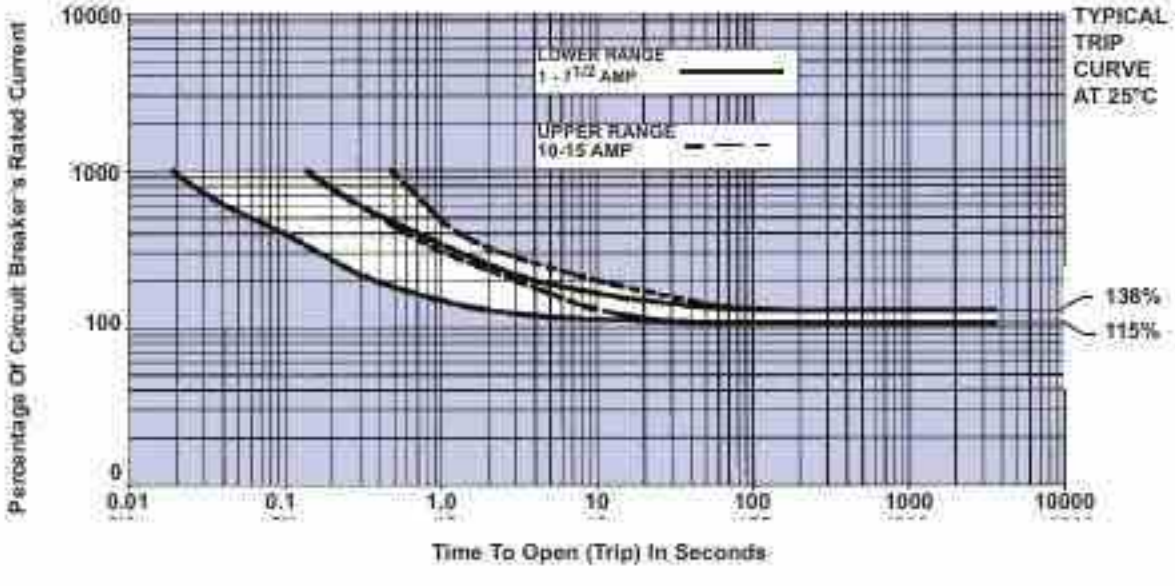
DIMENSIONS







TRIP CURVE



Three-Pole High Performance

Three-Phase Protection

Common trip mechanism trips all three phases, regardless of which phase is overloaded.

Integral Barriers

Terminals are separated by barriers molded into the case.

Single-Hole Mounting

For quick, easy installation.

Shock And Vibration Resistant Construction

Permits use in various types of portable and mobile airborne equipment.

Performance Rated Circuit Breaker

The 1536-001 is a lightweight, miniature breaker that features three bimetal sensing elements having very fast electro-dynamic response under short circuit conditions, and standard trip characteristics at lower levels of overloads.

Single hole mounting and small size facilitate easy installation. The breaker's one-piece, glass-filled case features integrally-molded barriers to separate the terminals.

PERFORMANCE DATA

Interrupting Capacity	1,000A at 265V, 400 Hz., three-phase symmetrical fault 1,000A at 120V, 400 Hz., single-phase fault
Endurance	At 120VAC, 400 Hz.: inductive load — 5,000 cycles; resistive load — 5,000 cycles; mechanical cycling, no load — 5,000 cycles
Overload Cycling	100 operations at 200% load
Dielectric Strength	1,500V minimum
Insulation Resistance	Not less than 100 megohms at 500V, DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration	Exceeds MIL-STD-202, Method 204, Condition A
Shock	Exceeds 300G's, 11 Milliseconds (half-sine pulse) MIL-STD-202, Method 213 Test J
Acceleration	Exceeds 300G's
Weight	181 grams (.40 lbs.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C		@ -55°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	100	—	100	—	100	—	% For 1 Hour
Must Trip	—	135 (Approx)*	—	135	—	135	% Within 1 Hour
300% Overload	6.00	15.0	—	—	—	—	Seconds
400% Overload	2.00	10.0	—	—	—	—	Seconds
600% Overload	1.00	4.0	—	—	—	—	Seconds
1000% Overload	0.03	1.4	—	—	—	—	Seconds

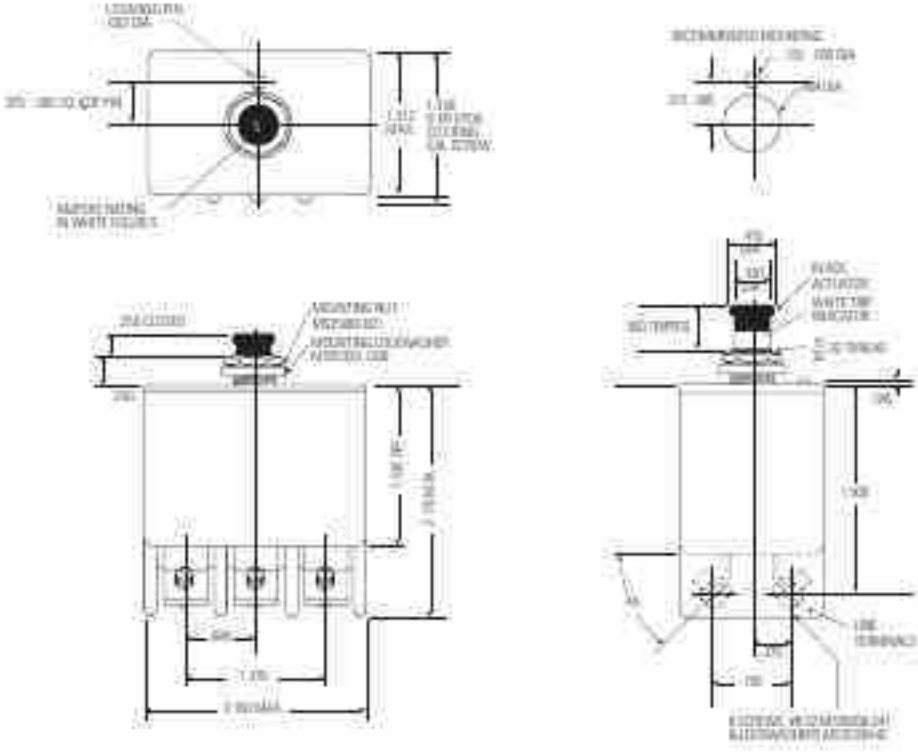
*Nominal trip point (individual phases) 150%
Trip curve available.

ORDERING INFORMATION

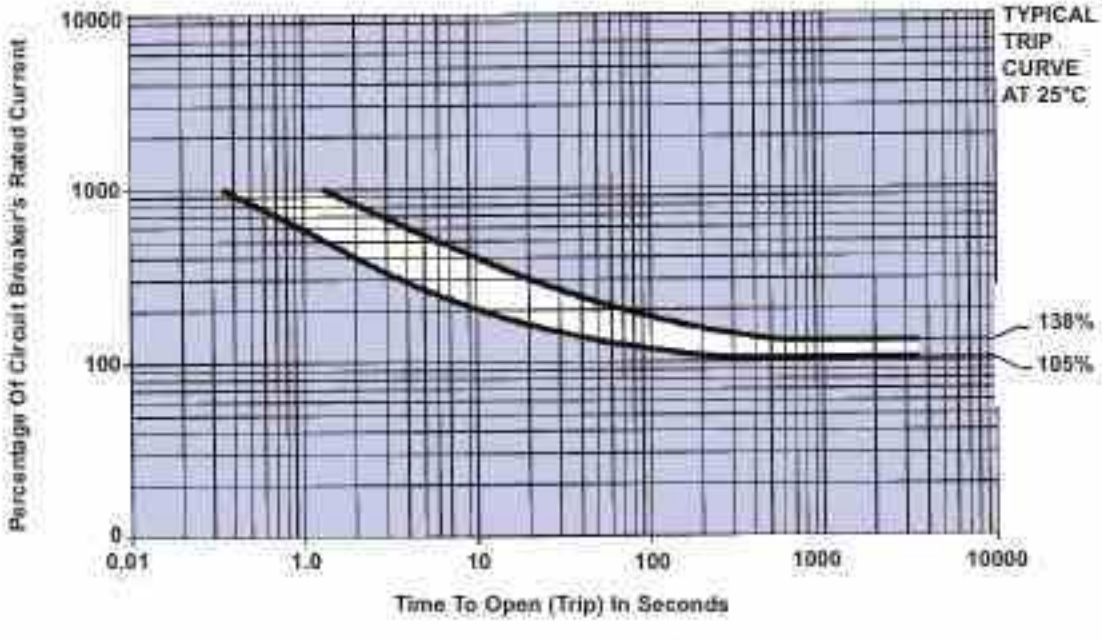
Ampere Rating	Voltage Drop Max.*	Part Number
5	0.300	1536-001-5
7.5	0.225	1536-001-7.5
10	0.300	1536-001-10
15	0.200	1536-001-15
20	0.200	1536-001-20
25	0.160	1536-001-25
30	0.160	1536-001-30
35	0.175	1536-001-35
40	0.175	1536-001-40
50	0.150	1536-001-50

*At rated nominal current
For other amperage ratings and configurations, consult the factory.

DIMENSIONS



TRIP CURVE



Standard

Three-Phase Protection

Qualified

To MS14154 of MIL-C-6809.

Lightweight

Weighs 88 grams maximum (0.15 lbs).

Vibration Resistance

Vibration resistance and mechanical life exceed MIL Specs — including random vibration.

Miniature Size — High Performance

19.8mm, 46.7mm, 35.0mm behind panel depth.

Temperature-Compensated

Ambient-temperature-compensated from -55°C to +71°C. Note: higher operating ranges are available.

Performance Rated Circuit Breaker

This lightweight, miniature, three-phase circuit breaker, Series 4330, reflects the latest advancements in circuit breaker design, incorporating self-wiping contacts, tight tolerances in design, and stringent manufacturing standards. It is fungus-proof and highly resistant to corrosion. The trip-free thermal mechanism avoids nuisance trips even during temporary surges of starting loads under ambient temperatures ranging from -55°C to +71°C. Calibration integrity is maintained through wide variations in ambient temperature and altitude, making this circuit breaker ideal for applications where temperature is not controlled.

Multiple Options

This series is available in many optional configurations.

It is presently being manufactured with .710, .1333 and metric mounting sleeves. Many variations of different terminals, lengths, and hardware are currently available. Consult AP Direct factory regarding provide non-standard with such as nut, lockwire.

PERFORMANCE DATA

Interrupting Capacity	1,200A balanced at 208V, 400Hz, 4C and 2,000A unbalanced at 120V, 400Hz, 4C at sea level and 70,000 feet
Endurance	120% 400 hz, AC, inductive load — 2,500 cycles; resistive load — 5,000 cycles; mechanical cycling no load — 2,000 cycles
Overload Cycling	500 cycles @ 200%
Dielectric Strength	At sea level, 25°C 1,500V AC, At 70,000 ft. +71°C 500V AC
Insulation Resistance	Not less than 100 megohms at 500V DC
Voltage Drop	Varies with rating (see "Ordering Information")
Vibration	Meets specifications MIL-STD-202, Method 204, Condition A 52G, 10-500 Hz. MIL "V" type, meets Condition B, 15G, 10-2,000 Hz and Condition C 10G, 10-2,000 Hz
Shock	100G's MIL-STD-202, Method 213 Sec B
Acceleration	Exceeds 100G's
Weight	88 grams max. (0.15 lbs.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C		@ -55°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	110	—	100	—	110	—	% For 1 Hour
Must Trip	—	135	—	145	—	160	% Within 1 Hour
200% Overload	4.00	20.00	2.30	20.00	4.00	40.00	Seconds
400% Overload	0.40	2.00	0.22	1.70	0.50	3.50	Seconds
1000% Overload	0.10	0.50	0.08	0.40	0.15	0.60	Seconds

ORDERING INFORMATION

			STANDARD		LONG BUTTON		HIGH VIBRATION		LONG BUTTON VIBRATION	
MIL-APPROVAL STATUS	AMPERE RATING	VOLTAGE DROP MAX.*	MS P/N	SAFRAN AP P/N	MS P/N	SAFRAN AP P/N	MS P/N	SAFRAN AP P/N	MS P/N	SAFRAN AP P/N
MIL-Approved	1	1.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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MIL-Approved	4	0.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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MIL-Approved	6	0.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MIL-Approved	7.5	0.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MIL-Approved	8	0.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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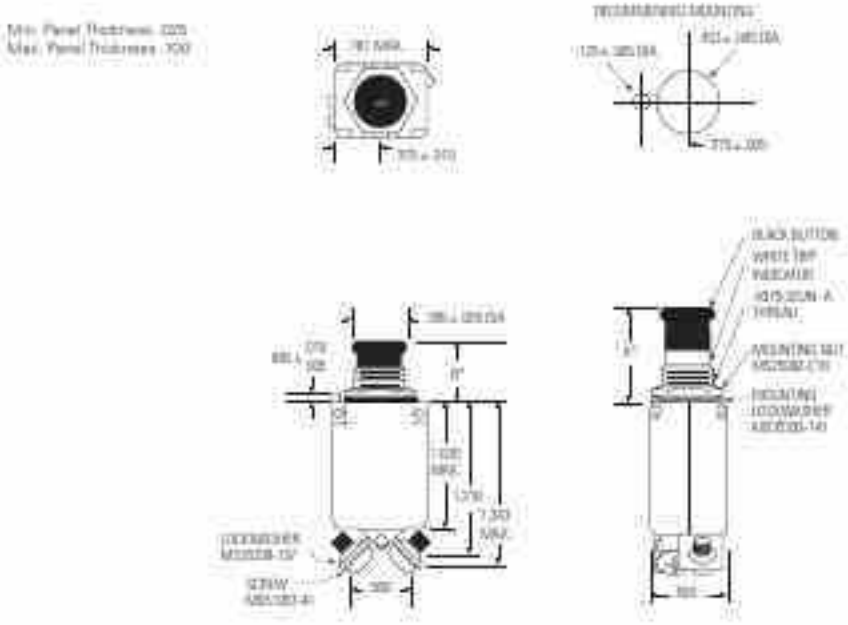
* AT RATED NOMINAL CURRENT.

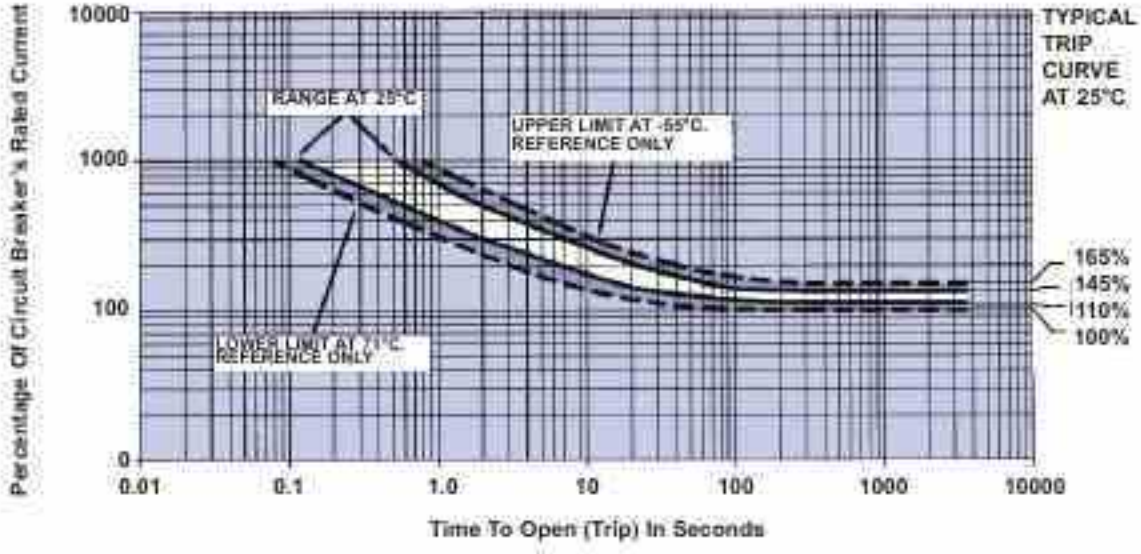
For other amperage ratings and configurations, consult the Sales Help Line.

DIMENSIONS

MIL Spec	Part No.	A*Max.	B*Min.
MS14154	4330-001	0.780	0.470
MS14154L	4330-007	1.125	0.845
MS14154V	4330-006	0.780	0.470
MS14154VL	4330-000	1.125	0.845



TRIP CURVE



REMOTE CONTROLLED CIRCUIT BREAKER (RCCB)

Single Phase
- 28 VDC
- 115/230 VAC 400 Hz

Three Phase
- 115/200 VAC 400 Hz
- Three Phase Only

Qualified

Qualified to demanding performance parameters of MIL-PRF-83383 standard.

Use as a Relay, Circuit Breaker, Or Both

RCCBs combine the best attributes of a circuit breaker and a relay. Automatically protects the wires and the load device during circuitboard breakdown, but allows the flight deck control of the load during normal operation.

Weight and Cost Savings

In distributed-load applications, RCCBs are a more efficient power distribution solution providing cost and weight savings through the elimination of long runs of heavy cables associated with the conventional relay - flight deck circuit protector method. Control of the RCCB requires only one #22 AWG control wire from the ICU on the flight deck to the RCCB.

Cockpit Space Savings

An RCCB system removes the presence of large circuit breakers from the cockpit while permitting remote On/Off operation from the flight deck. Combine Safran Electrical & Power RCCB with Indicator Control Unit (ICU) model #1500-053-05.

PERFORMANCE DATA

Rupture Levels	3000 A 115 VAC or 28VDC for 1 Pole and 1500VAC for 3 Pole
Endurance (Resistive & Inductive/Motor)	50,000 Cycles
Endurance (Motor)	5 0VA: 10,000 cycles; 60-0VA: 10,000 cycles
Endurance (Lamp)	5-25A: 10,000 cycles; 35-50A: 25,000 cycles; 60-100A: no rating
Dielectric Strength	1500V 60Hz, MIL-STD-202, Method 301, 10 mA max
Insulation Resistance	100 megaohm min, MIL-STD-202, Method 302
Thermal Temperature Range	-54°C to 71°C (-65°F to 160°F), MIL-STD-202, Method 107
Vibration	10Hz to 2000Hz, Exceeds MIL-STD-202, Method 204, Condition C, 15 microseconds max. shelter
Shock	200 G, MIL-STD-202, Method 213, 10 microseconds max. shelter
Altitude	50,000 ft
EMI Requirements	MIL-STD-461, Requirements CE101 and RE102 over the frequency range of 14 Khz to 400 Mhz and RE102 Class for Aircraft and Space Systems
EMI/RFI Susceptibility and Generation	MIL-STD-461, Class III
Moisture Resistance	MIL-STD-202, Method 106
Salt Spray Resistance	MIL-STD-202, Method 101, Condition B
Sand and Dust Resistance	MIL-STD-202, Method 110, Condition A
Fungus Resistance	MIL-HDBK-454, Guideline 4
Explosion Proof	MIL-STD-202, Method 109
Weight (Standard)	5-25A: 310 grams (0.683 lbs.); 35-50A: 325 grams (0.716 lbs.); 60-100A: 352 grams (0.774 lbs.)
Weight (w/ Auxiliary Contacts)	5-25A: 352 grams (0.774 lbs.); 35-50A: 356 grams (0.783 lbs.); 60-100A: 383 grams (0.843 lbs.)

OVERLOAD CALIBRATION DATA

Specification Table	@ 25°C		@ +71°C		@ -54°C		Test Time Parameters
	MIN	MAX	MIN	MAX	MIN	MAX	
Must Hold	115%		115%		115%		% for Infinite
Must Trip		135%		135%		135%	% Rated Current

ORDERING INFORMATION

	Single Pole Single Throw (Double Break Contacts)				Three Pole Single Throw (Double Break Contacts)	
	Standard		w/ Auxiliary Contacts		w/ Auxiliary Contacts	
AMPERE RATING	MIL P/N	SAFRAN P/N	MIL P/N	SAFRAN P/N	MIL P/N	SAFRAN P/N
5	M83383/01-01	SM600BA5A1	M83383/03-01	SM600BA5A1		**
2.5		**		**		**
10	M83383/01-03	SM600BA10A1	M83383/03-03	SM600BA10A1	M83383/04-03	SM600BA10A1
15	M83383/01-04	SM600BA15A1	M83383/03-04	SM600BA15A1		SM600BA15A1
20	M83383/01-05	SM600BA20A1	M83383/03-05	SM600BA20A1	M83383/04-05	SM600BA20A1
25	M83383/01-06	SM600BA25A1	M83383/03-06	SM600BA25A1		SM600BA25A1
35	M83383/01-07	SM600BA35A1	M83383/03-07	SM600BA35A1	M83383/04-07	SM600BA35A1
40	M83383/01-08	SM600BA40A1	M83383/03-08	SM600BA40A1	M83383/04-08	SM600BA40A1
50	M83383/01-09	SM600BA50A1	M83383/03-09	SM600BA50A1		SM600BA50A1
60	* M83383/01-10	SM600BA60A1	M83383/03-10	SM600BA60A1	M83383/04-10	SM600BA60A1
75	* M83383/01-11	SM600BA75A1	M83383/03-11	SM600BA75A1		
80	*	**		**		
100	* M83383/01-13	SM600BA100A1	M83383/03-13	SM600BA100A1		

All Ampere Ratings equal to Rated Contact Load Resistive, Inductive, Motor, and Lamp except as noted.
* No Lamp Load Rating
** Contact Ratings Only
To **Order Kit**: Specify (A) or Alternate Amperages, Top Cover, Control Configurations, Grounding, Auxiliary Switches, Mounting Systems, etc.

OVERLOAD CALIBRATION DATA - SINGLE POLE

AMPERE RATING	200% Trip Times -54°C to +71°C		400% Trip Times -54°C to +71°C		1000% Trip Times -54°C to +71°C	
	MIN	MAX	MIN	MAX	MIN	MAX
AMPERES	SECONDS	SECONDS	SECONDS	SECONDS	SECONDS	SECONDS
5	7	40	1.2	6.4	0.3	1.2
7.5	11	40	2.4	8.8	0.32	1.1
10	12	42	2.6	8.5	0.42	1.05
15	13	45	1.7	8.3	0.38	1.2
20	14	48	2.8	10	0.4	1.15
25	15	50	2.6	8.7	0.4	1.3
30	16	53	2.8	8.2	0.38	1.3
40	16	55	2.8	8.3	0.36	1.3
50	18	55	2.8	11	0.4	1.25
60	18	60	2.6	13	0.36	1.6
70	18	60	2.5	13	0.36	1.6
80	19	60	2.7	12.5	0.3	3
100	17	60	2.5	13	0.38	1.6

OVERLOAD CALIBRATION DATA - THREE POLE

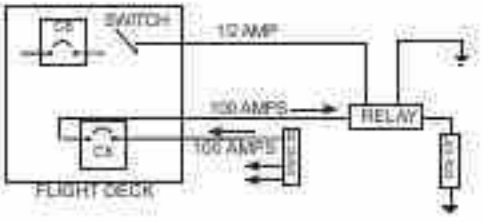
AMPERE RATING	200% Trip Times -54°C to +71°C		400% Trip Times -54°C to +71°C		1000% Trip Times -54°C to +71°C	
	MIN	MAX	MIN	MAX	MIN	MAX
AMPERES	SECONDS	SECONDS	SECONDS	SECONDS	SECONDS	SECONDS
10	13	80	2.8	11	0.42	1.5
15	13	80	1.7	10	0.38	1.2
20	14	80	2.8	9.8	0.4	1.15
25	15	80	2.6	10	0.4	1.3
30	16	80	2.6	11	0.38	1.3
40	16	80	2.6	10	0.38	1.3
50	17	80	2.8	10	0.4	1.25
60	17	80	2.4	18	0.36	1.6

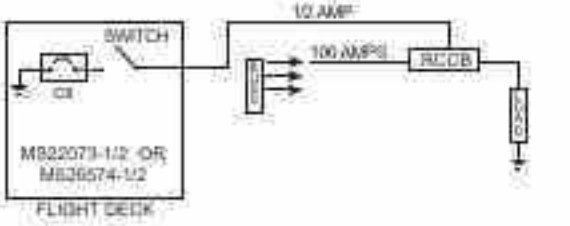
TRIP CURVE

Contact business unit for trip curve.

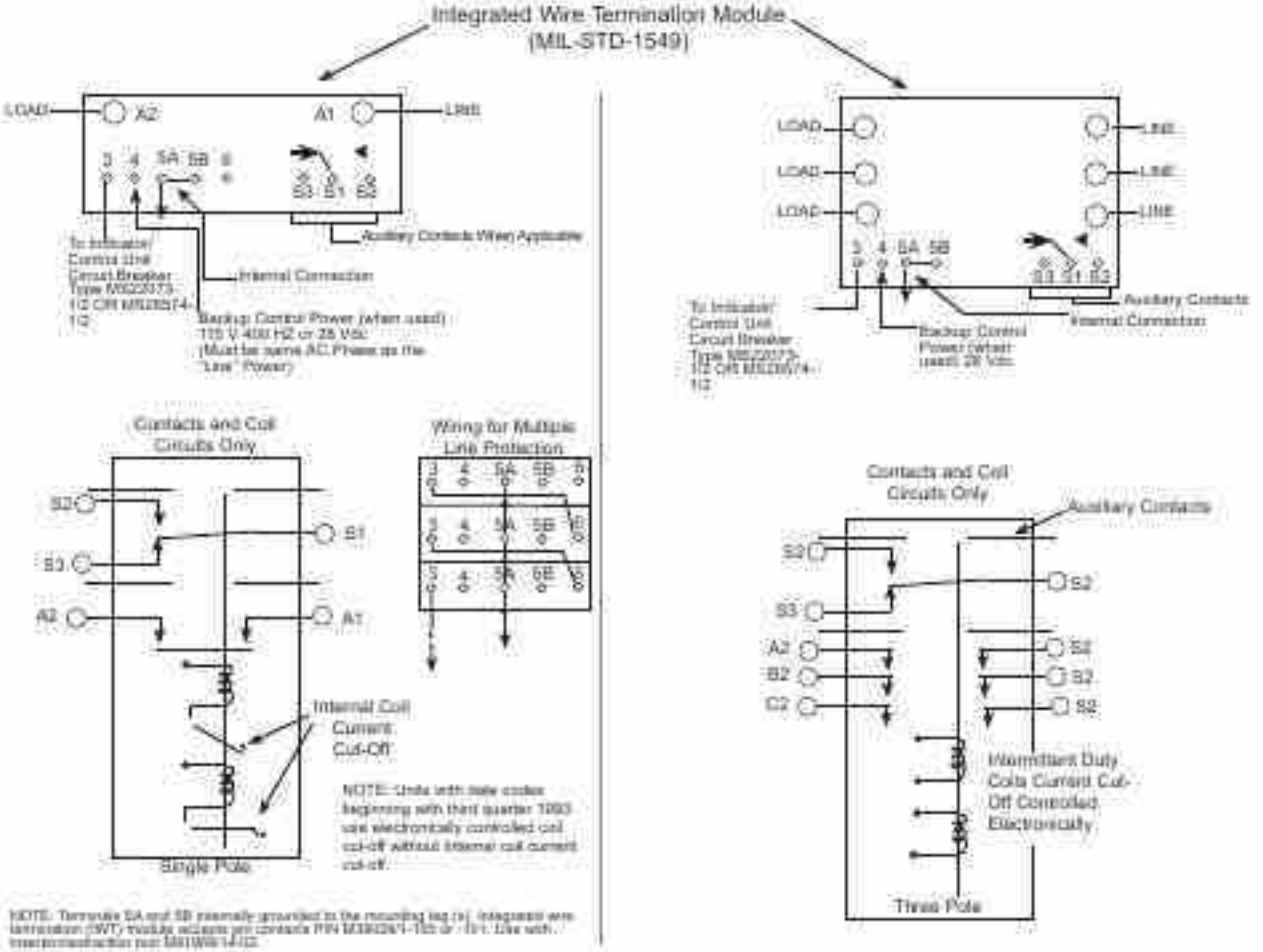
Engineering Data

Application Note





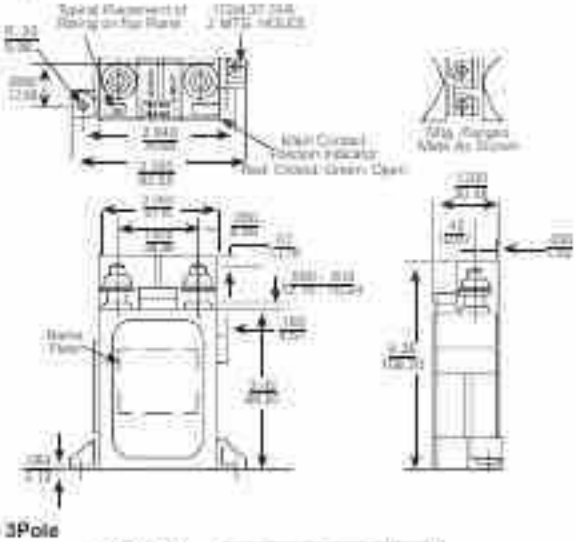
Typical Wiring Diagram



NOTE: Terminals 5A and 5B internally grounded to the mounting lug (s). Integrated wire termination (IWT) module accepts pin contacts P/N M39029/1-105 or -101. Use with interconnection cable M81969/14-02.

Engineering Data

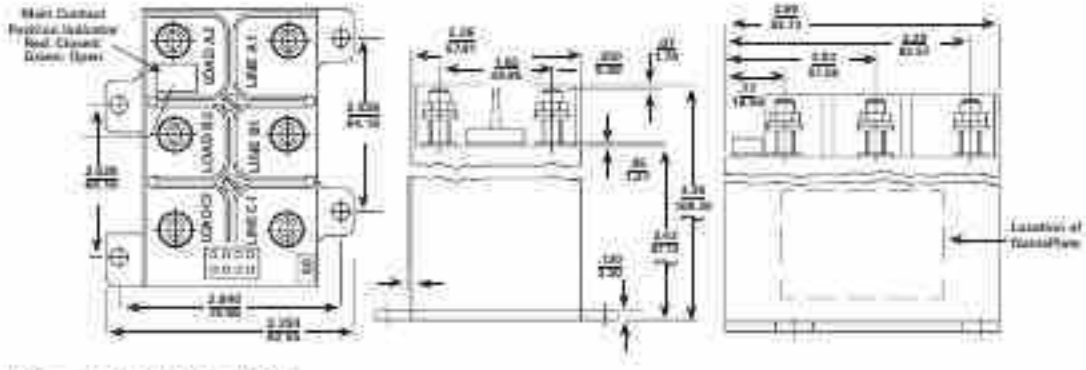
Approximate Dimensions - 1 Pole



Options

- Special application auxiliary switches
- Unique grounding
- Power sources
- Other current ratings
- Control via systems other than I/CU
- Low level auxiliary contacts available
- Data Bus/Interface capability available
- Electronically held coil

3Pole



Coil Operate Current/Set And Trip Time RCCB

Circuits	Nominal System Voltage	I/CU Set Current * Nom Voltage (Multiamp)	Set Coil Current * Nom Voltage Pulse	MAX. Set Time: Nominal Voltage & Room Temp.	MAX. Set Time: Most Adverse Condition - MIN. Voltage 71°C Ambient	*I/CU. Trip Current Nominal: 71°C & Nominal Voltage	*I/CU. Trip Current Nominal: -54°C & Nominal Voltage	*I/CU. Trip Current Nominal: Room Temp. Nominal Voltage	*I/CU. Trip Current Nominal: 71°C & Nominal Voltage	*I/CU. Trip Current Nominal: -54°C & Nominal Voltage	MAX. Standby Current Milliamp
1 Pole	28 Vdc (28 Volts MIN.) 115 Vac 400 Hz (104 V MIN.)	2	3.0 AMP MAX	30 Milliseconds	30 Milliseconds	1.4 AMP	1.3 AMP	1.6 AMP	0.9 AMP ***	2.1 AMP	10
		2	12 AMP MAX	15 Milliseconds	30 Milliseconds	8.5 AMP **	6.3 AMP **	9.6 AMP **	6.1 AMP **	10.4 AMP **	10
3 Pole	28 Vdc (28 Volts MIN.) 115 Vac 400 Hz (104 V MIN.)	2	3.0 AMP MAX	30 Milliseconds	30 Milliseconds	1.6 AMP	2.0 AMP	1.7 AMP	0.9 AMP ***	2.3 AMP	10
		2	13.5 AMP MAX	15 Milliseconds	30 Milliseconds	4.3 AMP **	3.3 AMP **	4.5 AMP **	4.0 AMP **	5.1 AMP **	10

* Value does not include resistance Ω.
** Average - Half Wave Rectified DC Current

Current decreases as ambient rises
*** Absolute Min. value from -53° to -17°C

REMOTE POWER CONTROLLER (RPC)

Single Pole
• 28 VDC

Electronic Current Sensing

The electronic over current sensing of these devices offer several advantages over the bi-metal sensing RCCB. Trip current levels can be closely controlled, for better protection of sensitive loads, trip times are faster, and both can be customized for specific applications. Other advantages included less heat buildup, and higher current capabilities in the same small package.

Use as a Relay, Circuit Breaker, Or Both

RPCs, like RCCBs, combine the best attributes of a circuit breaker and a relay. Automatically protects the wires and the load device during circuitbad breakdown, but allows the flight deck control of the load during normal operation.

Weight and Cost Savings

In distributed load applications, RPCs are a more efficient power distribution solution promoting cost and weight savings through the elimination of long runs of heavy cables associated with the conventional relay - flight deck circuit protector method. Control of the RPC requires only one #22 AWG control wire from the ICU (model #1500-053-05) on the flight deck to the RPC.

PERFORMANCE DATA

Rupture Levels	2000 A (28 Vdc)
Endurance (Resistive)	50,000 Cycles
Endurance (Inductive and Motor)	25,000 cycles
Endurance (Lamp)	No Rating
Mechanical Life	100,000 cycles
Dielectric Strength	Sea Level - VRMS: 2.2 seconds: Coil to Case - 1200 Initial, 1,000 After Life. All other Points 1,500 Initial, 1250 After Life 60,000 Ft. - VRMS 1 Minute: Coil to Case 500 Initial & After Life. All other Points 750 Initial & After Life
Insulation Resistance	100 Megaohms Initial, 50 Megaohms after Life, MIL-STD-202, method 302, test condition B
Thermal Temperature Range	-55°C to 85°C (-67°F to 185°F)
Vibration	Sinusoidal 5 to 10 Hz: 0.68 DA, 10 TO 50 Hz: 0.06 DA, 50 to 2000 Hz: 30G's
Shock	500 G's, 1/10 sec, 10-12 msec
Altitude	60,000 Ft Maximum
EMI Requirements	MIL-STD-461, Requirements CE101 and RE102 over the frequency range of 10 Khz to 400 MHz and RE103 (Hz) for Aircraft and Space Systems
Moisture Resistance	MIL-STD-202, method 106
Salt Spray Resistance	MIL-STD-202, method 101, Condition B
Sand and Dust Resistance	MIL-STD-202, method 110, Condition A
Fungus Resistance	MIL-HDBK-454, Guideline 4
Explosion Proof	MIL-STD-202, method 109
Weight (Standard)	425.217 grams (0.937 lbs.)

OVERLOAD DATA

% Rated Current	Trip in Seconds -55°C to +85°C
100%	No Trip
125%	45 Sec. Trip
300%	0.22 Sec. Trip
400%	0.085 Sec. Trip

ORDERING INFORMATION

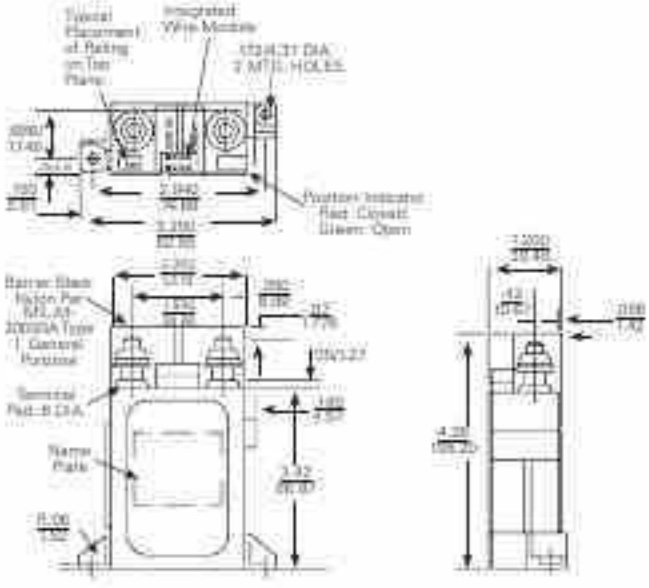
Single Pole Single Throw (Double Break Contacts)

AMPERE RATING	SAFRAN P/N	Rated Contact Load (Amperes) 28VDC			
125	[illegible]	125	125	125	5
150	[illegible]	150	150	150	5
175	[illegible]	175	150	175	5
200	[illegible]	200	150	175	5

Notes:
• One auxiliary contact included on each unit
• Contact Eaton Corp. in Warrick-Arlington, Pa. for Other Contact Configurations, Grounding, Aluminum Switches, Mounting Systems, etc.

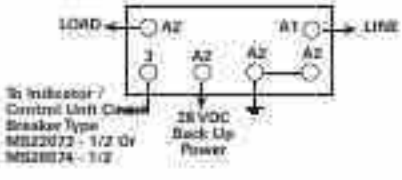
Engineering Data

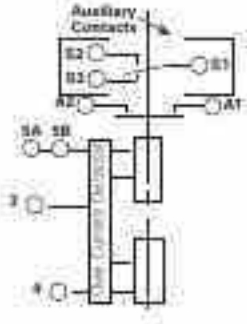
Approximate Dimensions - 1 Pole

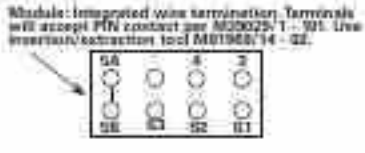


Typical Wiring Diagram

Approximate Dimensions







COIL OPERATE CURRENT/SET AND TRIP TIME

Nominal System Voltage	I/C Set Current @ Nom. Voltage (milliamp)	Set Coil Current @ Nom Voltage Pulse	MAX. Set Time: Nominal Voltage @ Room Temp	MAX. Set Time: Most Adverse Condition-Min. Voltage 71°C Ambient	%Coil Trip Current Nominal: 71°C and Nominal Voltage	%Coil Trip Current Nominal: -54°C and Nominal Voltage	%Coil Trip Current Nominal: Room Temp and Nominal Voltage	Max. Standby Current (milliamp)
28 VDC (18 Volts Min)	2	3.1 Amp	20 Milisec	30 Milisec	1.05 Amp	1.25 Amp	1.00 Amp	30

* With (F1) LINE IMPEDANCE 70 Ohms CURRENT DECREASE AFTER 30 [illegible] F1 = 2

Additional Series

In addition to the circuit breaker products described in this catalog, Safran Electrical & Power has the capability to manufacture over twenty additional series of circuit breakers. Please contact the Business Unit at 1-800-955-7354 for details or ordering information on these unique devices.

Series 60
Series 100
Series 130
Series 140
Series 180
Series 260
Series 270
Series 780
Series 920
Series 930
Series 960
Series 970
Series 1200
Series 1538
Series 1540
Series 1585
Series 2100
Series 4380
Series 8500
Series 9500

Additional Product Design Options

If your application calls for an amperage, feature, or option we do not currently list in our catalog, please contact the Business Unit at 1-800-955-7354.

Ambient Compensation
Limits or eliminates thermal derating (lowering of capability) caused by extreme ambient temperatures.

Ambient Temperature
Refers to the temperature of the air immediately surrounding the circuit breaker/protection device.

Automatic Reset
Device that will automatically open an overload circuit. It will also automatically close or complete the circuit after a period of time. If the overload is still present, the device will continue to cycle until either the power or the overload is removed.

Circuit Breaker
Device designed to open and close a circuit manually and to open the circuit automatically on a predetermined overload of current.

Current Rating
Designation of rating given in amperes at which the device will not trip. A specific temperature is usually assigned.

Dielectric Strength
The ability of an insulating material to withstand an over voltage without exceeding minimal leakage current levels or material breakdown. Specified in voltage (VAC), usually between a live metal part and ground or between open contacts of a device.

Fuse
A protective device using a special metal-alloyed conductor that is often notched or otherwise engineered to control the cross sectional area. A fault current will melt the narrow cross section, interrupting the flow of current.

Fusible Link/Fail Safe
A metallic sacrificial element within the RCCB or circuit breaker that melts and then arcs due to the joule heating of an over current. This feature ensures that a fault cannot cause the RCCB or circuit breaker to fail in the closed position.

Interrupt Capacity
The highest level of fault current that a circuit protective system is intended to interrupt. Depending on qualification requirements, some devices must clear the fault, be operable afterwards, and still be capable of tripping on 200 percent overloads. While other qualified devices may have a backup device wherein the combination must successfully clear the fault while leaving the protector in a fail-safe condition (no loss of case integrity, external materials remaining ungrated by gaseous emissions, and no dielectric path to grounded parts).

Manual Reset
Refers to breakers in which the electrical contacts remain open after a trip until someone physically closes or completes the circuit by either pushing a reset button or throwing a switch.

Maximum Ultimate Trip (must trip)
Current rating at which a circuit protection device will trip within a certain period of time at a specified temperature.

Minimum Ultimate Trip (must hold)
Current rating for which a circuit protection device will not trip for an extended period of time at a specified temperature.

Nuisance Trips
Those trips caused by a response to non-damaging inrush or start-up current surges, as opposed to an actual overcurrent trip.

Overcurrent
That current which may cause dangerous overheating.

Overcurrent Protection
Protection achieved by limiting the duration and magnitude of exposure to an overcurrent.

Overload
An electrical load or current flow greater than that which a circuit is designed to handle.

Overload Capacity
The highest level of overload current that devices will interrupt and remain in operable condition, capable of clearing additional overloads.

Safety Factor
The allowance added to the steady state application current to ensure that the protective device selected will be more than sufficient to handle the application without nuisance trips. Safran Electrical & Power recommends a minimum safety factor of 15 percent.

Slow-Blow Fuse
A dual element fuse that allows for slow response to overloads (less than 10x rating) and fast response to fault currents.

Trip-Free
A characteristic of certain breakers that provides independence between the protection mechanism and the operating button or handle, such that a fault cannot be maintained manually or held closed against an overload.

Trip Indication
Visual sign the breaker has opened.

Trip Curve
Graphic displaying minimum and maximum time a breaker takes to trip for given levels of overload.

Voltage Drop
The voltage decreases across the protector/breaker due to the internal resistance of the device.

QUALIFIED PRODUCTS UNDER MILITARY SPECIFICATION FOR MIL-C-8509 AND MIL-C-83383

MS P/N	SAFRAN P/N	Page	MS P/N	SAFRAN P/N	Page	MS P/N	SAFRAN P/N	Page	MS P/N	SAFRAN P/N	Page
MIL-C-8509			MS14154-6VL	4300-009-4	33	MS25244-30	700-007-16	36	MS2800N-13A	4200-004-10	22
MS3320-1	4310-001-1	24	MS14154-6	4300-001-6	33	MS25244-35	700-000-25	36	MS2800N-13L	4200-003-10	22
MS3320-1L	4310-001-1	24	MS14154-6L	4300-007-6	33	MS25244-P5	700-009-5	36	MS2800N-15	4200-001-15	22
MS3320-1V	4310-009-1	24	MS14154-6V	4300-009-6	33	MS25244-P7 1/2	700-009-7(5)	36	MS2800N-15A	4200-004-15	22
MS3320-1VL	4310-024-1	24	MS14154-6VL	4300-009-6	33	MS25244-P10	700-009-10	36	MS2800N-15L	4200-003-15	22
MS3320-2	4310-001-2	24	MS14154-7 1/2	4300-007-7(5)	33	MS25244-P15	700-009-15	36	MS2800N-20	4200-001-20	22
MS3320-2L	4310-001-2	24	MS14154-7 1/2L	4300-007-7(5)	33	MS25244-P20	700-009-20	36	MS2800N-20A	4200-004-20	22
MS3320-2V	4310-009-2	24	MS14154-7 1/2V	4300-009-7(5)	33	MS25244-P25	700-009-25	36	MS2800N-20L	4200-003-20	22
MS3320-2VL	4310-024-2	24	MS14154-7 1/2VL	4300-009-7(5)	33	MS25244-P30	700-009-30	36	MS2800N-D3/4	4200-006-075	22
MS3320-3 1/2	4310-001-3(5)	24	MS14154-10	4300-007-10	33	MS25244-P35	700-009-35	36	MS2800N-D3/4L	4200-007-075	22
MS3320-3 1/2L	4310-005-3(5)	24	MS14154-10L	4300-007-10	33	MS25244-P15	700-002-5	36	MS2800N-D1	4200-006-1	22
MS3320-3 1/2V	4310-019-3(5)	24	MS14154-10V	4300-009-10	33	MS25244-P7 1/2	700-002-7(5)	36	MS2800N-D1L	4200-007-1	22
MS3320-3 1/2VL	4310-024-3(5)	24	MS14154-10VL	4300-009-10	33	MS25244-P10	700-002-10	36	MS2800N-D1 1/2	4200-006-105	22
MS3320-3	4310-001-3	24	MS14154-15	4300-001-15	33	MS25244-P15	700-009-15	36	MS2800N-D1 1/2L	4200-007-105	22
MS3320-3L	4310-001-3	24	MS14154-15L	4300-007-15	33	MS25244-P20	700-000-20	36	MS2800N-D2	4200-006-2	22
MS3320-3V	4310-009-3	24	MS14154-15V	4300-009-15	33	MS25244-P25	700-000-25	36	MS2800N-D2L	4200-007-2	22
MS3320-3VL	4310-024-3	24	MS14154-15VL	4300-009-15	33	MS25244-P30	700-000-30	36	MS2800N-D2 1/2	4200-006-205	22
MS3320-4	4310-001-4	24	MS14154-20	4300-007-20	33	MS25244-P35	700-000-35	36	MS2800N-D2 1/2L	4200-007-205	22
MS3320-4L	4310-009-4	24	MS14154-20L	4300-007-20	33	MS25381-100	100-012-50	32	MS2800N-D3	4200-006-3	22
MS3320-4V	4310-009-4	24	MS14154-20V	4300-009-20	33	MS25381-100V	100-009-50	32	MS2800N-D3L	4200-007-3	22
MS3320-4VL	4310-024-4	24	MS14154-20VL	4300-009-20	33	MS25381-60	100-012-60	32	MS2800N-D4	4200-006-4	22
MS3320-6	4310-001-6	24	MS22073-1	4001-001-1	30	MS25381-60V	100-009-60	32	MS2800N-D4L	4200-007-4	22
MS3320-6L	4310-009-6	24	MS22073-1V	4001-009-1	30	MS25381-70	100-012-70	32	MS2800N-D5	4200-006-5	22
MS3320-6V	4310-019-6	24	MS22073-1 1/2	4001-001-105	30	MS25381-70V	100-009-70	32	MS2800N-D5L	4200-007-5	22
MS3320-6VL	4310-024-6	24	MS22073-1 1/2V	4001-009-105	30	MS25381-75	100-012-75	32	MS2800N-D7 1/2	4200-006-705	22
MS3320-7 1/2	4310-001-7(5)	24	MS22073-2	4001-001-2	30	MS25381-75V	100-009-75	32	MS2800N-D7 1/2L	4200-007-705	22
MS3320-7 1/2L	4310-005-7(5)	24	MS22073-2V	4001-009-2	30	MS25381-80	100-012-80	32	MS2800N-D10	4200-006-10	22
MS3320-7 1/2V	4310-019-7(5)	24	MS22073-2 1/2	4001-001-205	30	MS25381-80V	100-009-80	32	MS2800N-D10L	4200-007-10	22
MS3320-7 1/2VL	4310-024-7(5)	24	MS22073-2 1/2V	4001-009-205	30	MS25381-90	100-012-90	32	MS2800N-D15	4200-006-15	22
MS3320-10	4310-001-10	24	MS22073-3	4001-001-3	30	MS25381-90V	100-009-90	32	MS2800N-D15L	4200-007-15	22
MS3320-10L	4310-005-10	24	MS22073-3V	4001-009-3	30	MS25381-100	100-012-100	32	MS2800N-D20	4200-006-20	22
MS3320-10V	4310-009-10	24	MS22073-4	4001-001-4	30	MS25381-100V	100-009-100	32	MS2800N-D20L	4200-007-20	22
MS3320-10VL	4310-024-10	24	MS22073-4V	4001-009-4	30	MS2800N-3/4	4200-001-075	22			
MS3320-15	4310-001-15	24	MS22073-5	4001-001-5	30	MS2800N-3/4A	4200-004-075	22	**MIL-C-83383**		
MS3320-15L	4310-005-15	24	MS22073-5V	4001-009-5	30	MS2800N-3/4L	4200-003-075	22	MS3100X01-01	SAR000A001	34
MS3320-15V	4310-019-15	24	MS22073-7 1/2	4001-001-705	30	MS2800N-1	4200-001-1	22	MS3100X01-03	SAR000A103	34
MS3320-15VL	4310-024-15	24	MS22073-7 1/2V	4001-009-705	30	MS2800N-1A	4200-004-1	22	MS3100X01-04	SAR000A104	34
MS3320-20	4310-001-20	24	MS22073-10	4001-001-10	30	MS2800N-1L	4200-003-1	22	MS3100X01-05	SAR000A205	34
MS3320-20L	4310-005-20	24	MS22073-10V	4001-009-10	30	MS2800N-1 1/2	4200-001-105	22	MS3100X01-06	SAR000A206	34
MS3320-20V	4310-019-20	24	MS22073-15	4001-001-15	30	MS2800N-1 1/2A	4200-004-105	22	MS3100X01-07	SAR000A307	34
MS3320-20VL	4310-024-20	24	MS22073-15V	4001-009-15	30	MS2800N-1 1/2L	4200-003-105	22	MS3100X01-08	SAR000A408	34
MS14154-1	4300-001-1	33	MS22073-20	4001-001-20	30	MS2800N-2	4200-001-2	22	MS3100X01-09	SAR000A609	34
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MS14154-1V	4300-009-1	33	MS22073-01	4001-011-1	30	MS2800N-2L	4200-003-2	22	MS3100X01-11	SAR000A711	34
MS14154-1VL	4300-009-1	33	MS22073-01 1/2	4001-011-105	30	MS2800N-2 1/2	4200-001-205	22	MS3100X01-13	SAR000A1013	34
MS14154-2	4300-001-2	33	MS22073-02	4001-011-2	30	MS2800N-2 1/2A	4200-004-205	22	MS3100X02-01	SAR000A101	34
MS14154-2L	4300-007-2	33	MS22073-02 1/2	4001-011-205	30	MS2800N-2 1/2L	4200-003-205	22	MS3100X02-03	SAR000A103	34
MS14154-2V	4300-009-2	33	MS22073-03	4001-011-3	30	MS2800N-3	4200-001-3	22	MS3100X02-04	SAR000A104	34
MS14154-2VL	4300-009-2	33	MS22073-04	4001-011-4	30	MS2800N-3A	4200-004-3	22	MS3100X02-05	SAR000A205	34
MS14154-2 1/2	4300-007-205	33	MS22073-05	4001-011-5	30	MS2800N-3L	4200-003-3	22	MS3100X02-06	SAR000A206	34
MS14154-2 1/2L	4300-007-205	33	MS22073-05 1/2	4001-011-105	30	MS2800N-4	4200-001-4	22	MS3100X02-07	SAR000A307	34
MS14154-2 1/2V	4300-009-205	33	MS22073-07	4001-011-7	30	MS2800N-4A	4200-004-4	22	MS3100X02-08	SAR000A408	34
MS14154-2 1/2VL	4300-009-205	33	MS22073-07 1/2	4001-011-705	30	MS2800N-4L	4200-003-4	22	MS3100X02-09	SAR000A609	34
MS14154-3	4300-001-3	33	MS22073-010	4001-011-10	30	MS2800N-5	4200-001-5	22	MS3100X02-11	SAR000A811	34
MS14154-3L	4300-007-3	33	MS25244-5	700-001-5	36	MS2800N-5A	4200-004-5	22	MS3100X02-12	SAR000A912	34
MS14154-3V	4300-009-3	33	MS25244-7 1/2	700-001-7(5)	36	MS2800N-5L	4200-003-5	22	MS3100X04-01	SAR000A101H	34
MS14154-3VL	4300-009-3	33	MS25244-10	700-001-10	36	MS2800N-7 1/2	4200-001-705	22	MS3100X04-02	SAR000A102H	34
MS14154-4	4300-001-4	33	MS25244-15	700-001-15	36	MS2800N-7 1/2A	4200-004-705	22	MS3100X04-01	SAR000A101H	34
MS14154-4L	4300-007-4	33	MS25244-20	700-001-20	36	MS2800N-7 1/2L	4200-003-705	22	MS3100X04-08	SAR000A408H	34
MS14154-4V	4300-009-4	33	MS25244-25	700-001-25	36	MS2800N-10	4200-001-10	22	MS3100X04-10	SAR000A810H	34

Product Application Information and Warranty Disclaimer
It is buyer's responsibility to determine the suitability of the particular device for its application, and Safran Electrical & Power makes no warranties, and assumes no liability as to the suitability of sufficiency for buyer's application of the device. Ratings and switch performance are valid only on devices which have not been subjected to unauthorized modifications or misapplications. Dimensional drawings are available upon request.

Notice
The use of Safran Electrical & Power devices should be in accordance with the provisions of the National Electric Code, U.L. and/or other local, military or industry standards that are pertinent to the particular end use. Installation or use not in accordance with these codes and standards could be hazardous to personnel and/or equipment.

Government Cage Code
The Government Cage Codes for electrical power management products manufactured by Safran Electrical & Power are 81640 and 78374.

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