AIRPAX®

SNAPAK® Series
Magnetic Circuit Protectors

AIRPAX® | T/R/PP/PR CR/CPP/CPR Series

Hydraulic Magnetic Circuit Protectors (SNAPAK®)

INTRODUCTION

The Airpax™ SNAPAK® series is a snap-acting hydraulic-magnetic circuit protector that combines power switching and accurate, reliable circuit protection in one aesthetically pleasing package. The SNAPAK® combines the functions of three separate components: power switch, fuse and fuse holder. To the OEM, this means that only one item has to be mounted instead of three. Less assembly is required, inventory is cut by two-thirds and greater panel density is obtainable with less clutter. In addition, the SNAPAK® can be operated at either DC or 50/60Hz, eliminating the need to specify, order and stock separate units. 400Hz units are also available.

To enhance front-panel aesthetics, SNAPAK® is offered with paddle and rocker handles in six attractive colors and push-pull and push-to-reset actuators. Also offered is a variety of optional mounting hardware. The push-pull version is supplied with a black button with a white indicating band.

Orientation of the button when marked with an amperage notation must be specified when using the fourth decision table. Push-to-reset is supplied with a contrasting color indicating shaft. In addition, SNAPAK® is offered in SPST and DPST configurations. The single pole satisfies most applications. The two-pole version is often used for extra safety in products that utilize high voltage or where current sensing and breaking of both sides of the line is required. Quick connect terminals are standard, UNC 8-32 or M4 screw terminals are available as additional termination options.

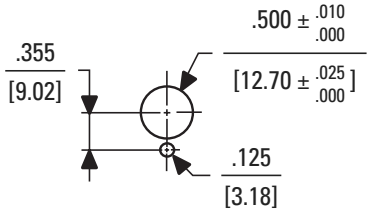
Since the SNAPAK® is snap-acting, it assures immediate opening and closing of the contacts. Its design also prevents operator "teasing" of the contacts and minimizes arcing. SNAPAK® circuit protectors are UL Recognized as supplementary protectors per UL STD. 1077, CSA Certified as supplementary protectors per CSA STD. C22.2 No. 235, VDE Approved as circuit breakers for equipment per STD. EN 60934, CCC Approved (customer must request product be manufactured in China) and CE Compliant. In addition, most versions are certified by UL to meet spacing requirements of IEC 950 for basic and functional insulation for front panel mounting.

Consult factory for details and exceptions. Typical applications include office appliances, electronic data processing, medical equipment, business machines, vending and amusement machines. Push-pull versions are particularly well suited for medical instrumentation, automotive production transfer lines and other applications where accidental turn off is unacceptable. For those applications which do not require circuit protection, SNAPAK® is offered in a power-switch-only configuration.

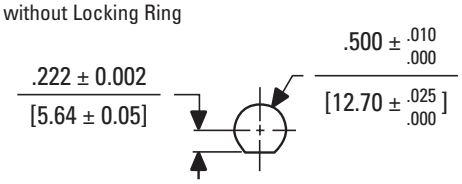
TOGGLE ACTUATORS

The SNAPAK® is available with paddle handles in six attractive colors. Engineered for safe, sure operation, the paddle handles may be specified in blue, white, red, green, yellow or black.

Mounting Details
with Locking Ring



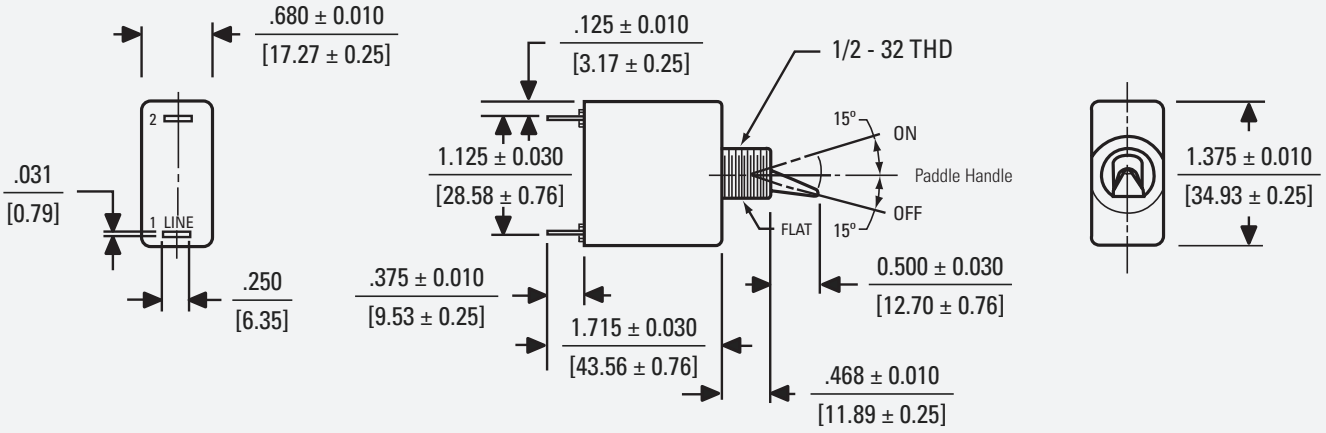
without Locking Ring



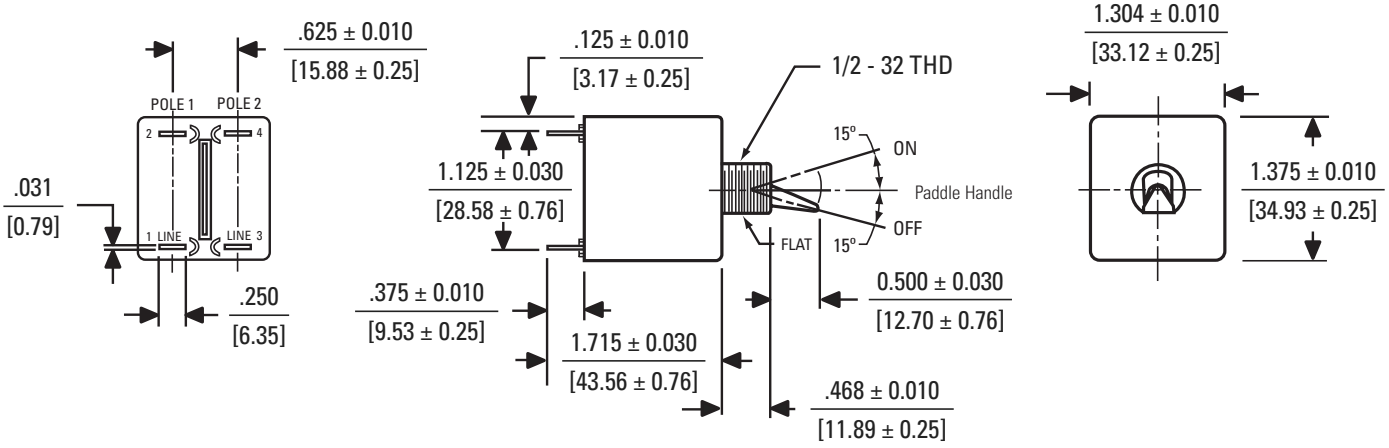
PANEL CUTOUT SHOWN ABOVE
MAY BE MADE WITH GREENLEE
RADIO CHASSIS PUNCH #733 x 1/2" DIA.

Note: Mounting Tolerance ± .005 [.13] unless noted angles: ±5°. Dimensions in Brackets [ ] are millimeters.

Single Pole, Toggle



Two Pole, Toggle

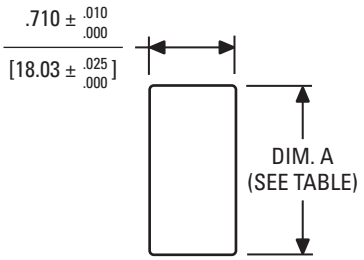


ROCKER HANDLES WITH ILLUMINATION OPTIONS

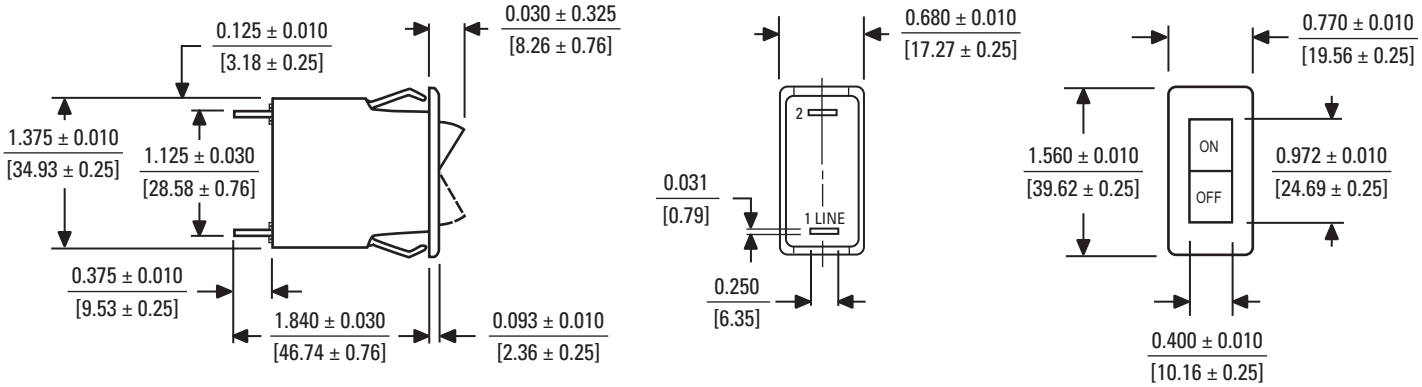
SNAPAKs are offered in single and two pole rocker styles in a choice of black, white or gray body colors. Handle color in non-illuminated types may be black, red, white or orange. Neon or light emitting diode (LED) illumination may be specified with a variety of options.

SNAPAK® circuit protectors with a second pole are available in paddle handle, push-pull, push-to-reset and rocker handle versions.

Mounting Detail



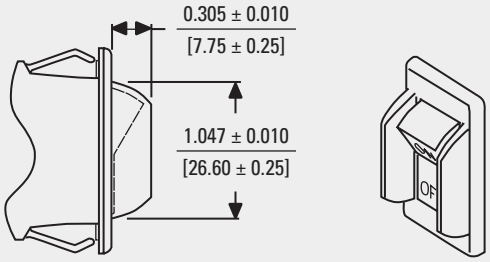
Rocker, Single Pole



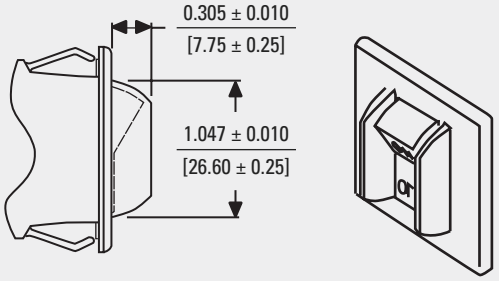
Handle Guards

The SNAPAK® circuit protector is available with an optional handle guard as an integrated part of the snap-in mounting design. Available for rocker actuators, the guard helps in providing protection from accidental "turn-off." Please refer to the SNAPAK® Part Number Decision Tables; fourth decision.

Handle Guards, Single Pole

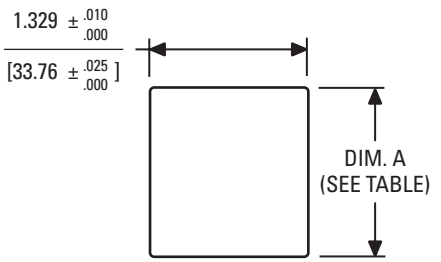


Handle Guards, Two Pole

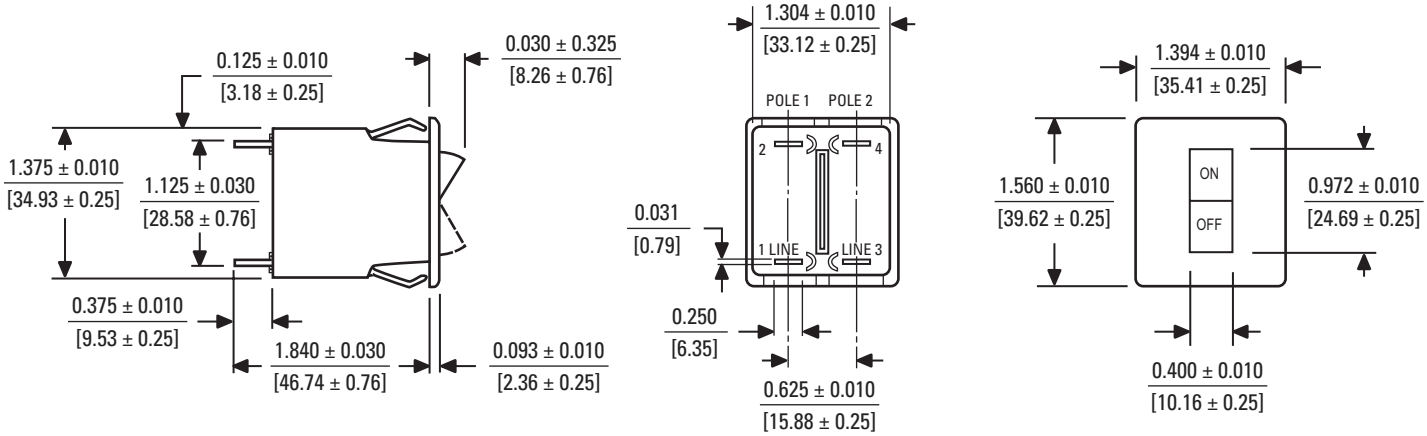


FRONT SNAP-IN MOUNT (STD)			
Panel Thickness	0.125 [3.18]	0.093 [2.36]	0.062 [1.57]
Dimension "A"	1.460 [37.08]	1.420 [36.07]	1.385 [35.18]
Note: Tolerance for Mtg. ± .005 (.13)			

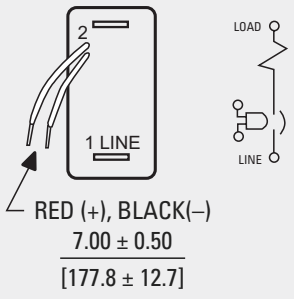
Mounting Detail



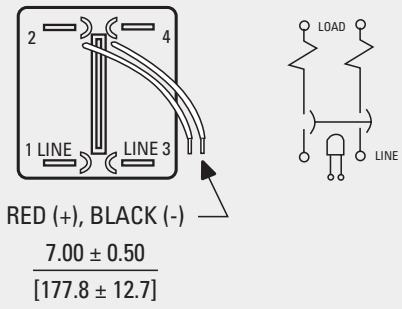
Rocker, Two Pole



Illuminated Handle
Single Pole



Two Pole

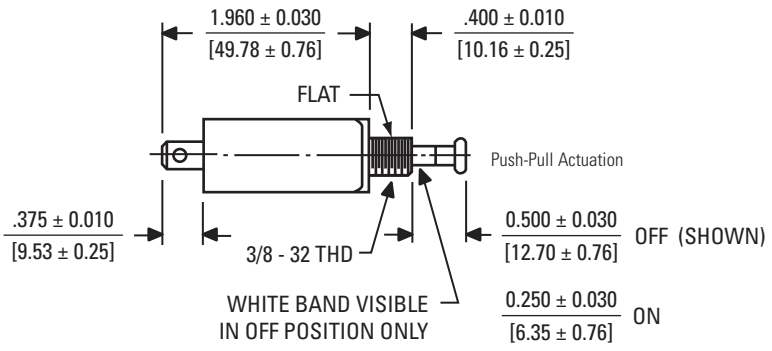


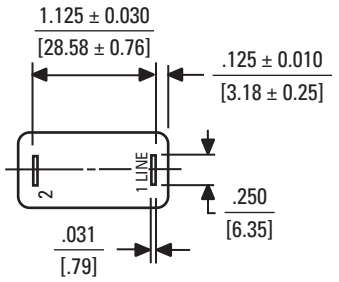
Note: Tolerance ± .005 [.13] unless noted angles: ±5°. Dimensions in Brackets [ ] are millimeters.

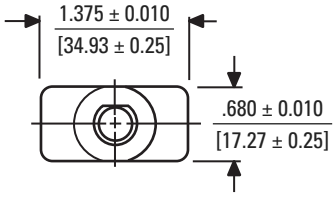
PUSH-PULL, PUSH-TO-RESET ACTUATORS

SNAPAK® may also be ordered with Push-Pull, or Push-to-Reset actuator buttons. As an option, the button can be embossed with the current rating (Push-Pull option only).

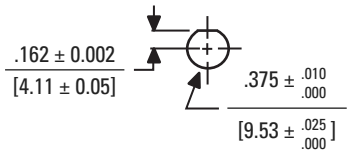
Push-Pull, Single Pole



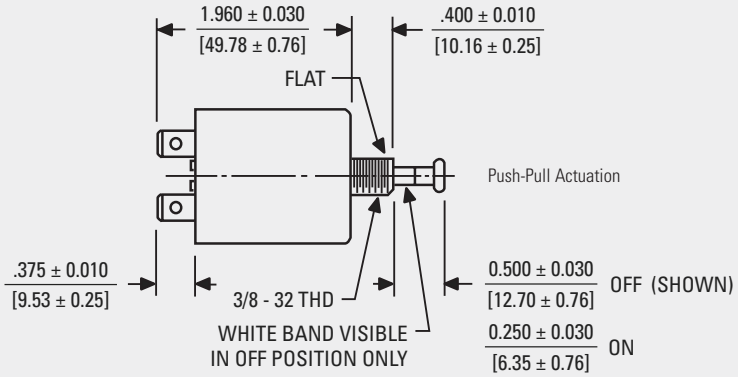


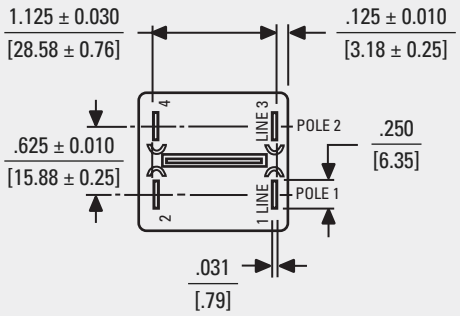


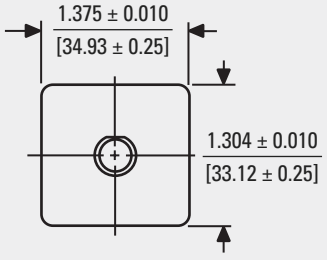
Mounting Detail
(Single Pole and Two Pole)



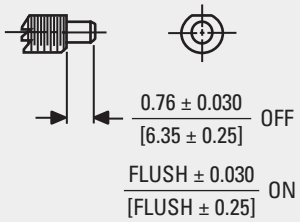
Push-Pull, Two Pole







Push-to-Reset Actuation
(Single and Two Pole)



Note: Tolerance ± .005 [.13] unless noted angles: ±5°. Dimensions in Brackets [ ] are millimeters.

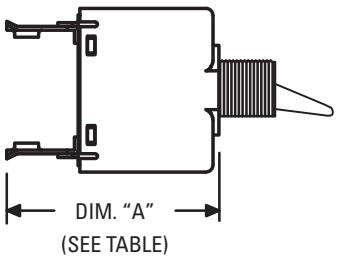
SCREW TERMINALS

Available as straight screw terminals with UNC 8-32 and Metric M4 screw types, bus-type connect (flat) or upturned lugs (tabs), with UL, CSA and TÜV approvals available. Screw terminals are available for all handle options (rocker, toggle, push-pull, push-to-reset). Single pole only, series only, non-auxiliary switch configurations.

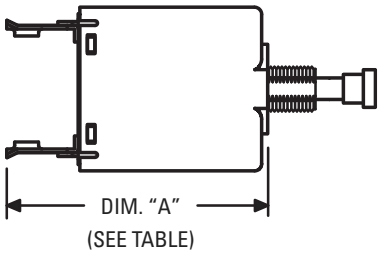
DIMENSION "A"

Handle Style	Screw Terminal	"A" Dimension
Toggle	Straight	1.773 [45.03]
Push Button	Straight	2.180 [55.37]
Rocker	Straight	2.058 [52.27]

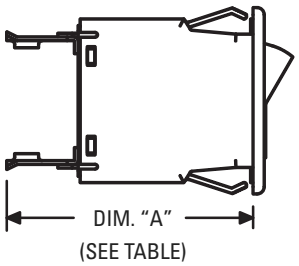
Toggle



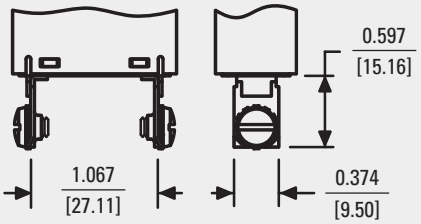
Push Button



Rocker



Straight

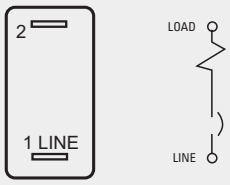


CONFIGURATIONS

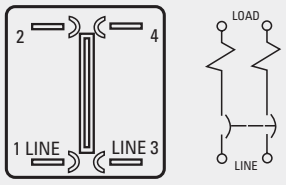
Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and the contacts are in series with the load being protected. In addition to providing conventional overcurrent protection, it is simultaneously used as an on-off switch.

Series Trip
Single Pole



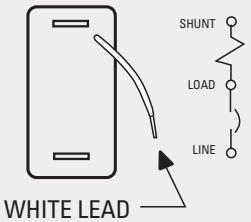
Two Pole



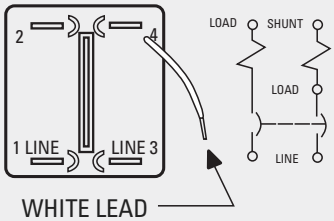
Shunt Trip

The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The current rating of both loads must not exceed the maximum contact rating.

Shunt Trip
Single Pole



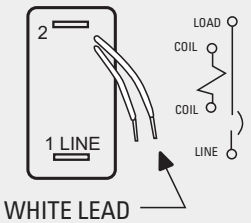
Two Pole
(1 pole shunt)



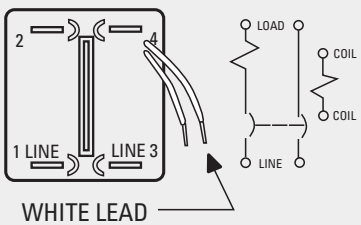
Relay Trip

This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

Relay Trip (Note A)
Single Pole



Two Pole
(1 pole relay)



Note A: Coil Ratings to 5 amperes maximum. Contact ratings are 7.5 amperes at 50 Vdc and 250 Vac; 15 amperes at 120 Vac; 32 Vdc.

Note: Tolerance ± .005 [.13] unless noted.
Dimensions in Brackets [ ] are millimeters.

Auxiliary Switch

This is furnished as an integral part of a series pole in single or, multi-pole assemblies. Isolated electrically from the protectors circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's ON-OFF status.

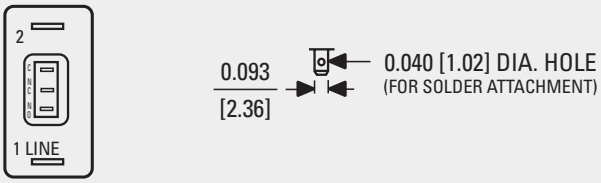
Voltage Trip

Sometimes called "dump circuits" or "panic trip circuits," these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt or relay configurations.

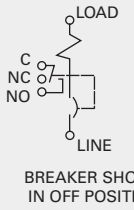
Power Switch

In the event that over-current protection is not desired, the coil mechanism can be deleted, providing an excellent low cost single or double-pole power switch. Maximum current rating is 20 amps.

Auxiliary Switch (Note B)
Single Pole

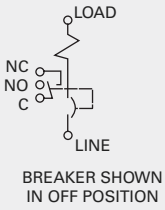


.100 to 20.0 amps, NON-VDE & NON-TÜV >20amps

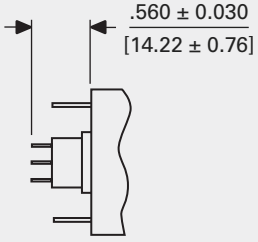


BREAKER SHOWN IN OFF POSITION

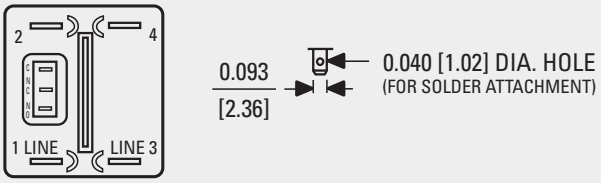
VDE, TÜV >20amps & U3 Construction



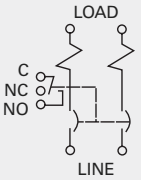
BREAKER SHOWN IN OFF POSITION



Auxiliary Switch (Note B)
Two Pole

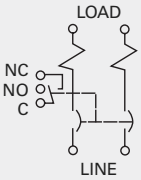


.100 to 20.0 amps, NON-VDE & NON-TÜV >20amps

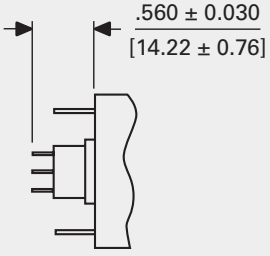


BREAKER SHOWN IN OFF POSITION

VDE, TÜV >20amps & U3 Construction



BREAKER SHOWN IN OFF POSITION



Note B: Switch is located in the left hand pole (viewed from terminal end).

OPERATING CHARACTERISTICS

Inrush Pulse Tolerance

Many circuit protector applications involve a transformer turn-on, an incandescent lamp load, or a capacitor charge from a DC source. Each of these applications has one common factor: a steep transient of very high current amplitude and short duration. This takes the form of a spike or a single pulse and is the cause of most nuisance tripping associated with magnetic circuit breakers.

SNAPAK® will withstand, without tripping, a single pulse of 8 milli-seconds duration (half sine wave configuration) and peak amplitude of 9 times its rating without the inertia wheel and 13 times its rating with an inertia wheel. (Not applicable to instant trip delays).

MAXIMUM DCR AND IMPEDANCE

Current Ratings (Amps)	T/R/PP/PR DC Resistance	T/R/PP/PR 50/60Hz Impedance	CR/CPP/CPR DC Resistance
.100	175	181	274
.500	6.34	6.63	9.77
1.00	1.63	1.69	2.31
2.00	.400	.425	.465
3.00	.175	.188	.261
4.00	.103	.106	.156
5.00	.076	.078	.091
7.50	.038	.039	.053
10.0	.026	.028	.023
12.5	.020	.021	.020
15.0	.013	.014	.010
20.0	.010	.011	.008
25.0			.004
30.0			.003

DCR and Impedance is measured after 1 hour at 100% rated current using the Voltmeter-Ammeter Method.

PULSE TOLERANCE

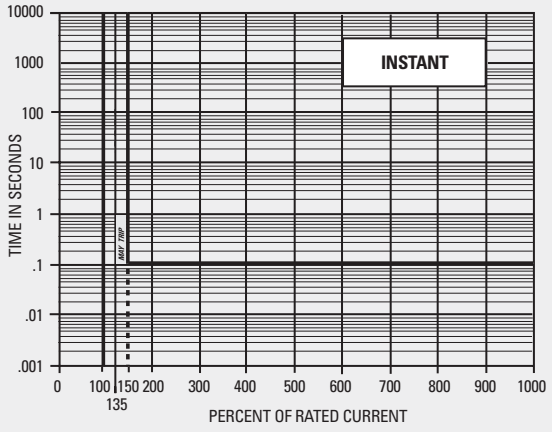
Delay	Pulse Tolerance
1, 2, 61, 62	*9 Times Rated Current
3, 4, 61F, 62F	*13 Times Rated Current

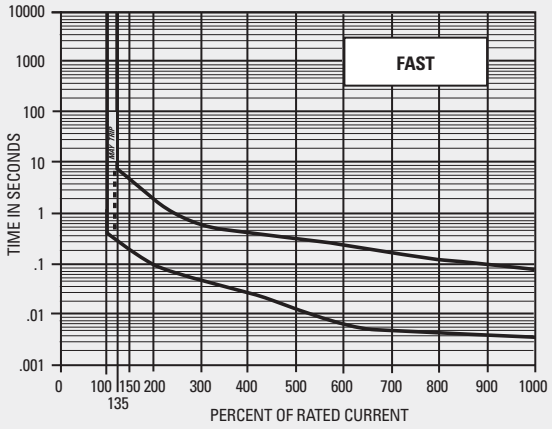
** Units above 15 amps are derated to 8 and 12 times rated current*

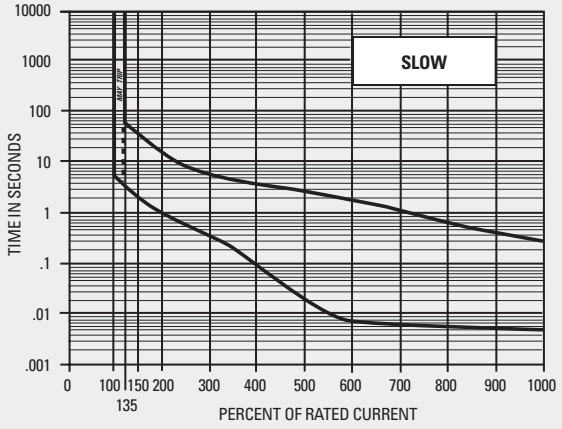
PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (VERTICAL MOUNT)

Delay	100%	135%	150% *	200%	400%	600%	800%
Instant	No Trip	May Trip	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max
Fast	No Trip	.3 to 7	.2 to 5	.1 to 2	.03 to .50	.015 to .30	.010 to .150
Slow	No Trip	3 to 70	2 to 40	1 to 15	.10 to 4.0	.015 to 2.0	.010 to .800

** Minimum trip for all instantaneous and 400Hz units.*







DELAY CURVES & SPECIFICATIONS

400 Hz, DC, 50/60Hz Delay Curves (typ)

A choice of delays is offered for DC, 50/60Hz and 400Hz applications. Delays 0, 49, 59 and 69 provide fast-acting, instantaneous trip and are often used to protect sensitive electronic equipment (not recommended where known inrush exists). Delays 1, 41, 51 and 61 have a short delay for general purpose applications. Delays 2, 42, 52 and 62 are long enough to start certain types of motors and most transformer and capacitor loads.

Trip Free

Will trip open on overload, even when forcibly held on.This prevents operator from damaging the circuit by holding handle in the ON position.

Trip Indication

The operating handle moves forcibly and positively to the OFF position on overload.

Ambient Operation

Operates normally in temperatures between –40° C and +85°C.

Insulation Resistance

Not less than 100 megohms at 500Vdc.

Dielectric Strength

Withstands 1500 volts, 60Hz for 60 seconds or 1800Vac for one second between all electrically isolated terminals.

Endurance

Mechanical life in excess of 50,000 operations. In many applications, however, contact wear due to the electrical load determines unit life. At maximum electrical ratings, the SNAPAK® can perform 10,000 operations at rated current and voltage. Under UL 1077, the SNAPAK® can perform 50 operations at 150% of maximum rated current followed by 6,000 operations at maximum rated current. Under VDE 0642 (EN60934) the SNAPAK® can perform 6,000 electrical operations. After any endurance cycle, the breaker will calibrate and have working dielectric strength.

AGENCY APPROVALS (T/P/PP/PR SUPPLEMENTARY PROTECTORS)

Voltage (Volts), Frequency (hz), Phase, Min Poles, TC, OL						Current (Amps)		Short Circuit Current Rating (Amps)		
Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE	UL 1077 & CSA	VDE	Notes
32	DC	-	1	1	0	.10-30(3)	.10-20	U1, 1000	500	
38	DC	-	1	1	0	.10-15	-	U2, 1000 / U1, 1000	-	PR only
65	DC	-	1	1	0	.10-7.5	-	U2, 500 /U1, 500	-	
65	DC	-	2	1	0	.10-15	-	U1, 1000	-	
65	DC	-	2	1	0	.10-20	.10-20	U2, 500 / U1, 500	500	
65(2)	DC	-	1	1	0	.10-30	.10-30	U2, 120	120	R, PP, PR only
65(2)	DC	-	2 only	1	0	.10-25	-	U1, 100	-	R only
65(2)	DC	-	2	1	0	.10-25	-	U2, 500	-	R only
125	50/60	1	1	1	0	.10-20	7.6-20	U1, 1000	500	
125	50/60	1	1	1	0	.10-30(3)	-	U1, 1000	-	T only
125(2)	50/60	1	1	1	0	.10-30	-	U2, 1000	-	R, PP, PR only
125(2)	50/60	1	1	1	1	.10-30	20.1-30	U3, 300(1)	500	R, PP, PR only
120/240	50/60	1	2	2	0	.10-20(3)	-	U2, 1000	-	
120/240	50/60	1	2	2	0	.10-30(3)	-	U1, 650	-	
125/250	50/60	1	2	2	0	.10-20	-	U1, 1000	-	
250	50/60	1	1	2	0	.10-20	.1-7.5	U1, 500	500	
250	50/60	1	1	1	0	.10-7.5	-	C1, 1000(4)	-	
250	50/60	1	2	2	0	.10-20	.10-20	U1, 1000	500	
250(2)	50/60	1	2	1	1	.10-30	-	U3, 300	-	R only
125	400	1	1	2	0	.10-20	-	U1, 1000	-	
125/250	400	1	2	2	0	.10-20	-	U1, 1000	-	
250	400	1	2	2	0	.10-20	-	U1, 1000	-	
250	400	1	1	2	0	.10-7.5	-	U1, 1000	-	
CR/CPP/CPR COMMUNICATIONS EQUIPMENT CIRCUIT BREAKERS										
65	DC	-	1 only	-	-	.10-30	.10-30	1000	1000	
80	DC	-	1 only	-	-	.10-30	.10-30	600	600	

(1) Non-standard construction. "Fit For Further Use" approval; (2) Non-snap action design; (3) No auxiliary switch available above 20A; (4) With 30A max. series fuse

General notes:

All supplementary protectors are of the overcurrent (OC) type

The family of protectors has been evaluated for end use application for use group (UG) A

The terminals (FW) are suitable for factory wiring only (0)

The maximum voltage ratings for which the protectors have been tested are shown in the chart

The current is the amperage range that the protectors have been tested

The tripping current (TC) for the protectors is either "1" (in the range of 125% to 135% of ampere rating) or "2" (more than 135% of ampere rating)

The overload rating (OL) – designates whether the protector has been tested for general use or motor starting applications.

0 – tested at 1.5 times amp rating for general use

1 – tested at 6 times AC rating or 10 times DC rating for motor starting

The short circuit current rating (SC) – The short circuit rating in amperes following a letter and number designating the test conditions and any calibration following the short circuit test is defined below:

C – Indicates short circuit test was conducted with series overcurrent protection

U – Indicates short circuit test was conducted without series overcurrent protection

1 – Indicates a recalibration was not conducted as part of the short circuit testing

2 – Indicates a recalibration was performed as part of the short circuit testing

3 – Indicates recalibration was performed along with the dielectric and voltage withstand for "Suitable for Further Use" rating

AUXILIARY SWITCH RATING

Silver			
3.0 amps	@	120 VAC	——
1.5 amps	@	——	32 VDC
Gold			
.100 amps	@	32 VAC	32VDC

APPROXIMATE WEIGHT PER POLE

	Ounces	Grams
Rocker Configuration	0.9	25
Toggle, PP, PR	1.2	32

Short Circuit Interrupting Capacity

1000 amperes maximum for UL and CSA, 500 amperes maximum for VDE. Consult factory for details.

Handle and Body Material

The handle and upper body material is polycarbonate and the lower body is PET.

Chemical Resistance

Handle and case may be cleaned with detergents or alcohols and should be restricted to outside surfaces only. Organic solvents are not recommended. Special attention should be given when solvents are used to remove excess flux from terminals. No oils or lubricants should be introduced into handle openings or onto bushing threads.

IEC, UL, CSA, SEV, VDE, CCC, CE, TÜV

Recognized by UL to STD-1077 and UL certified to spacing requirements of IEC 950 for basic and functional insulation for front panel mounting. Certified by CSA, file number LR26229 as recognized supplementary protectors, SEV approved, CCC approved, TÜV approved (including screw terminals) and VDE approved to VDE 0642. VDE approval of unmarked rocker handle option for appliance disconnect requires status of protectors to be indicated on the panel. Only VDE approved part numbers will be marked CE compliant. See shaded areas of part number decision tables for approved configurations and/or consult factory for exceptions and limitations.

Shock

Withstands 75G without tripping while carrying full rated current per MIL-STD-202, Method 213, Test Condition I. Instant trip breakers are tested at 80% of rated current.

Vibration

Time delayed units withstand 10G without tripping while carrying full rated current per MIL-STD-202, Method 204, Test Condition A. Instant trip breakers are tested at 80% of rated current.

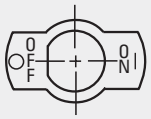
UL 489A Listed

The CR, CPP and CPR are dimensionally the same as the popular R, PP and PR Snapack products, but provide UL listing to UL489A for Communications Equipment. Available only in single pole with DC trip time delays for series or series with silver auxiliary switch configurations. As a circuit breaker, the CR, CPP or CPR provides communication equipment manufacturers with a UL listed circuit breaker in an extremely compact package that meets the stringent environmental requirements of today's marketplace. This makes the CR, CPP and CPR ideal for switching, transmission and wireless applications.

Paddle Handle Hardware

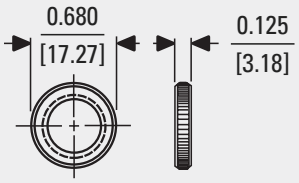
– A

Vertical Mount



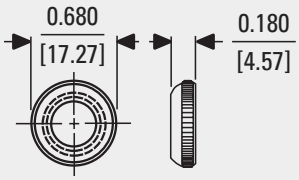
– B

Horizontal Mount



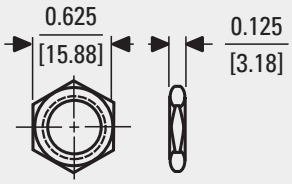
– 10 & –11

Knurled Nut



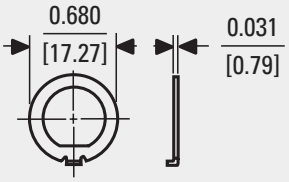
– 20 & –21

Panel Dress Nut



– 31

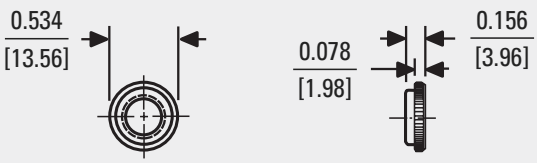
Hex Nut



– L

Locking Ring (Toggle)

Push-Pull & Push-to-Reset Hardware



3/8 - 32 Panel Nut
Bright Nickel

3/8 - 32 Hex Nut
Bright Nickel

Note: Tolerance ± .010 [.25] unless noted. Dimensions in brackets [ ] are millimeters.

HARDWARE

Indicator Plates

SNAPAK® toggle handle circuit protectors may be specified with indicator plates for either vertical or horizontal mounting. The "ON-OFF/O-I" plate is standard.

Note 1:

To allow for installation clearances, the minimum recommended distances between centers of panel openings should be:

RECOMMENDED CENTER DISTANCES FOR PANEL OPENINGS	
Breaker Type	Distance, inches [mm]
T11	0.750 [19.05]
T21	1.375 [34.93]
PP11 & PR11	0.750 [19.05]
PP21 & PR21	1.375 [34.93]
R11	0.805 [20.45]
R21	1.429 [36.30]

Note 2: Torque on mounting hardware is not to exceed 25 inch-pounds for 1/2 inch bushings or 15 inch-pounds for 3/8 inch bushings.

Mounting Nuts (Toggle)

A choice of knurled, dress and hex nuts are available. All three are available in bright nickel. The knurled and dress nuts are also available in a matte black finish. Every SNAPAK® comes with a hex nut, but you may order the front panel nuts which will best enhance your design.

Miscellaneous Hardware

SNAPAK® circuit protectors with 1/2-32 thread may also be equipped with optional locking rings to prevent rotation of the unit after it is installed.

3/8 - 32 Hex Nut and Panel Nuts

The hardware will be supplied with each Push-Pull (PP) and Push-to-Reset (PR).

3/8 - 32 Panel Nut

This nut when reversed will provide alignment in .437 (11.1) and .468 (11.88) diameter round panel holes.

HOW TO ORDER

The ordering code for the SNAPAK® circuit protectors may be determined by following the steps in the decision tables shown here.

The coding given permits a self-assigning part number, with certain limitations (due to the adaptability of magnetic protectors to complex circuits), requires a factory-assigned part number.

The example shown is the code for a paddle handle, single pole (UL construction), series circuit protector designed for operation of a 50/60Hz/DC circuit. A slow time delay and rating of 5 amperes has been indicated. Handle color is black, and a bright nickel knurled nut, vertical mount (ON-OFF) indicator plate and locking ring are to be supplied.

To determine the ordering code for your particular SNAPAK® unit, simply follow the steps shown, then fill in the letters and/or numbers in the boxes. Space is available on the circuit breaker label for your part number (up to 12 digits). You may then use your own part number to place an order or as a reference for further questions you may have. This option does require a factory assigned part number for traceability to your drawing or internal part number.

1 First Decision

Handle		Poles		Configurations*		Terminals	
T	Paddle Handle	1	Single Pole †	0	Switch Only (Note E)		Quick Connects (leave blank)
PP	Push-Pull	4	Single Pole ††	1	Series Circuit Protector	S	Screw Terminals, Single pole (-1) and series only
PR	Push-To-Reset	2	Two Pole †	3	Shunt Circuit Protector		(5th decision, group V - screw terminal option is required when 1st decision "S" is specified)
R	Rocker	5	Two Pole ††	4	Relay Circuit Protector ††††		
CR	Rocker	**		5	Series w/ Silver Aux. Switch †††		
CPP	Push-Pull	**		6	Series w/ Gold Aux. Switch †††		
CPR	Push to Reset	**		9	Mixed Construction (Two Pole Only)		

† UL & CSA Construction
†† Non UL & CSA Construction
††† Auxilary Switch is located in the left hand pole (viewed from terminal end)
†††† Does not meet spacings for many IEC / VDE equipment specs. Consult factory for additional information.
*Multi-pole units with mixed construction, poles numbered left to right when viewed from terminal end. Shunt or relay construction available in pole 2 only, other pole must be a series or switch only construction.
**UL 489A listed, available in 1 pole series or series w/silver aux. switch. DC delay only

T11 - 2- 5.00A - 01-11AL- V
1 2 3 4 5

2 Second Decision
Frequency & Delay

-0	Instant DC-50/60 Hz
-1	Fast DC-50/60 Hz
-2	Slow DC-50/60 Hz
-3	Fast w/ Inertia Wheel DC-50/60 Hz
-4	Slow w/ Inertia Wheel DC-50/60 Hz
-41	Fast 400 Hz*
-42	Slow 400 Hz*
-49	Instant 400 Hz
-51	Fast DC†
-52	Slow DC†
-59	Instant DC†
-61	Fast 50/60 Hz*
-62	Slow 50/60 Hz*
-69	Instant 50/60 Hz
-S	Switch Pole or Special Delay

*For addition of Inertia Delay an "F" may be added to delay numbers 41, 42, 51, 52, 61 and 62 only.
†CR, CPP, CPR only available in these delays

3 Third Decision
Rated Current

Circuit Breaker Construction
Use three numbers to print required current value between .100 amps minimum and 30.0 amps maximum.
For example, use:
.100 or 2.00 or 10.0

Switch Only Construction

-SW	Maintained SPST & DPST

Notes:

A A neon bulb is provided when specified for 120Vac and 250Vac operation. For operation at 120Vac a 33,000 ohm, 1/2 watt external resistor is required. At 250Vac a 100,000 ohm, 1 watt external resistor is required.

B An LED with 750 ft. L @ 20mA is provided in the center of the handle. Maximum power dissipation @ 25°C is 135mW. Continuous forward current is 20mA. Forward voltage, typical, is 1.6v at 20mA. Reverse current, typical, is 100mA @ 3.0 volts. An external resistor may be required to limit current to these values.

C When ordering Paddle Handles, you may choose one item from each hardware group to add to 5th decision if such items are desired. For example, "-11ALCA" would indicate a bright nickel knurled nut, plus a vertical mount indicator, plus a locking ring, plus #8-32 screw terminal, straight with tabs.

D All units except Rocker units will have (1) hex nut installed as standard hardware for the back of a panel. The choices in the fifth decision table are intended for the front or visible side of the panel and are offered for Paddle Handle configuration only. Push-Pull and Push-to-Reset configurations include one (1) panel nut and one (1) hex nut as standard hardware.

E Switch only — no current overload protection provided.

F. CCC Approval - If CCC is required on this product, please inform Sensata to have this product manufacturered in our China facility

4 Fourth Decision

Rocker

Step 1: Choose Letter For Body Color

B	Black	R	Black w/ Handle guard
G	Gray	S	Gray w/ Handle guard
W	White	T	White w/ Handle guard

Example: "W..."
For White Rocker Body (Rocker Style)

Step: 2: Choose Handle Combinations

Without Illumination Basic Handle Color (w/o Markings)

01	Black	Example: "-W06"
02	Red	
06	White	
07	Orange	

With Illumination Basic Handle Color & Light Choice (w/o Markings)

101	Clear w/Neon (Note A)
102	Clear w/Green Glow Neon (Note A)
103	Clear w/Red LED (Note B)
104	Clear w/4-8 Vdc Red LED
105	Clear w/8-16 Vdc Red LED
107	Clear w/Green LED (Note B)
108	Clear w/4-8 Vdc Green LED
109	Clear w/8-16 Vdc Green LED
121	Transparent Red w/Neon (Note A)
123	Transparent Red w/Red LED (Note B)
124	Transparent Red w/Red LED 4-8 Vdc
125	Transparent Red w/Red LED 8-16 Vdc
161	Translucent White w/Neon (Note A)
162	Translucent White w/ Green Glow Neon (Note A)
171	Transparent Amber w/Neon (Note A)
181	Transparent Smoke Gray w/Neon (Note A)
182	Transparent Smoke Gray w/Green Glow Neon (Note A)
183	Transparent Smoke Gray w/Red LED (Note B)
184	Transparent Smoke Gray w/4-8 Vdc Red LED
185	Transparent Smoke Gray w/8-16 Vdc Red LED
187	Transparent Smoke Gray w/Green LED (Note B)
188	Transparent Smoke Gray w/4-8 Vdc Green LED
189	Transparent Smoke Gray w/8-16 Vdc Green LED

Example: "-W124"

If you prefer NO markings, then your handle decision is now complete.

Step 3: Choose Handle Markings

Marked For Vertical Mount-After choice of 3 digit number in step 2 above.

Add "CV" for Combined markings.

Add "EV" for English markings.
Example: "-W124EV"

Add "IV" for Intíl. markings.

Marked For Horizontal Mount-After choice of 3 digit number in step 2 above.

Add "CH" for Combined markings.

Add "EH" for English markings.
Example "-W06EH"

Add "IH" for International markings.

If you have chosen a handle from this table, your 4th Decison and your catalog part number are now complete (except if you require "-S" screw terminal option from the 5th Decision Table.)

Paddle (T) Handle Color

-01	Black
-02	Red
-03	Yellow
-04	Green
-05	Blue
-06	White

If you have chosen a handle from this table, your 4th Decison is now complete except for hardware options in 5th Decision Table.

Push-Pull (PP, CPP and CPR)

-XX	No Button Markings desired (not available for CPP & CPR)	
-0A		Marked Buttons Available For These Amperages
-0B		0.1 1 10 .25 2.5 15 0.5 5 17.5 .75 7.5 20
-0C		

If you have chosen a handle from this table, your 4th Decison and your catalog part number are now complete (except if you require "-S" screw terminal option from the 5th Decision Table.)

Push-to-Reset (PR)

-XX	No Button Markings Only

If you have chosen a handle from this table, your 4th Decison and your catalog part number are now complete (except if you require "-S" screw terminal option from the 5th Decision Table.)

5 Fifth Decision

Hardware & Accessories (Notes C and D)

Group I		Group II (Indicator Plate)		Group V (Screw Terminal Options)			
-00	No Outer Hardware Desired	-A	Vertical Mount (Off/On & O/I)*	-C	SAE 8-32, Upturned Lugs (Tabs) Straight Terminal	-F	M4, Upturned Lugs (Tabs) Straight Terminal
-10	Black Knurled Nut						
-11	Bright Nickel Knurled Nut						
-20	Black Panel Dress Nut	-B	Horizontal Mount (Off/On & O/I)*	-D	SAE 8-32, Bus-Type Connect (Flat) Straight Terminal	-H	M4, Bus-Type Connect (Flat) Straight Terminal
-21	Bright Nickel Panel Dress Nut						
-31	Bright Nickel Hex Nut						
Group III							
-L	Locking Ring						

*Selection of A or B Indicator Plate required for VDE and CCC.

Please select a screw terminal option if you selected "S" in Decision 1

V = VDE, TÜV and CCC Approved

The shaded areas denote VDE, CCC (if applicable) and CE compliant options. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE approved, nor CE compliant, but other approvals still apply.

T = TÜV Approved

This approval requires the addition of a T at the end of the PN. The unit will not be VDE approved. If non-shaded areas are selected, the unit will not be TÜV approved, with the exception being you can select screw terminals and screw terminal options (1st & 5th decision) as these options are TÜV approved.

AIRPAX®

IAR/IUR/IER/CUR/CER Series
"1RU" Magnetic Circuit Protectors

AIRPAX® | IAR/IUR/IER/CUR/CER Series

"1RU" Hydraulic Magnetic Circuit Protectors

FEATURES

- UL1077, TÜV, UL489A approved
- Designed to fit in a "1RU" application
- 5,000 AIC interrupt capacity (65/80VDC, 120/240VAC)
- Series or mid-trip with auxiliary switch alarm options
- Various delays including motor start
- 1 to 2 poles, multiple termination options

INTRODUCTION

The Airpax™ IAR/IUR/IER/CUR/CER series is a snap-acting hydraulic-magnetic circuit breaker / protector that combines power switching and accurate, reliable circuit protection in one aesthetically pleasing, "1U" or "1RU" sized package.

Designed for rack mount applications, the IAR/IUR/IER/CUR/CER series allows efficient use of rack space without sacrificing performance via proven hydraulic-magnetic technology that provides consistent operation from -40°C to 85°C, with a circuit interrupt capacity up to 5,000 AIC at 65/80 VDC and120/240 VAC. Available in series trip and mid-trip configurations, with auxiliary alarm switch options to provide monitoring of critical circuits.

The CER series circuit breaker provides the necessary ratings for wireless and wired applications while meeting UL489A and TÜV requirements for approval.

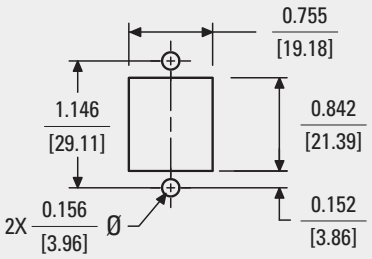
APPROVALS

Ratings	Voltage	A.I.C.	Agency Approvals	Poles
2 to 50 amps	65 VDC	5,000	UL489A & C-UL	1
2 to 50 amps	80 VDC	5,000	TÜV to EN60934	1
2 to 50 amps	250 VAC	2,000	UL1077 & TÜV to EN60934	1
2 to 50 amps	80 VDC	5,000	UL489A & TÜV to EN60934	2
2 to 30 amps	120 / 240 VAC	5,000	UL1077, C-UL, TÜV to EN60934	2

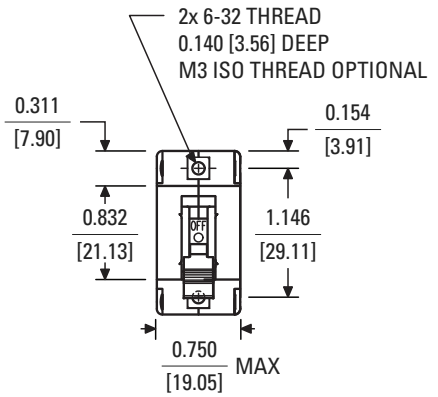
POLES & TERMINALS

The Airpax™ IAR/IUR/IER/CUR/CER series is available with one or two poles with various bullet, stud and screw terminals. Engineered for safe, sure operation, the toggle handles may be specified in blue, white, red, orange, green, yellow or black.

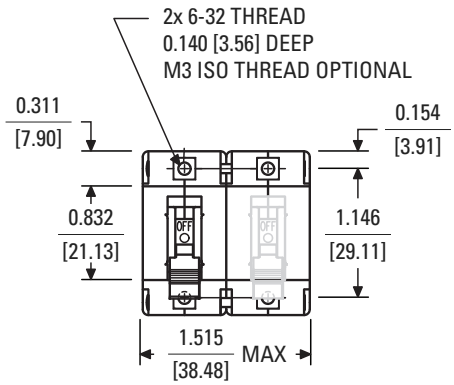
Panel Mounting Detail, Single Pole



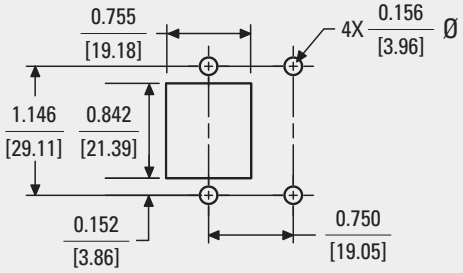
Single Pole

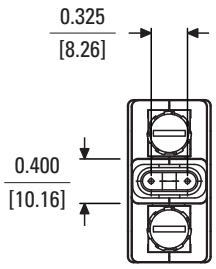


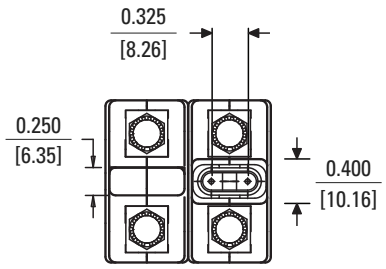
Two Pole
(with or without two handles)



Panel Mounting Detail, Two Pole, One Handle

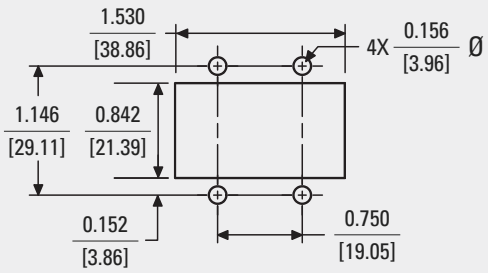




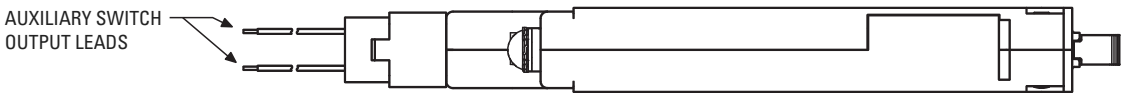


Auxiliary switch wires not shown for clarity

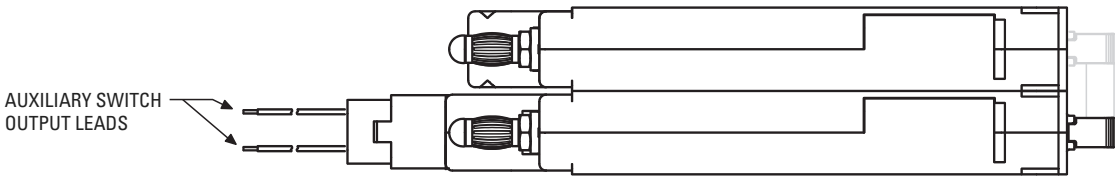
Panel Mounting Detail, Two Pole, Two Handles

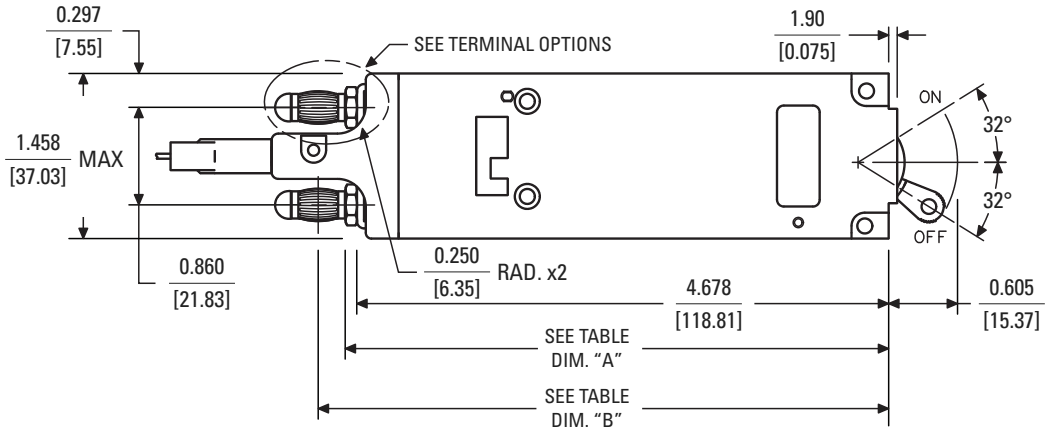


Single Pole



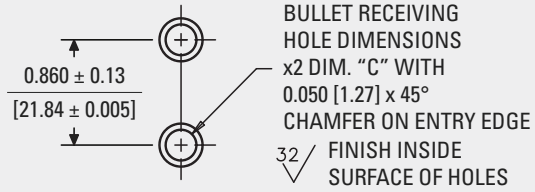
Two Pole (with or without 2nd handle)



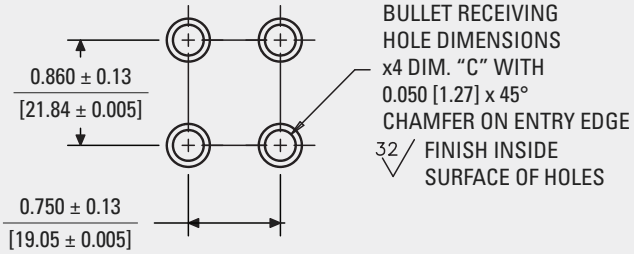


DIMENSIONS						
Bullet Type	**Dim. "A"**	**Dim. "B"**	**Dim. "C"**	**Stud Type**	**Dim. "E"**	**Dim. "F"**
1/4" Bullet	4.778 [121.35]	5.019 [127.48]	Ø 0.251 ± 0.001 Ø [6.38 ± 0.03]	10-32	0.545 [13.84]	0.622 [15.81]
5/16" Bullet	4.851 [123.22]	5.092 [129.35]	Ø 0.312 ± 0.001 Ø [7.92 ± 0.03]	M5	0.510 [12.95]	0.588 [14.92]

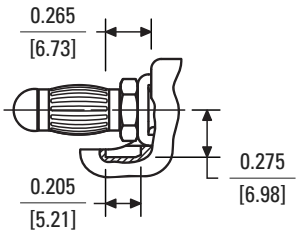
Single Pole Bullet Terminal Mounting Detail



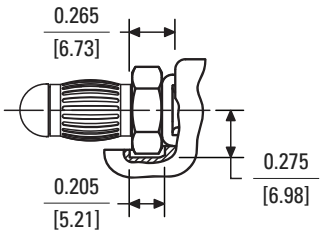
Two Pole Bullet Terminal Mounting Detail



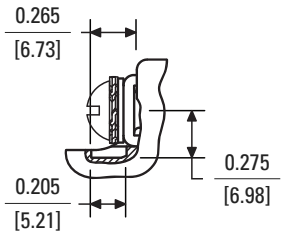
1/4" Bullet Terminals



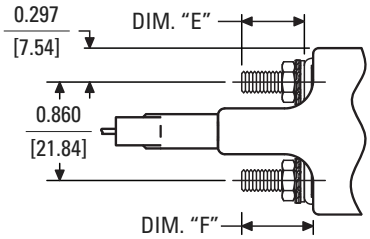
5/16" Bullet Terminals



10-32 or M5 Screw Terminals



10-32 or M5 Stud Terminals



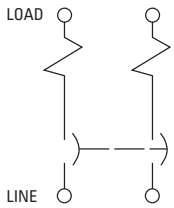
CONFIGURATIONS

Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and the contacts are in series with the load being protected. In addition to providing conventional overcurrent protection, it is simultaneously used as an on-off switch.

Single Pole, Series Trip

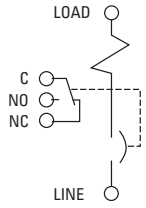
Two Pole, Series Trip



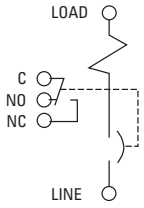
Mid-Trip

This is furnished as an integral part of a series pole in single or, multi-pole assemblies. Isolated electrically from the protectors circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's ON-OFF status.

Mid-Trip



Breaker shown in ON position or manually turned OFF position

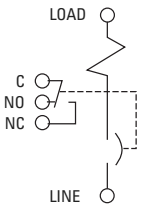


Breaker shown in mid-trip position (electrically tripped)

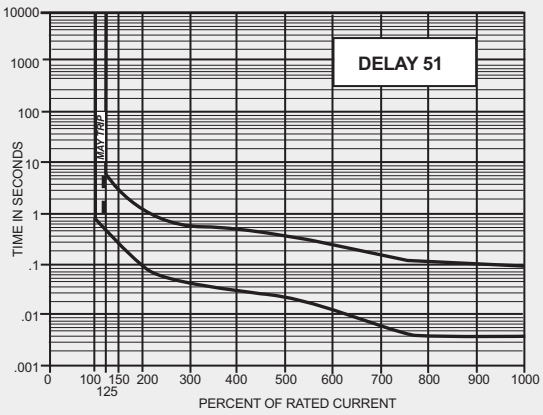
Auxiliary Switch

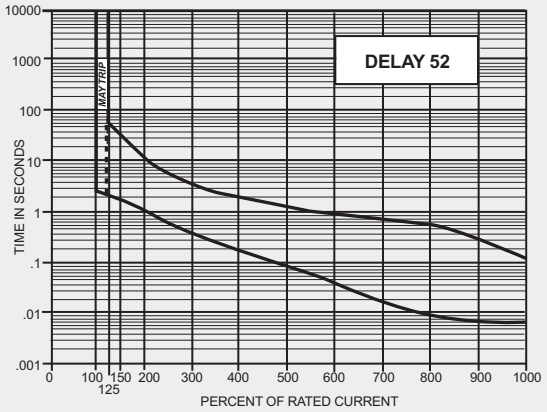
This is furnished as an integral part of a series pole in single or, multi-pole assemblies. Isolated electrically from the protectors circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's ON-OFF status.

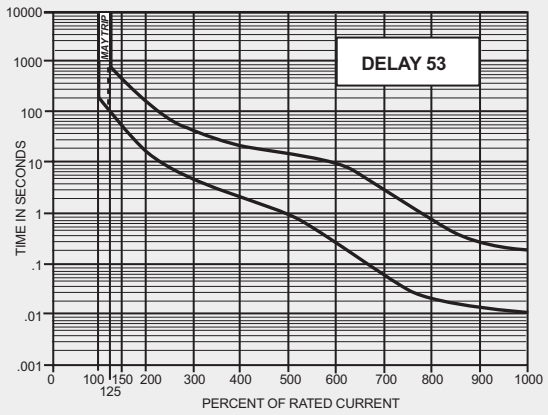
Auxiliary Switch

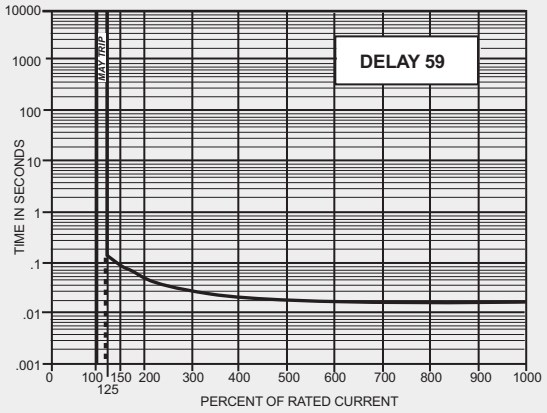


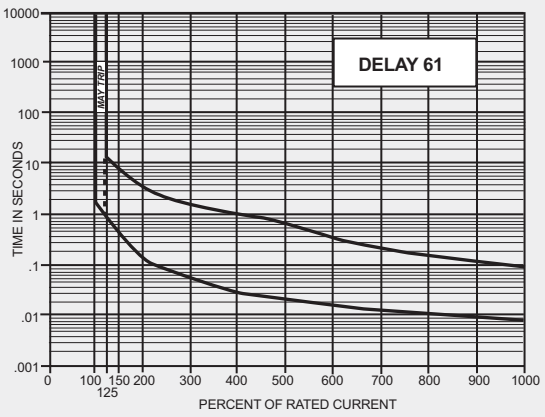
Breaker shown in OFF position

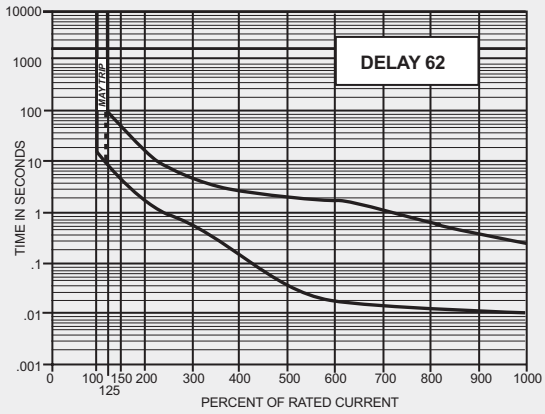


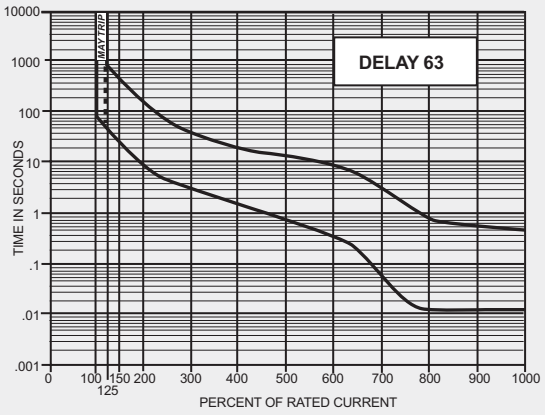


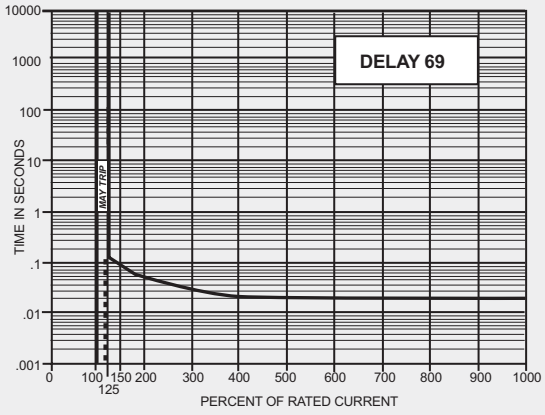












DELAY CURVES & SPECIFICATIONS

DC, 50/60Hz Delay Curves (typ)

A choice of delays is offered for DC and 50/60Hz applications. Delays 59 and 69 provide fast-acting, instantaneous trip and are often used to protect sensitive electronic equipment (not recommended where known inrush exists). Delays 51 and 61 have a short delay for general purpose applications. Delays 52 and 62 are long enough to start certain types of motors and most transformer and capacitor loads.

Trip Free

Will trip open on overload, even when forcibly held on. This prevents operator from damaging the circuit by holding handle in the ON position.

Trip Indication

The operating handle moves forcibly and positively to the OFF position on overload.

Ambient Operation

Operates normally in temperatures between –40° C and +85°C.

Insulation Resistance

Not less than 100 megaohms at 500Vdc.

Dielectric Strength

Shall withstand AC voltage 60 Hz, for 60 seconds between all electrically isolated terminals as described below.

Series, switch only	:	3,750 VAC
Auxiliary switches	:	600 VAC
Series w/ auxiliary switch	:	3,750 between main circuit breaker terminal and auxiliary switch terminal

Shock

Shall not trip when tested per MIL-STD-202, method 213, test condition 1 with 100% rated current applied to delayed units, except 90% current in plane 4, (i.e. handle down). Instantaneous units shall have 80% rated current applied in all planes.

Vibration

Shall not trip when vibrated per MIL-STD-202, method 204, test condition A with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

Endurance

In many applications contact wear due to the electrical load determines unit life. At maximum electrical ratings, the IAR/IUR/IER/CUR/CER can perform 10,000 operations at rated current and voltage at a maximum rate of 6 operations per minute.

OPERATING CHARACTERISTICS

Inrush Pulse Tolerance

Many circuit protector applications involve a transformer turn-on, an incandescent lamp load, or a capacitor charge from a DC source. Each of these applications has one common factor: a steep transient of very high current amplitude and short duration. This takes the form of a spike or a single pulse and is the cause of most nuisance tripping associated with magnetic circuit breakers.

The IAR/IUR/IER/CUR/CER series will withstand, without tripping, a single pulse of 8 milliseconds duration (half sine wave configuration) and peak amplitude of 10 times its rating.

MAXIMUM DCR AND IMPEDANCE (APPROXIMATE VALUES)

Current Ratings (Amps)	DC Resistance (Ohms) 51, 52, 53, 59	50/60Hz Impedance (Ohms) 61, 62, 63, 69
2.0	0.027	0.038
3.0	0.074	0.098
6.0	0.037	0.048
7.5	0.025	0.029
15.0	0.010	0.011
32.0	0.003	0.003
40.0	0.003	0.003
50.0	0.0024	0.0025

Tolerance: 2 to 2.5 amps ±20%; 2.6 to 20 amps ± 25%; 21 to 50 amps ±50%
**Consult factory for special values and for coil impedance of delays not shown*

AUXILIARY SWITCH RATING

10.0 amps	@	250 VAC, 60 Hz
3.0 amps	@	50 VDC
1.0 amps	@	80 VDC

APPROXIMATE WEIGHT PER POLE

1 pole	134 grams
2 pole	263 grams

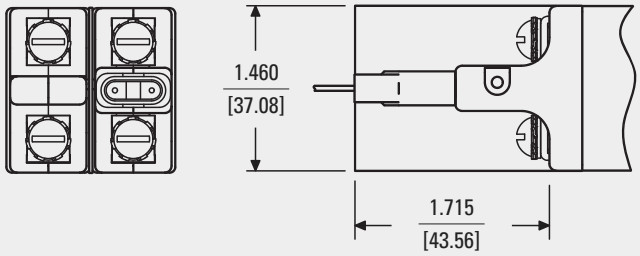
PULSE TOLERANCE

Delay	Pulse Tolerance
61, 62, 63	10 Times Rated Current

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (APPROXIMATE VALUES)

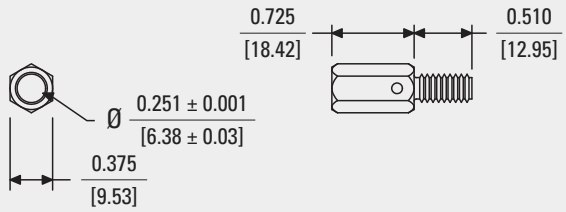
Delay	100%	125%	150%	200%	400%	600%	800%	1000%
51	No Trip	0.5 to 6.5	0.3 to 3	0.1 to 1.2	0.031 to 0.5	0.011 to 0.25	0.004 to 0.1	0.004 to 0.08
52	No Trip	2 to 60	1.8 to 30	1 to 10	0.15 to 2	0.015 to 1	0.008 to 0.5	0.006 to 0.1
53	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	0.015 to 9	0.015 to 0.55	0.012 to 0.2
59	No Trip	0.120 max	0.1 max	0.05 max	0.022 max	0.017 max	0.017 max	0.017 max
61	No Trip	0.7 to 12	0.35 to 7	0.13 to 3	0.03 to 1	0.015 to 0.3	0.01 to 0.15	0.008 to 0.1
62	No Trip	10 to 120	6 to 60	2 to 20	0.2 to 3	0.015 to 2	0.015 to 0.8	0.01 to 0.25
63	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	0.015 to 10	0.013 to 0.85	0.013 to 0.5
69	No Trip	0.12 max	0.1 max	0.05 max	0.022 max	0.017 max	0.017 max	0.017 max

Barrier (-B)

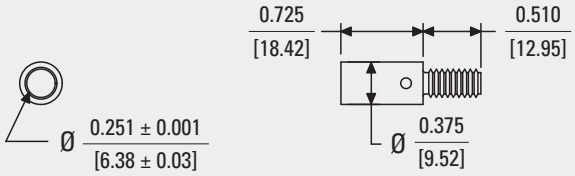


Bullets

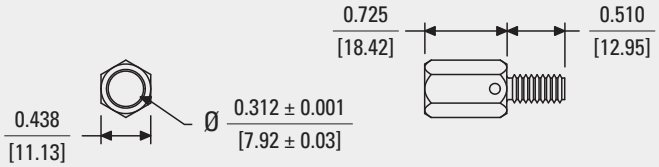
Socket 1/4-20 UNC-2A
Order # 641-480-5032
(silver plated copper)



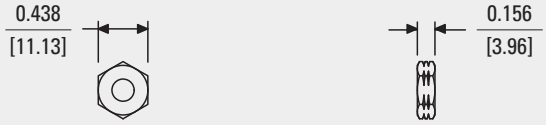
Socket 1/4-20 UNC-2A
Order # 641-480-5030
(silver plated copper)



Socket 1/4-20 UNC-2A
Order # 641-480-5022
(silver plated copper)



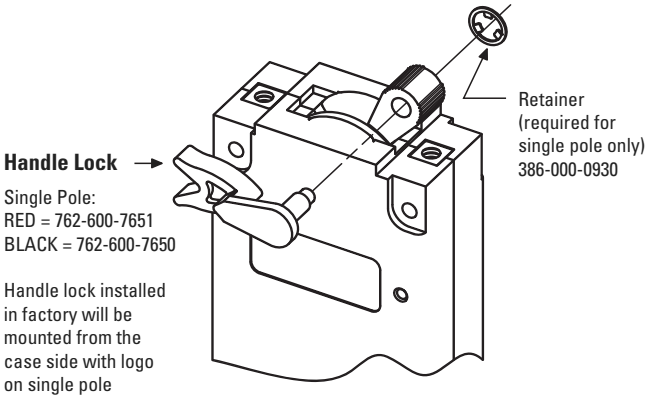
Nut 1/4-20 UNC-2B
Order # 388-899-5010
(silver plated copper)



HARDWARE

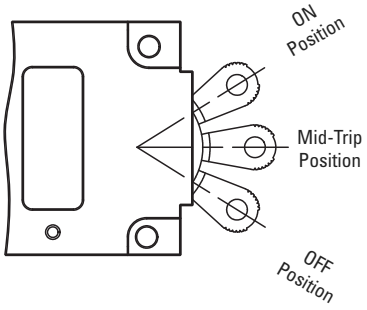
Handle Lock

A handle lock option is available to prevent accidental actuation of the handle. The handle lock may be used in the ON or OFF position. Use of the handle lock on breakers with alarm style auxiliary switches may defeat the alarm feature on electrical trip. This option is available separately or pre-assembled (on single pole constructions only).



Mid-Trip

The handle position indicates the status of the circuit breaker. In addition to full ON and full OFF positions, there is a middle "MID-TRIP" position indicating that the breaker has electrically tripped from an overload. It is available in single pole and multi-pole (handle per pole only) series constructions. Switch only configuration is not available in mid-trip build. An auxiliary switch can be furnished as an integral part of the mid-trip breaker. The switch provides an indication at a remote location when the circuit breaker has electrically tripped and handle is in the mid-trip position.



HOW TO ORDER

The ordering code for these circuit breakers / protectors may be determined by following the steps in the decision tables shown here.

The example shown is the code for a UL1077 & TÜV approved circuit protector with series trip, one handle per unit, single pole circuit protector with 10-32 terminal screws standard and a mechanical auxiliary switch. This unit is designed with a slow DC time delay and a rating of 20 amperes with optional metric threads and optional 80VDC capability. Handle color is black with white markings, and is has been met all the selection criteria to obtain the TÜV approval.

To determine the ordering code for your particular unit, simply follow the steps shown, then fill in the letters and/or numbers in the boxes. Space is available on the circuit breaker label for your part number (up to 12 digits). You may then use your own part number to place an order or as a reference for further questions you may have. This option does require a factory assigned part number for traceability to your drawing or internal part number.

1

First Choice: Type		Second Choice: Terminal	
IAR	Magnetic circuit protector, one handle per unit		10-32 screw terminal, standard (no entry)
IARH	Magnetic circuit protector, one handle per pole	K	10-32 stud terminal
IER	UL1077 & TÜV, series trip, one handle per unit	B	0.250" bullet terminal
IERH	UL1077 & TÜV, series trip, one handle per pole		
IUR	UL1077, series trip, one handle per unit		
IURH	UL1077, series trip, one handle per pole		
IMR	UL1077 & TÜV, mid trip, one handle per unit		
IMRH	UL1077 & TÜV, mid trip, one handle per pole		
CER	UL489A & TÜV, series trip, one handle per unit		
CERH	UL489A & TÜV, series trip, one handle per pole		
CUR	UL489A, series trip, one handle per unit		
CURH	UL489A, series trip, one handle per pole		
CMR	UL489A & TÜV, mid trip, one handle per unit		
CMRH	UL489A & TÜV, mid trip, one handle per pole		

The shaded areas denote TÜV approval options. This approval requires the addition of a "T" at the end of the part number (8th decision).

The "T" will automatically be added to any part number formed entirely from these shaded decisions. If non-shaded areas are selected, the unit will not be TÜV approved, but other approvals (if applicable) will still apply.

IER 1 - 1REC4C - 52 - 20.0 - AD - 01 - T

1 2 3 4 5 6 7 8

8 TÜV Approval

Per first decision's description: The shaded areas denote TÜV approval options. This approval requires the addition of a "T" at the end of the part number (8th decision).

2 Number of Poles

1	Single pole
11	Two pole

7 Handle Color & Markings

-00	Black	-01	Black w/ white markings (standard)
-10	Yellow	-11	Yellow w/ black markings
-20	Red	-21	Red w/ white markings
-30	Blue	-31	Blue w/ white markings
-40	Green	-41	Green w / white markings
-60	Orange	-61	Orange w/ black markings
-90	White	-91	White w/ black markings

3 Internal Configuration

-1	Series trip
-1REC4C	Mechanical trip auxiliary switch*
-1RS4C	Electrical trip auxiliary switch*
-1RLS4C	Electrical trip auxiliary switch* (mid-trip only)
-1REG4C	Series trip with auxiliary switch* 0.110 quick-connects (gold contacts)
-1REC40	Mechanical trip auxiliary switch**
-1RS40	Electrical trip auxiliary switch*
-1RLS40	Electrical trip auxiliary switch* (mid-trip only)
-1REG40	Series trip with auxiliary switch* 0.110 quick-connects (gold contacts)

* Alarms when circuit breaker closes
** Alarms when circuit breaker opens

Only one auxiliary switch is normally supplied on two pole units. Switch is located in the right hand pole (viewed from terminal end) unless otherwise specified.

6 Optional

-A	Metric thread mounting (M3) & terminals (M5)
-B	Barrier (AC only)
-C	65 VDC
-D	80VDC
-E	0.312" diameter bullet (standard is 0.250" when prefix with "B" is chosen in first decision)
-F	250VAC
-L	Handle Lock

Notes:
1. One or more descriptions may be used as required (for example, to get a barrier, 250VAC and handle lock, put -BFL)
2. When the sixth decision is not required, the seventh decision may be substituted and U.S. thread will be supplied

4 Frequency & Delay

-51	DC short delay
-52	DC long delay
-53	DC motor start / extra long delay
-59	DC 125% instant trip
-61	50 - 60 Hz short delay
-62	50 - 60 Hz Long Delay
-63	50 - 60 Hz motor start / extra long delay (30A max)
-69	50 - 60 Hz 125% instant trip

5 Rated Current

Use three numbers to print required current value between 2.00 amps minimum and 50.0 amps maximum.

AIRPAX®

AP/UP, AP/MIL Series
Magnetic Circuit Protectors

AIRPAX® | AP/UP, AP/MIL Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

The Airpax™ AP series are fully sealed, magnetic circuit protectors that combine power switching and accurate, reliable circuit protection with inverse time delays and trip free features.

Unlike a thermal circuit protector, the AP does not change its trip current over a wide temperature span. In addition, the AP magnetic circuit protector is available in either DC, 50/60Hz or 400Hz versions and with various delays to match the protector to specific application requirements.

One of the most important features of this protector is the "trip free" action, which means the circuit will not remain closed in the presence of an overload even though the handle is held in the ON position. The delay mechanism senses the fault and the contacts open.

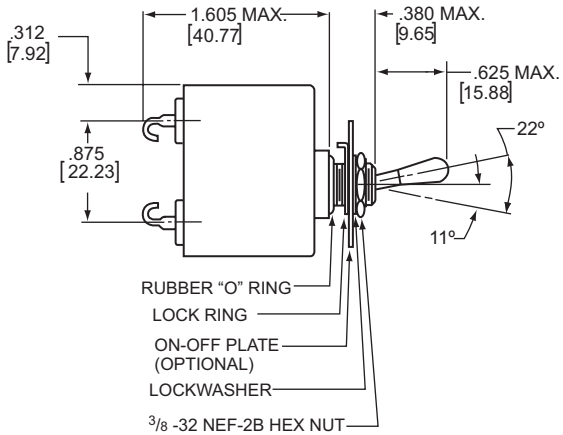
Waterproof panel integrity is provided by an "O" ring bushing seal and a silicon rubber gland within the bushing/handle assembly. Salt spray testing per MIL-STD-202, Method 101, Test Condition B, with no evidence of corrosion, electrical or mechanical damage.

Typical applications include communication, navigation and aircraft instrumentation, radar and power supplies.

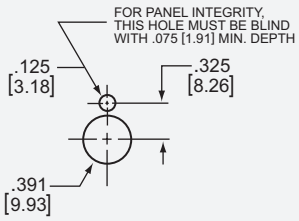
The Airpax™ UP circuit protector, with UL recognition and CSA certification, is essentially the same as the AP in construction and operating principle. It is approved for operation at 50 volts DC to 20 amperes, 120 volts 50/60Hz to 15 amperes and 240 volts 50/60Hz to 7.5 amperes. The UP circuit protector is available in single pole units only, due to UL and CSA creepage specifications and the wide glass terminals utilized.

The Airpax™ AP-MIL protectors are produced in accordance with MIL-PRF-39019 and the pertinent specification sheets, are subjected to an exacting production and test program to maintain their Qualified Products Listing (QPL). One, two and three pole series trip units, with or without auxiliary contacts, have been accepted for this listing. Refer to specification sheets MIL-PRF-39019/1 through 6 for the application government designations. The AIRPAX cage code number is 81541.

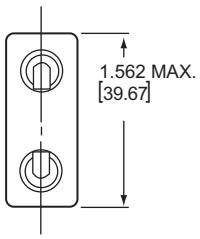
SINGLE POLE CIRCUIT PROTECTORS

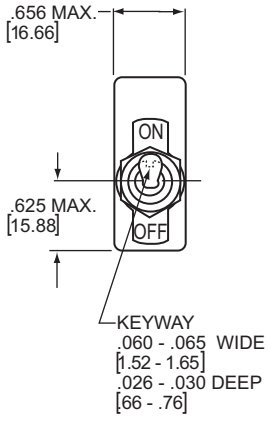


Mounting Detail



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13]
Maximum Panel Thickness: .156 [3.96]





MULTI-POLE CIRCUIT PROTECTORS

AP Multi-Pole Combinations

Circuit demands and design ingenuity suggest a limitless number of special combinations, ranging from a two pole unit with one series breaker and a simple ON·OFF switch, to a more complex three pole unit having one series, one shunt and one relay configuration with auxiliary indicator circuit contacts. Please contact Airpax for specific part number.

Two Pole, AP12

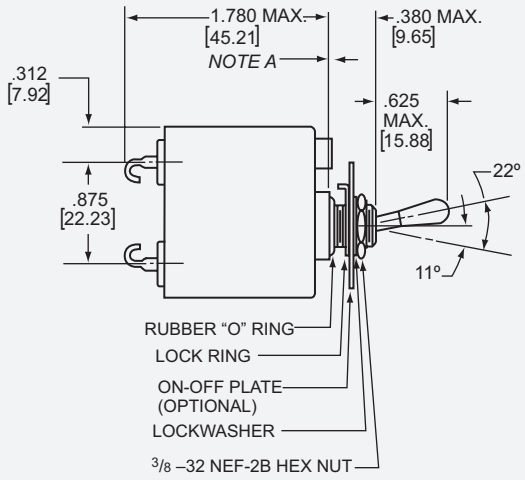
Two of the basic units are combined in a sealed case to provide protection for dual circuit. A single toggle handle actuates both internal trip mechanisms. Conversely, an overload in either circuit trips both simultaneously.

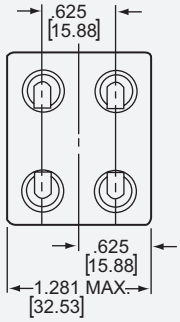
The AP12 consists of two independent series trip protectors, each available with its own rating and delay characteristics.

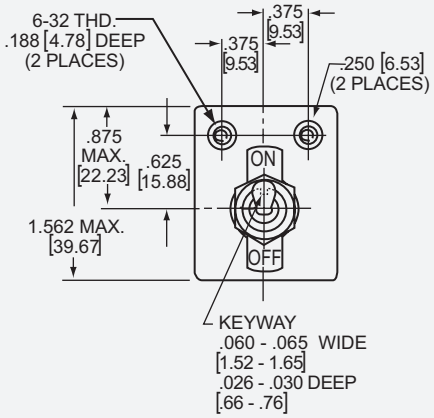
This two pole unit can therefore have an unlimited number of combinations, which makes ordering by a code system impractical. Thus, if the poles differ, a descriptive drawing is recommended.

One frequent use of two pole protectors is to interrupt either or both sides of a power line. Likewise, three pole protectors often use three identical coils. However, any two or three pole protectors may have any coil of any delay in any desired combination. (Unless otherwise specified, we assume the two or three poles to be all alike.)

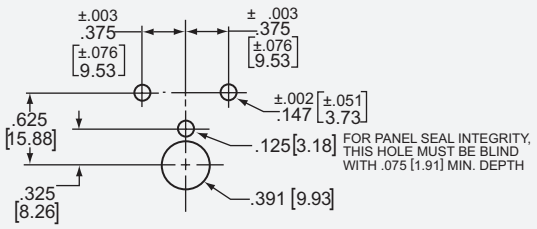
Two Pole, AP12, Toggle







Mounting Detail



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13]
Panel Thickness: .125-.156 [3.18-3.96]

Note: Tolerance ± .031 [.79] Angles: ±5° unless noted. Dimensions in brackets [ ] are millimeters.
A: Threaded inserts exceed seated height of bushing by .005-.015 [.13-.38]

combination. (Unless otherwise specified, we assume the two or three poles to be all alike.)

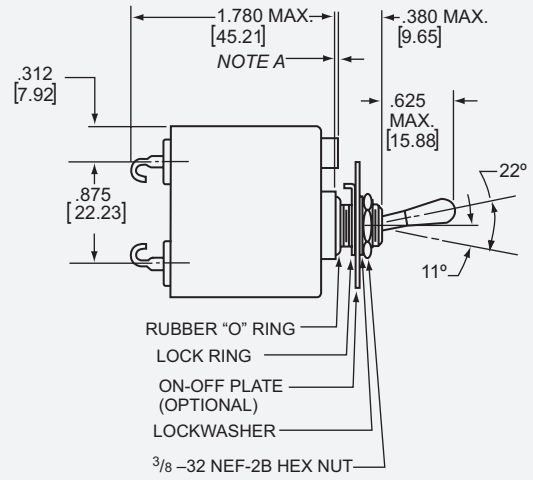
All multi-pole units have provisions for a rugged three point panel mount. Use of 6-32 panel seal screws together with the bushing mount is recommended to maintain specification shock and vibration levels.

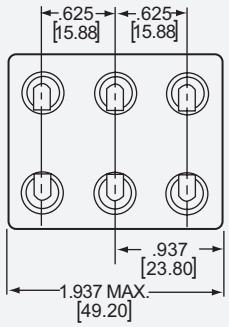
Three Pole, AP112

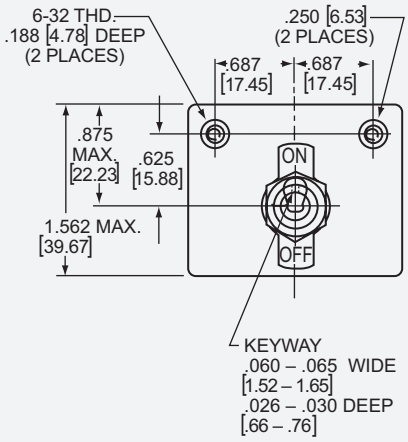
Three circuits may be simultaneously protected. One actuating toggle handle closes all circuits and all poles trip in the presence of an overload on any circuit. Some typical combinations could be: 3 series poles; 2 series and one shunt; 2 series and one relay; or 3 series with a set of auxiliary contacts.

Like the two pole protectors, each pole may have different ratings and delays.

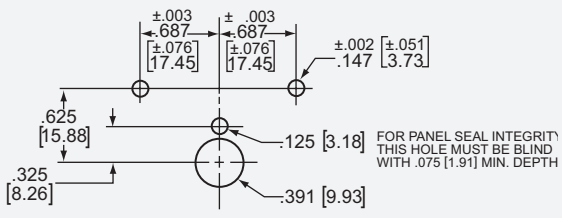
Three Pole, AP112, Toggle







Mounting Detail



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13]
Panel Thickness: .125-.156 [3.18-3.96]

CONFIGURATIONS

Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as a power disconnect.

Shunt Trip

The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

Relay Trip

This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed immediately upon tripping.

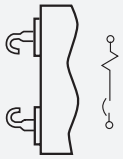
Remote Indication, AP1-1R

AP series trip circuit protectors are available with electrically isolated contacts which are rated at 1/2 ampere, 120 volts AC or 50 volts DC. These contacts provide SPDT switching action which can be used to indicate "power-on" and "power-off" conditions or to actuate lights, alarms or timing devices.

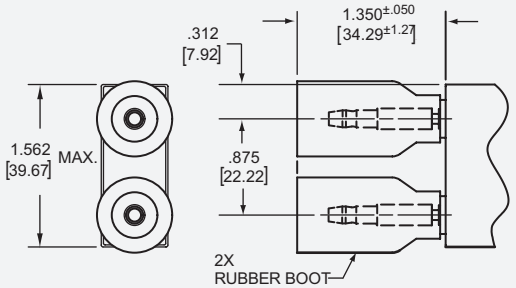
Voltage Trip

Sometimes called "dump circuits" or "panic trip circuits," these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt or relay configurations.

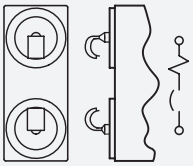
Series Trip
AP1-1

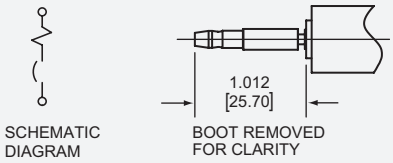


Optional Booted
Terminals

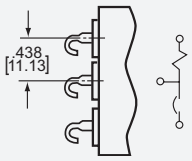


UP1-1
(UL Recognized
Series)

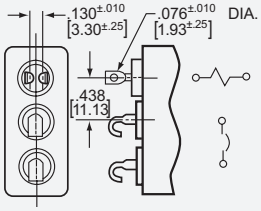




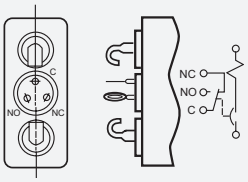
Shunt Trip
AP1-3



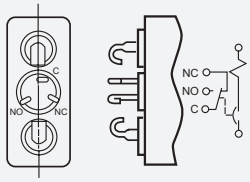
Relay Trip (Note A)
AP1-4 (Relay)



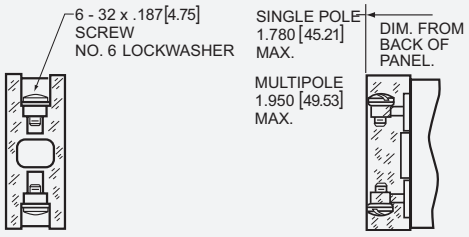
Series with Auxiliary Switch
AP1-1R (Note A)



Switch with Auxiliary Switch
AP1-1RC (Note A)



AP7-1 (Screw Terminal with Terminal Block)



Note: Tolerance ± .031 [.79] Angles: ±5° unless noted.
Dimensions in brackets [ ] are millimeters.
A. Main protector contacts open.

OPERATIONAL CHARACTERISTICS

Inrush Pulse Tolerance

The following table provides a comparison of inrush pulse tolerance with and without the inertial delay feature for each of the 50/60Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milli-seconds duration that will not trip the circuit protector.

DELAY VS PEAK AMPLITUDE

Delay	Peak Amplitude
61, 62, 71, 72, A, B	4 Times Rated Current (60Hz)
61F, 62F, 71F, 72F	6.5 Times Rated Current (60Hz)
64, 65	10 Times Rated Current (60Hz)
64F, 65F	13 Times Rated Current (60Hz)
41, 42, AF, BF	14 Times Rated Current (400Hz)
41F, 42F	20 Times Rated Current (400Hz)
51, 52	6 Times Rated Current (60Hz)
51F, 52F, AF, BF	8 Times Rated Current (60Hz)

SERIES RESISTANCE NOMINAL VALUES @ +25°C

Current Ratings DC, 50/60Hz, 400 Hz (Amps)	DC Series Resistance All Delays except 40, 50, 60 (ohms)	DC Series Resistance Delays 40, 50, 60 (ohms)
0.050	470	105
0.100	145	27.0
0.250	18.0	3.80
0.500	4.30	1.00
0.750	1.60	0.400
1.00	1.15	0.230
2.00	0.298	0.060
3.00	0.130	0.033
5.00	0.052	0.012
7.50	0.025	0.007
10.0	0.016	0.006
15.0	0.006	0.005
20.0	0.005	0.004

Tolerance at ±25% values based on V-A method after 1 hour stabilization at 100% rated current. Consult factory for other limits.

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (VERTICAL MOUNT)

Delay	100%	125% (Note A)	200%	400%	800%
40*	No Trip	.035 Max	.025 Max	.015 Max	.015 Max
41	No Trip	.200 to 7	.055 to .950	.010 to .240	.005 to .080
42	No Trip	3 to 60	.500 to 9	.010 to 1.75	.005 to .100
49*	No Trip	.100 Max	.050 Max	.020 Max	.015 Max
50*	No Trip	.035 Max	.025 Max	.015 Max	.015 Max
51	No Trip	.400 to 4	.060 to .600	.010 to .200	.005 to .035
52	No Trip	4 to 40	.600 to 6	.010 to 1.50	.005 to .050
59*	No Trip	.100 Max	.050 Max	.020 Max	.015 Max
60*	No Trip	.035 Max	.025 Max	.015 Max	.015 Max
61	No Trip	.500 to 5	.070 to .700	.020 to .200	.008 to .080
62	No Trip	4 to 40	.800 to 8	.010 to .300	.005 to .080
64	No Trip	.900 to 10	.200 to 1.70	.040 to .500	.012 to .100
65	No Trip	9 to 60	1.15 to 7	.110 to 1	.010 to .190
69*	No Trip	.100 Max	.050 Max	.020 Max	.015 Max
71 (Note B)	No Trip	.200 to 7	.055 to .950	.010 to .240	.005 to .080
72 (Note B)	No Trip	3 to 60	.500 to 9	.010 to 1.75	.005 to .100
79 (Note B)	No Trip	.100 Max	.050 Max	.020 Max	.015 Max

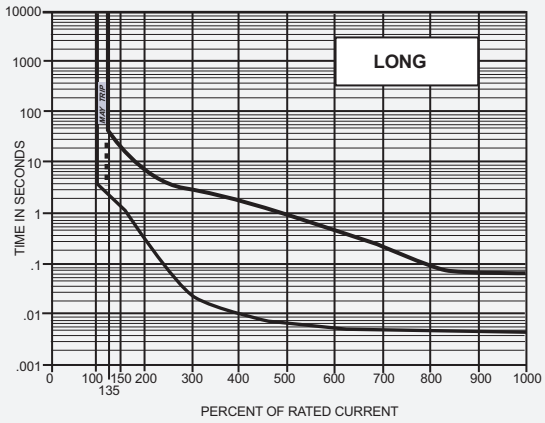
**Notes: Instantaneous delays (40, 49, 59, 60, 69, 79) are not compatible with inrush enhancement options and are not recommended for general use.*
A. 150% for delays 40, 50 & 60. 135% minimum trip for delays 41, 42, 49, 71, 72 & 79.
B. Military time delays. 71=A, 72=B, 79=C

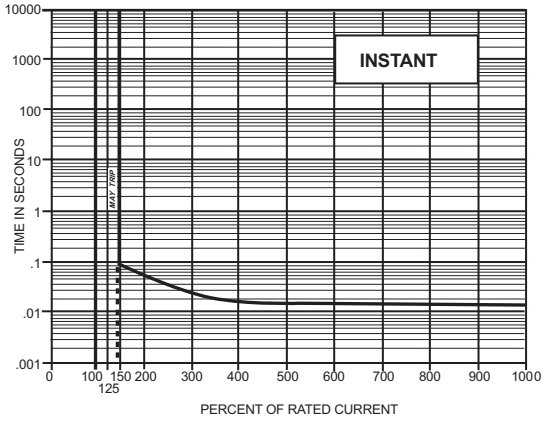
TYPICAL DELAY CURVES

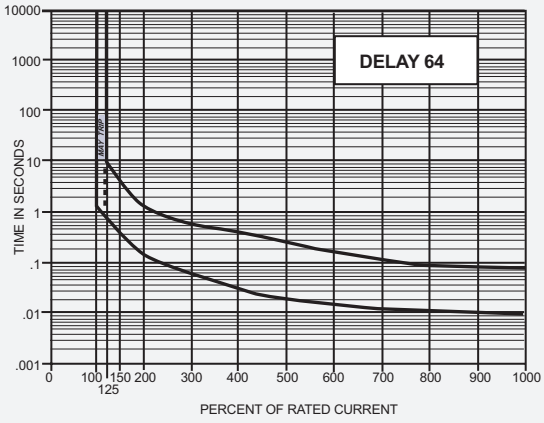
The delay curves below illustrate our standard instant, short and long delays. Please consult factory for specific delay curves or refer to table on page 87.

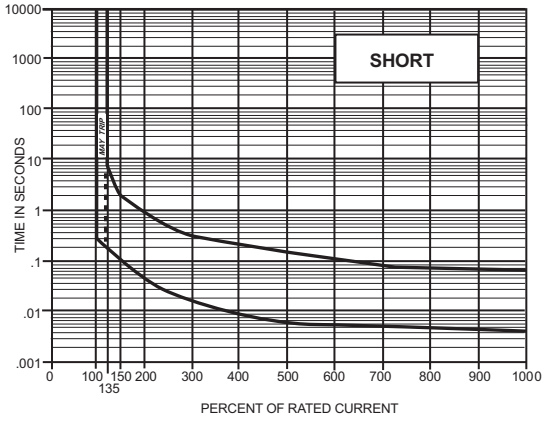
Delay curves 64 and 65 illustrate the improved inrush tolerance provided compared to standard delays. Not available in MIL configurations.

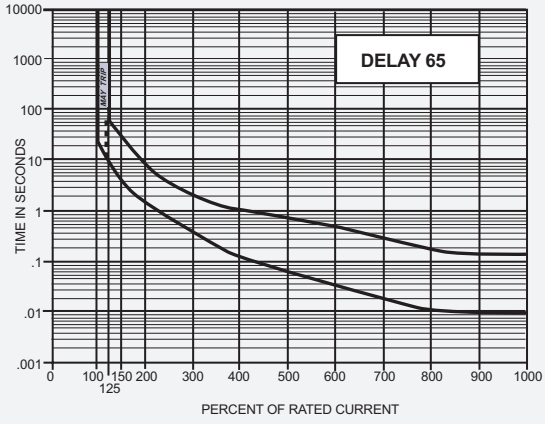
All trip times and trip currents are specified with the breaker mounted in the normal vertical position at ambient temperature of 25°C. For time delay test and measurement purposes, the breakers should not carry current prior to application of overload.











Trip Free

AP circuit protectors will trip open on overload, even when forcibly held ON. This prevents the operator from damaging the circuit by holding the handle in the ON position.

Trip Indication

The operating handle of the breaker moves forcibly and positively to the OFF position on overload. It is not necessary to manually "reset" to full "OFF" in order to turn it on again.

Ambient Operation

The protector will operate at any ambient between –40° C and +100° C, when tested in accordance with the requirements
of MIL-PRF-39019.

Insulation Resistance

Exceeds 100 megohms at a potential of 100Vdc.

Dielectric Strength

The protector will withstand 1250 volts RMS, 60Hz from terminals to case and between the terminals when open.

Endurance

With the circuit protector operated as an ON-OFF switch, operating life exceeds 10,000 operations at a rate of 6 per minute when tested as follows: 6000 OPS @ rated current plus 4000 OPS @ no load.

Ratings

AP protectors are available in current ratings from 50 milliamperes to 20 amperes, 50 volts DC or 240 volts AC, maximum, 60 Hz or 400 Hz. UP protectors are UL 1077 and CSA approved as per the following table. Please consult factory for ratings other than those noted.

Lever Strength

The operating lever or its seal will not be damaged by a 10 lb. force applied in any direction.

Shock

All protectors withstand 100G without tripping, even while carrying full rated current with shock applied in any plane of 6 ms duration. Test is made according to Method 213, Test Condition I or MIL-Std-202 as outlined in Paragraph 4.6.14 of MIL-PRF-39019. Delay 40, 50 and 60 breakers are tested at 80% of rated current.

Vibration

All protectors withstand vibration from 10 to 55 cycles at .06 double amplitude and 55 to 2000 cycles at 10G, applied in any plane, without damage and without tripping even while operating at full rated current. Test is made in accordance with Method 204A, Test Condition C, of MIL-Std-202 as outlined in Paragraph 4.6.12 of MIL-PRF-39019. Delay 40, 50 and 60 protectors are tested at 80% of rated current.

Short Circuit Capacity

When tested in accordance with the procedures of UL1077, AP supplementary protectors have a short circuit capacity of 1000 amperes at 32Vdc, 120Vac, 240Vac, 60 or 400Hz. Parts are recognized to UL1077 for type UP1 only. The rated Rupture Capacity per MIL-PRF-39019 is 500 amperes, 50 volts DC, 500 amperes, 120 volts AC and 300 amperes, 240 volts AC, 60 or 400Hz.

Case Seal

The breaker is fully sealed and will not show evidence of leakage under total immersion. Meets requirements of MIL-PRF-39019.

Panel Seal

The "O" ring provides, with the other illustrated hardware, a seal against a pressure differential of 15 psi applied for an hour.

RATINGS

Series	Voltage	Current	TC	OL	Short Circuit Rating (SC, amps)	CSA	Phase
UP	50 VDC	0.05 to 20 amps	1	1	U1, 1000	YES	—
UP	240 VAC	0.05 to 7.5 amps	1	0	C1, 1000 4X fuse max	YES	1
UP	120 VAC	0.05 to 15 amps	1	1	C1, 1000 4X fuse max	YES	1
UP	240 VAC (400)	0.05 to 7.5 amps	1	0	C1, 1000 4X fuse max	YES	1
UP	120 VAC (400)	0.05 to 15 amps	1	0	C1, 1000 4X fuse max	YES	1

RECOMMENDED TORQUE SPECIFICATIONS

Component	Torque (in-lbs)
6-32 Mounting Inserts	6 to 8
6-32 Screw Terminals	6 to 8
3/8-32 Mounting Bushing Nut	20 to 25

AUXILIARY SWITCH RATING

3.0 amps	@	120 VAC	50 VDC

APPROXIMATE WEIGHT PER POLE

1.8 Ounces	49 Grams

HOW TO ORDER

The ordering code for AP magnetic circuit protectors may be determined by following the steps in the decision tables shown here.

For example, the following is the code for a two pole AP, hook terminal, series unit, designed for operation in a DC circuit. It has a short time delay and a rating of 20 amperes. The coding given permits a descriptive part number, with limitations. In the illustrated double pole example (AP12-1-51-203), it is automatically assumed that both poles are identical. One great virtue of magnetic circuit protectors is their adaptability to complex circuits, thus variations from pole to pole become the rule rather than the exception. Descriptive drawings are recommended. In this event, factory assigned part numbers are utilized.

To determine the ordering number for your particular AP unit, simply follow the steps shown. You may use this number to place a order or as a reference for further questions you may have.

Notes:

A The UP has a wide glass terminal to meet UL and CSA creepage specifications. Except as completely non-standard there is no space for more than two terminals and the UP is therefore limited to only the single pole series circuit configuration (Third Decision Table – 1). Delays available in the UP are: 40, 50 and 60; 41, 51 and 61; 42, 52 and 62; 64, 65, 69, 71, 72 and 79.

B Users should refer to the applicable drawings of MIL-PRF-39019. Configurations vary dependent upon the revision of MIL-PRF-39019. The 6-32 threaded mounted bushings, useful for added strength, are approved under this specification.

To assure that proper parts are received, consult the factory for application assistance if there is any doubt about which version is correct for the application concerned.

C Screw terminals are available and are equipped with standard terminal block. Space permits their use only in the series configuration (Third Decision Table). Standard terminals are heavy copper hooks.

D Screw terminals with SPDT auxiliary switch, available only with the series circuit, may have “R” soldering terminals, flattened and pierced, or “RC” soldering terminals which are cane hooks. Screw terminals (–7, –17, –117) are available with SPDT auxiliary switch “R” type only.

E The nominal current values for 100% of rated current (see delay curves) are those listed. Other values can be readily supplied, in general, without delayed delivery. For values above or below the listed range, please consult an Airpax sales office or sales representative.

F Consult factory for assigned part numbers.

Example:

AP12 -1 -51-203-FM

1 2 3 4 5 6

1 First Decision

Type

AP	Fully sealed magnetic circuit protector
UP (Note A)	Underwriters' Laboratories recognized circuit supplementary protector
AP - MIL (Note B)	/1 through /6 QPL per MIL-PRF-39019

2 Second Decision (Note C)

Poles

Hook Terminals	Screw Terminals	
1	7	Single pole unit, mounted with 3/8 threaded bushing
12	17	Two pole unit, bushing plus (2) 6-32 threaded inserts
112	117	Three pole unit, bushing plus (2) 6-32 threaded units

3 Third Decision

Internal Configuration

-0	Switch Only (Omit 4th and 5th Decisions)
-1	Series
-1R (Note D)	Series with Auxiliary Switch with pierced pin terminals
-1RC (Note D)	Series with Auxiliary Switch with cane hook terminals
-3	Shunt
-4	Relay (5 amps max coil rating)

Multi-pole units with mixed construction, poles numbered left to right when viewed from terminal end (Note F).

4 Fourth Decision

Hz and Delay

-40	400Hz 150% instant trip*
-41	400Hz short time delay
-42	400Hz long time delay
-49	400Hz 135% instant trip*
-50	DC 150% instant trip*
-51	DC short time delay
-52	DC long time delay
-59	DC 125% instant trip*
-60	50/60Hz 150% instant trip*
-61	50/60Hz short time delay
-62	50/60Hz long time delay
-64	50/60Hz high pulse, short time delay (50/60Hz only)
-65	50/60Hz high pulse, long time delay (50/60Hz only)
-69	50/60Hz 125% instant trip*
-71	DC, 50/60Hz, 400Hz short time delay 135% trip
-72	DC, 50/60Hz, 400Hz long time delay 135% trip
-79	DC, 50/60Hz, 400Hz instant time delay 135% trip*

For addition of inertial delay, add an ìFî to any delay number. Except 40, 50 & 60.

*Instantaneous delays are not compatible with inrush enhancement options and are not recommended for general use.

5 Fifth Decision (Note E)

Nominal Amperage Rating

Code	Amperes
-051	.050
-101	.100
-201	.200
-251	.250
-401	.400
-501	.500
-601	.600
-751	.750
-102	1.000
-1251	1.250
-1751	1.750
-202	2.000
-252	2.500
-302	3.000
-502	5.000
-702	7.000
-752	7.500
-802	8.000
-103	10.000
-123	12.000
-153	15.000
-173	17.000
-203	20.000

See page 61 for maximum voltage ratings.

Note: Standard current ratings listed. For other ratings, please consult the factory.

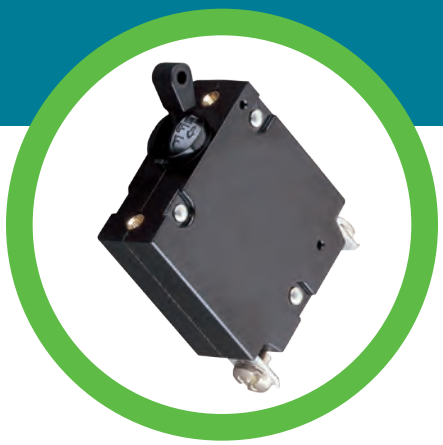
6 Optional

FM Approved (Factory Mutual Research)

Add –FM to part number to indicate FM approval. FM approval is available for Single Pole, Series Trip, UP type units only.
TA = –40ºC to +65ºC
Units ≤ 10A are rated CL 1, DIV 2, Group ABCD, T6
Units > 10A are rated CL 1, DIV 2, Group ABCD, T4A

AIRPAX®

IPA/CPA Series
Magnetic Circuit Protectors



AIRPAX® | IPA/CPA Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

The Airpax™ IPA/CPA hydraulic-magnetic circuit protectors provide low-cost power switching, reliable circuit protection and accurate circuit control for equipment in the international marketplace.

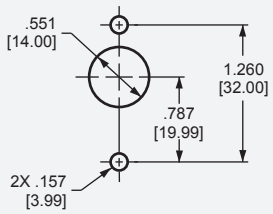
IPA models meet IEC spacing requirements that are mandatory for equipment which must comply with IEC specifications 601 and 950 and VDE specifications 0804 and 0805. In addition, they are UL Recognized as supplementary protectors per UL STD. 1077, CSA Certified as supplementary protectors per CSA C 22.2-No. 235, TUV Approved to VDE 0642 (EN60934), CCC Approved (pending) and CE Compliant.

Designed using the latest in sensitive hydraulic magnetic technology, the IPA line adapts itself to many applications and environments. They're ideal for data processing and business machines, medical instrumentation, broadcast equipment, vending and amusement machines, military applications and wherever precision operation is required. Temperature differences which affect fuses and other thermal devices are not a concern.

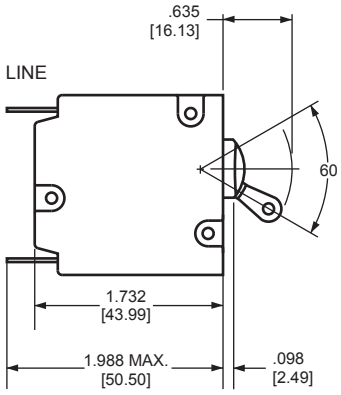
One important feature of this protector line is a "trip free" action, which means the circuit will trip in the presence of an overload even though the handle is held in the ON position. The delay mechanism senses the fault and the contacts open.

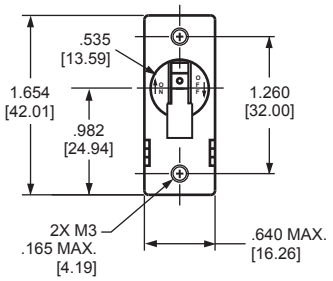
The IPA is available in configurations including series and series with auxiliary switch, with a choice of delays and ratings in either DC, 50/60Hz or 400Hz versions. Single or multi-pole versions are available, with a variety of pole arrangements to meet your specifications.

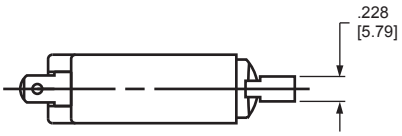
Mounting Detail



SINGLE POLE CIRCUIT PROTECTORS (ONE HANDLE)







Notes:
1. Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.
2. Main circuit breaker terminals are stationary male push-on type: .248 [6.30] wide x .031 [.787] thick x .474 [12.00] long, or screw type: M4 x .354 [8.99] wide x .031 [.787] thick x .474 [12.00] long.

MULTI-POLE CIRCUIT PROTECTORS

Two Pole Protectors

An assembly consisting of two single pole units, having their trip mechanisms internally coupled and with a single toggle handle, forms the IPA-11 with quick-connect D.I.N.-style terminals. Individual poles may differ in ratings, delays and internal connections. An auxiliary switch may be included in either or both poles, allowing you to mix SELV and hazardous voltages. Rugged screw-type terminals can be provided, in which case the designation would be IPA-66. The IPAH offers a toggle handle for each pole.

Three Pole Protectors

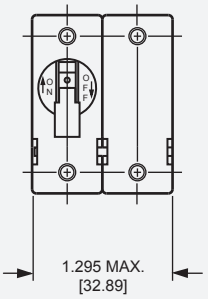
The three pole construction consists of three single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A single toggle handle operates all three poles for quick and convenient control, or if preferred, a handle per pole is available. The individual poles need not have identical characteristics and any series trip pole may have an auxiliary switch. If screw-type terminals are required, the breaker designation will be IPA-666 for a three pole version.

Breaker poles are numbered consecutively when viewed from the terminal side, with the ON position up, starting with Pole #1 on the left side and proceeding to the right.

Handles

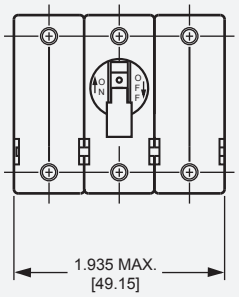
The IPAH two and three pole models are available with a handle per pole.

Two Pole Protectors
(one handle)



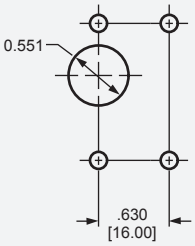
(Optional: Handle may be located in Pole 1 instead of Pole 2)

Three Pole Protectors
(one handle)

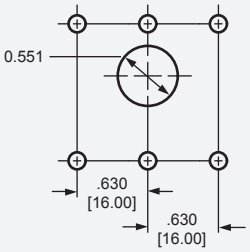


Mounting Details

Two Pole

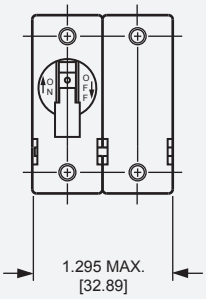


Three Pole



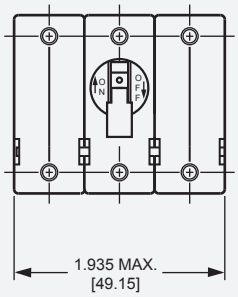
Note: Tolerance ± .015 [.38] unless noted. Dimensions in Brackets [ ] are millimeters.

Two Pole Protectors
(one handle)



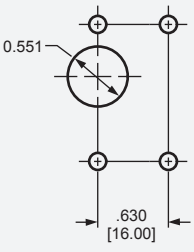
(Optional: Handle may be located in Pole 1 instead of Pole 2)

Three Pole Protectors
(one handle)

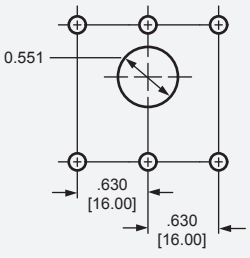


Mounting Details

Two Pole

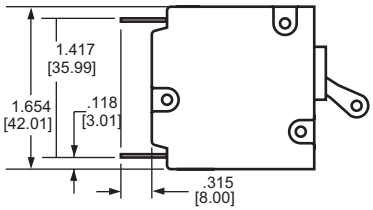


Three Pole

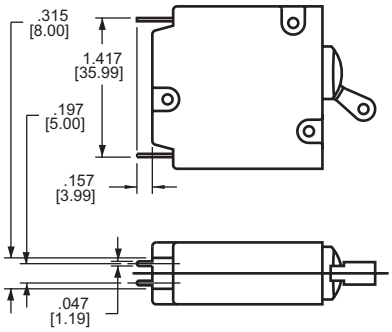


Note: Tolerance ± .015 [.38] unless noted. Dimensions in Brackets [ ] are millimeters.

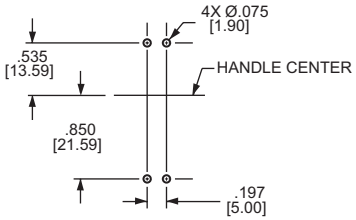
PC (PRINTED CIRCUIT) BOARD MOUNTED CIRCUIT PROTECTORS



Printed Circuit Board Mounting Terminal Type "S"



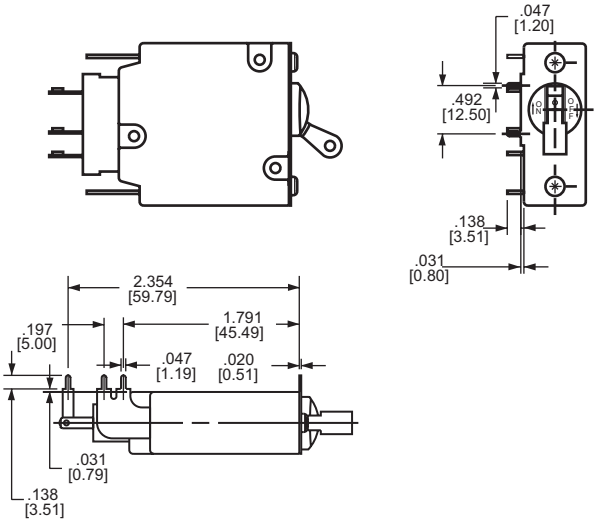
Mounting Detail



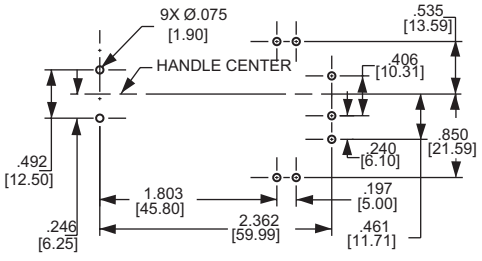
(Auxiliary switch is not recommended with this type mounting.)

Note: Tolerance ± .015 [.38] unless noted.
Dimensions in brackets [ ] are millimeters.

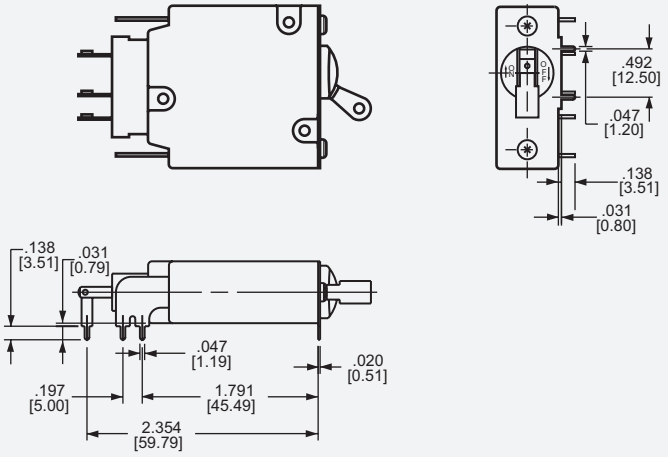
Printed Circuit Board Mounting Terminal Type "R"



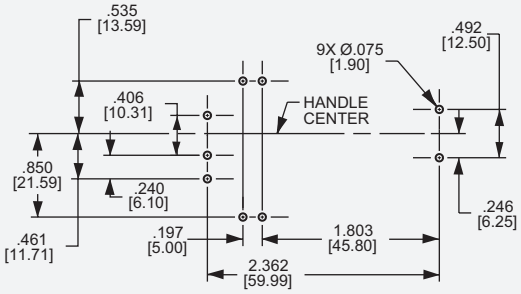
Mounting Detail



Printed Circuit Board Mounting Terminal Type "L"



Mounting Detail



Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

CONFIGURATIONS

Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. In addition to providing conventional overcurrent protection, the handle position conveniently indicates circuit status.

Auxiliary Switch (Applies to Series Trip Only)

This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.

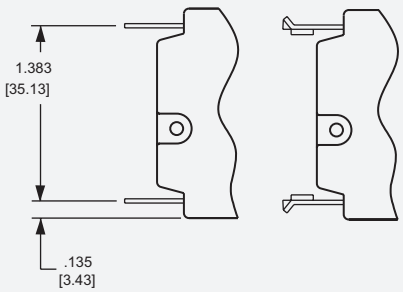
Auxiliary switch contacts actuate simultaneously with the main breaker contacts, and will open regardless of whether the breaker contacts are opened manually or electrically. For auxiliary switch ratings below 6Vac or 5Vdc, an auxiliary switch with gold contacts, designated as REG, is available. Gold contacts are not recommended for load current above 100 milliamps. An optional auxiliary switch, RS, configuration allows an alarm or signal to be forwarded only upon electrical overload, allowing for easier detection of fault circuit.

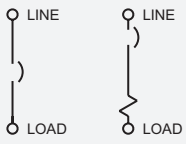
TYPICAL RESISTANCE / IMPEDANCE

Current Ratings (Amps)	Series Type (Except delays 40, 50, 60)		
	DC (ohms)	AC, 50/60Hz (ohms)	AC, 400Hz (ohms)
0.050	427	478	—
0.100	100	103	204
0.250	19	20	34
0.500	4.6	6.3	8.2
0.750	2.04	2.06	3.52
1.00	0.91	0.92	1.86
2.50	0.17	0.19	0.28
5.00	0.045	0.046	0.073
7.50	0.018	0.019	0.037
10.0	0.013	0.014	0.020
15.0	0.0072	0.0073	0.0109
20.0	0.005	0.0051	—
25.0	0.003	0.0035	—

*DCR and Impedance values are based on measurements by the voltmeter ammeter method. Rated current is applied for one hour and at a voltage not less than 20 volts. Ambient temperature: 25 C; Tolerance: Below 10 amps ± 25%; Above 10 amps ± 50%; *Consult factory for special values and for coil impedance of delays not shown.*

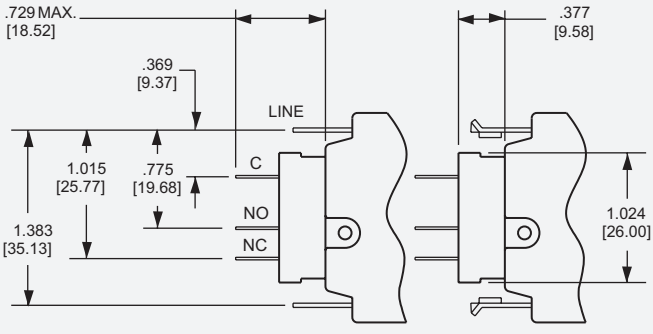
Series Trip

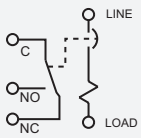




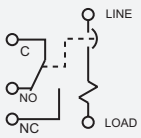
Switch Series

Series with Auxiliary Switch

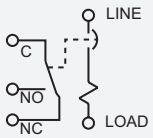




C-NC = Breaker in "OFF" position.



Breaker in "ON" or manually turned "OFF" position.



Breaker in electrically tripped "OFF" position.

Series with Auxiliary Switch

Auxiliary Alarm Switch (IRS4, IRSG4)

Notes:
1. Main circuit protector terminals are stationary male push-on type: .248 [6.30] wide x .031 [.787] thick x .474 [12.00] long, or screw type: M4 x .354 [8.99] wide x .031 [.787] thick x .474 [12.00] long.
2. Auxiliary switch terminals are: .110 [2.79] wide x .020 [0.51] thick x .343 [8.71] long.
3. Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

AGENCY APPROVALS

IPA Series				Rated Current (Amps)		Interrupting Capacity (Amps)	
Max Voltage Rating	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL1077 & CSA**	**TÜV**
65	DC	—	1	.05 to 30	.05 to 25	3000	1000 (Note 1)
80	DC	—	1	.05 to 20	—	300	—
240	50/60	1 & 3	1	25.1 to 30	—	1000 (Note 1)	—
250	50/60	1 & 3	1	.05 to 25	.05 to 25	1000 (Note 2)	1000 (Note 1)
250	50/60	1	2	.05 to 30	.05 to 30	1500	1500 (Note 1)
250	400	1 & 3	1	.10 to 15	.05 to 15	1000	1000 (Note 1)
CPA Series				**Rated Current (Amps)**		**Interrupting Capacity (Amps)**	
Max Voltage Rating	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL1077 & CSA**	**TÜV**
65	DC	—	1	1 to 30	—	1000	—

Notes: (1) with 4 times rated series backup fuse.
(2) with 80A max. series fuse.

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (VERTICAL MOUNT)

Frequency	Delay	100%	125%	150%	200%	400%	600%	800%	1000%
400 Hz	40	No Trip	May Trip	May Trip	.090 Max	.060 Max	.050 Max	.040 Max	.035 Max
	41	No Trip	May Trip	.2 to 9	.09 to 3	.02 to .6	.006 to .3	.003 to .2	.003 to .15
	42	No Trip	May Trip	3 to 80	1 to 25	.06 to 4	.01 to 1.5	.004 to .6	.003 to .3
	400	No Trip	May Trip	20 to 900	6 to 250	.2 to 45	.01 to 6	.003 to .9	.003 to .5
DC	51*	No Trip	.500 to 16	.3 to 5	.13 to 1.5	.03 to .2	.005 to .1	.003 to .05	.003 to .025
	52*	No Trip	7 to 100	3 to 40	.620 to 15	.12 to 2.5	.003 to .5	.003 to .05	.003 to .025
	59*	No Trip	.120 Max	.073 Max	.038 Max	.021 Max	.017 Max	.017 Max	.017 Max
	500	No Trip	70 to 800	25 to 300	10 to 100	1.2 to 20	.007 to 5	.004 to .65	.003 to .1
50/60 Hz	61	No Trip	.700 to 15	.3 to 4	.1 to 1.3	.02 to .25	.006 to .13	.003 to .07	.003 to .04
	62	No Trip	12 to 180	6 to 70	2 to 25	.15 to 3.5	.005 to .3	.004 to .13	.004 to .04
	69	No Trip	.120 Max	.073 Max	.038 Max	.021 Max	.017 Max	.017 Max	.017 Max
	600	No Trip	50 to 800	20 to 300	5.5 to 110	.3 to 17	.004 to .5	.004 to .5	.004 to .1

Notes: All trip times and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of 25 C.
Breakers do not carry current prior to application of overload.
**CPA type units are available only with 51, 52 and 59 delays.*

TYPICAL DELAY CURVES - DC, 50/60HZ, 400HZ

A choice of delays is offered for DC, 50/60Hz and 400Hz applications.

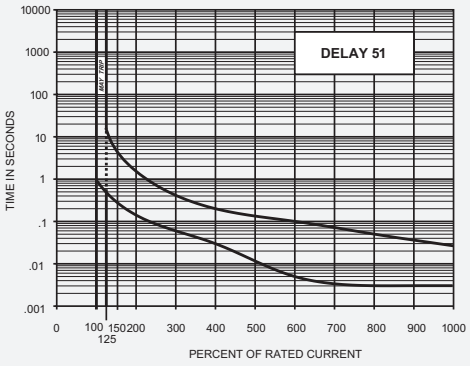
Delays 40, 59 and 69 provide fast acting, instantaneous trip and are often used to protect sensitive electronic equipment (not recommended where a known inrush exists).

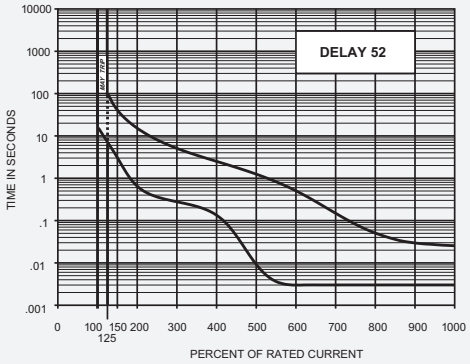
Delays 41, 51 and 61 have a short delay for general purpose applications.

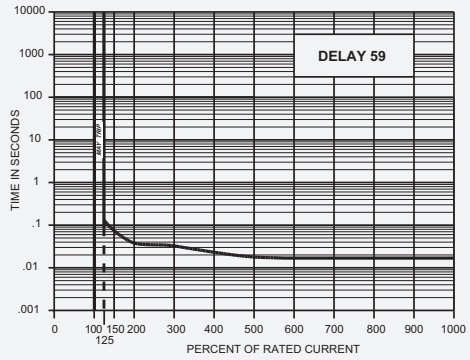
Delays 42, 52 and 62 are long enough to start certain types of motors and most transformer and capacitor loads.

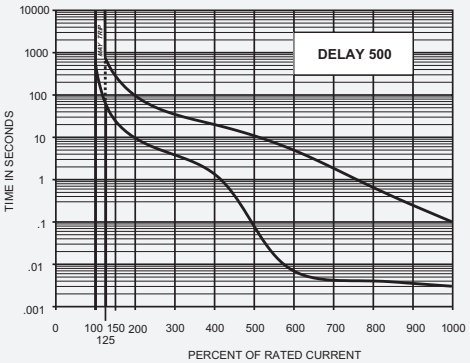
Delays 400, 500 and 600 are long delays for special motor applications.

DC Delay Curves (typ)

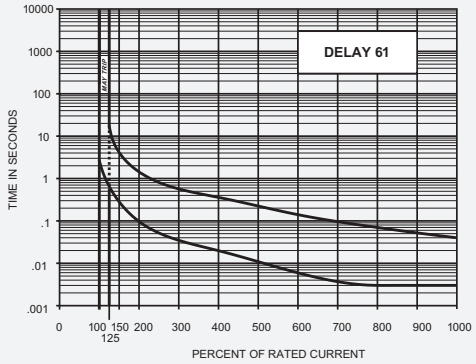


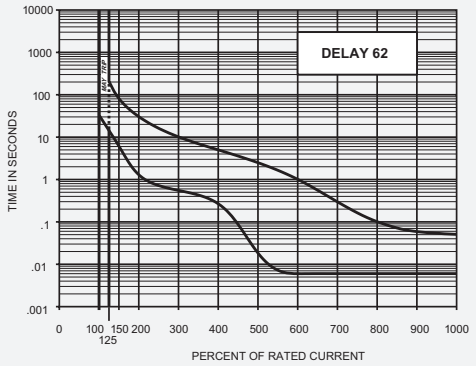


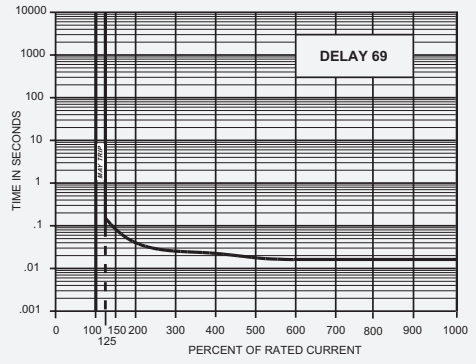


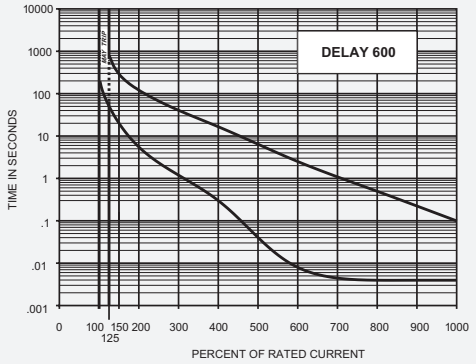


50/60Hz Delay Curves (typ)

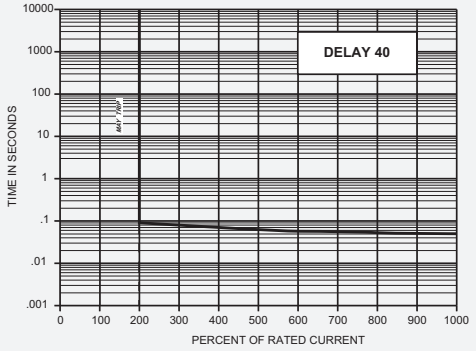


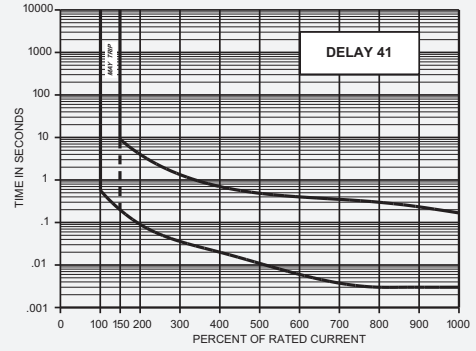


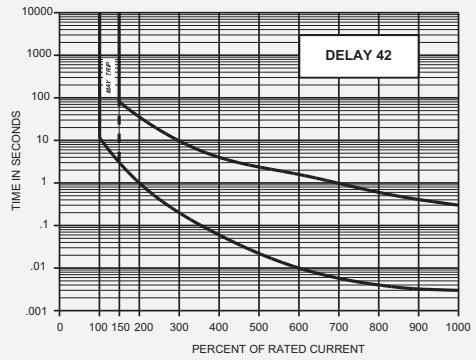


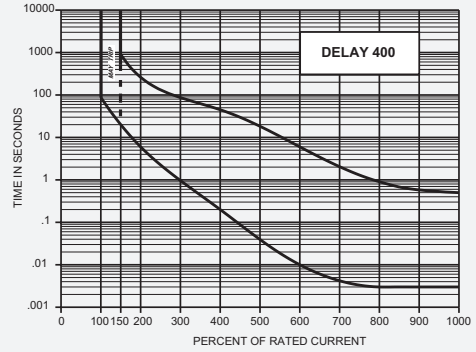


400Hz Delay Curves (typ)









SPECIFICATIONS

Trip Free
Will trip open on overload, even when the handle is forcibly held on or restrained. This prevents operator from damaging the circuit by holding the handle in the ON position.

Trip Indication
The operating handle moves positively to the OFF position.

Ambient Operation
IPA protectors operate in temperatures between –40°C and +85°C.

Insulation Resistance
Not less than 100 megohms at 500 volts DC.

Dielectric Strength
IPA protectors withstand 3000Vac, 60Hz for 60 seconds between all electrically isolated terminals except auxiliary switch terminals shall withstand 500Vac, 60Hz for REG and REC types.

Endurance
Operating as a switch, the operating life exceeds 10,000 operations, at rated current, at a rate of 6 per minute.

Electrical Characteristics
IPA protectors are rated .050 to 30 amperes 65Vdc; .050 to 30 amperes 240 Vac 50/60Hz; 0.050 to 15 amperes 250Vac, 400Hz.

Poles
One through three poles available.

Construction
Series and series with auxiliary switch available in various delays and combinations.

Auxiliary and Alarm Switch
When supplied shall be S.P.D.T. configuration with a maximum rating of 3.0 amperes, 250Vac resistive load. Gold contacts are rated at .100 amperes, 125Vac resistive load.

Moisture Resistance
Meet all the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-STD-202.

Salt Spray (Corrosion)
Meet the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-STD-202.

Shock
Circuit protectors shall not trip when tested per MIL-STD-202, Method 213, Test Condition B with 100% rated current applied to delayed units and 80% rated current to instantaneous units. Units with auxiliary switches will withstand 30G max.

Vibration
Circuit protectors shall not trip when vibrated per MIL-STD-202, Method 201, Test Condition A with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
M4 Terminal Screws	10 to 12
Where applicable, mechanical support must be provide to the terminals when applying torque	

APPROXIMATE WEIGHT PER POLE	
Ounces	**Grams**
1.7	48

INRUSH PULSE TOLERANCE	
Delay	**Pulse Tolerance**
61, 62, 600	8 times rated current
61F, 62F, 600F	12 times rated current
Comparison of inrush pulse tolerance is with and without the inertia delay feature for each of the 50/60 Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit protector.	

HOW TO ORDER

The ordering code for IPA/CPA protectors may be determined by following the steps in the decision tables shown here.

Note:

A The coding given permits a self-assigning part number.Other configurations may require a factory assigned part number. Typical examples are units with mixed ratings, combinations of styles or construction. With these, it is suggested that order entry be by description and/or drawings and a part number will be assigned. Additionally, it is a standard policy to establish a factory assigned part number wherever a descriptive drawing exits to provide cross reference, traceability and manufacturing control.

1 First Decision

Type

IPA	One toggle handle per unit UL Recognized
IPAP	One toggle handle per unit UL Recognized PC board mount
IPAH	One toggle handle per pole UL Recognized
IPAHP	One toggle handle per pole UL Recognized PC board mount
CPA	One toggle handle per unit UL Listed per UL489A
CPAH	One toggle handle per pole UL Listed per UL489A

2 Second Decision

Poles

-1	Single pole w/ quick connect terminals or PC board if P is used.
-11	Two pole w/ quick connect terminals or PC board if P is used.
-111	Three pole w/ quick connect terminals or PC board if P is used.
-6	Single pole w/ screw terminals
-66	Two pole w/ screw terminals
-666	Three pole w/ screw terminals

Example: IPAP -1 -1REC4 - 61- 10.0 - L - 01 - T

1 2 3 4 5 6 7 8

3 Third Decision

Configurations

-0	Switch only
-1	Series
-1REC4	Series with silver contact Auxiliary switch
-1REG4	Series with gold contact Auxiliary switch
-1RS4	Series with silver contact Alarm switch
-1RSG4	Series with gold contact Alarm switch

Notes:
1. For switch type, eliminate 4th & 5th decision.
2. Switch will be marked with Max. current & voltage.
3. The alarm switch is located in the handle pole for single handle types and in pole 2 for units with a handle per pole. The auxilliary switch may be located in any pole. However the standard location is in pole 2.
4. Switch type with alarm switch must be multi-pole connected to a pole equipped with either an overcurrent or overvoltage mechanism. (Consult factory for further information.)

4 Fourth Decision

Frequency & Delay

SW	Switch only
-40	400Hz instant trip
-41	400Hz short delay
-42	400Hz long delay
-400	400Hz motor start
-50	DC instant trip*
-51	DC short delay*
-52	DC long delay*
-500	DC motor start
-60	50/60Hz instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-600	50/60Hz motor start

Note: For addition of inertial delay, add an "F" to any delay numeral. (Example: 62F)
*CPA types are only available with DC ratings.

5 Fifth Decision

Rated Current

Use three numbers to specify required value within ranges described below.

Rating
0.50-30.0*

Notes:
1. On multi-pole units, the poles are numbered left to right when viewed from terminal end.
2. *15 amps maximum at 400Hz

6 Sixth Decision (Optional)

Mounting & Terminal Type

A-	Metric M3 mounting inserts and if screw terminals M4.
L-	PC board mounting plate & terminals, 90 facing left
R-	PC board mounting plate & terminals, 90 facing right
S-	PC board terminals, rear facing with front panel insert mount.

Note: Right and Left determined with breaker viewed from the rear, in normal vertical mounted position. (see pages 70 & 71)

7 Seventh Decision

Handle Color

01	Black with I/O markings

8 Eighth Decision (Optional)

Agency Approval

T	TUV*
C	CCC

Notes:
1. *25 amperes maximum rated current for TUV Approval
2. CCC Approval is pending.

AIRPAX®

IAG/IUG/IEG/CEG/LEG
Magnetic Circuit Protectors

AIRPAX® | IAG/IUG/IEG/CEG/LEG Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

The Airpax™ IAG/IUG/IEG/CEG/LEG magnetic circuit protectors provide low-cost power switching, reliable circuit protection and accurate circuit control for equipment in the international marketplace.

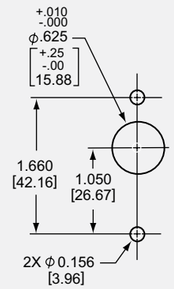
IEG models meet IEC spacing requirements which is mandatory for equipment that must comply with IEC specifications 601 and 950 and VDE specifications 0804 and 0805. In addition, they are UL Recognized as supplementary protectors per UL STD. 1077, CSA Certified as supplementary protectors per CSA C22.2–No. 235, VDE Approved to VDE 0642 (EN60934), CCC Approved and CE Compliant. IAG models are for those applications where the unit's inherent attributes are desired, but compliance with the various standards is not required.

Designed using the latest in sensitive hydraulic magnetic technology, the IAG/IUG/IEG/CEG/LEG line adapts itself to many applications and environments. They're ideal for data processing and business machines, medical instrumentation, broadcast equipment, vending and amusement machines, military applications and wherever precision operation is required. Temperature differences which affect fuses and other thermal devices are not a concern.

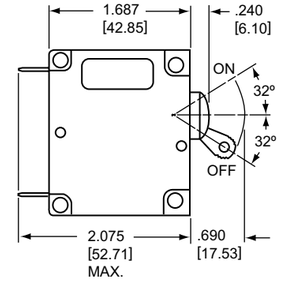
One important feature of this protector line is a "trip free" action, which means the circuit will trip in the presence of an overload even though the handle is held in the ON position. The delay mechanism senses the fault and the contacts open.

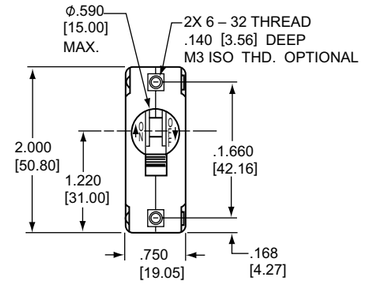
The IAG/IUG/IEG/CEG/LEG is available in a wide variety of configurations including series, series with auxiliary switch, shunt and relay with a choice of delays and ratings in either DC, 50/60Hz or 400Hz versions. Handles come in seven different colors and international markings are standard. Single or multi-pole versions are available, with a variety of pole arrangements to meet your specifications. Four pole models require a double toggle handle. Units with a handle per pole come in one through six pole assemblies.

Single Pole Mounting Detail

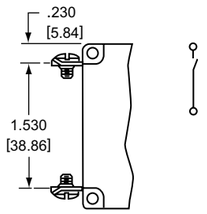


SINGLE POLE CIRCUIT PROTECTOR





LEG Type Units Require Screw Terminals



Note: Tolerance ±.015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

MULTI-POLE CIRCUIT PROTECTORS (IAG/IUG/IEG/CEG/LEG)

Two Pole Protectors

An assembly consisting of two single pole units, having their trip mechanisms internally coupled and with a single toggle handle, forms the IEG11 with quick-connect D.I.N.-style terminals. Individual poles may differ in ratings, delays and internal connections. An auxiliary switch may be included in either or both poles, allowing you to mix SELV and hazardous voltages. Rugged screw-type terminals can be provided, in which case the designation would be IEG66. The IEGH offers a toggle handle for each pole. LEG type units are avavailable only in one or two pole configurations.

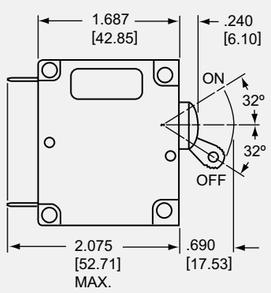
Three Pole and Four Pole Protectors

The three pole construction consists of three single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A single toggle handle operates all three poles for quick and convenient control, or if preferred, a handle per pole is available. The four pole construction consists of four single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A double toggle handle operates all four poles. The individual poles need not have identical characteristics and any series trip pole may have an auxiliary switch. If screw-type terminals are required, the breaker designation will be IEG666 for a three pole version and IEG6666 for a four pole version.

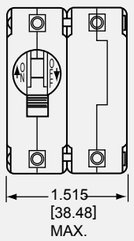
Protector poles are numbered consecutively when viewed from the terminal side, with the ON position up, starting with Pole #1 on the left side and proceeding to the right.

IAG/IUG/IEG/CEG/LEG Multi-Pole Circuit Breakers

IAG/IUG/IEG/CEG/LEG

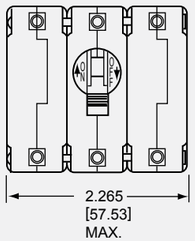


Two Pole*

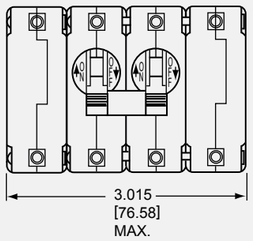


(Optional: Handle may be located in Pole 1 instead of Pole 2)

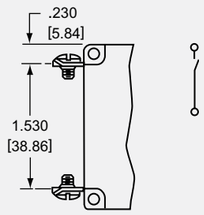
Three Pole*



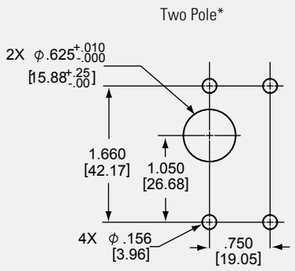
Four Pole*



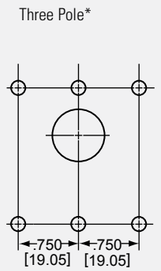
LEG Type Units Require Screw Terminals



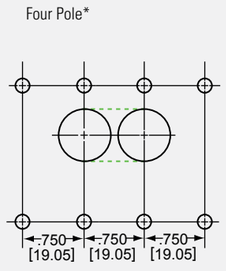
Two Pole*



Three Pole*



Four Pole*



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.
*See Single Pole Mounting Detail for hole sizes and locations. LEG type units are only available in one or two poles.

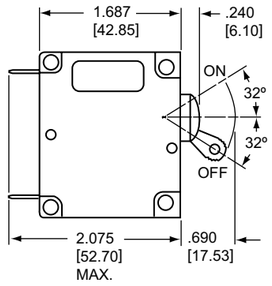
Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

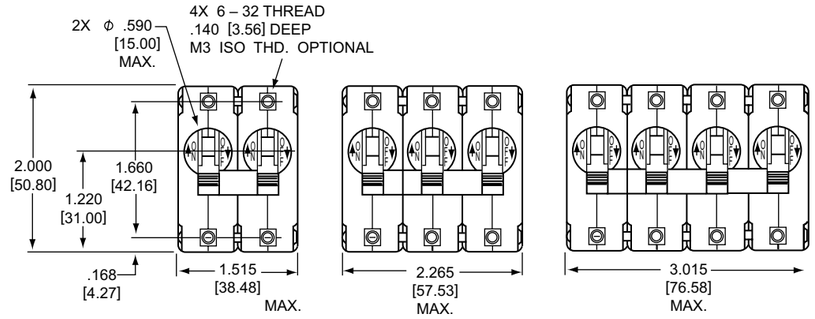
MULTI-POLE CIRCUIT PROTECTORS (IAGH/IUGH/IEGH/CEGH/LEGH)

The IAGH/IUGH/IEGH/CEGH/LEGH two, three and four pole models are available with a handle per pole.

LEGH type units are available only in two pole models.

IAGH/IUGH/IEGH/CEGH/LEGH Protectors

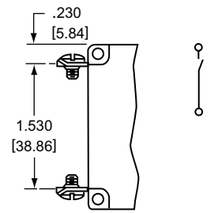




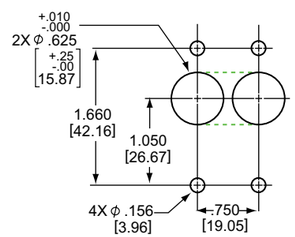
Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.

NOTE: We recommend machining slots into your panel for 2 or more poles. This eliminates the need to dissemble/reassemble the handle ties to be able to insert the handles thru indvidiually drilled holes. LEG type units are only available in one or two poles.

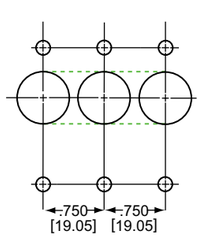
LEG Type Units Require Screw Terminals



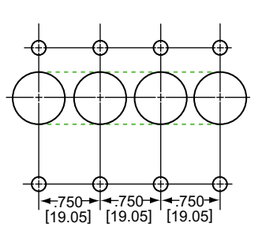
Two Pole



Three Pole*



Four Pole*

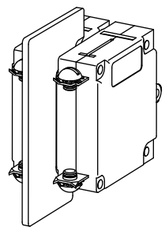


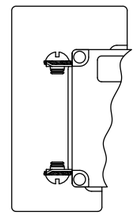
*See Two Pole Mounting Detail for hole sizes and locations.

LEG/LEGH Barriers (required)

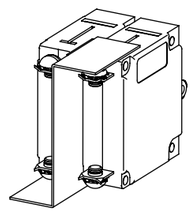
In order to meet UL listing requirements, the LEG/LEGH two pole model requires barriers. Available with a standard straight barrier or an optional "Z" type barrier.

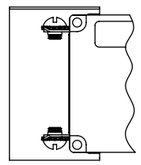
Standard Barrier





Optional "Z" Barrier





Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

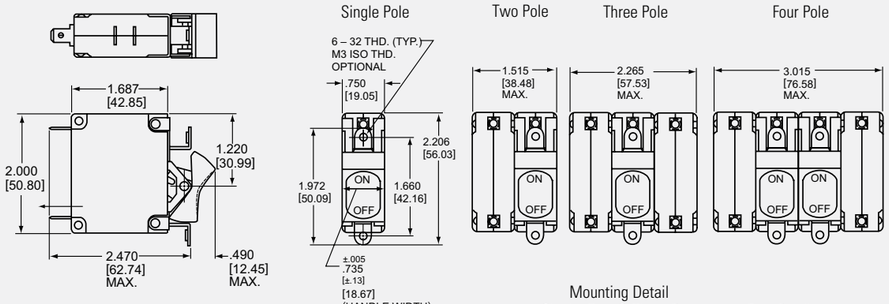
ROCKER CIRCUIT PROTECTORS (IAGX/IAGZX/IUGX/IUGZX/IEGX/IEGZX/CEGX/CEGZX/LEGZX)

The IAGX/IUGX/IEGX/CEGX and IAGZX/IUGZX/IEGZX/CEGZX/LEGZX styles offer two attractive rocker actuator versions of our popular IAG/IUG/IEG/CEG/LEG family. Designed with the operator in mind, each features handles with a concave surface and aesthetic appearance for front panel applications.

Both are available with rocker handle styles in a choice of five single colors: black, red, grey, orange or white.

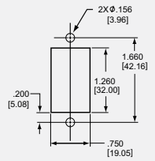
The IAGZX/IUGZX/IEGZX/CEGZX/LEGZX style adds our "EZ" options of contrasting dual color rocker actuators, affording a clear visual indication of the handle position and integrated handle guards, to help prevent accidental turn-on and turn-off of the unit. Available with a black rocker and white, red or green indicator color for either ON or OFF indication.

IAGX/IUGX/IEGX/CEGX

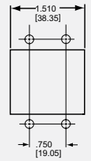


(Optional: Handle may be located in Pole 2 instead of Pole 1)

Mounting Detail
Single, Two & Three Pole

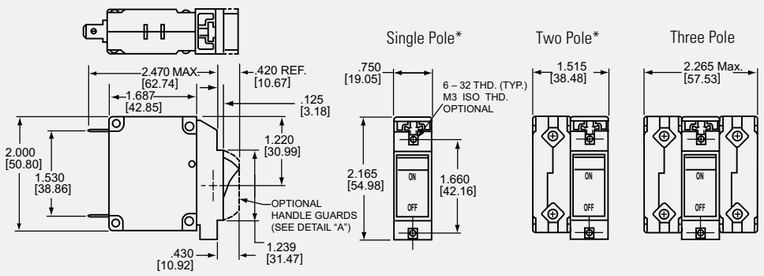


Four Pole*

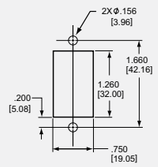


Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.
*See Single Pole Mounting Detail for hole sizes and locations.

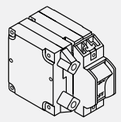
IAGZX/IUGZX/IEGZX/CEGZX/LEGZX



Single, Two & Three Pole



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.



Detail "A"

* LEG type units are only available in one or two poles.

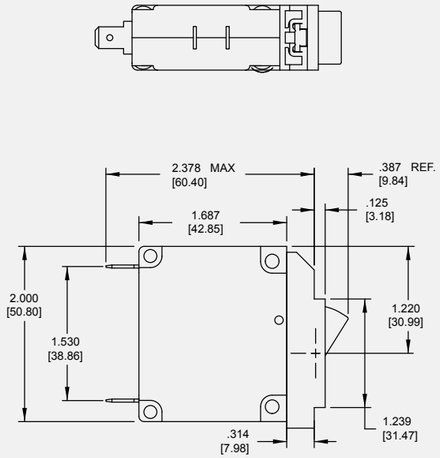
Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

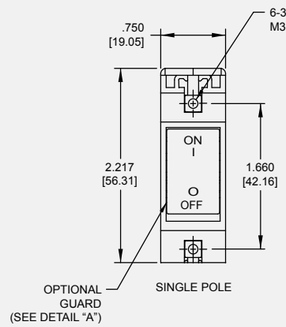
ROCKER CIRCUIT PROTECTORS (IAGBX/IUGBX/IEGBX/CEGBX/LEGBX)

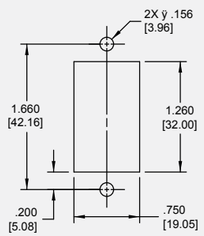
The innovative new design of our IEG BX style circuit breaker features a flat front rocker that not only satisfies your aesthetic needs, it guards against accidental actuation while providing the highest degree of circuit protection and quality. Only Airpax offers this new standard in user interface, providing additional peace of mind that guards alone can't supply.

Available on a variety of versions with a full range of agency approvals, the new IEG BX style circuit breakers meet or exceed all current performance specifications, including interrupting capacities up to 50,000 amperes. Various guard options offer additional and increasing levels of actuation protection performance. The two shot mold on the flat rocker surface provides a clean, crisp legend that can withstand demanding use.

IAGBX/IUGBX/IEGBX/CEGBX/LEGBX

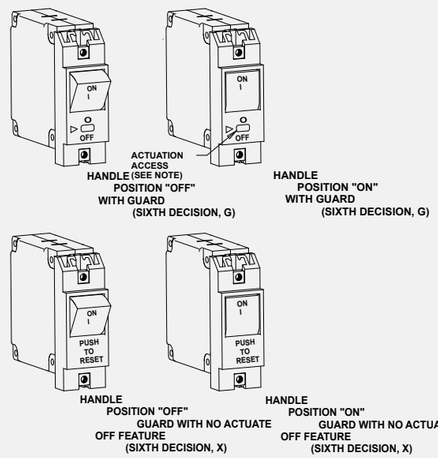


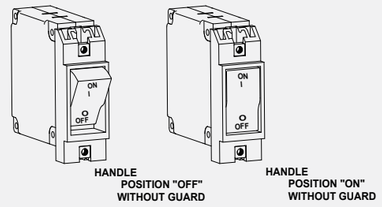




Panel Mounting Detail

MOUNTING DETAIL TOLERANCE: ±.005 [.13] UNLESS NOTED





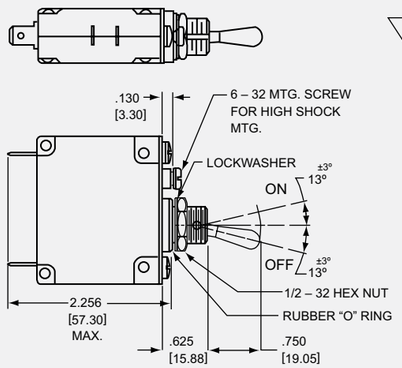
DETAIL "A"

NOTE: ACCESS IS LIMITED TO A DEVICE SMALLER THAN THE UNDERWRITERS LABORATORY "ARTICULATED PROBE" DEFINED IN UL-489 FIG. 11.1.7.2.1.

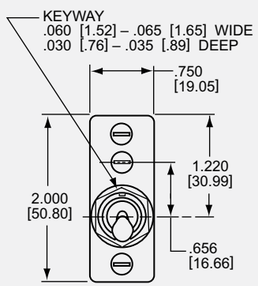
SEALED TOGGLE CIRCUIT PROTECTORS (IAGN/IUGN)

The IAGN/IUGN family is a sealed toggle version of the IAG/IUG family. The silicone rubber seal around the handle assures panel seal integrity and makes this style a natural for harsh environments.

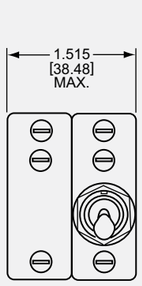
This sealed toggle family is available in one to three poles with ratings of .050 to 50 amperes.



Single Pole

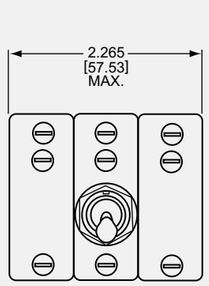


Two Pole

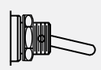


(Optional: Handle may be located in Pole 2 instead of Pole 1)

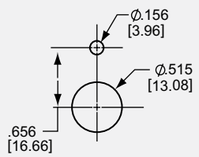
Three Pole



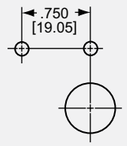
Optional Handle



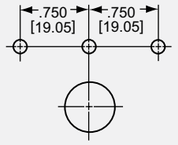
Mounting Detail
Single Pole



Two Pole*



Three Pole*



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.
*See Single Pole Mounting Detail for hole sizes and locations.

Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

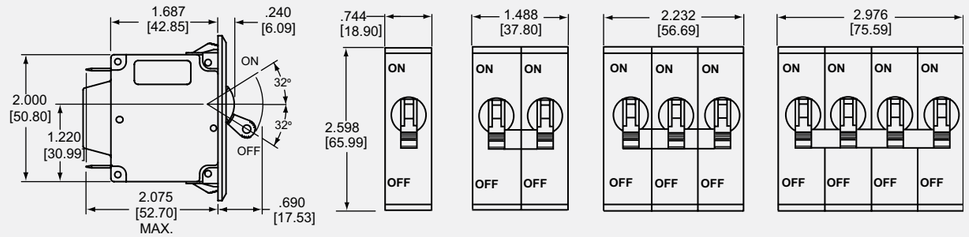
SNAP-IN CIRCUIT PROTECTORS (IEGS/IEGHS/CEGS/CEGHS/LEGS/LEGHS)

The Snap-In version of the IEG brings mounting simplification and international spacing together in a package that is aesthetically enhanced. The IEGS securely snaps into a rectangular cut-out, eliminating the need for panel mounting hardware and the associated costs. The face plate of the IEGS is a clean, black matte and it satisfies the increasing demand for front panel components that are designed with ergonomic considerations.

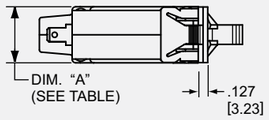
The IEGS is offered in either flush or beveled versions, in 1, 2, 3 or 4 pole packages, and with a handle per pole or per unit.

The IEGS is UL Recognized, CSA Certified and VDE approved.

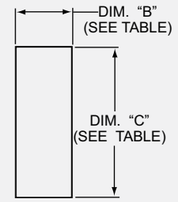
IEGHS/CEGHS/LEGHS Circuit Protectors (Note B)
(Multi-Pole-IEGH Handles Per Pole)
(Omit H for Single Pole)



Panel Cutout Detail
Panel Thickness: (See Table)



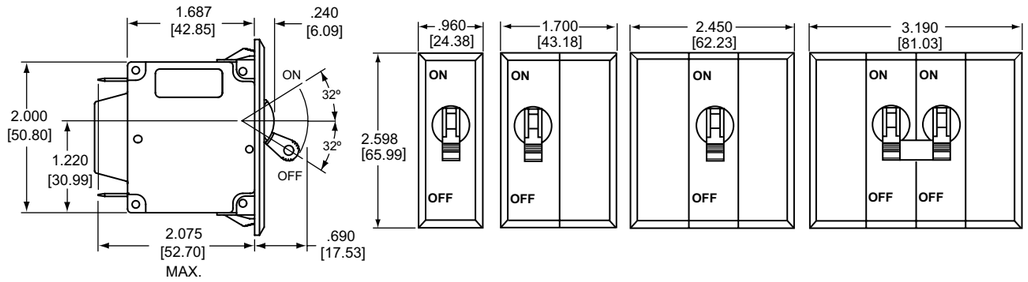
Note:
A: Flush face plate is optional. See decision tables, sixth decision.
B: Tolerance ± .031 [.79] Angles: ±5° unless noted. Dimensions in brackets [ ] are millimeters.



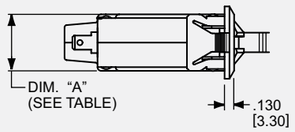
DIMENSIONS "A", "B", "C"

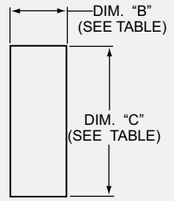
Number of Poles	Dimension "A", inches [mm]	Dimension "B", inches [mm]	Dimension "C", inches [mm]	
1 pole	.750 [19.05] max	.755 [19.18] min	2.180 ± .005 [55.37 ± .13]	2.186 ± .011 [55.52 ± .28]
2 pole	1.515 [38.48] max	1.520 [38.61] min		
3 pole	2.265 [57.53] max	2.270 [57.66] min		
4 pole	3.015 [76.58] max	3.020 [76.71] min		
		Panel Thickness	.040 to .059 [1.02 to 1.50]	.060 to .100 [1.52 to 2.54]

IEGS/CEGS/LEGS Circuit Protectors (Note B)
(Add H for multiple handles per unit, IEGHS)



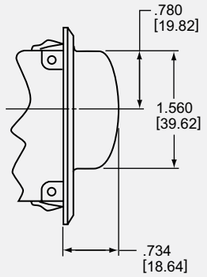
Panel Cutout Detail
Panel Thickness: (See Table)

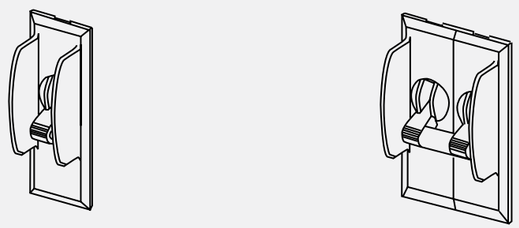




DIMENSIONS "A", "B", "C"				
Number of Poles	**Dimension "A", inches [mm]**	**Dimension "B", inches [mm]**	**Dimension "C", inches [mm]**	
1 pole	.750 [19.05] max	.780 ± .015 [19.81 ± .381]	2.180 ± .005 [55.37 ± .13]	2.186 ± .011 [55.52 ± .28]
2 pole	1.515 [38.48] max	1.540 ± .015 [39.12 ± .381]		
3 pole	2.265 [57.53] max	2.290 ± .015 [58.17 ± .381]		
4 pole	3.015 [76.58] max	3.040 ± .015 [77.22 ± .381]		
		Panel Thickness	.040 to .059 [1.02 to 1.50]	.060 to .100 [1.52 to 2.54]

Optional Handle Guard





Note: A: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.
B: Bevelled face plate is standard.

CONFIGURATIONS

Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an on-off switch.

Shunt Trip

The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

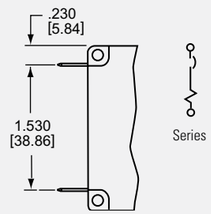
Auxiliary Switch (Applies to Series Trip Only)

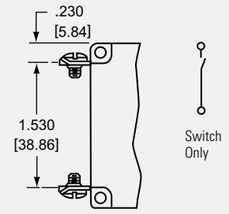
This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.

Auxiliary switch contacts actuate simultaneously with the main protector contacts, and will open regardless of whether the protector contacts are opened manually or electrically. For auxiliary switch ratings below 6Vac or 5Vdc, an auxiliary switch with gold contacts designated as REG is available. Gold contacts are not recommended for load current above 100 milliamps.

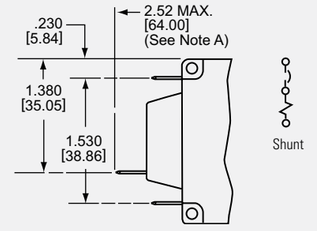
MAIN TERMINAL TYPES					
Amp Rating	**Push-On**	**8-32 Screw**	**M4 Screw**	**10-32 Screw**	**M5 Screw**
.05 to 30	X	X	X		
30.1 to 50				X	X

Note:
A: Terminal protrusion dimensions are referenced from back mounting panel.
B: Main terminals are male push-on type .250 [6.35] wide x 0.31 [.79] thick x .375 [9.53] long or 8-32 x .187 [4.75] screw type. Metric screw terminals are M4 x 5mm (<=30A): M5 x 5mm screw type (>30A). On VDE approved builds with screw terminals, external tooth lockwashers are supplied. On VDE approved builds with push-on terminals a soldered connection is required above 25 amperes.

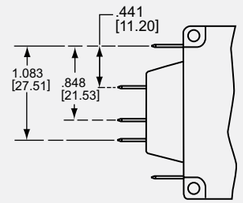




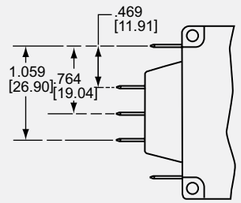
Optional flat
screw terminal

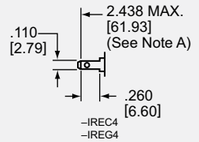


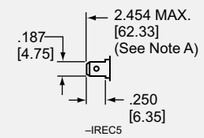
Standard Auxiliary Switch



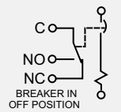
VDE Auxiliary Switch







Series with Auxiliary Switch



Relay Trip

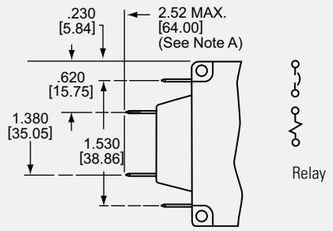
This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency /rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

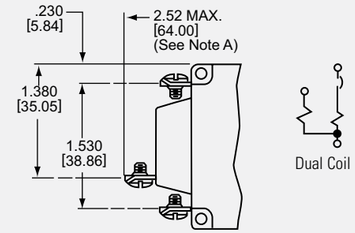
Dual Coil

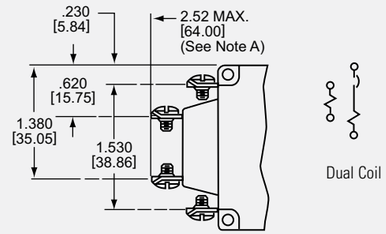
By combining two electrically independent coils on a common magnetic circuit, it is possible to provide contact opening when either an over-current or trip voltage is applied to the respective coils. One coil will be a current trip coil with standard specifications. The second, or dual coil, can be used to provide a control function permitting contact opening from a remote interlock or other transducer functions. Standard coils are 6, 12, 24, 48, 120 and 240 volts. Tripping is instantaneous and must be removed (usually self-interrupting) after trip.

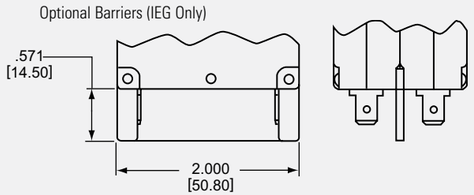
Voltage Trip

Sometimes called “dump circuits” or “panic trip circuits,” these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt or relay configurations.









Note: Tolerance ± .015 [.38] unless noted.
Dimensions in brackets [ ] are millimeters.

TYPICAL RESISTANCE / IMPEDANCE

Current Ratings (Amps)	Impedance		
	DC (ohms)	AC, 50/60Hz (ohms)	AC, 400Hz (ohms)
	51, 52, 53, 59	***61, 62, 63, 69***	***41, 42, 43, 49***
0.200	36.6	34.2	74.2
1.00	1.38	1.47	2.85
2.00	0.31	0.25	0.64
5.00	0.053	0.051	0.100
10.0	0.016	0.013	0.027
20.0	0.006	0.005	0.008
30.0	0.0027	0.0026	0.004
50.0	0.0019	0.0018	—

DCR and Impedance based on 100% rated current applied and stabalized for a minimum of one hour. Tolerance .05-2.5 amperes ± 20%: 2.6 -20 amperes ± 25%, 21-50 amperes ± 50%. Consult factory for special values and for coil impedance of delays not shown.

OPERATING CHARACTERISTICS

Inrush Pulse Tolerance

The following table provides a comparison of inrush pulse tolerance with and without the inertial delay feature for each of the 50/60Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker. The table at left provides a guide to determine if the inertia delay feature is required. Consult factory for further assistance.

INRUSH PULSE TOLERANCE	
Delay	**Pulse Tolerance**
61, 62, 63, 71, 72, 73	10 times rated current (approx)
61F, 62F, 63F, 71F, 72F, 73F	12 times rated current (approx)
64, 65, 66	25 times rated current (approx)

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (VERTICAL MOUNT)

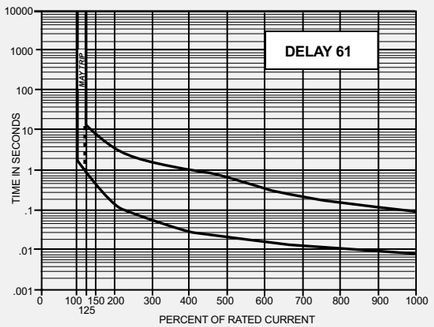
Delay	100%	125%	150%	200%	400%	600%	800%	1000%
41	No Trip	May Trip	.500 to 8.0	.150 to 1.9	.020 to .40	.006 to .25	.004 to .1	.004 to .05
42	No Trip	May Trip	5 to 70	2.2 to 25	.40 to 5.0	.012 to 2	.006 to .2	.006 to .15
43	No Trip	May Trip	35 to 350	12 to 120	1.5 to 20	.012 to 2.2	.01 to .22	.01 to .1
49	No Trip	May Trip	.100 Max	.050 Max	.020 Max	.020 Max	.020 Max	.020 Max
51*	No Trip	.500 to 6.5	.300 to 3.0	.100 to 1.2	.031 to .500	.011 to .25	.004 to .1	.004 to .08
52*	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2.0	.04 to 1	.008 to .5	.006 to .1
53*	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.23 to 9	.018 to .55	.012 to .2
59*	No Trip	.120 Max	.050 Max	.050 Max	.022 Max	.017 Max	.017 Max	.017 Max
61*	No Trip	.700 to 12	.35 to 7.0	.130 to 3.0	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62*	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3.0	.02 to 2	.015 to .8	.01 to .25
63*	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.013 to .85	.013 to .5
64	No Trip	.7 to 12	.35 to 7	.13 to 3	.030 to 1	.017 to .3	.01 to .16	.008 to .1
65	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3	.02 to 2	.017 to .76	.01 to. 6
66	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.014 to 5	.014 to 3
69*	No Trip	.120 Max	.100 Max	.050 Max	.022 Max	.017 Max	.017 Max	.017 Max
71**	No Trip	.440 to 10	.300 to 7	.100 to 3.0	.03 to 1	.012 to .3	.004 to .15	.004 to .1
72**	No Trip	1.8 to 100	1.7 to 60	1 to 20	.15 to 3	.04 to 2	.008 to .79	.006 to .28
73**	No Trip	50 to 600	30 to 400	10 to 150	1.8 to 20	.22 to 10	.018 to .88	.011 to .50
79**	No Trip	.120 Max	.100 Max	.050 Max	.023 Max	.016 Max	.015 Max	.015 Max

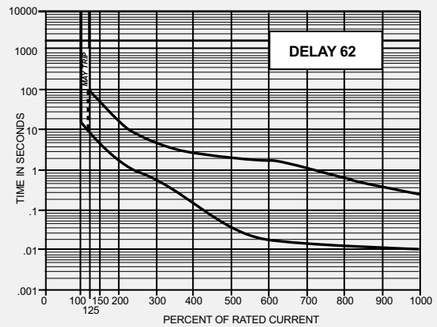
**CEG type units are available only with 51, 52, ,53 and 59 delays LEG type units are available only with 61, 62, 63 and 69 delays*
***135% minimum trip point for delays 71, 72, 73 and 79*

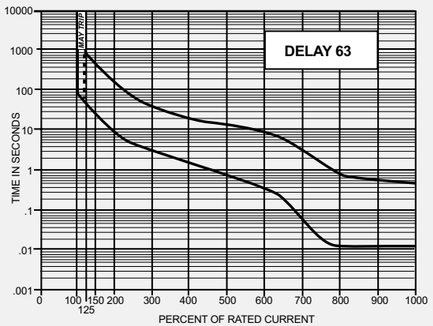
DELAY CURVES (IAG/IUG/IEG/CEG/LEG)

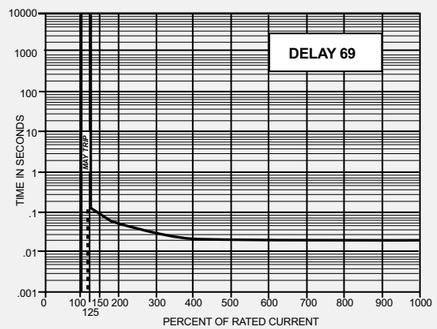
400Hz, DC, 50/60Hz Delay Curves (typ)

A choice of delays is offered for DC, 50/60Hz and 400Hz applications. Delays 49, 59 and 69 provide fast acting, instantaneous trip and are often used to protect sensitive electronic equipment (not recommended where known inrush exists). Delays 41, 51 and 61 have a short delay for general purpose applications. Delays 42, 52 and 62 are long enough to start certain types of motors and most transformer and capacitor loads. Delays 43, 53 and 63 are long delays for special motor applications at 400Hz, DC and 60Hz. CEG type units are only available in 51, 52, 53 and 59 delay curves. LEG type units are only available in 61, 62, 63 and 69 delay curves.



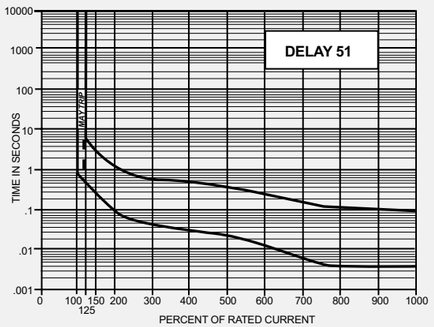


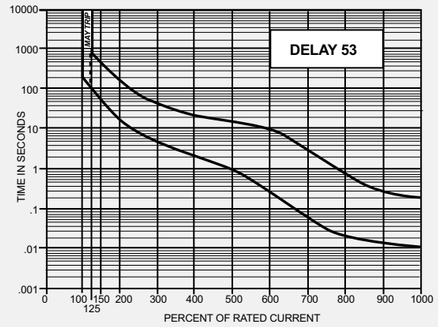


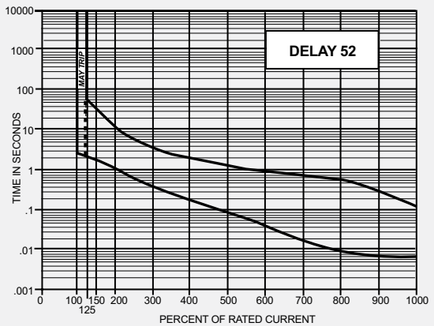


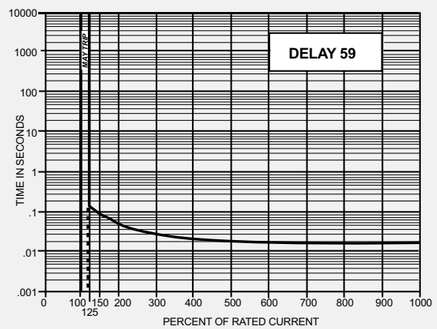
DELAY CURVES (IAG/IUG/IEG/CEG)

DC Delay Curves (typ)



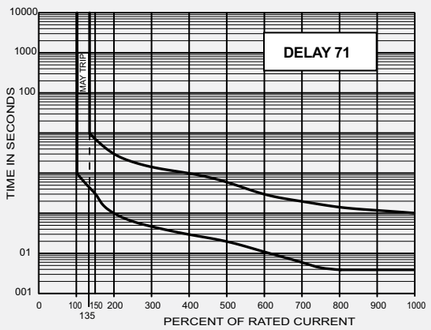


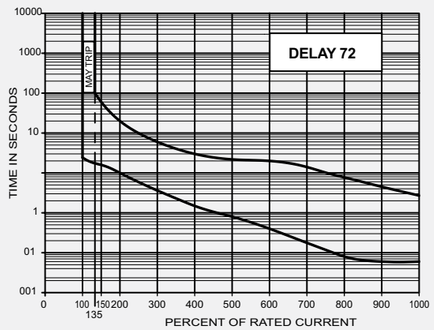


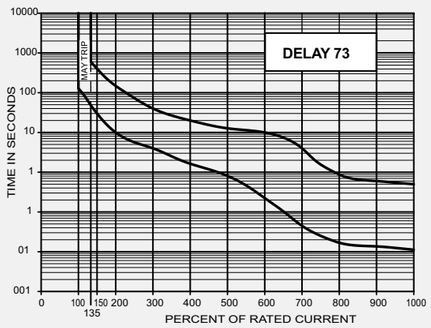


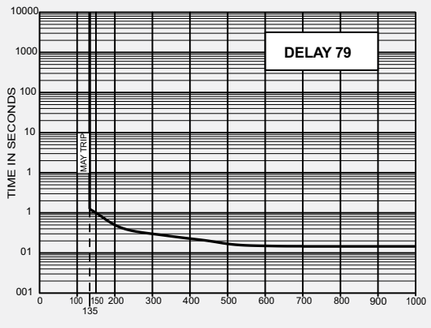
DELAY CURVES (IAG/IUG/IEG)

Multi-frequency - DC, 50/60Hz Delay Curves (typ)



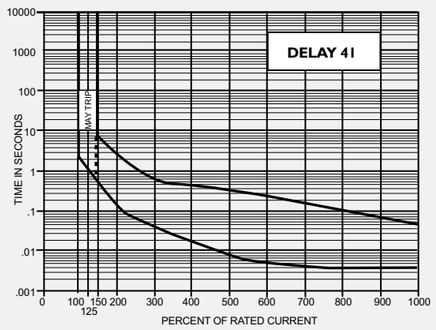


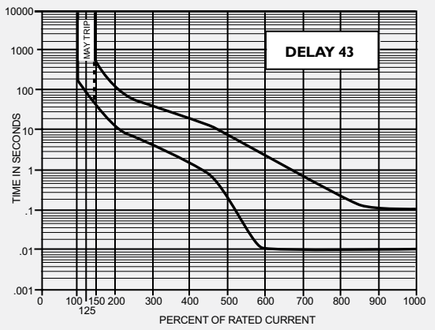


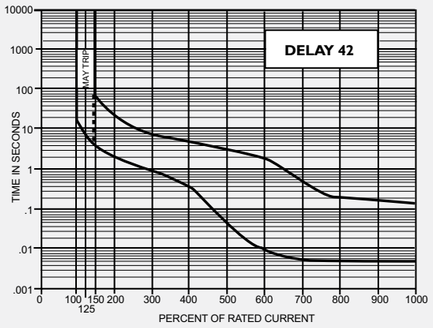


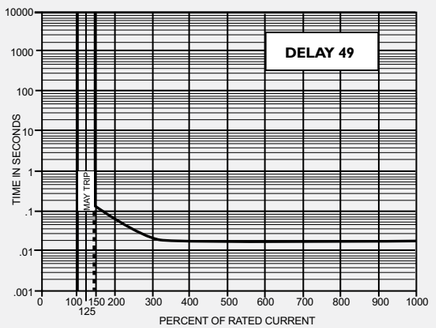
DELAY CURVES (IAG/IUG/IEG)

400Hz Delay Curves (typ)









SPECIFICATIONS

Trip Free
Will trip open on overload, even when forcibly held in the ON position. This prevents the operator from damaging the circuit by holding on the protector.

Trip Indication
The operating handle moves positively to the OFF position on overload.

Ambient Operation
IAG/IUG/IEG/CEG/LEG protectors operate in temperatures between –40° C to +85° C.

Insulation Resistance
Not less than 100 megohms at 500 volts DC.

Dielectric Strength
IAG/IUG/IEG/CEG/LEG protectors withstand 3750Vac, 60Hz for 60 seconds between all electrically isolated terminals, except auxiliary switch terminals shall withstand 600Vac, 60Hz for REG and REC types. Four terminal dual coil and relay construction (not offered in the IEG) will withstand 1500Vac.

Endurance
Operating as a switch, the operating life exceeds 10,000 operations at a rate of 6 per minute when tested as follows: 6000 OPS @ rated current plus 4000 OPS @ at no load.

Electrical Characteristics
.050-50 amperes; 80Vdc Max., 240Vac Max., 50/60Hz and .050-30 amperes: 250Vac Max., 400Hz. Units above 30 amps are not suitable for across-the-line motor starting.

Auxiliary Switch
When supplied shall be SPDT configuration. Non VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz; 3.0 amperes, 50 volts DC, 1 amperes, 80 volts DC (REC) type or 0.1 amperes, 125 volts, 60Hz. (REG type).

VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz, 1 amperes, 80 volts DC (REG type); or 0.1 amperes, 125 volts, 60Hz (REG type); or 0.1 amperes, 125 volts, 60Hz (REG type).

Moisture Resistance
Meets all the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-STD-202.

Salt Spray (Corrosion)
Meets the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-STD-202.

Shock
Circuit protectors shall not trip when tested per MIL-STD-202, Method 213, Test Condition I with 100% rated current applied to delayed units, except 90% current in plane 4 (i.e., handle down). Instantaneous units shall have 80% rated current applied in all planes.

Construction
Series, shunt, relay and series with auxiliary switch available in various delays and combinations.

Vibration
Circuit protector shall not trip when vibrated per MIL-STD-202, Method 204, Test Condition A with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

VDE Approval
IEG is VDE approved under VDE 0642 (EN60934). The IEG has 8mm creepage and clearance between the main circuit and the following areas:
A. Operator accessible area around the handle.
B. The mounting inserts or brackets.
C. The auxiliary switch circuit.
D. Between poles.

Care must be taken to maintain spacings at the terminals when wired. The VDE approval for standard terminals is not for use with bare wire. A crimp type lug is required. In addition, all VDE approved units will be in compliance with specific CE Directives. These units will be marked as CE Compliant.

UL1500 (Marine Ignition Protected)
IDG/IDGH is approved for Marine Ignition Protection

UL489A Listed
The CEG is dimensionally the same as the popular IEG, but provides UL listing to UL489A. Available in one to three poles, in series, series with auxiliary switch, shunt, dual coil and voltage trip configurations. As a circuit breaker, the CEG provides communication equipment manufacturers with a UL listed circuit breaker in a very compact package that meets the stringent environmental requirements of today's marketplace. This makes the CEG ideal for switching, transmission and wireless applications.

UL489 Listed
The LEG is dimensionally the same as the popular IEG, but provides UL listing to UL489. Available with one or two poles, in series, series with auxiliary switch, shunt and three-terminal dual coil configurations. As a circuit breaker, the LEG provides equipment manufacturers with a UL listed magnetic hydaulic circuit breaker in the most compact package available on the market.

APPROXIMATE WEIGHT PER POLE (1 TO 6 POLES AVAILABLE)	
Ounces	**Grams**
2.2	62.4

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
8-32 Screw Terminals	10 to 12
M4 Terminal Screws	10 to 12
10-32 Screw Terminals	14 to 15
M5 Screw Terminals	14 to 15
1/2 - 32 Mounting Bushing	30 to 35
Where applicable, mechanical support must be provide to the terminals when applying torque	

AGENCY APPROVALS

IAG/IUG/IEG Supplementary Protectors				Rated Current (Amps)		Short Circuit Rating (SC), Amps	
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL1077 & CSA**	**TÜV**
80	DC	—	1	.02 to 50	.10 to 30	U2, 7500	4000
125	50/60	1	1	.02 to 50	—	U2, 3000	—
125	50/60	1	1	.02 to 30	—	C1, 5000(3)	—
125	50/60	1	1	.02 to 50	—	U3, 1000	—
125 / 250	50/60	1	2	.02 to 50	—	U1, 3000	—
125 / 250	50/60	1	1	2/1 - 30/15	—	C2, 5000(1)	—
240	50/60	1 & 3	1	.02 to 50	—	U1, 2000	—
240	50/60	1 & 3	1	.02 to 50	—	C2, 5000(1)	—
250	50/60	1	1	.02 to 2	—	U2, 5000	—
250	50/60	1 & 3	1	.02 to 30	.10 to 50	U1, 2000	2000
250	50/60	1 & 3	1	.02 to 30	—	C2, 3500(2)	—
250 (4)	50/60	1 & 3	1	.02 to 30	—	C1, 3500(2)	—
250 (4)	50/60	1 & 3	1	.02 to 30	—	U1, 1000	—
250 (5)	50/60	1	2	.02 to 50	—	U3, 1000	—
250 (5)	50/60	3	3	.02 to 50	—	U3, 1000	—
277	50/60	1	1	.02 to 30	—	U2, 2000	—
277	50/60	1	1	.02 to 30	—	C2, 5000(2)	—
250	400	1 & 3	1	.02 to 30	—	U2, 1500	—
250	400	3	—	.02 to 30	—	U3, 200	—

IDG Supplementary Protectors							
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL1077 & CSA**	**TÜV**
48	DC	—	1	.02-50	—	U2, 5000	—
65	DC	—	1	.02-50	—	U2, 3000	—
125	50/60	1	1	.02-50	—	U2, 2000	—
125/250	50/60	1	2	.02-50	—	U2, 1500	—
250	50/60	1 & 3	1	.02-30	—	U1, 1000	—

CEG Communications Equipment Circuit Breakers							
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL489A**	**TÜV**
80	DC	—	1	.05-50	—	5000	—

LEG Circuit Breakers							
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL489**	**TÜV**
125	50/60	1	1	.05-30	.10-30	5000	2000
120/240	50/60	1	2	1-30	.10-30	5000	2000

Notes: (1) With 125 A max. series fuse; (2) With 80 A max. series fuse; (3) With 50 A max. circuit breaker; (4) With blocked vent construction; (5) Non-standard construction. "Fit for further use" approval

General notes:
All supplementary protectors are of the overcurrent (OC) type
The family of protectors has been evaluated for end use application for use groups (UG) A, B, C and D
The terminals (FW) are suitable for factory wiring only (0)
The maximum voltage ratings for which the protectors have been tested are shown in the chart
The current is the amperage range that the protectors have been tested
The tripping current (TC) for all of the protectors is "1" (in the range of 125% to 135% of ampere rating except for the 400Hz protectors which is "2" (more than 135% of ampere rating)
The overload rating (OL) - designates whether the protector has been tested for general use or motor starting applications.

0 – tested at 1.5 times amp rating for general use
1 – tested at 6 times AC rating or 10 times DC rating for motor starting
The short circuit current rating (SC) – The short circuit rating in amperes following a letter and number designating the test conditions and any calibration following the short circuit test is defined below:
C – Indicates short circuit test was conducted with series overcurrent protection
U – Indicates short circuit test was conducted without series overcurrent protection
1 – Indicates a recalibration was not conducted as part of the short circuit testing
2 – Indicates a recalibration was performed as part of the short circuit testing
3 – Indicates recalibration was performed along with the dielectric and voltage withstand for "Suitable for Further Use" rating

IAG / IUG / IEG / CEG DECISION TABLES

The ordering code for IAG/IUG/IEG/CEG/IDG circuit protectors may be determined by following the decision steps in the tables shown here.

The coding given permits a self-assigning part number but with certain limitations. Special applications may require a factory-assigned part number. Typical examples are units with mixed ratings, combinations of styles, or constructions not listed in the third decision table. With these, it is suggested that order entry be by description and/or drawings and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit protector for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the following is the code for a single pole, IEG quick-connect type terminal, series unit with auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay, a rating of 20 amperes, a black marked handle and is VDE approved.

To determine the ordering number for your particular IAG/IUG/IEG/CEG unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

Notes:

A. It is recommended that power leads be soldered to circuit protectors having push-on type terminals for current trip ratings above 20 amperes.

B. When "A" (metric thread mounting) is specified in the sixth decision in combination with screw terminal option in the second decision, metric screw terminals are supplied.

C. IEG, IEGH, IEGS, IEGHS, IEGX and IEGZX circuit protectors are designed to meet 8mm creepage and clearance requirements for installation Category III, Pollution Degree 3, Case A as measured in IEC 664. Intended for use in equipment designed to comply with IEC 601 and 950 and VDE 0804 and 0805.

1 First Decision

Select Type and Terminal

Type	Description
IAG IUG* IEG** CUG+ CEG++	One toggle handle per unit
IAGH IUGH* IEGH** CUGH+ CEGH++	One toggle handle per pole
IDG***	One toggle handle per unit, marine ignition protection
IDGH***	One toggle handle per pole marine ignition protection
IMG** CMG++	One toggle handle per unit mid-trip indication
IMGH** CMGH++	One toggle handle per pole mid-trip indication

*UL Recognized, CSA Certified
**UL Recognized, CSA Certified, VDE Approved
*** UL Recognized UL1500
+ UL489A Listed CSA Certified
++ UL489AListed CSA Certified VDE Approved

Handle and Mounting Options	
	Standard toggle/mounting, no designation required
S	Toggle w/ snap-in mounting
X	Rocker w/ standard mounting*
ZX	ZX Rocker w/ integral mounting*
BX	BX Rocker w/ integral mounting
N	Sealed toggle w/bushing mounting**

Note: Add "F" for flat screw terminals
* Not available on mid-trip units
** Available only on IAG, IUG units

2 Second Decision

Poles and Terminals

Push-on Terminals	Screw Terminals	
1	6	Single pole
11	66	Two pole
111	666	Three pole
1111	6666	Four pole

*Not available in toggle seal handle type.

Example:

IEG 1 - 1REC4 - 61 - 20.0 - 01 - V

1 2 3 4 5 7

3 Third Decision

Internal Configuration

-0	Switch only
-1	Series
-1REC4	Series w/ auxiliary switch * .110 quick connect
-1REC5	Series w/ auxiliary switch * .187 quick connect
-1REG4	Series w/ auxiliary switch (gold contacts)* .110 quick connect
-1RS4	Series w/ alarm switch, electrical trip, .110 Q.C. terminals
-1RLS4	Series w/ alarm switch, electrical trip, .110 Q.C. terminals (mid-trip only)
-3	Shunt
-4	Relay

* Only one auxiliary switch is normally supplied on two or three pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Frequency and Delay

SW	Switch only
-41	400Hz short delay
-42	400Hz long delay
-43	400Hz motor start
-49	400Hz 150% instant trip
-51	DC short delay*
-52	DC long delay*
-53	DC motor start*
-59	DC 125% instant trip*
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-64	50/60Hz short delay
-65	50/60Hz long delay
-66	50/60Hz motor start
-69	50/60Hz 125% instant trip
-71	DC/60Hz short delay
-72	DC/60Hz long delay
-73	DC/60Hz motor start
-79	DC/60 Hz 135% instant trip

For addition of inertial delay, add an iFI to any delay numeral.
* CEG types are only available with DC ratings

C = CCC Approved

This approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

5 Fifth Decision

Rated Current

Standard ratings listed. For other ratings, please contact the factory.

.100	10.0
.250	15.0
.500	20.0
.750	30.0
1.00	35.0*
2.50	40.0*
5.00	50.0*
7.50	

* IDG/IDGH is rated for 30 amps max.

7 Seventh Decision

Handle Color and Marking Selection

Toggle Handle

Color	Unmarked	Marked ON-OFF I-O
Black	-00	-01 (STD)
Yellow	-10	-11
Red	-20	-21
Blue	-30	-31
Green	-40	-41
Orange	-60	-61
White	-90	-91

Handle marking color is white on black, red, blue & green handles and black on white, yellow and orange handles. See alternate 7th decision below for X, ZX & BZ rocker handles.

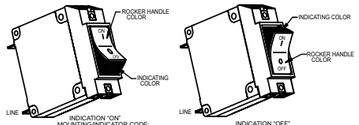
6 Sixth Decision

Optional

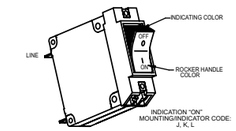
	Standard hardware. No designation required.
-A	Metric thread mounting inserts and terminals
-B	Barriers*
-C	277V (50/60Hz only) (See note 3)
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-L	Handle lock
-M	Handle in opposite pole (2 pole only)
-Q	APG style "FAT" handle
-S	Face plate sides flush with protector (see note 4)
-X	Handle guard with no actuation feature (BX rocker only) (Not available with mid-trip indication)

Notes:
1. One or more descriptions may be used as required.
2. When this is not used, table one may be substituted and U.S. thread will be supplied. Unit will be rated at 250V (50/60Hz only.)
3. VDE approved at 250VAC
4. IEGS standard face plate has beveled sides(see pg.90)

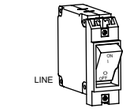
* Not available on snap-in units



MARKING DETAIL "A" (SEE TABLE)



MARKING DETAIL "B" (SEE TABLE)



MARKING DETAIL "C" (SEE TABLE)

7 Seventh Decision

Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

IAGX, IUGX, IEGX, IAGZX, IUGZX, IEGZX, CUGZX, CEGZX Rocker Handle (Single Rocker Color)

					Vertical Mounting			Horizontal Mounting			
Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	On-Off Fig.1	I-O Fig.2	On-Off I-O Fig.3	On-Off Fig.4	I-O Fig.5	On-Off I-O Fig.6	Marking Detail
Black	N/A	White	N/A	-00	-01	-02	-03	-04	-05	-06	A
Red	N/A	White	N/A	-20	-21	-22	-23	-24	-25	-26	
Grey	N/A	Black	N/A	-40	-41	-42	-43	-44	-45	-46	
Orange	N/A	Black	N/A	-50	-51	-52	-53	-54	-55	-56	
White	N/A	Black	N/A	-90	-91	-92	-93	-94	-95	-96	
IAGZX, IUGZX, IEGZX, CUGZX, CEGZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	-A0	-A1	-A2	-A3	-A4	-A5	-A6	A
Black	Red	White	On	-B0	-B1	-B2	-B3	-B4	-B5	-B6	
Black	Green	White	On	-C0	-C1	-C2	-C3	-C4	-C5	-C6	
Black	White	White	Off	-F0	-F1	-F2	-F3	-F4	-F5	-F6	
Black	Red	White	Off	-G0	-G1	-G2	-G3	-G4	-G5	-G6	
Black	Green	White	Off	-H0	-H1	-H2	-H3	-H4	-H5	-H6	
Black	White	White	On	-J0	-J1	-J2	-J3	-J4	-J5	-J6	B
Black	Red	White	On	-K0	-K1	-K2	-K3	-K4	-K5	-K6	
Black	Green	White	On	-L0	-L1	-L2	-L3	-L4	-L5	-L6	
IAGBX, IUGBX, IEGBX, CUGBX, CEGBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	-M0	N/A	-M2	-M3	N/A	-M5	-M6	C
Black	Red	Red	Off	-N0	N/A	-N2	-N3	N/A	-N5	-N6	
Black	Green	Green	Off	-P0	N/A	-P2	-P3	N/A	-P5	-P6	
Black	Yellow	Yellow	Off	-R0	N/A	-R2	-R3	N/A	-R5	-R6	

Notes: A. Bezels of IAGBX, IUGBX, IEGBX, CUGBX, CEGBX are black.
B. Consult factory for other marking options.

LEG DECISION TABLES

The ordering code for LEG circuit breakers may be determined by following the decision steps in the tables shown here.

The coding given permits a self-assigning part number but with certain limitations. Special applications may require a factory-assigned part number. Typical examples are units with mixed ratings, combinations of styles, or constructions not listed in the third decision table. With these, it is suggested that order entry be by description and/or drawings and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit breaker for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the following is the code for a single pole, LEG screw type terminal, series unit with auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay, a rating of 20 amperes, a black marked handle and is VDE approved.

To determine the ordering number for your particular LEG unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

Notes:

A. When "A" (metric thread mounting) is specified in the sixth decision in combination with screw terminal option in the second decision, metric screw terminals are supplied.

B. LEG, LEGH, LEGS, LEGHS, LEGZX and LEGBX circuit breakers are designed to meet 8mm creepage and clearance requirements for installation Category III, Pollution Degree 3, Case A as measured in IEC 664. Intended for use in equipment designed to comply with IEC 601 and 950 and VDE 0804 and 0805.

1 First Decision

Select Type and Terminal

Type	Description
LEG	One toggle handle per unit
LMG	One toggle handle per unit mid-trip indication
LEGH	One toggle handle per pole
LMGH	One toggle handle per pole mid-trip indication

Note: All types are UL489 listed, CUL certified

Handle and Mounting Options	
	Standard toggle/mounting, no designation required
S	Toggle w/ snap-in mounting
ZX	ZX Rocker w/ integral mounting*
BX	BX Rocker w/ integral mounting

Note: Add "F" for flat screw terminals
* Not available on mid-trip units

2 Second Decision

Poles and Terminals

Push-on Terminals	Screw Terminals	
1	6	Single pole
11	66	Two pole

*Not available in toggle seal handle type.

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series w/ auxiliary switch * .110 quick connect
-1REC5	Series w/ auxiliary switch * .187 quick connect
-1REG4	Series w/ auxiliary switch* (gold contacts) .110 quick connect
-1RS4	Series w/ alarm switch*, electrical trip, .110 Q.C. terminals
-1RLS4	Series w/ alarm switch*, electrical trip, mid-trip only, .110 Q.C. terminals
-3	Shunt

* Only one auxiliary switch is normally supplied on two pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Frequency and Delay

-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip

For addition of inertial delay, add an "F" to any delay numeral.
* CEG types are only available with DC ratings

V = VDE Approved

The shaded areas denote VDE Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE Approved, but other approvals still apply.

C = CCC Approved

This approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

Example:

LEG 6 - 1REC4 - 61 - 20.0 - 01 - V

(1) (2) (3) (4) (5) (7)

5 Fifth Decision

Rated Current

Use three numbers to print required current value between .100 amps minimum and 30.0 amps maximum.

For example, use:
.100 or 2.00 or 10.0

6 Sixth Decision

Optional

	Standard hardware. No designation required.
-A	Metric thread mounting inserts and terminals
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-L	Handle lock
-S	Face plate sides flush with breaker
-X*	Handle guard with no actuation feature (BX rocker only)
-Z	"Z" Barriers

Notes:
1. One or more descriptions may be used as required.
2. When this is not used, table one may be substitutad and U.S. thread will be supplied. Unit will be rated at 250V (50/60Hz only.)
3. LEGS standard face plate has beveled sides(see pg. 90)
* Not available on mid-trip units

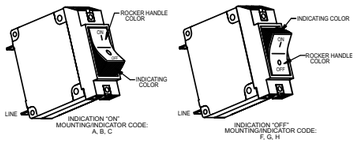
7 Seventh Decision

Handle Color and Marking Selection

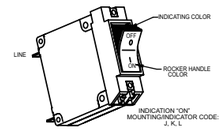
Toggle Handle

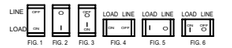
Color	Unmarked	Marked ON-OFF I-O
Black	-00	-01 (STD)
Yellow	-10	-11
Red	-20	-21
Blue	-30	-31
Green	-40	-41
Orange	-60	-61
White	-90	-91

Handle marking color is white on black, red, blue & green handles and black on white, yellow and orange handles.
See alternate 7th decision below for ZX & BZ rocker handles.



MARKING DETAIL "A" (SEE TABLE)





MARKING DETAIL "B" (SEE TABLE)

MOUNTING/INDICATOR CODE: M, N, P, R

MARKING DETAIL "C" (SEE TABLE)

7 Seventh Decision

Rocker Handle Color, Indicator Color and Marking Selection (See Note)

Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	Vertical Mounting On-Off Fig.1	Vertical Mounting I-O Fig.2	Vertical Mounting On-Off I-O Fig.3	Horizontal Mounting On-Off Fig.4	Horizontal Mounting I-O Fig.5	Horizontal Mounting On-Off I-O Fig.6	Marking Detail
LEGZX Rocker Handle (Single Rocker Color)											
Black	N/A	White	N/A	-00	-01	-02	-03	-04	-05	-06	A
Red	N/A	White	N/A	-20	-21	-22	-23	-24	-25	-26	
Grey	N/A	Black	N/A	-40	-41	-42	-43	-44	-45	-46	
Orange	N/A	Black	N/A	-50	-51	-52	-53	-54	-55	-56	
White	N/A	Black	N/A	-90	-91	-92	-93	-94	-95	-96	
LEGZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	-A0	-A1	-A2	-A3	-A4	-A5	-A6	A
Black	Red	White	On	-B0	-B1	-B2	-B3	-B4	-B5	-B6	
Black	Green	White	On	-C0	-C1	-C2	-C3	-C4	-C5	-C6	
Black	White	White	Off	-F0	-F1	-F2	-F3	-F4	-F5	-F6	
Black	Red	White	Off	-G0	-G1	-G2	-G3	-G4	-G5	-G6	
Black	Green	White	Off	-H0	-H1	-H2	-H3	-H4	-H5	-H6	
Black	White	White	On	-J0	-J1	-J2	-J3	-J4	-J5	-J6	B
Black	Red	White	On	-K0	-K1	-K2	-K3	-K4	-K5	-K6	
Black	Green	White	On	-L0	-L1	-L2	-L3	-L4	-L5	-L6	
LEGBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	-M0	N/A	-M2	-M3	N/A	N/A	-M6	C
Black	Red	Red	Off	-N0	N/A	-N2	-N3	N/A	N/A	-N6	
Black	Green	Green	Off	-P0	N/A	-P2	-P3	N/A	N/A	-P6	
Black	Yellow	Yellow	Off	-R0	N/A	-R2	-R3	N/A	N/A	-R6	

Notes:A. Bezels of LEGBX are black.
B. Consult factory for other marking options.

AIRPAX®

IAG/IUG/IEG/CEG/LEG
Magnetic Circuit Protectors

AIRPAX® | IAG/IUG/IEG/CEG/LEG Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

The Airpax™ IAG/IUG/IEG/CEG/LEG magnetic circuit protectors provide low-cost power switching, reliable circuit protection and accurate circuit control for equipment in the international marketplace.

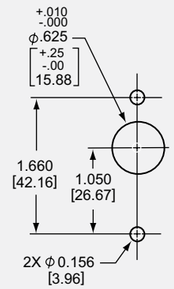
IEG models meet IEC spacing requirements which is mandatory for equipment that must comply with IEC specifications 601 and 950 and VDE specifications 0804 and 0805. In addition, they are UL Recognized as supplementary protectors per UL STD. 1077, CSA Certified as supplementary protectors per CSA C22.2–No. 235, VDE Approved to VDE 0642 (EN60934), CCC Approved and CE Compliant. IAG models are for those applications where the unit's inherent attributes are desired, but compliance with the various standards is not required.

Designed using the latest in sensitive hydraulic magnetic technology, the IAG/IUG/IEG/CEG/LEG line adapts itself to many applications and environments. They're ideal for data processing and business machines, medical instrumentation, broadcast equipment, vending and amusement machines, military applications and wherever precision operation is required. Temperature differences which affect fuses and other thermal devices are not a concern.

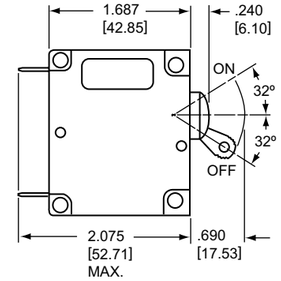
One important feature of this protector line is a "trip free" action, which means the circuit will trip in the presence of an overload even though the handle is held in the ON position. The delay mechanism senses the fault and the contacts open.

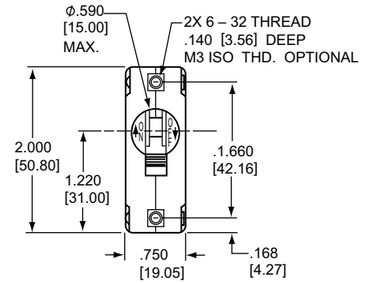
The IAG/IUG/IEG/CEG/LEG is available in a wide variety of configurations including series, series with auxiliary switch, shunt and relay with a choice of delays and ratings in either DC, 50/60Hz or 400Hz versions. Handles come in seven different colors and international markings are standard. Single or multi-pole versions are available, with a variety of pole arrangements to meet your specifications. Four pole models require a double toggle handle. Units with a handle per pole come in one through six pole assemblies.

Single Pole Mounting Detail

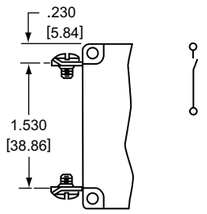


SINGLE POLE CIRCUIT PROTECTOR





LEG Type Units Require Screw Terminals



Note: Tolerance ±.015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

MULTI-POLE CIRCUIT PROTECTORS (IAG/IUG/IEG/CEG/LEG)

Two Pole Protectors

An assembly consisting of two single pole units, having their trip mechanisms internally coupled and with a single toggle handle, forms the IEG11 with quick-connect D.I.N.-style terminals. Individual poles may differ in ratings, delays and internal connections. An auxiliary switch may be included in either or both poles, allowing you to mix SELV and hazardous voltages. Rugged screw-type terminals can be provided, in which case the designation would be IEG66. The IEGH offers a toggle handle for each pole. LEG type units are avavailable only in one or two pole configurations.

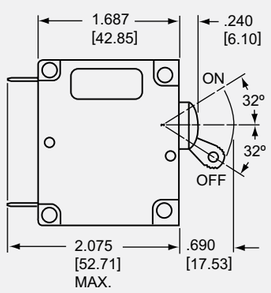
Three Pole and Four Pole Protectors

The three pole construction consists of three single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A single toggle handle operates all three poles for quick and convenient control, or if preferred, a handle per pole is available. The four pole construction consists of four single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A double toggle handle operates all four poles. The individual poles need not have identical characteristics and any series trip pole may have an auxiliary switch. If screw-type terminals are required, the breaker designation will be IEG666 for a three pole version and IEG6666 for a four pole version.

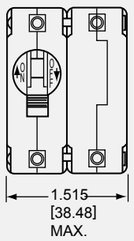
Protector poles are numbered consecutively when viewed from the terminal side, with the ON position up, starting with Pole #1 on the left side and proceeding to the right.

IAG/IUG/IEG/CEG/LEG Multi-Pole Circuit Breakers

IAG/IUG/IEG/CEG/LEG

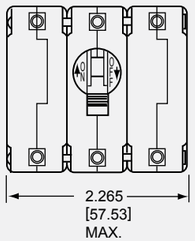


Two Pole*

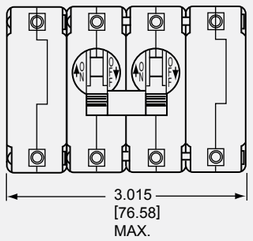


(Optional: Handle may be located in Pole 1 instead of Pole 2)

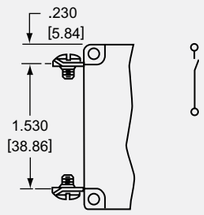
Three Pole*



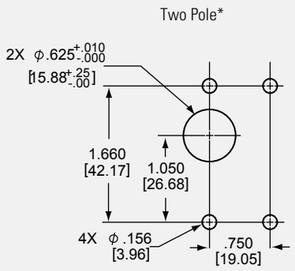
Four Pole*



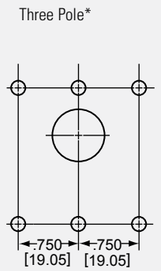
LEG Type Units Require Screw Terminals



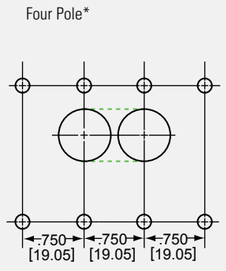
Two Pole*



Three Pole*



Four Pole*



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.
*See Single Pole Mounting Detail for hole sizes and locations. LEG type units are only available in one or two poles.

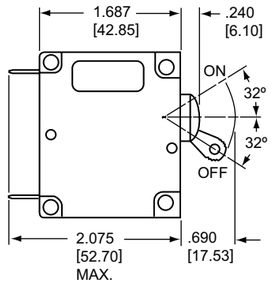
Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

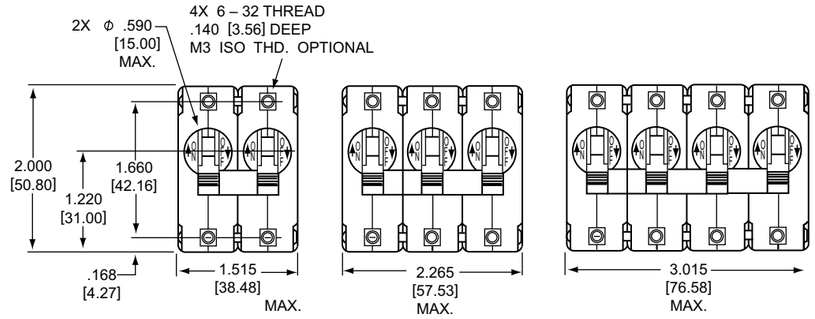
MULTI-POLE CIRCUIT PROTECTORS (IAGH/IUGH/IEGH/CEGH/LEGH)

The IAGH/IUGH/IEGH/CEGH/LEGH two, three and four pole models are available with a handle per pole.

LEGH type units are available only in two pole models.

IAGH/IUGH/IEGH/CEGH/LEGH Protectors

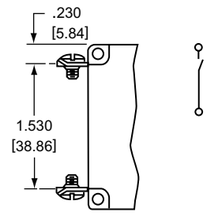




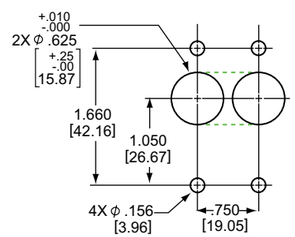
Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.

NOTE: We recommend machining slots into your panel for 2 or more poles. This eliminates the need to dissemble/reassemble the handle ties to be able to insert the handles thru indvidiually drilled holes. LEG type units are only available in one or two poles.

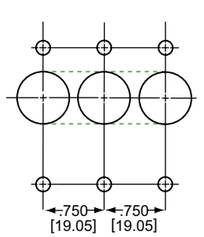
LEG Type Units Require Screw Terminals



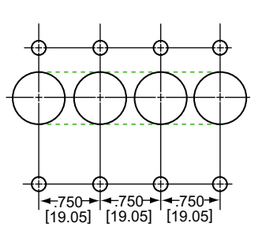
Two Pole



Three Pole*



Four Pole*

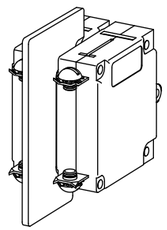


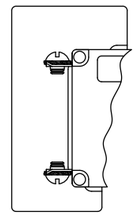
*See Two Pole Mounting Detail for hole sizes and locations.

LEG/LEGH Barriers (required)

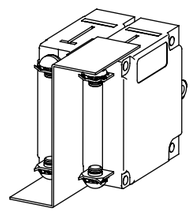
In order to meet UL listing requirements, the LEG/LEGH two pole model requires barriers. Available with a standard straight barrier or an optional "Z" type barrier.

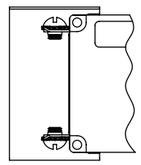
Standard Barrier





Optional "Z" Barrier





Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

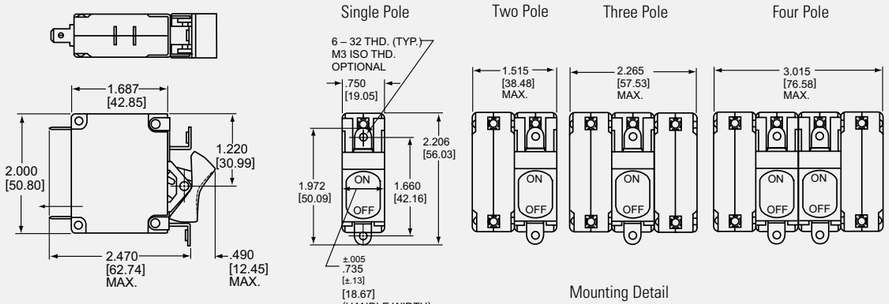
ROCKER CIRCUIT PROTECTORS (IAGX/IAGZX/IUGX/IUGZX/IEGX/IEGZX/CEGX/CEGZX/LEGZX)

The IAGX/IUGX/IEGX/CEGX and IAGZX/IUGZX/IEGZX/CEGZX/LEGZX styles offer two attractive rocker actuator versions of our popular IAG/IUG/IEG/CEG/LEG family. Designed with the operator in mind, each features handles with a concave surface and aesthetic appearance for front panel applications.

Both are available with rocker handle styles in a choice of five single colors: black, red, grey, orange or white.

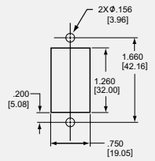
The IAGZX/IUGZX/IEGZX/CEGZX/LEGZX style adds our "EZ" options of contrasting dual color rocker actuators, affording a clear visual indication of the handle position and integrated handle guards, to help prevent accidental turn-on and turn-off of the unit. Available with a black rocker and white, red or green indicator color for either ON or OFF indication.

IAGX/IUGX/IEGX/CEGX

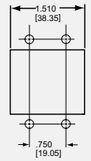


(Optional: Handle may be located in Pole 2 instead of Pole 1)

Mounting Detail
Single, Two & Three Pole

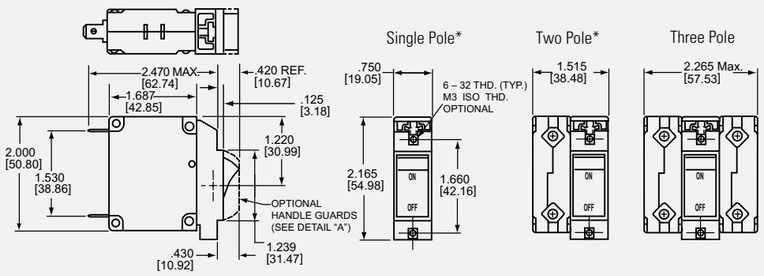


Four Pole*

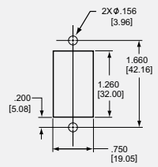


Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.
*See Single Pole Mounting Detail for hole sizes and locations.

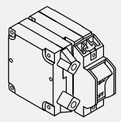
IAGZX/IUGZX/IEGZX/CEGZX/LEGZX



Single, Two & Three Pole



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.



Detail "A"

* LEG type units are only available in one or two poles.

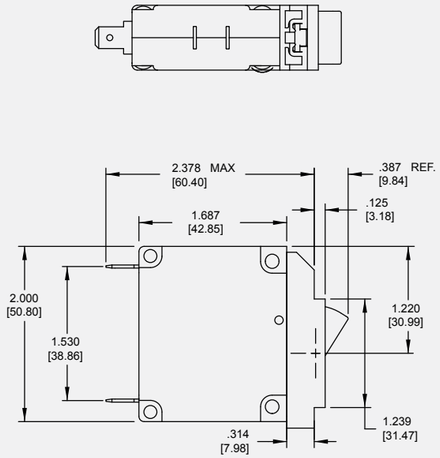
Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

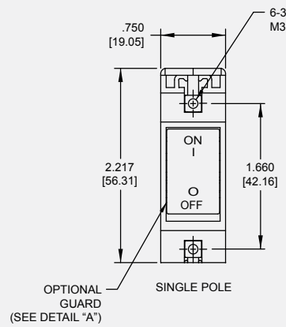
ROCKER CIRCUIT PROTECTORS (IAGBX/IUGBX/IEGBX/CEGBX/LEGBX)

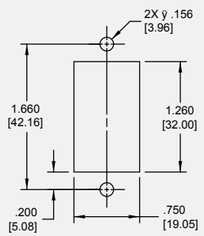
The innovative new design of our IEG BX style circuit breaker features a flat front rocker that not only satisfies your aesthetic needs, it guards against accidental actuation while providing the highest degree of circuit protection and quality. Only Airpax offers this new standard in user interface, providing additional peace of mind that guards alone can't supply.

Available on a variety of versions with a full range of agency approvals, the new IEG BX style circuit breakers meet or exceed all current performance specifications, including interrupting capacities up to 50,000 amperes. Various guard options offer additional and increasing levels of actuation protection performance. The two shot mold on the flat rocker surface provides a clean, crisp legend that can withstand demanding use.

IAGBX/IUGBX/IEGBX/CEGBX/LEGBX

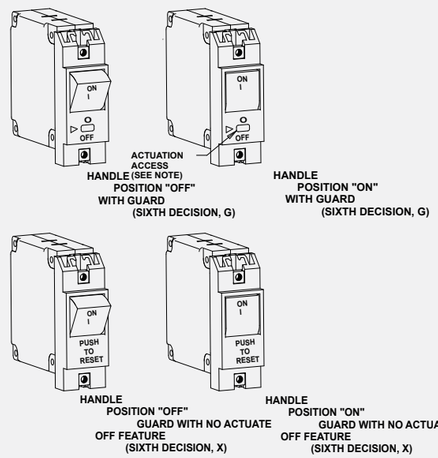


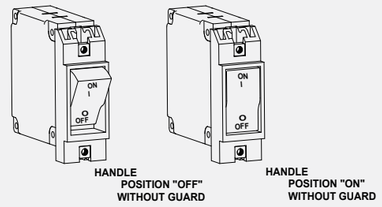




Panel Mounting Detail

MOUNTING DETAIL TOLERANCE: ±.005 [.13] UNLESS NOTED





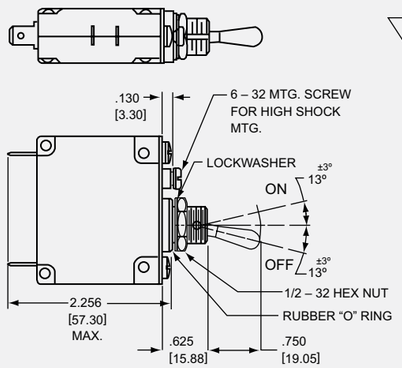
DETAIL "A"

NOTE: ACCESS IS LIMITED TO A DEVICE SMALLER THAN THE UNDERWRITERS LABORATORY "ARTICULATED PROBE" DEFINED IN UL-489 FIG. 11.1.7.2.1.

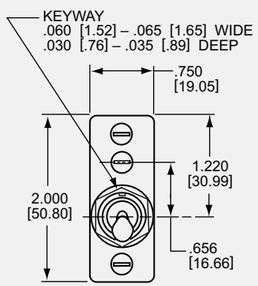
SEALED TOGGLE CIRCUIT PROTECTORS (IAGN/IUGN)

The IAGN/IUGN family is a sealed toggle version of the IAG/IUG family. The silicone rubber seal around the handle assures panel seal integrity and makes this style a natural for harsh environments.

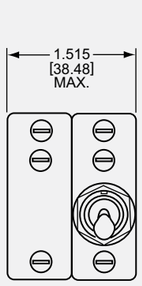
This sealed toggle family is available in one to three poles with ratings of .050 to 50 amperes.



Single Pole

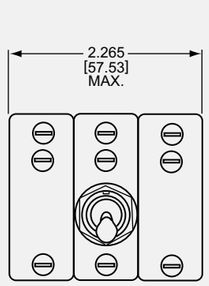


Two Pole

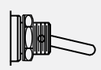


(Optional: Handle may be located in Pole 2 instead of Pole 1)

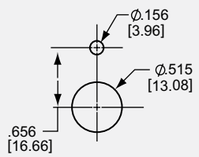
Three Pole



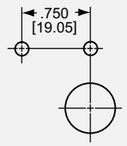
Optional Handle



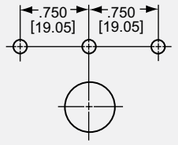
Mounting Detail
Single Pole



Two Pole*



Three Pole*



Panel Mounting Detail: Tolerance for Mtg. ±.005 [.13] unless noted.
*See Single Pole Mounting Detail for hole sizes and locations.

Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

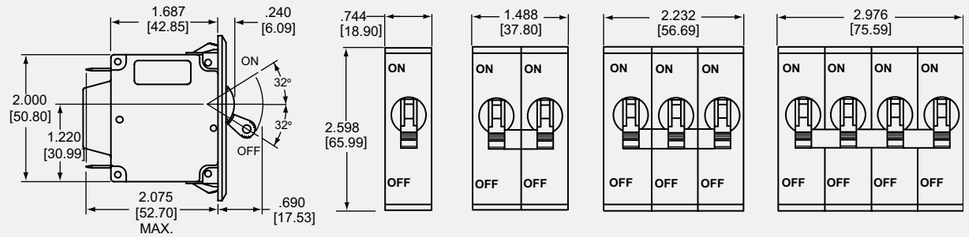
SNAP-IN CIRCUIT PROTECTORS (IEGS/IEGHS/CEGS/CEGHS/LEGS/LEGHS)

The Snap-In version of the IEG brings mounting simplification and international spacing together in a package that is aesthetically enhanced. The IEGS securely snaps into a rectangular cut-out, eliminating the need for panel mounting hardware and the associated costs. The face plate of the IEGS is a clean, black matte and it satisfies the increasing demand for front panel components that are designed with ergonomic considerations.

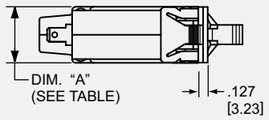
The IEGS is offered in either flush or beveled versions, in 1, 2, 3 or 4 pole packages, and with a handle per pole or per unit.

The IEGS is UL Recognized, CSA Certified and VDE approved.

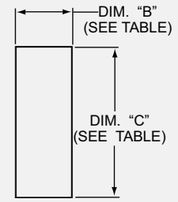
IEGHS/CEGHS/LEGHS Circuit Protectors (Note B)
(Multi-Pole-IEGH Handles Per Pole)
(Omit H for Single Pole)



Panel Cutout Detail
Panel Thickness: (See Table)



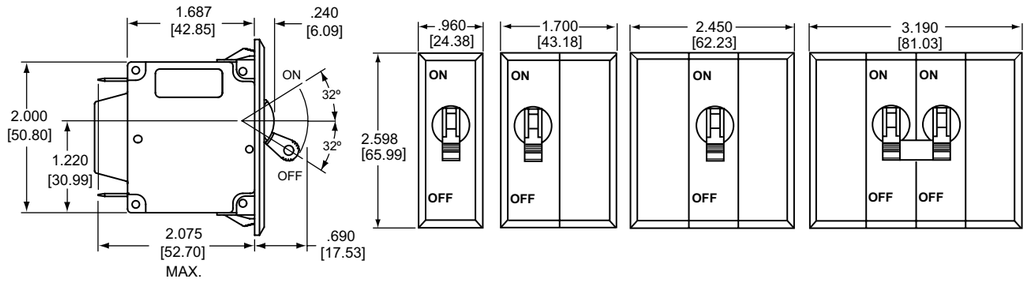
Note:
A: Flush face plate is optional. See decision tables, sixth decision.
B: Tolerance ± .031 [.79] Angles: ±5° unless noted. Dimensions in brackets [ ] are millimeters.



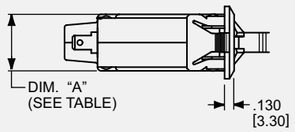
DIMENSIONS "A", "B", "C"

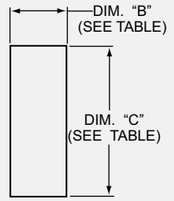
Number of Poles	Dimension "A", inches [mm]	Dimension "B", inches [mm]	Dimension "C", inches [mm]	
1 pole	.750 [19.05] max	.755 [19.18] min	2.180 ± .005 [55.37 ± .13]	2.186 ± .011 [55.52 ± .28]
2 pole	1.515 [38.48] max	1.520 [38.61] min		
3 pole	2.265 [57.53] max	2.270 [57.66] min		
4 pole	3.015 [76.58] max	3.020 [76.71] min		
		Panel Thickness	.040 to .059 [1.02 to 1.50]	.060 to .100 [1.52 to 2.54]

IEGS/CEGS/LEGS Circuit Protectors (Note B)
(Add H for multiple handles per unit, IEGHS)



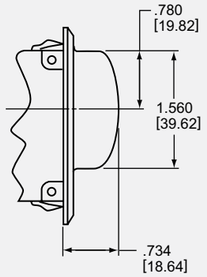
Panel Cutout Detail
Panel Thickness: (See Table)

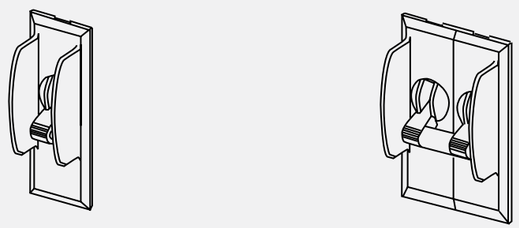




DIMENSIONS "A", "B", "C"				
Number of Poles	**Dimension "A", inches [mm]**	**Dimension "B", inches [mm]**	**Dimension "C", inches [mm]**	
1 pole	.750 [19.05] max	.780 ± .015 [19.81 ± .381]	2.180 ± .005 [55.37 ± .13]	2.186 ± .011 [55.52 ± .28]
2 pole	1.515 [38.48] max	1.540 ± .015 [39.12 ± .381]		
3 pole	2.265 [57.53] max	2.290 ± .015 [58.17 ± .381]		
4 pole	3.015 [76.58] max	3.040 ± .015 [77.22 ± .381]		
		Panel Thickness	.040 to .059 [1.02 to 1.50]	.060 to .100 [1.52 to 2.54]

Optional Handle Guard





Note: A: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.
B: Bevelled face plate is standard.

CONFIGURATIONS

Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an on-off switch.

Shunt Trip

The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

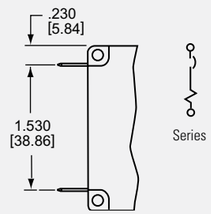
Auxiliary Switch (Applies to Series Trip Only)

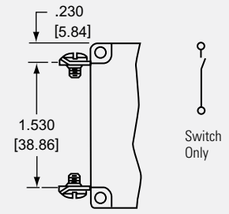
This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.

Auxiliary switch contacts actuate simultaneously with the main protector contacts, and will open regardless of whether the protector contacts are opened manually or electrically. For auxiliary switch ratings below 6Vac or 5Vdc, an auxiliary switch with gold contacts designated as REG is available. Gold contacts are not recommended for load current above 100 milliamps.

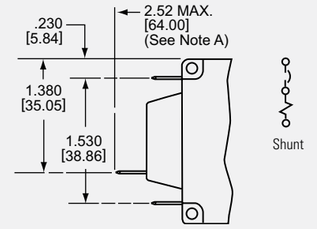
MAIN TERMINAL TYPES					
Amp Rating	**Push-On**	**8-32 Screw**	**M4 Screw**	**10-32 Screw**	**M5 Screw**
.05 to 30	X	X	X		
30.1 to 50				X	X

Note:
A: Terminal protrusion dimensions are referenced from back mounting panel.
B: Main terminals are male push-on type .250 [6.35] wide x 0.31 [.79] thick x .375 [9.53] long or 8-32 x .187 [4.75] screw type. Metric screw terminals are M4 x 5mm (<=30A): M5 x 5mm screw type (>30A). On VDE approved builds with screw terminals, external tooth lockwashers are supplied. On VDE approved builds with push-on terminals a soldered connection is required above 25 amperes.

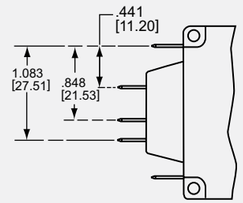




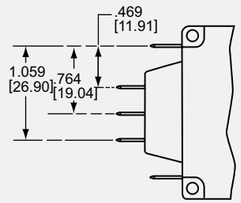
Optional flat
screw terminal

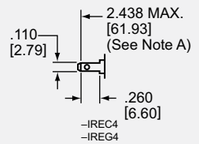


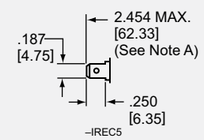
Standard Auxiliary Switch



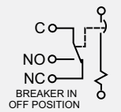
VDE Auxiliary Switch







Series with Auxiliary Switch



Relay Trip

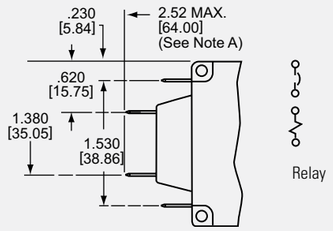
This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency /rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

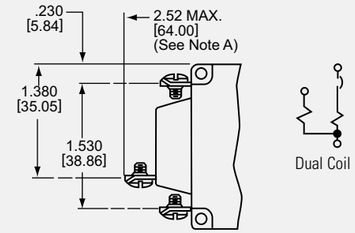
Dual Coil

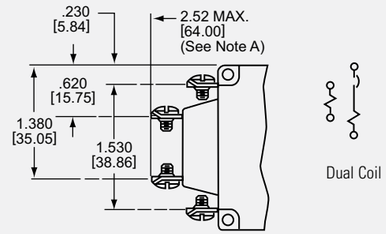
By combining two electrically independent coils on a common magnetic circuit, it is possible to provide contact opening when either an over-current or trip voltage is applied to the respective coils. One coil will be a current trip coil with standard specifications. The second, or dual coil, can be used to provide a control function permitting contact opening from a remote interlock or other transducer functions. Standard coils are 6, 12, 24, 48, 120 and 240 volts. Tripping is instantaneous and must be removed (usually self-interrupting) after trip.

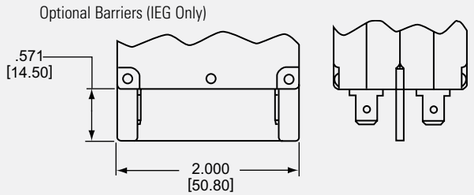
Voltage Trip

Sometimes called “dump circuits” or “panic trip circuits,” these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt or relay configurations.









Note: Tolerance ± .015 [.38] unless noted.
Dimensions in brackets [ ] are millimeters.

TYPICAL RESISTANCE / IMPEDANCE

Current Ratings (Amps)	Impedance		
	DC (ohms)	AC, 50/60Hz (ohms)	AC, 400Hz (ohms)
	51, 52, 53, 59	***61, 62, 63, 69***	***41, 42, 43, 49***
0.200	36.6	34.2	74.2
1.00	1.38	1.47	2.85
2.00	0.31	0.25	0.64
5.00	0.053	0.051	0.100
10.0	0.016	0.013	0.027
20.0	0.006	0.005	0.008
30.0	0.0027	0.0026	0.004
50.0	0.0019	0.0018	—

DCR and Impedance based on 100% rated current applied and stabalized for a minimum of one hour. Tolerance .05-2.5 amperes ± 20%: 2.6 -20 amperes ± 25%, 21-50 amperes ± 50%. Consult factory for special values and for coil impedance of delays not shown.

OPERATING CHARACTERISTICS

Inrush Pulse Tolerance

The following table provides a comparison of inrush pulse tolerance with and without the inertial delay feature for each of the 50/60Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker. The table at left provides a guide to determine if the inertia delay feature is required. Consult factory for further assistance.

INRUSH PULSE TOLERANCE	
Delay	**Pulse Tolerance**
61, 62, 63, 71, 72, 73	10 times rated current (approx)
61F, 62F, 63F, 71F, 72F, 73F	12 times rated current (approx)
64, 65, 66	25 times rated current (approx)

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (VERTICAL MOUNT)

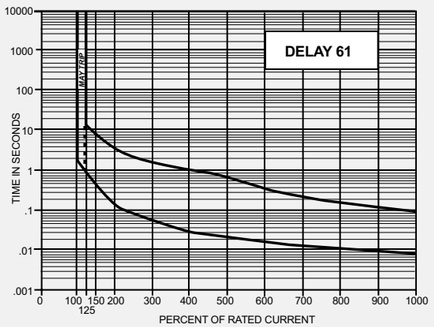
Delay	100%	125%	150%	200%	400%	600%	800%	1000%
41	No Trip	May Trip	.500 to 8.0	.150 to 1.9	.020 to .40	.006 to .25	.004 to .1	.004 to .05
42	No Trip	May Trip	5 to 70	2.2 to 25	.40 to 5.0	.012 to 2	.006 to .2	.006 to .15
43	No Trip	May Trip	35 to 350	12 to 120	1.5 to 20	.012 to 2.2	.01 to .22	.01 to .1
49	No Trip	May Trip	.100 Max	.050 Max	.020 Max	.020 Max	.020 Max	.020 Max
51*	No Trip	.500 to 6.5	.300 to 3.0	.100 to 1.2	.031 to .500	.011 to .25	.004 to .1	.004 to .08
52*	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2.0	.04 to 1	.008 to .5	.006 to .1
53*	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.23 to 9	.018 to .55	.012 to .2
59*	No Trip	.120 Max	.050 Max	.050 Max	.022 Max	.017 Max	.017 Max	.017 Max
61*	No Trip	.700 to 12	.35 to 7.0	.130 to 3.0	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62*	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3.0	.02 to 2	.015 to .8	.01 to .25
63*	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.013 to .85	.013 to .5
64	No Trip	.7 to 12	.35 to 7	.13 to 3	.030 to 1	.017 to .3	.01 to .16	.008 to .1
65	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3	.02 to 2	.017 to .76	.01 to. 6
66	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.014 to 5	.014 to 3
69*	No Trip	.120 Max	.100 Max	.050 Max	.022 Max	.017 Max	.017 Max	.017 Max
71**	No Trip	.440 to 10	.300 to 7	.100 to 3.0	.03 to 1	.012 to .3	.004 to .15	.004 to .1
72**	No Trip	1.8 to 100	1.7 to 60	1 to 20	.15 to 3	.04 to 2	.008 to .79	.006 to .28
73**	No Trip	50 to 600	30 to 400	10 to 150	1.8 to 20	.22 to 10	.018 to .88	.011 to .50
79**	No Trip	.120 Max	.100 Max	.050 Max	.023 Max	.016 Max	.015 Max	.015 Max

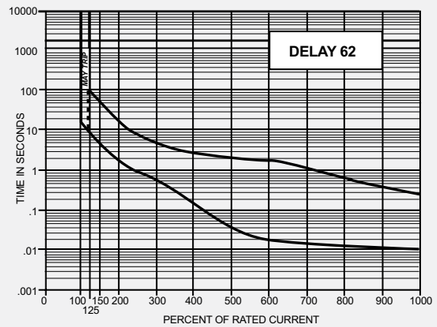
**CEG type units are available only with 51, 52, ,53 and 59 delays LEG type units are available only with 61, 62, 63 and 69 delays*
***135% minimum trip point for delays 71, 72, 73 and 79*

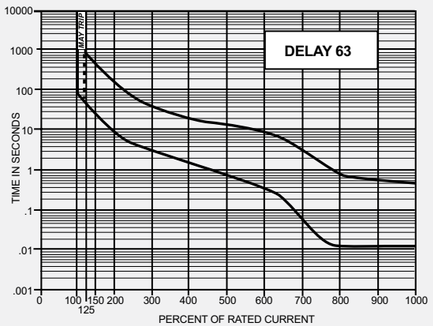
DELAY CURVES (IAG/IUG/IEG/CEG/LEG)

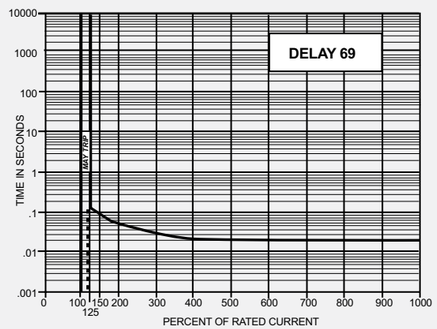
400Hz, DC, 50/60Hz Delay Curves (typ)

A choice of delays is offered for DC, 50/60Hz and 400Hz applications. Delays 49, 59 and 69 provide fast acting, instantaneous trip and are often used to protect sensitive electronic equipment (not recommended where known inrush exists). Delays 41, 51 and 61 have a short delay for general purpose applications. Delays 42, 52 and 62 are long enough to start certain types of motors and most transformer and capacitor loads. Delays 43, 53 and 63 are long delays for special motor applications at 400Hz, DC and 60Hz. CEG type units are only available in 51, 52, 53 and 59 delay curves. LEG type units are only available in 61, 62, 63 and 69 delay curves.



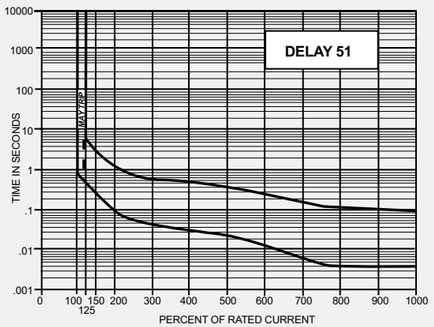


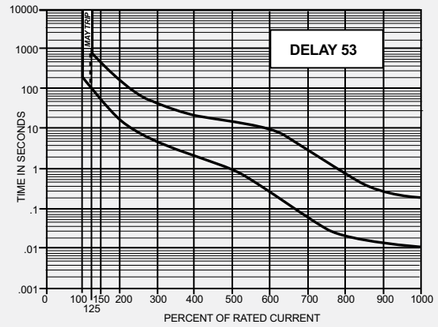


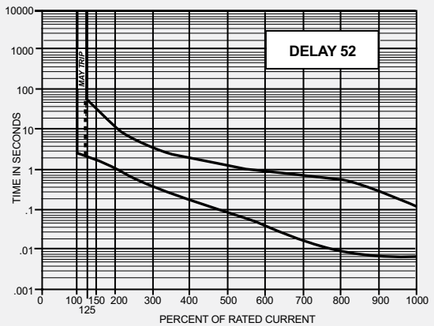


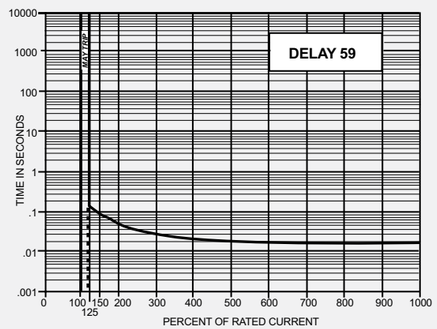
DELAY CURVES (IAG/IUG/IEG/CEG)

DC Delay Curves (typ)



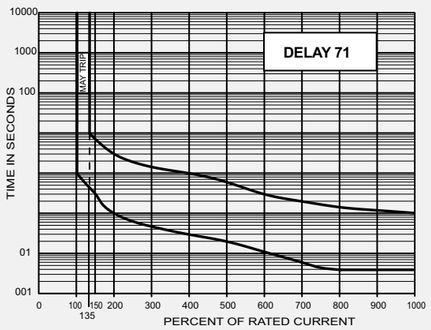


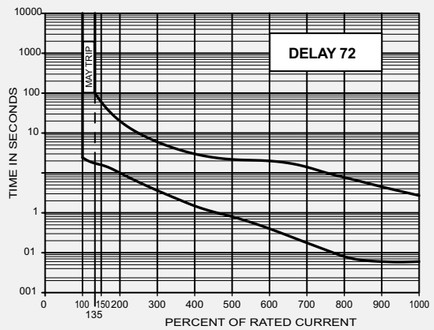


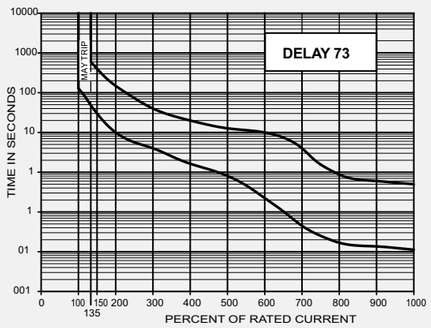


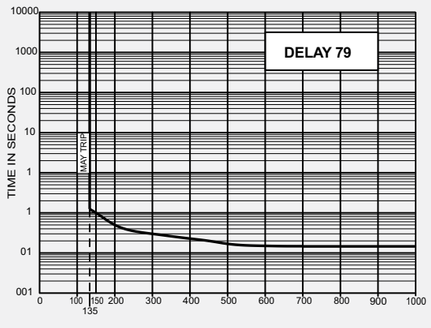
DELAY CURVES (IAG/IUG/IEG)

Multi-frequency - DC, 50/60Hz Delay Curves (typ)



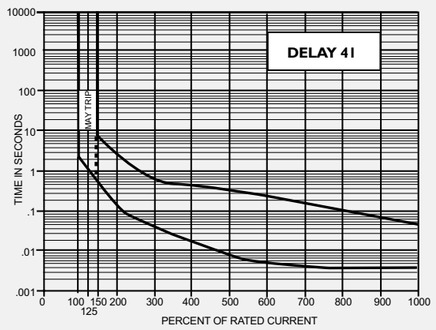


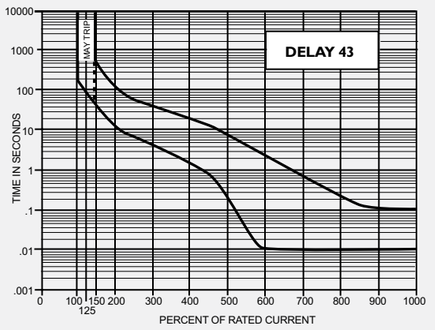


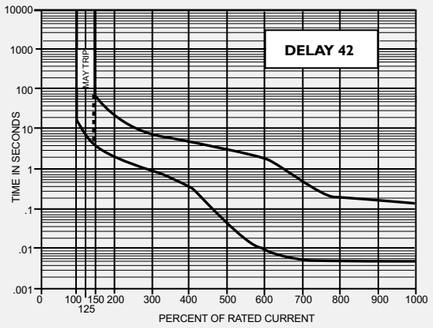


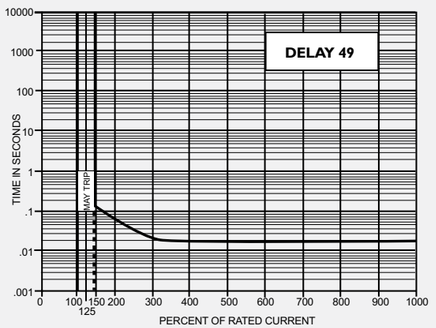
DELAY CURVES (IAG/IUG/IEG)

400Hz Delay Curves (typ)









SPECIFICATIONS

Trip Free
Will trip open on overload, even when forcibly held in the ON position. This prevents the operator from damaging the circuit by holding on the protector.

Trip Indication
The operating handle moves positively to the OFF position on overload.

Ambient Operation
IAG/IUG/IEG/CEG/LEG protectors operate in temperatures between –40° C to +85° C.

Insulation Resistance
Not less than 100 megohms at 500 volts DC.

Dielectric Strength
IAG/IUG/IEG/CEG/LEG protectors withstand 3750Vac, 60Hz for 60 seconds between all electrically isolated terminals, except auxiliary switch terminals shall withstand 600Vac, 60Hz for REG and REC types. Four terminal dual coil and relay construction (not offered in the IEG) will withstand 1500Vac.

Endurance
Operating as a switch, the operating life exceeds 10,000 operations at a rate of 6 per minute when tested as follows: 6000 OPS @ rated current plus 4000 OPS @ at no load.

Electrical Characteristics
.050-50 amperes; 80Vdc Max., 240Vac Max., 50/60Hz and .050-30 amperes: 250Vac Max., 400Hz. Units above 30 amps are not suitable for across-the-line motor starting.

Auxiliary Switch
When supplied shall be SPDT configuration. Non VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz; 3.0 amperes, 50 volts DC, 1 amperes, 80 volts DC (REC) type or 0.1 amperes, 125 volts, 60Hz. (REG type).

VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz, 1 amperes, 80 volts DC (REG type); or 0.1 amperes, 125 volts, 60Hz (REG type); or 0.1 amperes, 125 volts, 60Hz (REG type).

Moisture Resistance
Meets all the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-STD-202.

Salt Spray (Corrosion)
Meets the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-STD-202.

Shock
Circuit protectors shall not trip when tested per MIL-STD-202, Method 213, Test Condition I with 100% rated current applied to delayed units, except 90% current in plane 4 (i.e., handle down). Instantaneous units shall have 80% rated current applied in all planes.

Construction
Series, shunt, relay and series with auxiliary switch available in various delays and combinations.

Vibration
Circuit protector shall not trip when vibrated per MIL-STD-202, Method 204, Test Condition A with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

VDE Approval
IEG is VDE approved under VDE 0642 (EN60934). The IEG has 8mm creepage and clearance between the main circuit and the following areas:
A. Operator accessible area around the handle.
B. The mounting inserts or brackets.
C. The auxiliary switch circuit.
D. Between poles.

Care must be taken to maintain spacings at the terminals when wired. The VDE approval for standard terminals is not for use with bare wire. A crimp type lug is required. In addition, all VDE approved units will be in compliance with specific CE Directives. These units will be marked as CE Compliant.

UL1500 (Marine Ignition Protected)
IDG/IDGH is approved for Marine Ignition Protection

UL489A Listed
The CEG is dimensionally the same as the popular IEG, but provides UL listing to UL489A. Available in one to three poles, in series, series with auxiliary switch, shunt, dual coil and voltage trip configurations. As a circuit breaker, the CEG provides communication equipment manufacturers with a UL listed circuit breaker in a very compact package that meets the stringent environmental requirements of today's marketplace. This makes the CEG ideal for switching, transmission and wireless applications.

UL489 Listed
The LEG is dimensionally the same as the popular IEG, but provides UL listing to UL489. Available with one or two poles, in series, series with auxiliary switch, shunt and three-terminal dual coil configurations. As a circuit breaker, the LEG provides equipment manufacturers with a UL listed magnetic hydaulic circuit breaker in the most compact package available on the market.

APPROXIMATE WEIGHT PER POLE (1 TO 6 POLES AVAILABLE)	
Ounces	**Grams**
2.2	62.4

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
8-32 Screw Terminals	10 to 12
M4 Terminal Screws	10 to 12
10-32 Screw Terminals	14 to 15
M5 Screw Terminals	14 to 15
1/2 - 32 Mounting Bushing	30 to 35
Where applicable, mechanical support must be provide to the terminals when applying torque	

AGENCY APPROVALS

IAG/IUG/IEG Supplementary Protectors				Rated Current (Amps)		Short Circuit Rating (SC), Amps	
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL1077 & CSA**	**TÜV**
80	DC	—	1	.02 to 50	.10 to 30	U2, 7500	4000
125	50/60	1	1	.02 to 50	—	U2, 3000	—
125	50/60	1	1	.02 to 30	—	C1, 5000(3)	—
125	50/60	1	1	.02 to 50	—	U3, 1000	—
125 / 250	50/60	1	2	.02 to 50	—	U1, 3000	—
125 / 250	50/60	1	1	2/1 - 30/15	—	C2, 5000(1)	—
240	50/60	1 & 3	1	.02 to 50	—	U1, 2000	—
240	50/60	1 & 3	1	.02 to 50	—	C2, 5000(1)	—
250	50/60	1	1	.02 to 2	—	U2, 5000	—
250	50/60	1 & 3	1	.02 to 30	.10 to 50	U1, 2000	2000
250	50/60	1 & 3	1	.02 to 30	—	C2, 3500(2)	—
250 (4)	50/60	1 & 3	1	.02 to 30	—	C1, 3500(2)	—
250 (4)	50/60	1 & 3	1	.02 to 30	—	U1, 1000	—
250 (5)	50/60	1	2	.02 to 50	—	U3, 1000	—
250 (5)	50/60	3	3	.02 to 50	—	U3, 1000	—
277	50/60	1	1	.02 to 30	—	U2, 2000	—
277	50/60	1	1	.02 to 30	—	C2, 5000(2)	—
250	400	1 & 3	1	.02 to 30	—	U2, 1500	—
250	400	3	—	.02 to 30	—	U3, 200	—

IDG Supplementary Protectors							
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL1077 & CSA**	**TÜV**
48	DC	—	1	.02-50	—	U2, 5000	—
65	DC	—	1	.02-50	—	U2, 3000	—
125	50/60	1	1	.02-50	—	U2, 2000	—
125/250	50/60	1	2	.02-50	—	U2, 1500	—
250	50/60	1 & 3	1	.02-30	—	U1, 1000	—

CEG Communications Equipment Circuit Breakers							
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL489A**	**TÜV**
80	DC	—	1	.05-50	—	5000	—

LEG Circuit Breakers							
Max Voltage	**Frequency (Hz)**	**Phase**	**Minimum Poles**	**UL/CSA**	**TÜV**	**UL489**	**TÜV**
125	50/60	1	1	.05-30	.10-30	5000	2000
120/240	50/60	1	2	1-30	.10-30	5000	2000

Notes: (1) With 125 A max. series fuse; (2) With 80 A max. series fuse; (3) With 50 A max. circuit breaker; (4) With blocked vent construction; (5) Non-standard construction. "Fit for further use" approval

General notes:
All supplementary protectors are of the overcurrent (OC) type
The family of protectors has been evaluated for end use application for use groups (UG) A, B, C and D
The terminals (FW) are suitable for factory wiring only (0)
The maximum voltage ratings for which the protectors have been tested are shown in the chart
The current is the amperage range that the protectors have been tested
The tripping current (TC) for all of the protectors is "1" (in the range of 125% to 135% of ampere rating except for the 400Hz protectors which is "2" (more than 135% of ampere rating)
The overload rating (OL) - designates whether the protector has been tested for general use or motor starting applications.

0 – tested at 1.5 times amp rating for general use
1 – tested at 6 times AC rating or 10 times DC rating for motor starting
The short circuit current rating (SC) – The short circuit rating in amperes following a letter and number designating the test conditions and any calibration following the short circuit test is defined below:
C – Indicates short circuit test was conducted with series overcurrent protection
U – Indicates short circuit test was conducted without series overcurrent protection
1 – Indicates a recalibration was not conducted as part of the short circuit testing
2 – Indicates a recalibration was performed as part of the short circuit testing
3 – Indicates recalibration was performed along with the dielectric and voltage withstand for "Suitable for Further Use" rating

IAG / IUG / IEG / CEG DECISION TABLES

The ordering code for IAG/IUG/IEG/CEG/IDG circuit protectors may be determined by following the decision steps in the tables shown here.

The coding given permits a self-assigning part number but with certain limitations. Special applications may require a factory-assigned part number. Typical examples are units with mixed ratings, combinations of styles, or constructions not listed in the third decision table. With these, it is suggested that order entry be by description and/or drawings and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit protector for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the following is the code for a single pole, IEG quick-connect type terminal, series unit with auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay, a rating of 20 amperes, a black marked handle and is VDE approved.

To determine the ordering number for your particular IAG/IUG/IEG/CEG unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

Notes:

A. It is recommended that power leads be soldered to circuit protectors having push-on type terminals for current trip ratings above 20 amperes.

B. When "A" (metric thread mounting) is specified in the sixth decision in combination with screw terminal option in the second decision, metric screw terminals are supplied.

C. IEG, IEGH, IEGS, IEGHS, IEGX and IEGZX circuit protectors are designed to meet 8mm creepage and clearance requirements for installation Category III, Pollution Degree 3, Case A as measured in IEC 664. Intended for use in equipment designed to comply with IEC 601 and 950 and VDE 0804 and 0805.

1 First Decision

Select Type and Terminal

Type	Description
IAG IUG* IEG** CUG+ CEG++	One toggle handle per unit
IAGH IUGH* IEGH** CUGH+ CEGH++	One toggle handle per pole
IDG***	One toggle handle per unit, marine ignition protection
IDGH***	One toggle handle per pole marine ignition protection
IMG** CMG++	One toggle handle per unit mid-trip indication
IMGH** CMGH++	One toggle handle per pole mid-trip indication

*UL Recognized, CSA Certified
**UL Recognized, CSA Certified, VDE Approved
*** UL Recognized UL1500
+ UL489A Listed CSA Certified
++ UL489AListed CSA Certified VDE Approved

Handle and Mounting Options	
	Standard toggle/mounting, no designation required
S	Toggle w/ snap-in mounting
X	Rocker w/ standard mounting*
ZX	ZX Rocker w/ integral mounting*
BX	BX Rocker w/ integral mounting
N	Sealed toggle w/bushing mounting**

Note: Add "F" for flat screw terminals
* Not available on mid-trip units
** Available only on IAG, IUG units

2 Second Decision

Poles and Terminals

Push-on Terminals	Screw Terminals	
1	6	Single pole
11	66	Two pole
111	666	Three pole
1111	6666	Four pole

*Not available in toggle seal handle type.

Example:

IEG 1 - 1REC4 - 61 - 20.0 - 01 - V

1 2 3 4 5 7

3 Third Decision

Internal Configuration

-0	Switch only
-1	Series
-1REC4	Series w/ auxiliary switch * .110 quick connect
-1REC5	Series w/ auxiliary switch * .187 quick connect
-1REG4	Series w/ auxiliary switch (gold contacts)* .110 quick connect
-1RS4	Series w/ alarm switch, electrical trip, .110 Q.C. terminals
-1RLS4	Series w/ alarm switch, electrical trip, .110 Q.C. terminals (mid-trip only)
-3	Shunt
-4	Relay

* Only one auxiliary switch is normally supplied on two or three pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Frequency and Delay

SW	Switch only
-41	400Hz short delay
-42	400Hz long delay
-43	400Hz motor start
-49	400Hz 150% instant trip
-51	DC short delay*
-52	DC long delay*
-53	DC motor start*
-59	DC 125% instant trip*
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-64	50/60Hz short delay
-65	50/60Hz long delay
-66	50/60Hz motor start
-69	50/60Hz 125% instant trip
-71	DC/60Hz short delay
-72	DC/60Hz long delay
-73	DC/60Hz motor start
-79	DC/60 Hz 135% instant trip

For addition of inertial delay, add an iFI to any delay numeral.
* CEG types are only available with DC ratings

C = CCC Approved

This approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

5 Fifth Decision

Rated Current

Standard ratings listed. For other ratings, please contact the factory.

.100	10.0
.250	15.0
.500	20.0
.750	30.0
1.00	35.0*
2.50	40.0*
5.00	50.0*
7.50	

* IDG/IDGH is rated for 30 amps max.

7 Seventh Decision

Handle Color and Marking Selection

Toggle Handle

Color	Unmarked	Marked ON-OFF I-O
Black	-00	-01 (STD)
Yellow	-10	-11
Red	-20	-21
Blue	-30	-31
Green	-40	-41
Orange	-60	-61
White	-90	-91

Handle marking color is white on black, red, blue & green handles and black on white, yellow and orange handles. See alternate 7th decision below for X, ZX & BZ rocker handles.

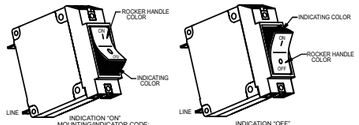
6 Sixth Decision

Optional

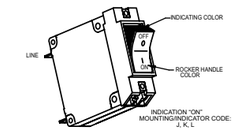
	Standard hardware. No designation required.
-A	Metric thread mounting inserts and terminals
-B	Barriers*
-C	277V (50/60Hz only) (See note 3)
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-L	Handle lock
-M	Handle in opposite pole (2 pole only)
-Q	APG style "FAT" handle
-S	Face plate sides flush with protector (see note 4)
-X	Handle guard with no actuation feature (BX rocker only) (Not available with mid-trip indication)

Notes:
1. One or more descriptions may be used as required.
2. When this is not used, table one may be substituted and U.S. thread will be supplied. Unit will be rated at 250V (50/60Hz only.)
3. VDE approved at 250VAC
4. IEGS standard face plate has beveled sides(see pg.90)

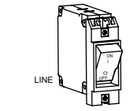
* Not available on snap-in units



MARKING DETAIL "A" (SEE TABLE)



MARKING DETAIL "B" (SEE TABLE)



MARKING DETAIL "C" (SEE TABLE)

7 Seventh Decision

Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

IAGX, IUGX, IEGX, IAGZX, IUGZX, IEGZX, CUGZX, CEGZX Rocker Handle (Single Rocker Color)

					Vertical Mounting			Horizontal Mounting			
Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	On-Off Fig.1	I-O Fig.2	On-Off I-O Fig.3	On-Off Fig.4	I-O Fig.5	On-Off I-O Fig.6	Marking Detail
Black	N/A	White	N/A	-00	-01	-02	-03	-04	-05	-06	A
Red	N/A	White	N/A	-20	-21	-22	-23	-24	-25	-26	
Grey	N/A	Black	N/A	-40	-41	-42	-43	-44	-45	-46	
Orange	N/A	Black	N/A	-50	-51	-52	-53	-54	-55	-56	
White	N/A	Black	N/A	-90	-91	-92	-93	-94	-95	-96	
IAGZX, IUGZX, IEGZX, CUGZX, CEGZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	-A0	-A1	-A2	-A3	-A4	-A5	-A6	A
Black	Red	White	On	-B0	-B1	-B2	-B3	-B4	-B5	-B6	
Black	Green	White	On	-C0	-C1	-C2	-C3	-C4	-C5	-C6	
Black	White	White	Off	-F0	-F1	-F2	-F3	-F4	-F5	-F6	
Black	Red	White	Off	-G0	-G1	-G2	-G3	-G4	-G5	-G6	
Black	Green	White	Off	-H0	-H1	-H2	-H3	-H4	-H5	-H6	
Black	White	White	On	-J0	-J1	-J2	-J3	-J4	-J5	-J6	B
Black	Red	White	On	-K0	-K1	-K2	-K3	-K4	-K5	-K6	
Black	Green	White	On	-L0	-L1	-L2	-L3	-L4	-L5	-L6	
IAGBX, IUGBX, IEGBX, CUGBX, CEGBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	-M0	N/A	-M2	-M3	N/A	-M5	-M6	C
Black	Red	Red	Off	-N0	N/A	-N2	-N3	N/A	-N5	-N6	
Black	Green	Green	Off	-P0	N/A	-P2	-P3	N/A	-P5	-P6	
Black	Yellow	Yellow	Off	-R0	N/A	-R2	-R3	N/A	-R5	-R6	

Notes: A. Bezels of IAGBX, IUGBX, IEGBX, CUGBX, CEGBX are black.
B. Consult factory for other marking options.

LEG DECISION TABLES

The ordering code for LEG circuit breakers may be determined by following the decision steps in the tables shown here.

The coding given permits a self-assigning part number but with certain limitations. Special applications may require a factory-assigned part number. Typical examples are units with mixed ratings, combinations of styles, or constructions not listed in the third decision table. With these, it is suggested that order entry be by description and/or drawings and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit breaker for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the following is the code for a single pole, LEG screw type terminal, series unit with auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay, a rating of 20 amperes, a black marked handle and is VDE approved.

To determine the ordering number for your particular LEG unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

Notes:

A. When "A" (metric thread mounting) is specified in the sixth decision in combination with screw terminal option in the second decision, metric screw terminals are supplied.

B. LEG, LEGH, LEGS, LEGHS, LEGZX and LEGBX circuit breakers are designed to meet 8mm creepage and clearance requirements for installation Category III, Pollution Degree 3, Case A as measured in IEC 664. Intended for use in equipment designed to comply with IEC 601 and 950 and VDE 0804 and 0805.

1 First Decision

Select Type and Terminal

Type	Description
LEG	One toggle handle per unit
LMG	One toggle handle per unit mid-trip indication
LEGH	One toggle handle per pole
LMGH	One toggle handle per pole mid-trip indication

Note: All types are UL489 listed, CUL certified

Handle and Mounting Options	
	Standard toggle/mounting, no designation required
S	Toggle w/ snap-in mounting
ZX	ZX Rocker w/ integral mounting*
BX	BX Rocker w/ integral mounting

Note: Add "F" for flat screw terminals
* Not available on mid-trip units

2 Second Decision

Poles and Terminals

Push-on Terminals	Screw Terminals	
1	6	Single pole
11	66	Two pole

*Not available in toggle seal handle type.

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series w/ auxiliary switch * .110 quick connect
-1REC5	Series w/ auxiliary switch * .187 quick connect
-1REG4	Series w/ auxiliary switch* (gold contacts) .110 quick connect
-1RS4	Series w/ alarm switch*, electrical trip, .110 Q.C. terminals
-1RLS4	Series w/ alarm switch*, electrical trip, mid-trip only, .110 Q.C. terminals
-3	Shunt

* Only one auxiliary switch is normally supplied on two pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Frequency and Delay

-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip

For addition of inertial delay, add an "F" to any delay numeral.
* CEG types are only available with DC ratings

V = VDE Approved

The shaded areas denote VDE Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE Approved, but other approvals still apply.

C = CCC Approved

This approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

Example:

LEG 6 - 1REC4 - 61 - 20.0 - 01 - V

(1) (2) (3) (4) (5) (7)

5 Fifth Decision

Rated Current

Use three numbers to print required current value between .100 amps minimum and 30.0 amps maximum.

For example, use:
.100 or 2.00 or 10.0

6 Sixth Decision

Optional

	Standard hardware. No designation required.
-A	Metric thread mounting inserts and terminals
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-L	Handle lock
-S	Face plate sides flush with breaker
-X*	Handle guard with no actuation feature (BX rocker only)
-Z	"Z" Barriers

Notes:
1. One or more descriptions may be used as required.
2. When this is not used, table one may be substitutad and U.S. thread will be supplied. Unit will be rated at 250V (50/60Hz only.)
3. LEGS standard face plate has beveled sides(see pg. 90)
* Not available on mid-trip units

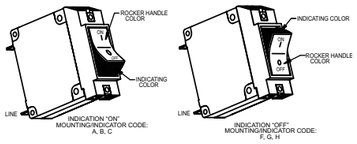
7 Seventh Decision

Handle Color and Marking Selection

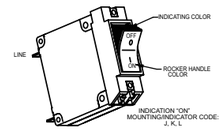
Toggle Handle

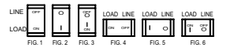
Color	Unmarked	Marked ON-OFF I-O
Black	-00	-01 (STD)
Yellow	-10	-11
Red	-20	-21
Blue	-30	-31
Green	-40	-41
Orange	-60	-61
White	-90	-91

Handle marking color is white on black, red, blue & green handles and black on white, yellow and orange handles.
See alternate 7th decision below for ZX & BZ rocker handles.



MARKING DETAIL "A" (SEE TABLE)





MARKING DETAIL "B" (SEE TABLE)

MOUNTING/INDICATOR CODE: M, N, P, R

MARKING DETAIL "C" (SEE TABLE)

7 Seventh Decision

Rocker Handle Color, Indicator Color and Marking Selection (See Note)

Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	Vertical Mounting On-Off Fig.1	Vertical Mounting I-O Fig.2	Vertical Mounting On-Off I-O Fig.3	Horizontal Mounting On-Off Fig.4	Horizontal Mounting I-O Fig.5	Horizontal Mounting On-Off I-O Fig.6	Marking Detail
LEGZX Rocker Handle (Single Rocker Color)											
Black	N/A	White	N/A	-00	-01	-02	-03	-04	-05	-06	A
Red	N/A	White	N/A	-20	-21	-22	-23	-24	-25	-26	
Grey	N/A	Black	N/A	-40	-41	-42	-43	-44	-45	-46	
Orange	N/A	Black	N/A	-50	-51	-52	-53	-54	-55	-56	
White	N/A	Black	N/A	-90	-91	-92	-93	-94	-95	-96	
LEGZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	-A0	-A1	-A2	-A3	-A4	-A5	-A6	A
Black	Red	White	On	-B0	-B1	-B2	-B3	-B4	-B5	-B6	
Black	Green	White	On	-C0	-C1	-C2	-C3	-C4	-C5	-C6	
Black	White	White	Off	-F0	-F1	-F2	-F3	-F4	-F5	-F6	
Black	Red	White	Off	-G0	-G1	-G2	-G3	-G4	-G5	-G6	
Black	Green	White	Off	-H0	-H1	-H2	-H3	-H4	-H5	-H6	
Black	White	White	On	-J0	-J1	-J2	-J3	-J4	-J5	-J6	B
Black	Red	White	On	-K0	-K1	-K2	-K3	-K4	-K5	-K6	
Black	Green	White	On	-L0	-L1	-L2	-L3	-L4	-L5	-L6	
LEGBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	-M0	N/A	-M2	-M3	N/A	N/A	-M6	C
Black	Red	Red	Off	-N0	N/A	-N2	-N3	N/A	N/A	-N6	
Black	Green	Green	Off	-P0	N/A	-P2	-P3	N/A	N/A	-P6	
Black	Yellow	Yellow	Off	-R0	N/A	-R2	-R3	N/A	N/A	-R6	

Notes:A. Bezels of LEGBX are black.
B. Consult factory for other marking options.

Sensata
Technologies

AIRPAX®

LEGA Series

Low-Depth, Hydraulic-Magnetic Circuit Breakers

Sensata Technologies

AIRPAX® | LEGA Series

Low-Depth, Hydraulic-Magnetic Circuit Breakers

INTRODUCTION

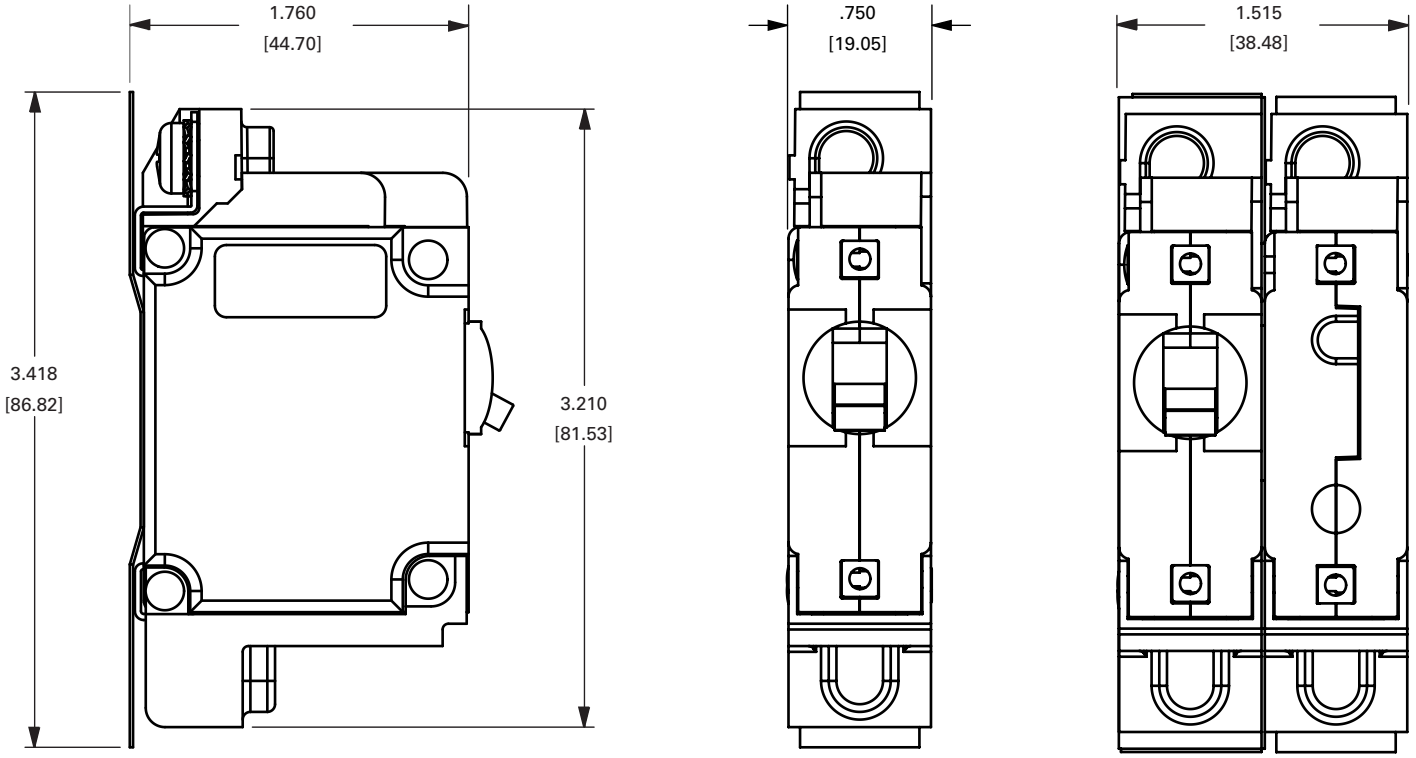
Developed to meet the evolving demand for low-profile datacenter rack power distribution units, the Airpax™ LEGA series circuit breaker provides a cost effective solution with uncompromising performance and reliability in a low-depth package. The UL-489 Listed product includes TÜV certification to EN60947-2 for global acceptance in UL-60950 and EN60950 ITE applications, a variety of limited access actuator styles and secure screw terminals oriented for ease of assembly and efficient power conductor routing.

FEATURES

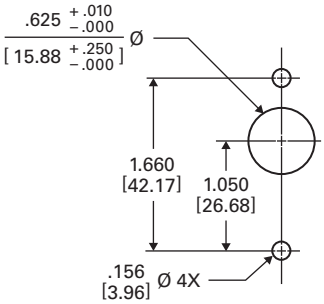
- Retains proven high performance specifications & reliability of the Airpax™ LEG series
- Low-depth design to minimize PDU intrusion into equipment rack space
- Rear access screw terminals provide secure vibration resistant connection for high reliability applications
- Terminal orientation allows simple power conductor routing and ease of assembly
- Global agency certifications for UL60950 and EN60950 ITE requirements
- Short toggle and flat rocker actuators available for protection against accidental “turn-off”
- Barriers fold-away to allow easier screw access

SPECIFICATIONS

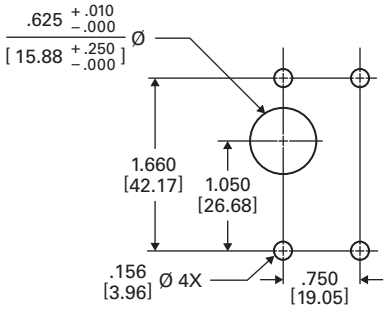
Agency Certification	Rated Amperage	Maximum Voltage	Short Circuit Amperage	Phase
UL-489	1.00A - 30.0A	120vac, 50/60Hz	5,000A	1
UL-489	1.00A - 30.0A	120/240vac, 50/60Hz	5,000A	1
UL-489	1.00A - 50.0A	80vdc	5,000A	—
TÜV (EN60947-2) Ics	1.00A - 30.0A	250vac, 50/60Hz	3,000A	1
TÜV TUV (EN60947-2) Ics	1.00A - 50.0A	80vdc	3,000A	—
TÜV (EN60947-2) Ics	1.00A - 30.0A	240/415vac, 50/60Hz	3,000A	1 & 3



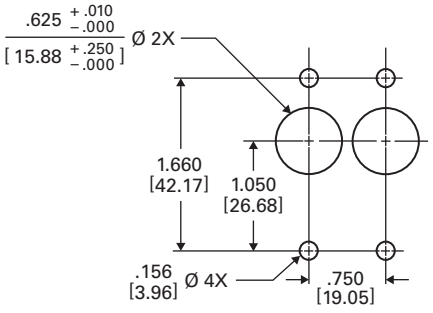
- Single Pole, Toggle Handle



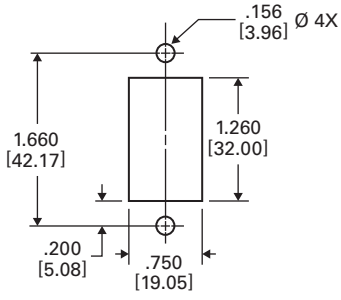
- Two Pole, Single Toggle Handle



- Two Pole, Two Toggle Handles



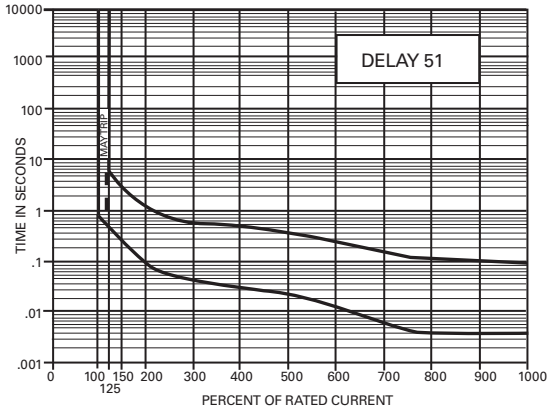
- Single Pole, Rocker Handle



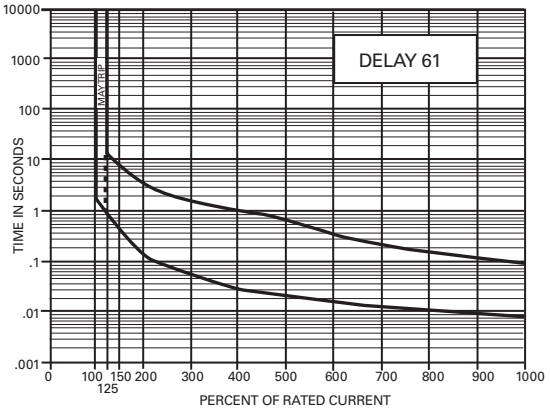
Panel Mounting Detail: Tolerance for Mtg. ± .005 [.13] unless noted.

DELAY CURVES

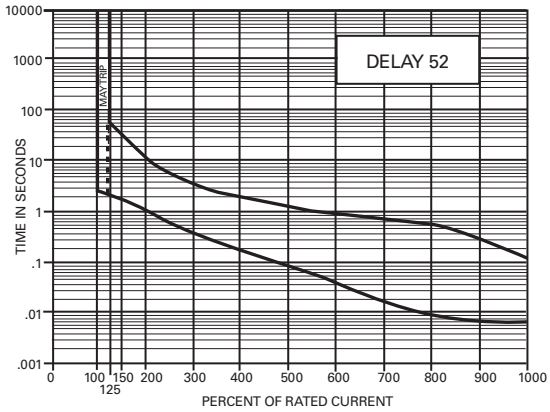
- DC Short Delay



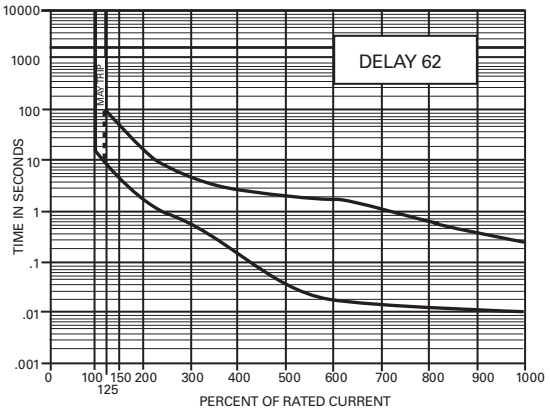
- 50/60Hz Short Delay



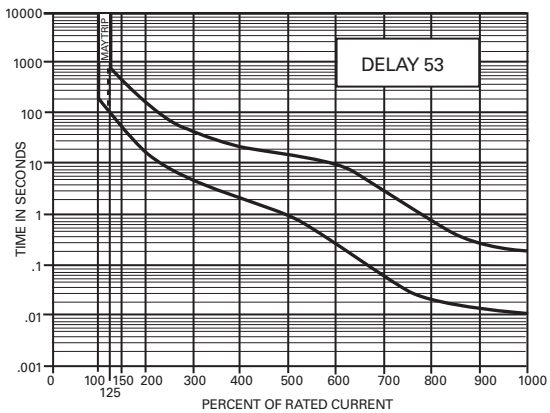
- DC Medium Delay



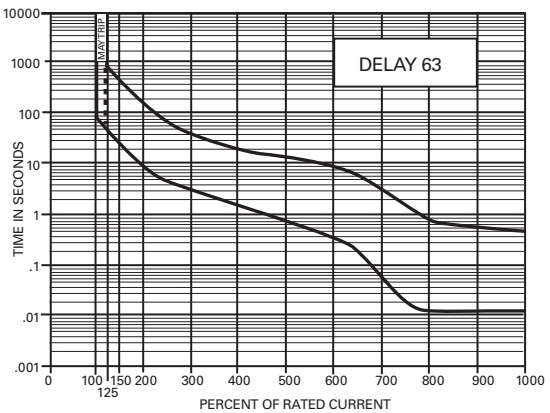
- 50/60Hz Medium Delay



- DC Long Delay (Motor Start)



- 50/60Hz Long Delay (Motor Start)



INTERNAL CONFIGURATION - SERIES TRIP

The most popular configuration for hydraulic-magnetic circuit breakers is the series trip, where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional over-current protection, it's simultaneously used as an ON-OFF switch.

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C (VERTICAL MOUNT)

Delay	100%	125%	150%	200%	400%	600%	800%	1000%
51	No Trip	.500 to 6.5	.300 to 3.0	.100 to 1.2	.031 to .500	.011 to .25	.004 to .1	.004 to .08
52	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2.0	.04 to 1	.008 to .5	.006 to .1
53	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.23 to 9	.018 to .55	.012 to .2
61	No Trip	.700 to 12	.35 to 7.0	.130 to 3.0	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3.0	.02 to 2	.015 to .8	.01 to .25
63	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.013 to .85	.013 to .5

INRUSH PULSE TOLERANCE

Delay	Pulse Tolerance
61, 62, 63	10 times rated current (approx)
61F, 62F, 63F	12 times rated current (approx)

INRUSH PULSE TOLERANCE

The table above provides a comparison of inrush pulse tolerance with and without the inertial delay feature for each of the 50/60Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker. Consult Sensata Technologies for further assistance.

TYPICAL RESISTANCE / IMPEDANCE

Current Ratings (Amps)	Impedance	
	DC (ohms)	AC, 50/60Hz (ohms)
	51, 52, 53	***61, 62, 63***
0.200	36.6	34.2
1.00	1.38	1.47
2.00	0.31	0.25
5.00	0.053	0.051
10.0	0.016	0.013
20.0	0.006	0.005
30.0	0.0027	0.0026
50.0	0.0019	—

DCR and Impedance based on 100% rated current applied and stabalized for a minimum of one hour. Tolerance .05-2.5 amperes ± 20%: 2.6 -20 amperes ± 25%, 21-50 amperes ± 50%. Consult factory for special values and for coil impedance of delays not shown.

Sensata Technologies

1. Type & Handle

Step 1a		Step 1b	
LEG	One handle per unit	**A**	Standard toggle & mounting, Low depth construction
LEGH	One handle per pole	**ZXA***	ZX rocker with integral mounting, Low depth construction
LMG	One handle per unit, mid-trip	**BXA***	BX flat rocker with integral mounting, Low depth construction
LMGH	One handle per pole, mid-trip		

*** All types are UL-489 Listed*
** Rockers can not have option "H", a handle per pole (for example LEGHZXA or LMGHBXA is incorrect)*

2. Poles & Terminals

6	Single Pole, Screw Terminals
66	Two Pole, Screw Terminals

3. Internal Configuration

1	Series

4. Frequency & Delay

Step 4a		Step 4b	
SW	Switch only		Standard
51	DC short delay	**F**	Inertial wheel
52	DC medium delay		
53	DC long delay		
61	50/60Hz short delay		
62	50/60Hz medium delay		
63	50/60Hz long delay (motor start)		

All delays can add an optional inertial wheel by adding an "F" to the end of the code.

Example:
61 becomes 61F

5. Rated Current

1.0	1 amp
5.0	5 amp
7.5	7.5 amp
10.0	10 amp
12.5	12.5 amp
15.0	15 amp
16.0	16 amp
20.0	20 amp
25.0	25 amp
30.0	30 amp
40.0	40 amp***
50.0	50 amp***

*** Ratings over 30 amps only available with DC delay characteristics*

Other ratings available upon request

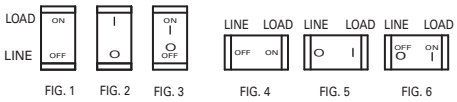
6. Additional Options

	Standard hardware, no options required
A	Metric thread mounting inserts and terminal hardware
G	Hand guard (available for ZX & BX versions only)
M	Handle in opposite pole (2-pole only)
Q	APG/UPG style "fat" toggle actuator
X	Handle guard with no actuation feature (BX only, no mid-trip)

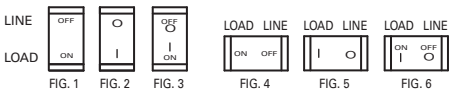
8. Approvals

T	TÜV approved Certified to EN60947-2 Includes the CE mark

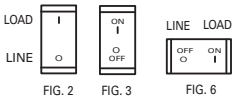
LEGBXA 66 – 1 – 62 – 20.0 – AG – M6 – T



MARKING DETAIL "A"



MARKING DETAIL "B"



MARKING DETAIL "C"

7. Handle Colors, Indicators & Markings

Toggle Handle

Unmarked	Marked ON - OFF I - O	Handle Color	Unmarked	Marked ON - OFF I - O	Handle Color	Unmarked	Marked ON - OFF I - O	Handle Color	Unmarked	Marked ON - OFF I - O	Handle Color
- 00	- 01	Black	- 10	- 11	Yellow	- 20	- 21	Red	- 30	- 31	Blue
- 40	- 41	Green	- 60	- 61	Orange	- 90	- 91	White			

ZX Rocker Handle (Single-Color Rocker) — *Marking Detail A*

Unmarked	Vertical Mount ON - OFF *(fig 1)*	Vertical Mount I - O *(fig 2)*	Vertical Mount ON - OFF I - O *(fig 3)*	Horizontal Mount ON - OFF *(fig 4)*	Horizontal Mount I - O *(fig 5)*	Horizontal Mount ON - OFF I - O *(fig 6)*	Handle Color	Indicating Color	Marking Color	Indicates
- 00	- 01	- 02	- 03	- 04	- 05	- 06	Black	—	White	—
- 20	- 21	- 22	- 23	- 24	- 25	- 26	Red	—	White	—
- 40	- 41	- 42	- 43	- 44	- 45	- 46	Gray	—	Black	—
- 50	- 51	- 52	- 53	- 54	- 55	- 56	Orange	—	Black	—
- 90	- 91	- 92	- 93	- 94	- 95	- 96	White	—	Black	—

ZX Rocker Handle (Two-Color Rocker) — *Marking Detail A & B*

Unmarked	Vertical Mount ON - OFF *(fig 1)*	Vertical Mount I - O *(fig 2)*	Vertical Mount ON - OFF I - O *(fig 3)*	Horizontal Mount ON - OFF *(fig 4)*	Horizontal Mount I - O *(fig 5)*	Horizontal Mount ON - OFF I - O *(fig 6)*	Handle Color	Indicating Color	Marking Color	Indicates
- A0	- A1	- A2	- A3	- A4	- A5	- A6	Black	White	White	ON
- B0	- B1	- B2	- B3	- B4	- B5	- B6	Black	Red	White	ON
- C0	- C1	- C2	- C3	- C4	- C5	- C6	Black	Green	White	ON
- F0	- F1	- F2	- F3	- F4	- F5	- F6	Black	White	White	OFF
- G0	- G1	- G2	- G3	- G4	- G5	- G6	Black	Red	White	OFF
- H0	- H1	- H2	- H3	- H4	- H5	- H6	Black	Green	White	OFF
- J0	- J1	- J2	- J3	- J4	- J5	- J6	Black	White	White	ON
- K0	- K1	- K2	- K3	- K4	- K5	- K6	Black	Red	White	ON
- L0	- L1	- L2	- L3	- L4	- L5	- L6	Black	Green	White	ON

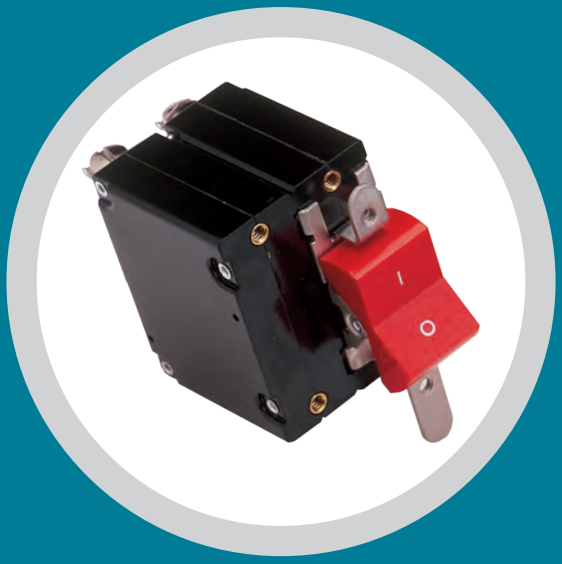
BX Rocker Handle (Two-Color Rocker) — *Marking Detail C*

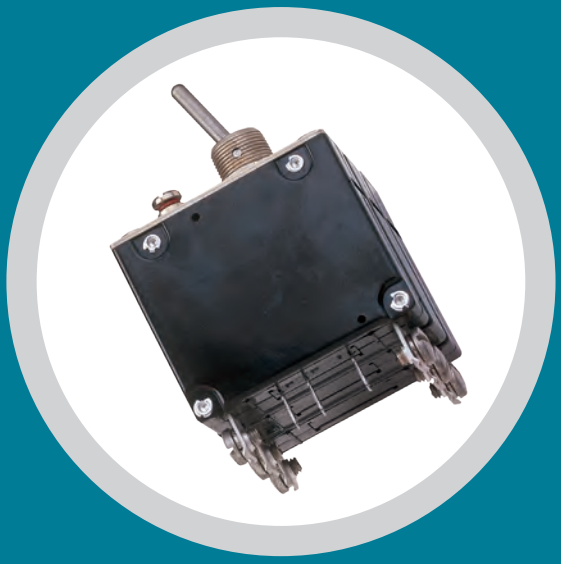
Unmarked	Vertical Mount ON - OFF *(fig 1)*	Vertical Mount I - O *(fig 2)*	Vertical Mount ON - OFF I - O *(fig 3)*	Horizontal Mount ON - OFF *(fig 4)*	Horizontal Mount I - O *(fig 5)*	Horizontal Mount ON - OFF I - O *(fig 6)*	Handle Color	Indicating Color	Marking Color	Indicates
- M0	—	- M2	- M3	—	—	- M6	Black	White	White	OFF
- N0	—	- N2	- N3	—	—	- N6	Black	Red	Red	OFF
- P0	—	- P2	- P3	—	—	- P6	Black	Green	Green	OFF
- R0	—	- R2	- R3	—	—	- R6	Black	Yellow	Yellow	OFF

Bezel of BX is black. Consult factory for other marking options.
Black, red, blue and green handles have white marking. White, yellow and orange handles have black marking.

AIRPAX®

APG/UPG/IPG Series
"Existing Designs Only"





AIRPAX® | APG/UPG/IPG Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

IMPORTANT NOTICE: *The APG/UPG is a legacy product and no new design-in orders are being accepted. If the specifications for this product are necessary for your system, Sensata Technologies recommends utilizing the Airpax™ IAG series.*

The APG/UPG magnetic circuit protector provides low-cost power switching, reliable circuit protection and accurate circuit control in one complete package. It is intended for use in data processing and broadcast equipment, vending and amusement machines, military and marine applications, and wherever precision operation is required.

Designed using a current sensitive hydraulic magnetic principle, the APG/UPG adapts itself to many applications and environments. Temperature compensations which affect fuses and other thermal devices are not a concern. Nuisance tripping is minimized.

The APG/UPG is available in a wide variety of configurations with a choice of delays and ratings. In addition, it is available in either DC, 50/60Hz or 400Hz versions.

Available in single or multi-pole variations, the APG/UPG comes with a variety of actuators. To enhance front-panel aesthetics, toggle or rocker actuated handles and caps are available in a variety of attractive colors.

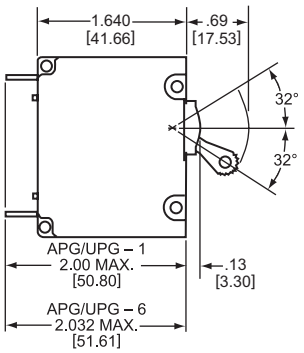
Multi-pole circuit protectors can be furnished with either single or multiple actuators. In addition, a unique sealed, single handle toggle version for harsh or military environments is available in single or multi-pole configurations.

The UPG circuit protector is recognized under UL Standard 1077, file numbers E66410 and E33504 as a supplementary protector. It is also certified by CSA under CSA STD. C22.2–No. 235, file number LR26229 as a supplementary protector. The APG is qualified to MIL-PRF-55629.

APG/UPG circuit protectors are available in one through four pole assemblies with a variety of pole arrangements, terminal styles, and accessories to meet your specifications, including APG/UPG adapter plate option to allow mounting in APL/UPL cutout.

APG/UPG SINGLE POLE CIRCUIT PROTECTORS

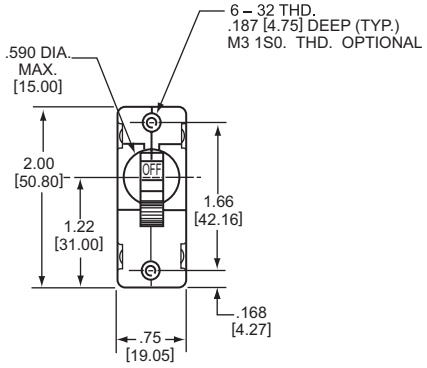
Single Pole, Toggle



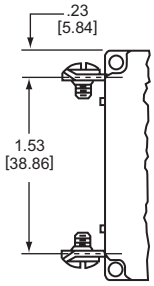
MAIN TERMINAL TYPES

Amp Rating	Push-On	8-32 Screw	M4 Screw	10-32 Screw	M5 Screw
.1 to 30	X	X	X		
30.1 to 50				X	X

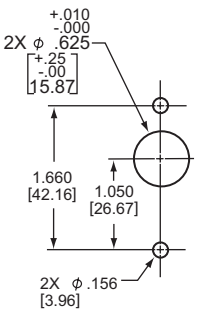
Single Pole



APG 6-1*



Single Pole, Mounting Detail

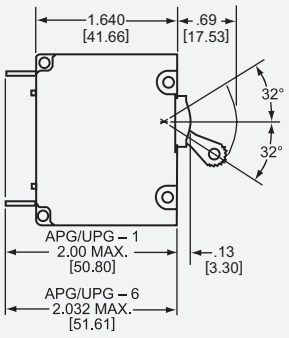


Notes: Tolerance ±.015 [.38] unless noted.
Dimensions in Brackets [ ] are millimeters.
* * Allows mounting in APL/UPL cutout.

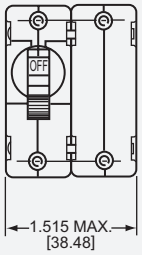
TWO POLE PROTECTORS

An assembly consisting of two single pole units, having their trip mechanisms internally coupled, and with a single toggle handle, forms the APG/UPG-11. It is also possible to provide a handle per pole, which is referred to as UPGH11. Individual poles may differ in ratings, delays and internal connections. An auxiliary switch may be included in either or both poles if they are of the series trip type. Screw-type terminals can be provided, in which case the designation would be APG/UPG-66.

Two Pole

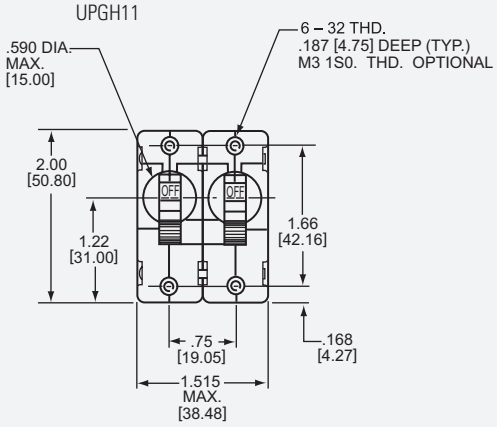


UPG11

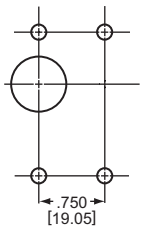


(Optional, handle may be in pole 1 instead of pole 2)

UPGH11

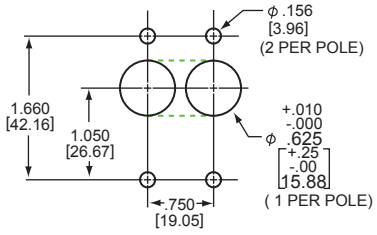


UPG11



Two Pole*

UPGH11



Two Pole

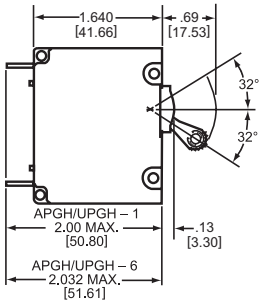
Panel Mounting Detail: Tolerance ±.005 [.13] unless noted.

Note: Tolerance ± .015 [.38] unless noted. Dimensions in Brackets [ ] are millimeters.
* See single pole mounting detail for hole sizes and locations.

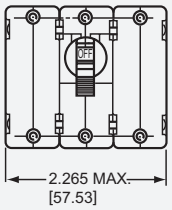
THREE POLE AND FOUR POLE PROTECTORS

The three pole structure consists of three single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A single toggle handle operates all three poles, or a handle per pole is available. The four pole structure consists of four single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. A double toggle handle operates all four poles, or a handle per pole is available. The individual poles need not have identical characteristics and any series trip pole may have an auxiliary switch. If screw-type terminals are required, the breaker designation will be APG/UPG-666 for a three pole version and APG/UPG-6666 for a four pole version.

Protector poles are numbered consecutively when viewed from the terminal side, with the ON position up, starting with Pole #1 on the left side and proceeding to the right.

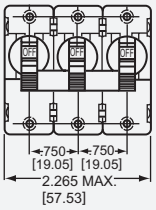


Three Pole



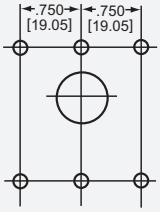
UPG 111

Three Pole



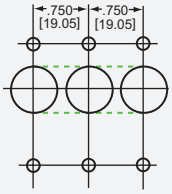
UPGH 111

Mounting Detail



Three Pole*

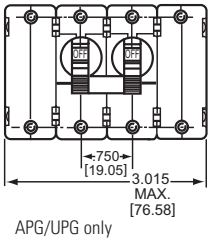
Mounting Detail



Three Pole*

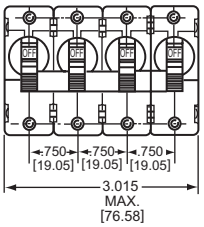
* See single pole mounting detail for hole sizes and locations.

Four Pole



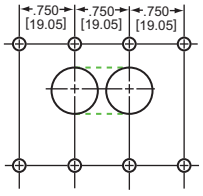
APG/UPG only

Four Pole



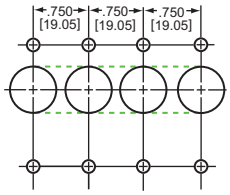
APGH/UPGH only

Mounting Detail



Four Pole*

Mounting Detail

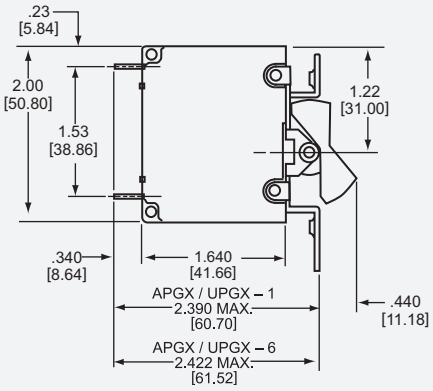


Four Pole*

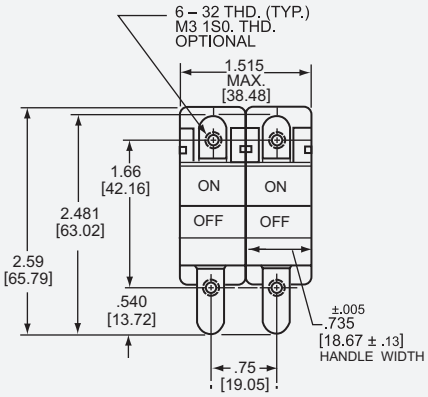
APGHX / UPGHX

Rocker actuated APGHX/UPGHX provides one rocker handle for each pole of a multi-pole circuit protector.

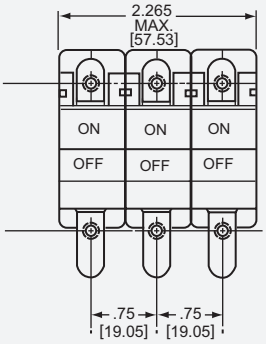
DIMENSION "A"	
Number of Poles	**Dimensions "A"**
2	1.510 ± .005 [38.35 ± .13]
3	2.265 ± .005 [57.53 ± .13]



Two Pole

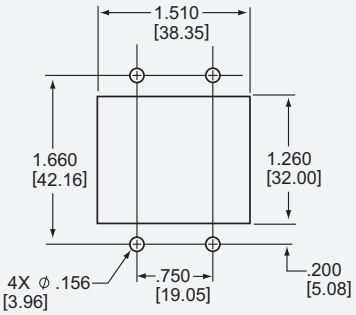


Three Pole

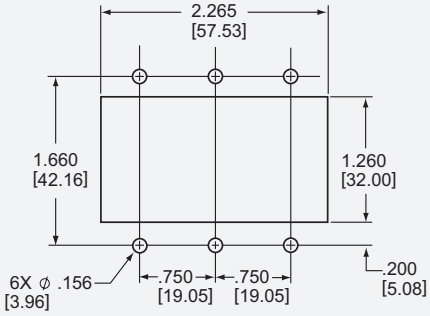


Panel Mounting Detail: Tolerance ±.005 [.13] unless noted.

Two Pole

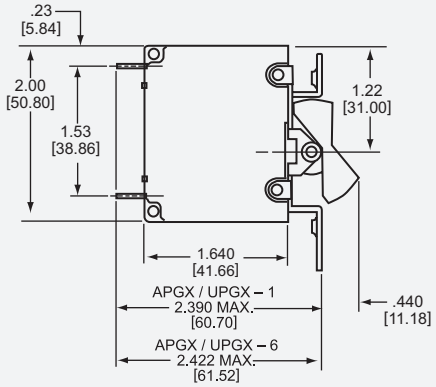


Three Pole

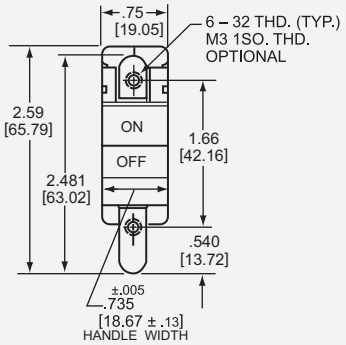


APGX / UPGX

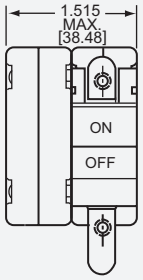
Rocker actuated APGX / UPGX provides one rocker handle per circuit protector.



Single Pole

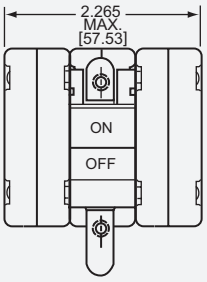


Two Pole

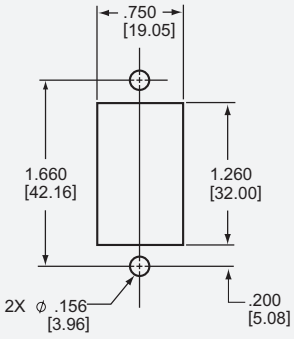


(Optional, handle may be in pole 2 instead of pole 1)

Three Pole



One, Two & Three Pole

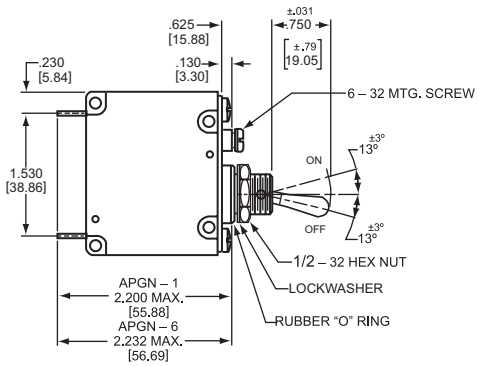


Panel Mounting Detail: Tolerance ±.005 [.13] unless noted.

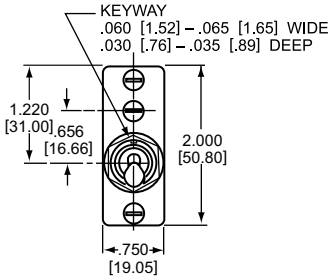
Note: Tolerance ± .015 [.38] unless noted.
Dimensions in Brackets [ ] are millimeters.

BAT HANDLE / PANEL SEAL (APGN / UPGN)

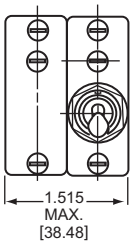
The APGN is designated to provide circuit protection in harsh and military environments. Waterproof panel integrity is provided by an "O" ring bushing seal and silicon rubber gland within the bushing/ handle assembly. Single, two or three pole versions are available with two and three pole versions featuring a single operating handle and mounting bushing.



Single Pole

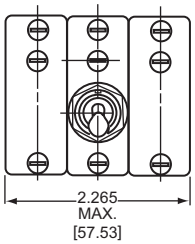


Two Pole

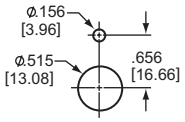


(Optional handle may be in pole 2 instead of pole 1)

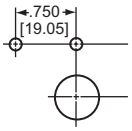
Three Pole



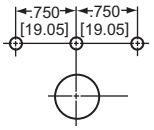
Single Pole



Two Pole*



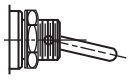
Three Pole*



Panel Mounting Detail: Mounting detail tolerance ±.005 [.13] unless noted.

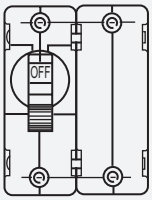
*See single pole mounting detail for hole sizes and locations.

Optional Handle



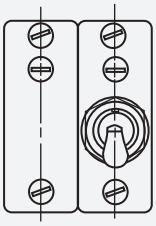
Standard Handle Location
(Applies to 2 Pole Only)

Toggle Handles



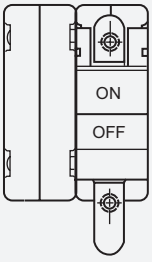
APG/UPG

Bat Handle/
Panel Seal



APGN/UPGN

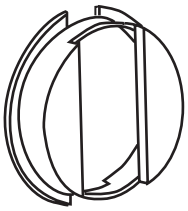
Rocker



APGX/UPGX

TOGGLE HANDLES (APG/UPG)

The APG/UPG circuit protector is available with toggle handles in six different colors. For attractive panel appearance, color caps are also available. Handles may be specified in black, white, yellow, red, blue and green. For multi-pole units, specify handle per unit or handle per pole.



Color Caps
For attractive panel appearance the following color caps are available for use on APG/UPG protectors.

COLOR CAPS	
Color	**Order Separately**
Red	762 - 300 - 8046
Green	762 - 300 - 8043
White	762 - 300 - 8040
Gray	762 - 300 - 8041
Blue	762 - 300 - 8042
Yellow	762 - 300 - 8044
Orange	762 - 300 - 8045
Brown	762 - 300 - 8047
Black	762 - 300 - 8048

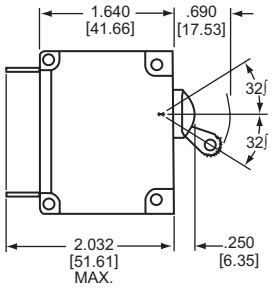
IPG MAGNETIC CIRCUIT PROTECTORS

The IPG circuit protectors provide the advantages of magnetic “stand alone” protection and compliance with UL, CSA, SEV, VDE and IEC standards.

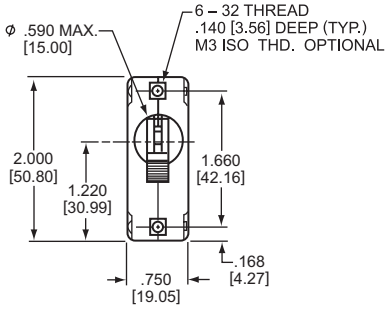
They are UL Recognized per UL STD. 1077 as supplementary protectors, CSA Certified per CSA C22.2–No. 235 as supplementary protectors, VDE approved and CE compliant to VDE 0642 (EN60934). Additionally, they conform to the spacing requirements of VDE 0730, 0804, 0805 and 0806, and IEC 950 for use in office machines and data processing equipment.

IPG circuit protectors have current ratings from .020 to 50 amperes, 250Vac, 65Vdc, and an auxiliary switch is available with either gold or silver contacts. They feature one through four pole configurations, with one handle per pole. A choice of handle actuation colors, terminals and hardware are available and international markings are standard. And, with an adapter plate, they will fit in panels cut for Airpax APL and UPL type protectors.

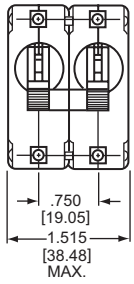
Note:
Main terminals are stationary male push-on type .250 [6.35] wide x .031 [.787] thick x .312 [7.92] long or 8-32 x .187 [4.75] screw type (≤30A). 10-32 x .187 [4.75] screw type (>30A).



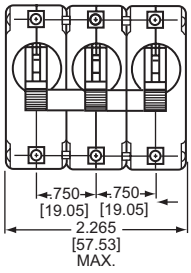
Single Pole



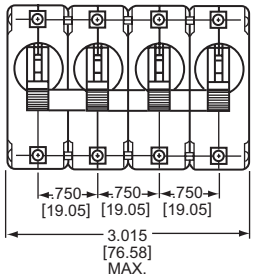
Two Pole

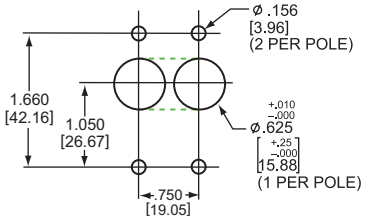


Three Pole



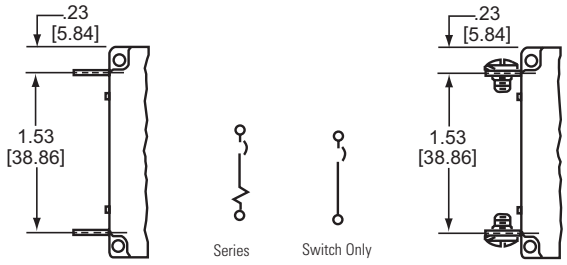
Four Pole



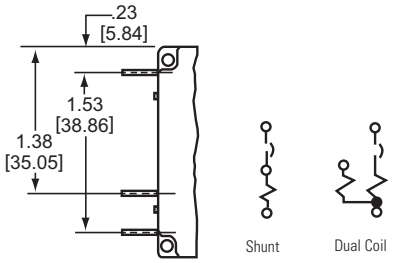


Panel mounting detail:
Tolerance ± .005 [.13] unless noted.

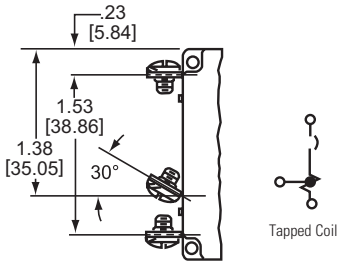
Series and Switch Only



Shunt and Dual Coil



Tapped Coil



Note: Tolerance ± .015 [.38] unless noted.
Dimensions in Brackets [ ] are millimeters.

APG/UPG/IPG CONFIGURATIONS

Series Trip

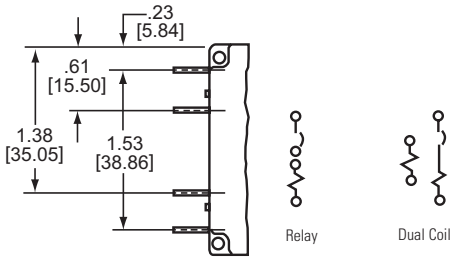
The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an on-off switch.

Shunt Trip

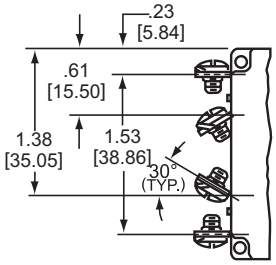
The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

Relay Trip
This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

Relay and Dual Coil



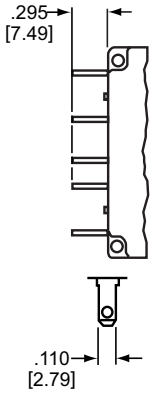
Auxiliary Switch
This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.



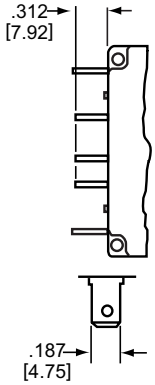
Relay and Four Terminal
Dual Coil with Screw Terminal

Voltage Trip
Sometimes called "dump circuits" or "panic trip circuits," these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt, or relay configurations.

Auxiliary Switch



-1 REC 4
-1 REG 4
Quick Connect
Terminals



-1 REC 5
-1 REG 5
Quick Connect
Terminals

Series with Auxiliary Switch
All auxiliary switch terminals
.020[.51] thick
Standard auxiliary switch is REC 4.

Breaker in OFF position

Note:
Main terminals are stationary male push-on type .250 [6.35] wide, x .031 [.787] thick, x .312 [7.92] long or 8-32 x [4.75] screw type (≤30A), 10-32 x .187 [4.75] screw type (>30A).

Note:
Tolerance ± .015 [.38] unless noted.Dimensions in Brackets [ ] are millimeters.

APG/UPG/IPG OPERATING CHARACTERISTICS

NOMINAL DCR / IMPEDANCE

Current Ratings (Amps)	Resistance (ohms)				Impedance (ohms)				Impedance (ohms)	
	DC Delays				AC, 50/60Hz Delays				AC, 400Hz Delays	
	50	***59***	***51, 52, 53***	***Dual Coil 51, 52, 53***	***60***	***69***	***600, 61, 62 71, 72, 73***	***64, 65, 66 Dual Coil 61, 62***	***40, 49***	***41, 42, 43***
0.05	162	540	460	640	174	419	582	691	1975	1195
0.10	35.4	105	155	150	42.5	103.4	119.0	160	495	284
0.50	1.2	4.2	4.5	5.6	1.9	4	4.1	6.2	22	12
1.0	.236	1.02	1.2	1.41	.41	.955	1.08	1.56	5.01	2.72
5.0	.021	.048	.059	.070	.030	.045	.048	.068	.240	.140
10.0	.0060	.0121	.0140	.0160	.0075	.0105	.0134	.0174	.0520	.0283
15.0	.0040	.0067	.0092	.0100	.0038	.0068	.0070	.0120	.0260	.0140
20.0	.0032	.0047	.0052	.0070	.0024	.0049	.0050	.0069	.0140	.0088
30.0	.0021	.0036	.0036	.0040	.0022	.0032	.0035	.0037	.0079	.0043
50.0	.0020	.0024	.0026	.0023	.0020	.0020	.0025	.0030	.0036	.0028

Notes: DCR and impedance based on 100% rated current applied and stablized a minimum of one hour.
Tolerance: .02 amperes to 2.5 amperes, ± 20%; 2.6 amperes to 20 amperes, ± 25%; 21 amperes to 50 amperes, ± 50%. Consult factory for special values and for coil impedance of delays not shown

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Delay	100%	125% (Note A)	150%	200%	400%	600%	800%	1000%
40	No Trip	May Trip	.040 Max.	.035 Max.	.030 Max.	.025 Max.	.020 Max.	.018 Max.
41	No Trip	May Trip	.5 to 8	.15 to 1.9	.02 to .4	.006 to .25	.004 to .1	.004 to .05
42	No Trip	May Trip	5 to 70	2.2 to 25	.40 to 5	.012 to 2	.006 to .2	.006 to .15
49	No Trip	.150 Max.	.100 Max.	.032 Max.	.020 Max.	.020 Max.	.020 Max.	.020 Max.
43 & 400	No Trip	May Trip	35 to 350	12 to 120	1.5 to 20	.1 to 4	.01 to .250	.009 to .100
50	No Trip	May Trip	.032 Max.	.024 Max.	.020 Max.	.018 Max.	.016 Max.	.015 Max.
51	No Trip	.5 to 6.5	.3 to 3	.1 to 1.2	.031 to 5	.011 to .25	.004 to .1	.004 to .08
52	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2	.04 to 1	.008 to .5	.006 to .1
59	No Trip	.100 Max.	.070 Max	.032 Max.	.020 Max.	.020 Max.	.020 Max.	.020 Max.
53 & 500	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.7 to 10	.1 to 3	.010 to .100
60	No Trip	May Trip	.040 Max.	.035 Max.	.030 Max.	.025 Max.	.020 Max.	.018 Max.
61	No Trip	.7 to 12	.35 to 7	130 to 3	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3	.02 to 2	.015 to .8	.01 to .25
64	No Trip	.7 to 10	.35 to 6	.15 to 3	.05 to .6	.025 to .3	.020 to .22	.015 to .15
65	No Trip	7 to 90	3 to 40	1 to 12	.2 to 3	.08 to 1	.03 to .7	.016 to .3
66	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.05 to 3	.02 to 2
69	No Trip	.120 Max.	.100 Max.	.050 Max.	.022 Max.	.017 Max.	.017 Max.	.017 Max.
600	No Trip	80 to 700	45 to 400	15 to 150	2 to 20	.2 to 4	.025 to 1	.01 to .2

Notes: All trip curves and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of +25° C. Protectors do not carry current prior to application of overload. A: Ratings above 30 amps may deviate from the above limits by approximately 10% (130% for delay 49).

DUAL FREQUENCY (50/60HZ) PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Delay	100%	135%	150%	200%	400%	600%	800%	1000%
71	No Trip	.4 to 14	.2 to 7	.1 to 3	.027 to 1	.015 to .3	.01 to .15	.008 to .1
72	No Trip	7 to 130	3 to 60	1.3 to 20	.085 to 3	.02 to 2	.015 to .8	.01 to .26
73	No Trip	50 to 700	30 to 400	10 to 150	.8 to 20	.14 to 4	.025 to 1	.01 to .26

Notes: All trip curves and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of +25° C. Protectors do not carry current prior to application of overload.

Inrush Pulse Tolerance

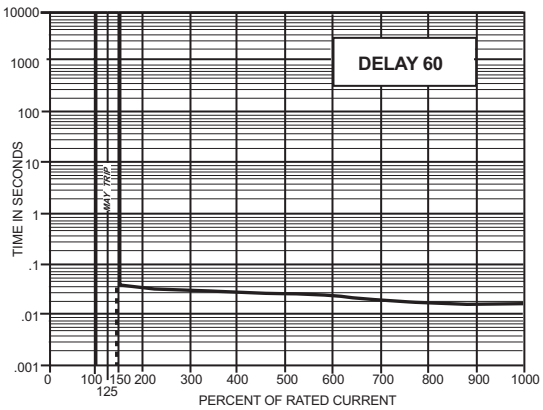
It can be seen that the 64, 65 and 66 delays have a high inrush capability and for most applications an inertia wheel would not be required. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker.

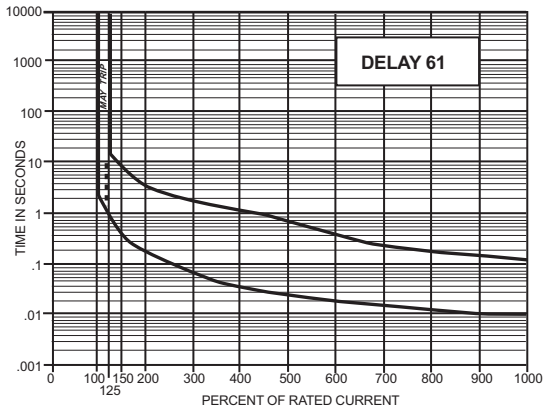
INRUSH PULSE TOLERANCE	
Delay	**Pulse Tolerance**
61, 62	10 times rated current (approx)
61F, 62F	20 times rated current (approx)
64, 65, 66	20 times rated current (approx)
64F, 65F, 66F	35 times rated current (approx)
Note: These limits do not apply to dual coil and tapped coil units	

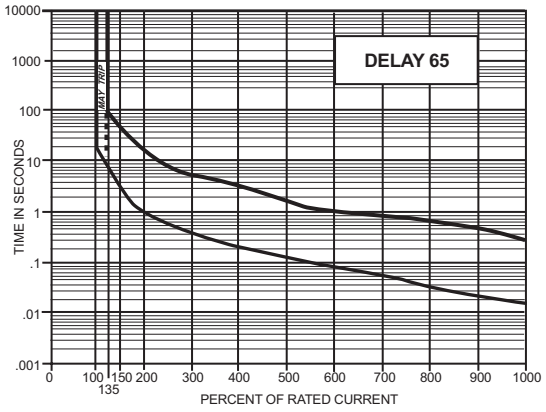
DELAY CURVES (TYP)

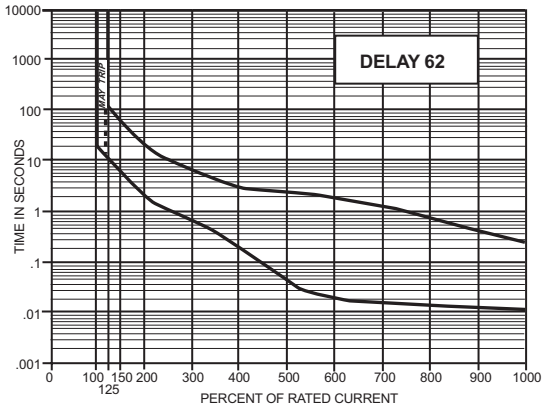
50/60Hz Delay Curves (typ)

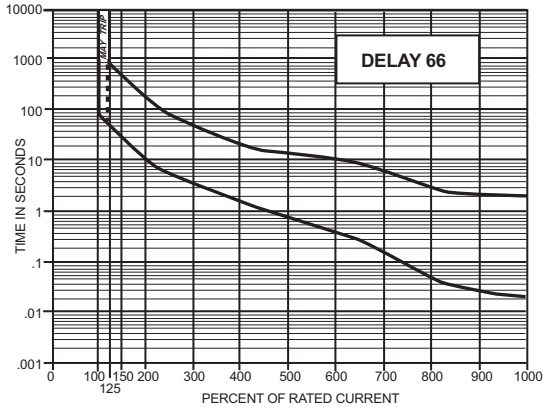
A choice of delays is offered for DC, 50/60Hz, and 400 Hz applications. Delays 40, 50, 60, 49, 59 and 69 provide fast-acting, instantaneous trip and are often used to protect sensitive electronic equipment (not recommended where known inrush exists). Delays 41, 51, 61 and 71 have a short delay for general purpose applications. Delays 42, 52 and 62 are long enough to start certain types of motors and most transformer and capacitor loads. Delays 43, 53 and 63 are long delays for special motor applications at 400Hz DC and 50/60Hz.

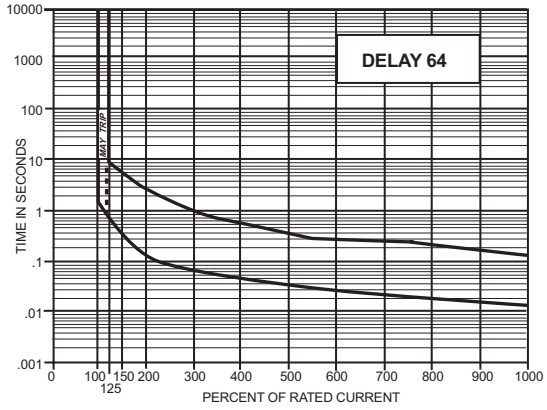


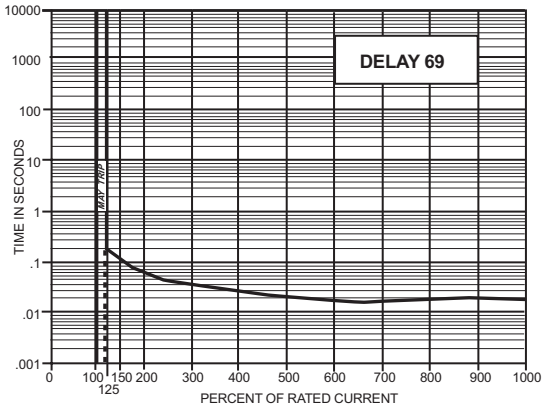



DELAY 65
MAY TRIP
TIME IN SECONDS
10000
1000
100
10
1
.1
.01
.001
0
100
150
200
300
400
500
600
700
800
900
1000
135
PERCENT OF RATED CURRENT

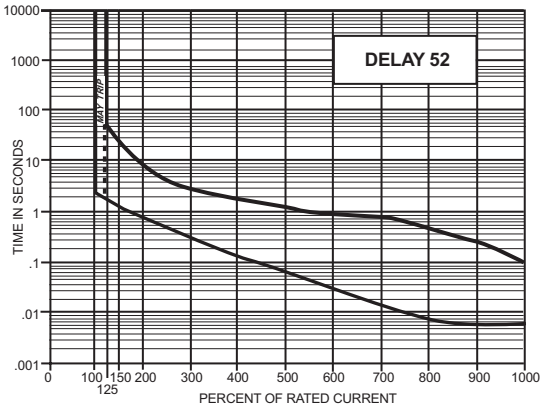

DELAY 62
MAY TRIP
TIME IN SECONDS
10000
1000
100
10
1
.1
.01
.001
0
100
150
200
300
400
500
600
700
800
900
1000
125
PERCENT OF RATED CURRENT

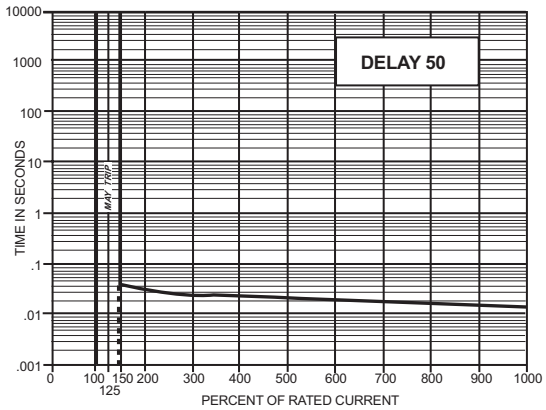

DELAY 66
MAY TRIP
TIME IN SECONDS
10000
1000
100
10
1
.1
.01
.001
0
100
150
200
300
400
500
600
700
800
900
1000
125
PERCENT OF RATED CURRENT

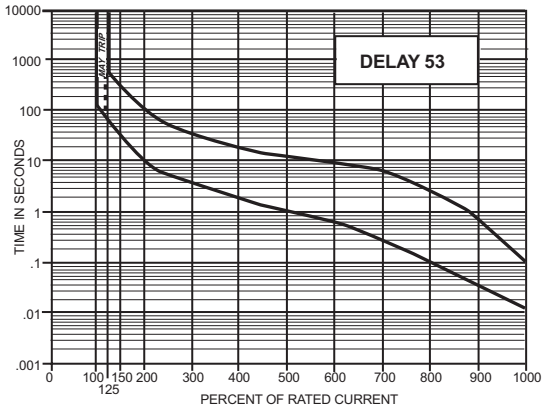

DELAY 64
MAY TRIP
TIME IN SECONDS
10000
1000
100
10
1
.1
.01
.001
0
100
150
200
300
400
500
600
700
800
900
1000
125
PERCENT OF RATED CURRENT

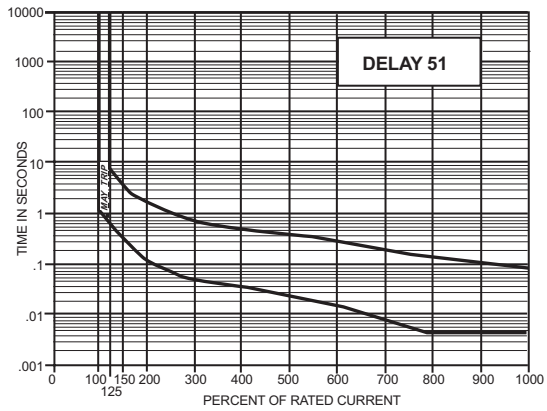

DELAY 69
MAY TRIP
TIME IN SECONDS
10000
1000
100
10
1
.1
.01
.001
0
100
150
200
300
400
500
600
700
800
900
1000
125
PERCENT OF RATED CURRENT

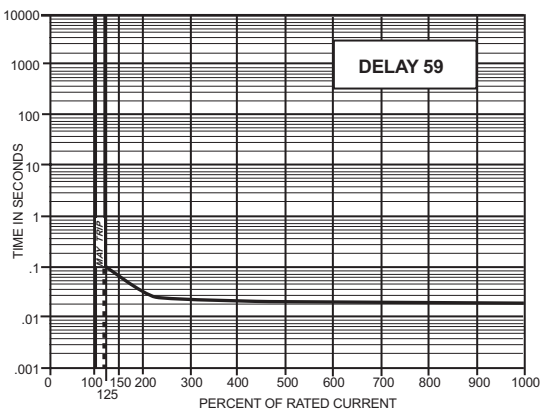
DC Delay Curves (typ)



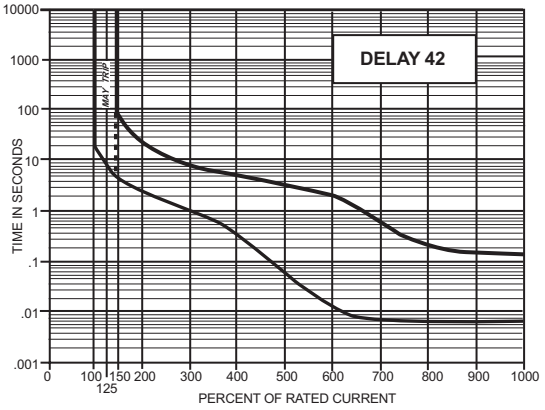


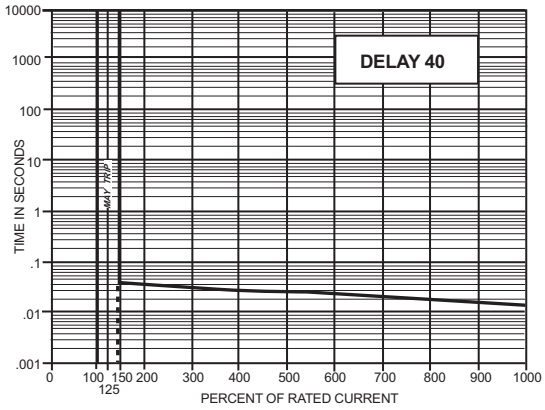


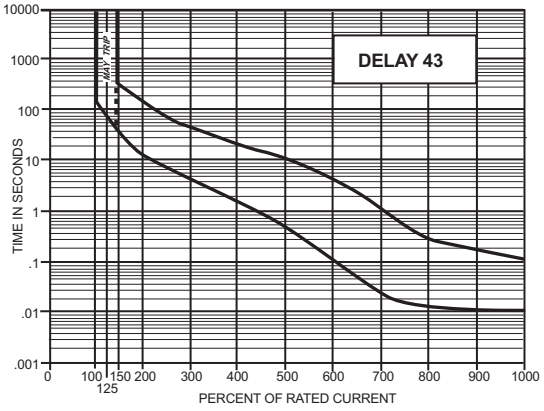


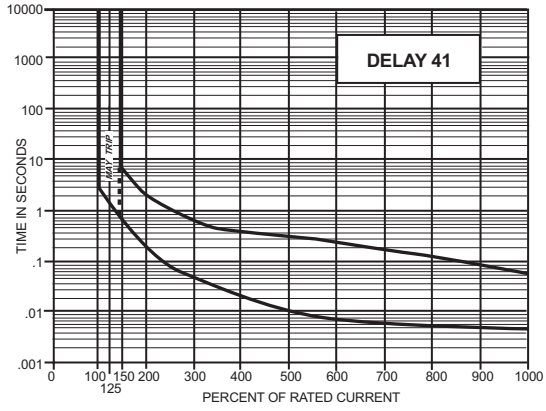


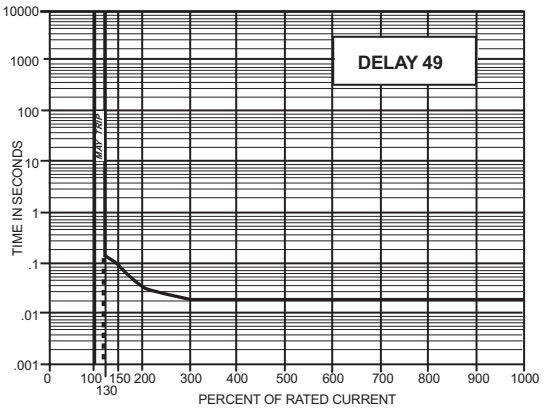
400Hz Delay Curves (typ)











Trip Free
Will trip open on overload, even when forcibly held in the ON position.

Trip Indication
The operating handle moves positively to the OFF position on overload.

Ambient Operation
APG/UPG protectors operate normally in temperatures between –40°C and +85°C.

Insulation Resistance
Not less than 100 megohms at 500Vdc.

Dielectric Strength
APG/UPG/IPG protectors withstand 1500 volts, 60Hz for 60 seconds between all electrically isolated terminals. Except auxiliary switch terminals shall withstand 600 Volts at 60Hz.

Endurance
Withstands 10,000 operations at rated voltage and current or withstands 50 operations of 600% AC or 1000% DC rated current at rated voltage followed by 6000 operations at rated voltage and current, in accordance with UL 1077.

AUXILIARY SWITCH RATINGS (SILVER)			
3.0 amps	@	120VAC	—
1.5 amps	@	—	32VDC
AUXILIARY SWITCH RATINGS (GOLD)			
.100 amps	@	32VAC	32VDC

AGENCY APPROVALS

Voltage (Volts)				Rated Current (Amps)	Interrupting Capacity, Amps	
Max Voltage	Frequency (Hz)	Phase	Min Poles	UL/CSA	UL1077 & CSA	Max Series Fuse
32	DC	—	1	.05 to 50	2500	none
65	DC	—	1	.05 to 30	2000	none
130	DC	—	2	.05 to 15	1000	none
120	50/60	1	1	.05 to 50	3600	200
120 / 240	50/60	1	2	.05 to 50	1000	none
240	50/60	1 & 3	1	.05 to 10	5000	40
250	50/60	1 & 3	1	.05 to 50	1000	none
250	50/60	1 & 3	1	.05 to 50	3650	80
277	50/60	1	1	.05 to 30	1000	120
277	50/60	1	1	.05 to 10	5000	40
125	400	1	1	.05 to 30	2000	none
240	400	1 & 3	1	.05 to 20	2100	80
250	400	1 & 3	1	.05 to 30	1000	none
250	400	1 & 3	1	.05 to 30	3500	125
277	400	1	1	.05 to 20	1000	80

Notes: Series fuse to be a branch-circuit UL approved type K-5 back-up fuse rated at not more than four times the rating of the highest-rated type UPG (15 amps minimum)

Moisture Resistance
Meets all the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-Std. 202.

Salt Spray (Corrosion)
Meets requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-Std. 202. All APG/UPG protectors are constructed with stainless steel springs and plated parts. In addition to meeting normal requirements for moisture and salt spray resistance, the protector meets the fungus resistance requirements of MIL-PRF-55629.

Poles
One through four poles with the UPGH, one through three poles with all other types.

MIL-PRF-55629 (APG)
Single, two and three pole versions, with and without the auxiliary switch option, have been qualified to MIL-PRF-55629.

Construction
Series, shunt, relay, dual coil, tapped coil, voltage trip, no-voltage trip, auxiliary switch, switch only. Various delays and combinations.

Shock
Withstands 100G or more without tripping while carrying full rated current per MIL-Std. 202, Method 213, Test Condition I. Instant trip protectors are tested at 80% of rated current.

Vibration
Withstands 10G without tripping while carrying full rated current per MIL-Std. 202, Method 204, Test Condition A. Instant trip protectors are tested at 80% of rated current.

APPROXIMATE WEIGHT PER POLE

Series	Ounces	Grams
APG/UPG/IPG	2.2	60.5
APGN/UPGN	3.0	76.2

RECOMMENDED TORQUE SPECIFICATIONS

Component	Torque (in-lbs)
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
8-32 Screw Terminals	10 to 12
M4 Terminal Screws	10 to 12
10-32 Screw Terminals	14 to 15
M5 Screw Terminals	14 to 15
1/2 - 32 Mounting Bushing	30 to 35
Where applicable, mechanical support must be provide to the terminals when applying torque	

APG / UPG Decision Table - How to Order
The ordering code for APG/UPG circuit protectors may be determined by following the steps in the decision tables shown here.

The coding given permits a self-assigning part number but with certain limitations. Units with mixed ratings, combinations of styles, or constructions not listed in the third decision table, require a factory-assigned part number. With these, it is suggested that order entry be by description and/or drawings, and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit protector for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the following is the code for a single pole UPG, quick-connect type terminal series unit with auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay and a rating of 20 amperes. A white handle is specified by the seventh decision table.

To determine the ordering number for your particular APG/UPG unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

1 First Decision

Type

Type	Description
APG	One handle per unit
UPG	One handle per unit UL Recognized and CSA Certified
APGX	One rocker handle per unit
UPGX	One rocker handle per unit UL Recognized and CSA Certified
APGN	Panel seal (one bat handle per unit)
UPGN	Panel seal (one bat handle per unit) UL Recognized and CSA Certified
APGH	One handle per pole
UPGH	One handle per pole UL Recognized and CSA Certified
APGHX	One rocker handle per pole
UPGHX	One rocker handle per pole UL Recognized and CSA Certified

2 Second Decision

Poles (Note A)

Quick-Connect Terminals	Screw Terminals	Number of poles
1	6	Single pole unit
11	66	Two pole unit
111	666	Three pole unit
1111	6666	Four pole unit (Note D)

Notes:
A It is recommended that power leads be soldered to protectors having quick-connect terminals for current trip ratings above 10 amperes.
B The standard current values for 100% of rated current are listed. Please consult an Airpax office or sales representative for other values.
C UL recognized and CSA certified applications above 30 amperes are restricted to loads having a power factor of 75 minimum and limited to 32Vdc only. Standard terminals on ratings over 30 amperes are 10-32 screw type.
D Four pole protectors are available only in the APGH/UPGH and APG/UPG types. The APGH/UPGH four pole provides one handle per pole, while the APG/UPG four pole has handles in the center two poles only, for simplified mounting.
E Sub panel mount available in APGX/UPGX configuration only.
F When "A" is specified in the sixth decision in conjunction with APG/UPG-6 type, metric screw terminals are supplied.
G If a circuit breaker is marked in this manner, it means 277V per pole – single phase source. Thus, if a two or three pole unit is marked 277V, all line terminals must be connected to the same phase, assuming the 277V is taken from line to neutral of 3 phase 277/480V system.

3 Third Decision

Internal Configuration

-0	Switch only (omit 4th and 5th decisions)
-1	Series
-1REC4	Auxiliary switch* .110 quick-connect
-1REG4	Auxiliary switch* (Gold Contacts) .110 quick-connect
-1REC5	Auxiliary switch* .187 quick-connect
-3	Shunt (up to 30 amperes only)
-4	Relay (up to 30 amperes only)

*Only one auxiliary switch is normally supplied on two and three pole units. Can be used for solder terminals also. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified. Multi-pole units with mixed construction, poles numbered left to right when viewed from terminal end.

4 Fourth Decision

Hz and Delay

-40	400Hz 150% instant trip
-41	400Hz short delay
-42	400Hz long delay
-43*	400Hz motor start
-49	400Hz 130% instant trip
-50	DC 150% instant trip
-51	DC short delay
-52	DC long delay
-53*	DC motor start
-59	DC 125% instant trip
-60	50/60Hz 150% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-600*	50/60Hz motor start delay
-64	50/60Hz, short delay (high pulse)
-65	50/60Hz, long delay (high pulse)
-66*	50/60Hz, motor start (high pulse)
-69	50/60Hz 125% instant trip
-71	DC, 50/60Hz short delay
-72	DC, 50/60Hz long delay
-73*	DC, 50/60Hz motor start delay

For addition of inertial delay, add an "F" to any delay number. * Not available above 30 amperes.

Example:

UPG 1- 1REC4- 61- 203- 09

1 2 3 4 5 7

5 Fifth Decision

Rated Current (Note B)

Current Code	Ratings (Amps)	Current Code	Ratings (Amps)
-101	.100	-103	10.0
-251	.250	-153	15.0
-501	.500	-203	20.0
-751	.750	-303	30.0
-102	1.0	-353	35.0*
-252	2.5	-403	40.0*
-502	5.0	-503	50.0*
-752	7.5		

See page 122 for maximum voltage ratings. (*Note C)

Standard current ratings listed. For other ratings, please consult factory.

6 Sixth Decision

Optional

-A	Metric thread mounting (Not available on APGN/UPGN) (Note F)
-B	Sub panel mount (Note E)
-C	277Vac 50/60Hz (Note G)
-H	International handle markings

One or more descriptions may be used as required. If this table is not used, go directly to the seventh decision.

7 Seventh Decision

Handle/Actuator Color**

	Toggle Handle Color †
-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white warkings
-41	Green w/ white markings
-91	White w/ black markings
	Rocker/Actuator Color
-00	Black w/o markings
-01	Black w/ white markings
-02	Red w/o markings
-05	Opaque white w/o markings
-08	Gray w/o markings
-09	Translucent white w/o markings
-21	Red w/ white markings
-51	Opaque white w/ black markings
-81	Gray w/ black markings
-91	Translucent white w/ black markings

**Not available for bat handle.
†Unmarked handles are available. Please consult factory.

IPG Decision Table - How to Order
The ordering code for IPG circuit protectors may be determined by following the steps in the decision tables shown here.

The coding given permits a self-assigning part number but with certain limitations. Units with mixed ratings, combinations of styles, or constructions not listed in the third decision table, require a factory-assigned part number. With these, it is suggested that order entry be by description and/or drawings, and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit protector for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the following is the code for a single pole IPG, quick-connect type terminal series unit with auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay and a rating of 20 amperes. Metric mounting inserts and a white handle are also specified.

To determine the ordering number for your particular IPG unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

Notes:
A It is recommended that power leads be soldered to protectors having push-on terminals for current trip ratings above 10 amperes.
B The standard current values for 100% of rated current are listed in the fifth decision table. Please consult an Airpax office or sales representative for other values.
C All IPG protectors meet normal requirements for moisture and salt spray resistance.
D UL recognized and CSA certified applications above 30 amperes are restricted to loads having a power factor of .75 minimum, and limited to 32Vdc only. VDE approval above 30 amperes is restricted to 32Vdc and 120Vac 50/60Hz. Standard terminals on ratings over 30 amperes are 10-32 screw type.
E When "A" is specified in the sixth decision in conjunction with IPG-6 type, metric screw terminals are supplied.

1 First Decision
Type

Type	Description	Std. Handle Color
IPG	Single pole with one handle per unit (Not available in multi-pole configuration)	Black
IPGH	Multi-pole with handle per pole	Black

2 Second Decision
Poles

Push-On Terminals	Screw Terminals	Number of poles
1	6	Single pole
11	66	Two pole
111	666	Three pole
1111	6666	Four pole

3 Third Decision
Internal Configuration

-0	Switch only (omit 4th and 5th decisions)
-1	Series
-1REC4	Auxiliary switch* .110 quick-connect
-1REG4	Auxiliary switch* (Gold Contacts) .110 quick-connect
-1REC5	Auxiliary switch* .187 quick-connect
-3	Shunt (up to 30 amperes only)

*Only one auxiliary switch is normally supplied on two and three pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Hz and Delay

-40	400Hz 150% instant trip
-41	400Hz short delay
-42	400Hz long delay
-43*	400Hz motor start
-49	400Hz 130% instant trip
-50	DC 150% instant delay
-51	DC short delay
-52	DC long delay
-53*	DC motor start
-59	DC 125% instant trip
-60	50/60Hz 150% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-64	50/60Hz, short delay (high pulse)
-65	50/60Hz, long delay (high pulse)
-66*	50/60Hz, motor start (high pulse)
-69	50/60Hz 125% instant trip

For addition of inertial delay, add an "F" to any delay number.
* Not available above 30 amperes.

5 Fifth Decision

Nominal Amperage Rating

Current Code	Ratings (Amps)	Current Code	Ratings (Amps)
-101	.100	-103	10.0
-251	.250	-153	15.0
-501	.500	-203	20.0
-751	.750	-303	30.0
-102	1.0	-353	35.0*
-252	2.5	-403	40.0*
-502	5.0	-503	50.0*
-752	7.5		

See page 122 for maximum voltage ratings. (*Note D)

Standard current ratings listed. For other ratings, please consult factory.

6 Sixth Decision

Optional

-A	Metric thread mounting (Note E)

When this table is not used, table 7 may be substituted and U.S. thread will be supplied.

Example:

IPG 1-1REC4-61-203-A-00-V

1 2 3 4 5 6 7 V

7 Seventh Decision

IPG and IPGH

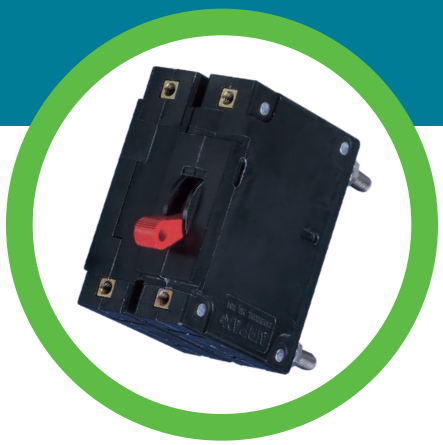
Toggle Handle Color	
-00	Black
-10	Yellow
-20	Red
-30	Blue
-40	Green
-90	White

V = VDE Approved

The shaded areas denote VDE approval options.
This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions.
If non-shaded areas are selected, the unit will not be VDE approved, but other approvals still apply.

AIRPAX®

IAL/CEL/LEL Series
Magnetic Circuit Protectors



AIRPAX® | IAL/CEL/LEL Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

IAL/IUL/IEL/LEL magnetic circuit protectors provide low-cost power switching, reliable circuit protection and accurate circuit control for equipment in the international marketplace.

IAL models are for those applications where the unit's inherent attributes are desired, but compliance with the various standards is not required.

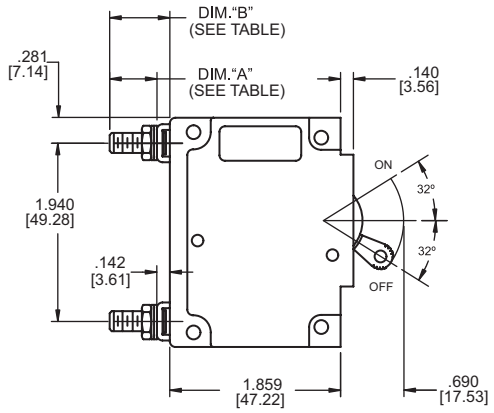
IUL models have been tested and approved in accordance with UL 1077 requirements for UL recognition.

IEL/LEL models are VDE approved to VDE 0660, part 101. They meet IEC spacing requirements, mandatory for equipment which must comply with IEC specifications 601 and 950, and VDE specifications 0804 and 0805. In addition, the IEL models are UL recognized to UL 1077 as supplementary protectors and the LEL models are UL listed under the conditions of UL 489. Both are CSA certified and CCC Approved. The IEL is CSA certified as a supplementary protector per CSA C22.2–No. 235.

The CEL model has achieved two new enhancements, including a single pole, 125 amp rating with TÜV approval, and a parallel 4-pole version with 400 amp rating.

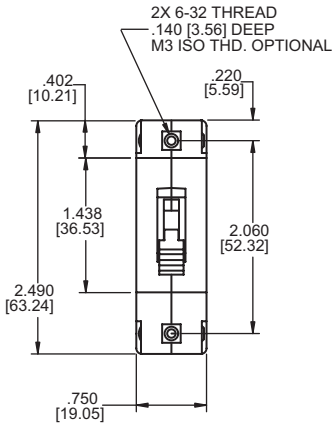
Airpax™ IAL/CEL/LEL circuit protectors are available in a wide variety of configurations, including series, series with auxiliary switch, shunt and relay with choice of delays and ratings in DC and/or 50/60Hz or 400Hz versions. Single or multi-pole versions are available with a variety of pole arrangements to meet your specifications. Please see the appropriate product specification table for ratings and limitations.

SINGLE POLE, STANDARD STUD TERMINAL

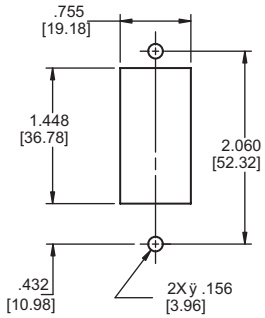


STUD TERMINAL TYPES		
Screw Stud Thread	**Dimension "A"**	**Dimension "B"**
M6	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
1/4 -20	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]
M5	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
10-32	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]

Single Pole

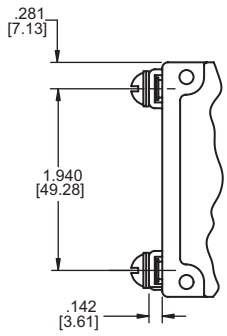


Mounting Detail

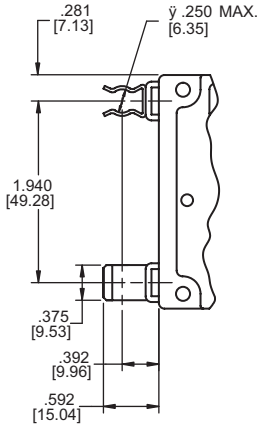


Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

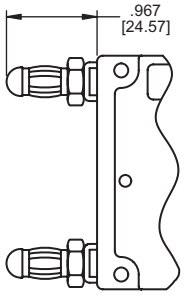
Screw Terminal



Clip Terminal



Bullet Terminal



Notes:
Tolerance ± .015 [.39] unless noted.
Dimensions in brackets [ ] are millimeters.
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312 [7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A) (<=50A for LEL),1/4-20 or M6 hex nut (>70A)(>50A for LEL).

Bullet terminal receptacle should be .312 ± .001 diameter hole not less than .250 depth. Contact Airpax for other bullet sizes.

Note: Each outer terminal is supplied with a flatwasher, tooth lockwasher and a hex nut.

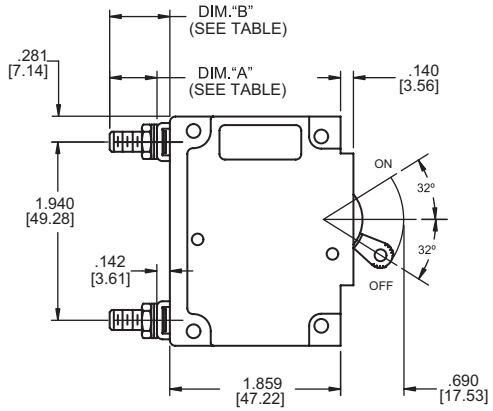
MULTI-POLE CIRCUIT PROTECTORS

Multi-pole units are combined in an assembly with the trip mechanisms internally coupled. A fault in any protected circuit opens all poles simultaneously. Applications include use in polyphase circuits, single-phase three-wire systems, or in two or more related but electrically isolated circuits. A mix of delays, ratings and configurations are offered. The auxiliary switch is offered with either gold or silver contacts and is available when a series construction pole is specified.

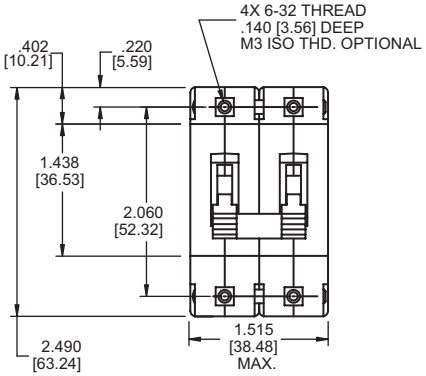
Two Pole Units

An assembly consisting of two single pole units, having their trip mechanisms internally coupled, is available with either a single toggle handle or with a handle per pole. Please see decision one of the part number decision tables. Individual poles may vary in ratings, delays and internal configurations. If the poles are of series construction, an auxiliary switch may be included in either or both poles, allowing you to mix SELV and hazardous voltages.

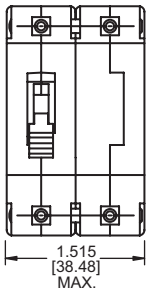
Two Pole



IELH11



IEL11

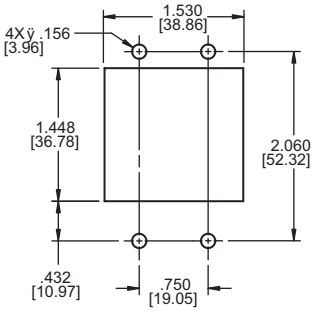


Note:
Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

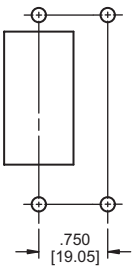
M6	.510	.652
1/4 - 20	.545	.687
M5	.510	.652
10 - 32	.545	.687
Screw stud thread	Dim. ìAî (± .045)	Dim. ìBî (± .035)

Note:
Each outer terminal is supplied with a flatwasher, tooth lockwasher and a hex nut.

Two Pole*



Two Pole*



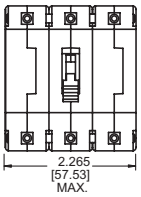
Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

Note:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312 [7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).

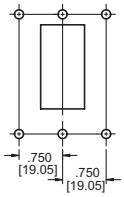
Three Pole and Four Pole Units
The three pole structure consists of three single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. The units are available with either a single toggle handle or with a handle per pole. Units with four pole construction operate with a minimum of two center toggle handles or with a handle per pole. Please see decision one of the part number decision tables. Mixing of delays, ratings and configurations is available in each individual pole. The auxiliary switch is offered in any series trip pole.

Breaker poles are numbered consecutively when viewed from the terminal side, with the ON position up, starting with pole #1 on the left side and proceeding to the right.

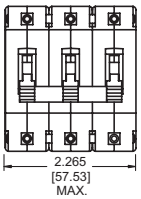
Three Pole
IEL111



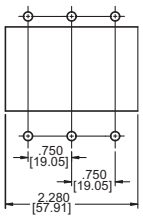
Mounting Detail*



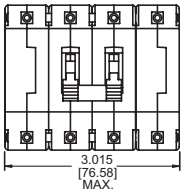
Three Pole
IELH111



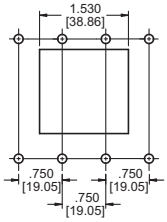
Mounting Detail*



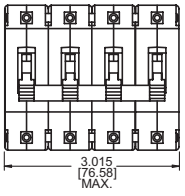
Four Pole
IEL1111



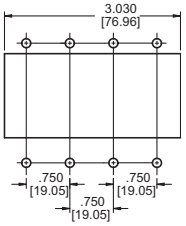
Mounting Detail*



Four Pole
IELH1111



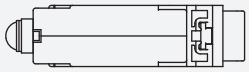
Mounting Detail*

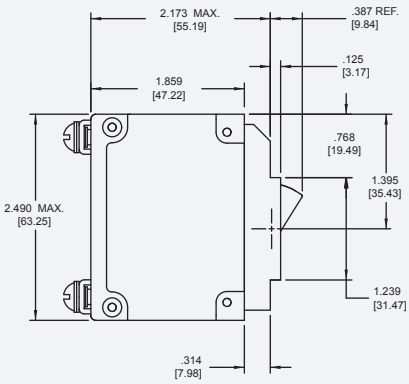


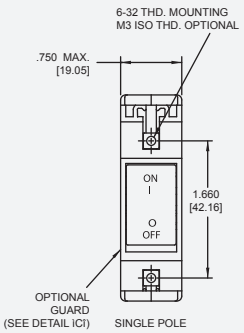
Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

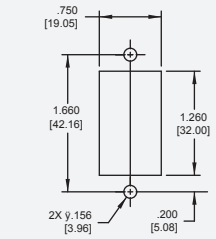
BX STYLE CIRCUIT PROTECTORS

The innovative new design of our IAL/CEL/LEL BX Style circuit protectors features a flat rocker that will satisfy your aesthetic needs while guarding against accidental actuation, providing the highest degree of circuit protection and quality. Only Airpax offers this new standard in user interface. Available on a variety of versions with a full range of agency approvals, the IEL BX style circuit protectors meet or exceed all current performance specifications, including interrupting capacities up to 50,000 amperes.

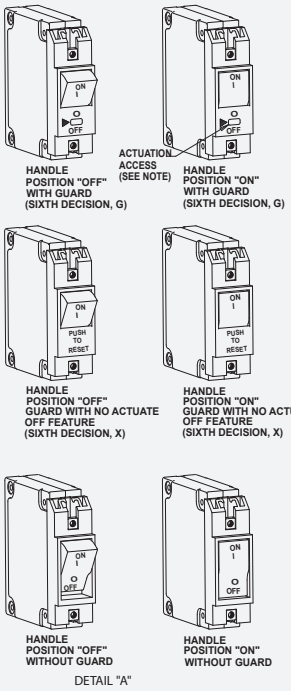








Panel Mounting Detail
Mounting Detail Tolerance:
±.005 [.13] unless noted



NOTE: ACCESS IS LIMITED TO A DEVICE SMALLER THAN THE UNDERWRITERS LABORATORY "ARTICULATED PROBE" DEFINED IN UL-489 FIG. 11.1.7.2.1.

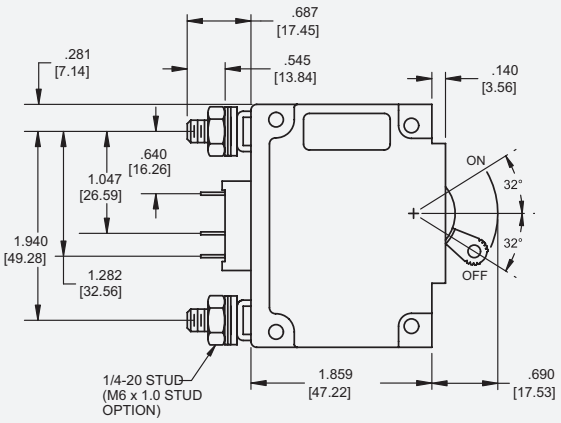
Note:
Tolerance ± .015 [.39] unless noted. Dimensions in brackets [ ] are millimeters.
*See Single Pole Mounting Detail for Hole Sizes and Locations.

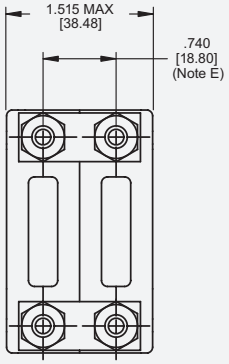
LELHP/CELHP CIRCUIT PROTECTORS

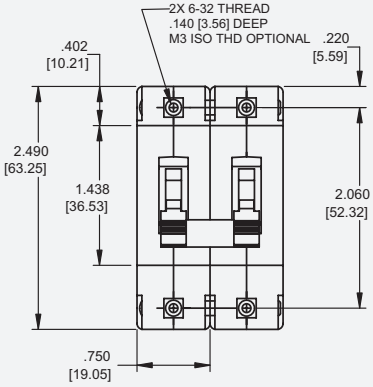
The Airpax™ LELHP/CELHP high current magnetic circuit protector compliments our entire series of LEL circuit protectors. Its unique, parallel current sensing design provides precise current overload protection and reliability in the compact size of a two pole LEL. The unit is ideal for high power DC applications such as drive motor systems and telecommunication power systems.

LEL is available in series and series with auxiliary switch configurations with a choice of delays for DC ratings of 125, 150, 175 and 200 amperes. The CEL has been enhanced to include these same ratings plus a 4-pole, parallel 400 amp rating for UL489A. The LELHP is UL listed under the conditions of UL489 and CSA certified. The CELHP is UL listed under the conditions of UL489A. Mid-trip handle indication, voltage trip and remote operator options complete the LELHP/CELHP circuit breaker series. Please see the individual product tables for approved ratings.

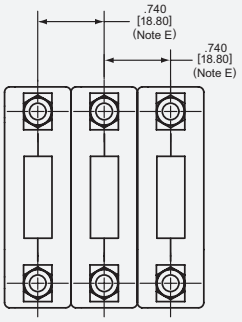
Two Pole

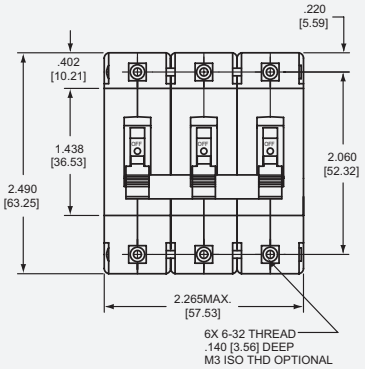






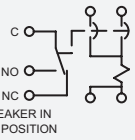
Three Pole (Note D)



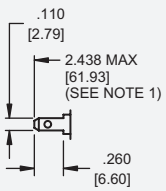


Series Parallel

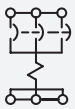
Series Parallel with optional
1REC4 Auxiliary switch



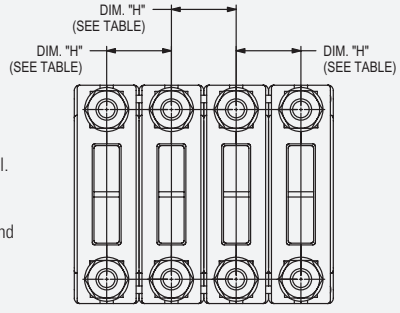
-REC4

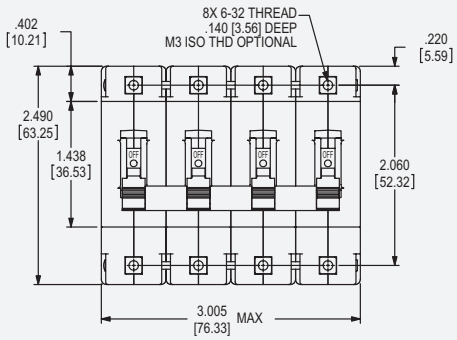


175/200 Parallel Pole



Four Pole (CEL _ _ P and CML _ _ P only)





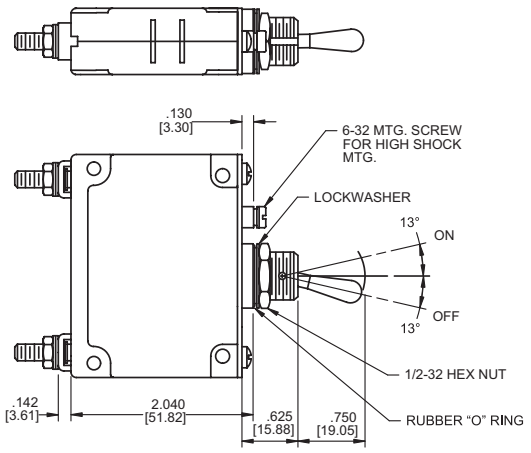
Notes:
Tolerance ± .015 [.39] unless noted. Dimensions in brackets [ ] are millimeters.

A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).
D Units are supplied without bus bars must have a minimum copper strap (1 31/32 x 1/2 x 1/16) of appropriate length to accommodate connections tying each set of terminals together.
E Other spacing available upon request. Contact factory for assistance.

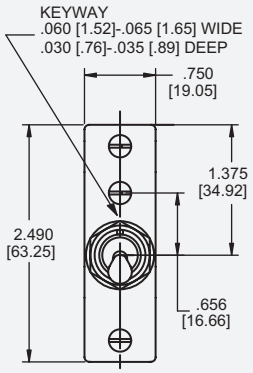
IALN/IULN PANEL SEAL CIRCUIT PROTECTORS

The IALN/IULN family is a sealed toggle version of the IAL/IUL family. The silicone rubber seal around the handle assures panel seal integrity and makes this style a natural for harsh environments.

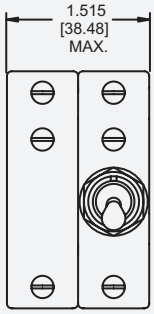
This sealed toggle family is available in one to three pole models with ratings of .050 to 100 amperes.



Single Pole

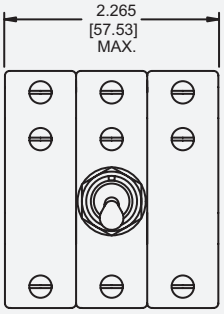


Two Pole



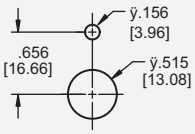
(Optional handle may be in pole 2 instead of pole 1.)

Three Pole

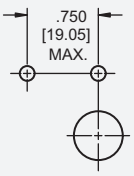


Panel Mounting Details: Tolerance ±.005 [.13] Unless noted.

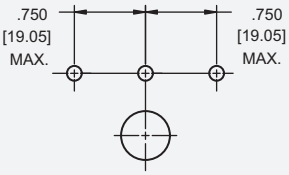
Single Pole



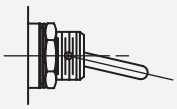
Two Pole*



Three Pole*



Optional handle



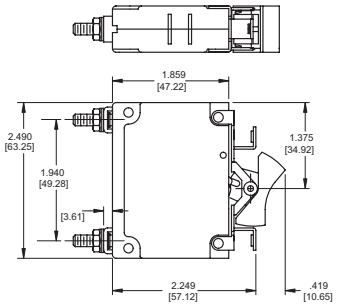
*See Single Pole Mounting Detail for Hole Sizes and Locations.

Notes:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).

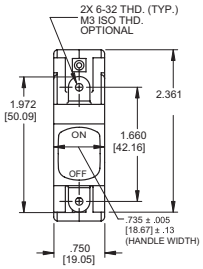
IALX/IULX/IELX ROCKER HANDLE STYLES

The rocker style is available in one to four poles. Choose either vertical or horizontal mounting with ON-OFF, international markings or a combination of both.

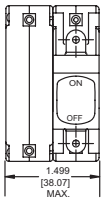
Five front panel enhancing colors including black, white, red, grey and orange are available.



Single Pole

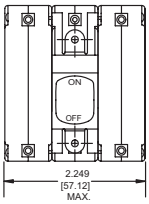


Two Pole

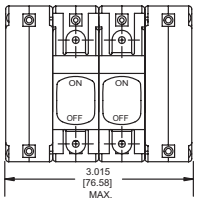


(Optional handle may be in Pole 2 instead of Pole 1.)

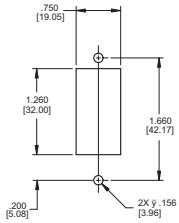
Three Pole



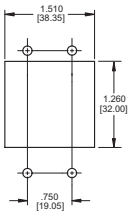
Four Pole



Panel Mounting Detail*
Single,Two & Three Pole



Four Pole**

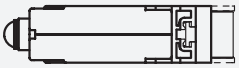


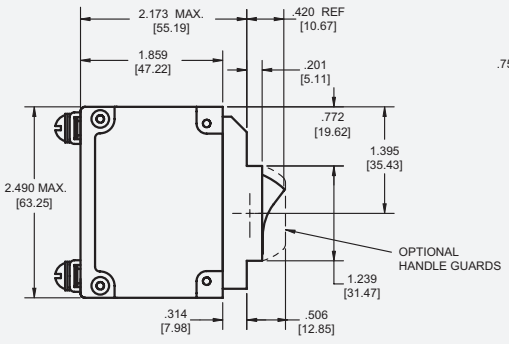
*Mounting detail tolerance ±.005 [.13] Unless noted.
**See single mounting detail for hole sizes and locations.

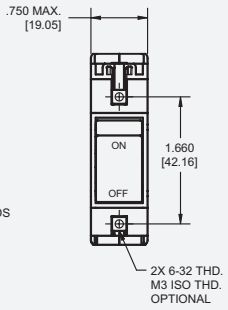
Note:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lock washer and a 10-32 or M5 hex nut (<=70A), °-20 or M6 hex nut (>70A).

IALZX/IULZX/IELZX ROCKER HANDLE STYLES

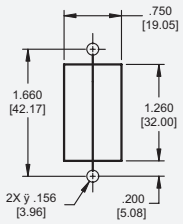
The IALZX/IULZX/IELZX style adds our rocker handle options of contrasting dual color rocker actuators, affording a clear visual indication of the handle position and integrated handle guards, to help prevent accidental turn-on and turn-off of the unit. Available with a black rocker and white, red or green indicator color for either ON or OFF indication.







Panel Mounting Detail



Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

CONFIGURATIONS

Series Trip
The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an on-off switch.

Shunt Trip
The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

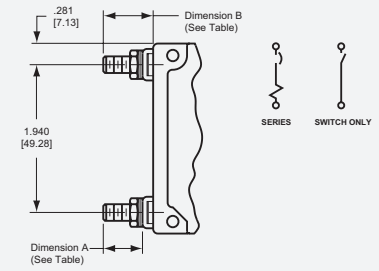
Dual Coil
By combining two electrically independent coils on a common magnetic circuit, it is possible to provide contact opening when either an over-current or trip voltage is applied to the respective coils. One coil will be a current trip coil with standard specifications. The second, or dual coil, can be used to provide a control function permitting contact opening from a remote interlock or other transducer functions. Standard coils are 6, 12, 24, 48, 120 and 240 volts. Tripping is instantaneous and must be removed (usually self-interrupting) after trip.

Auxiliary Switch (Applies to Series Trip Only)
This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.

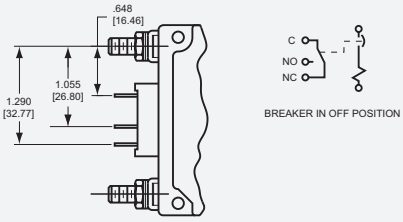
Auxiliary switch contacts actuate simultaneously with the main breaker contacts, and will open regardless of whether the breaker contacts are opened manually or electrically. For auxiliary switch ratings below 6Vac or 5Vdc, an auxiliary switch with gold contacts, designated as REG is available. Gold contacts are not recommended for load current above 100 milliamps.

Note:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lock washer and a 10-32 or M5 hex nut (<=70A), 1/4-20 or M6 hex nut (>70A).

Series and Switch Only



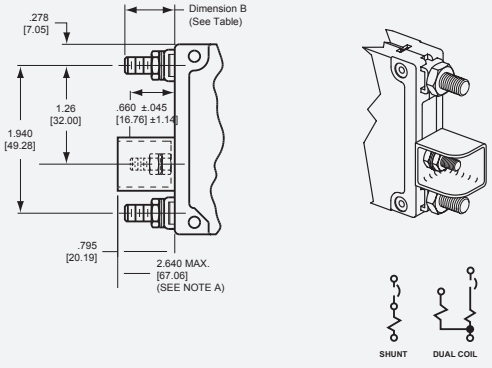
Series with Auxiliary Switch



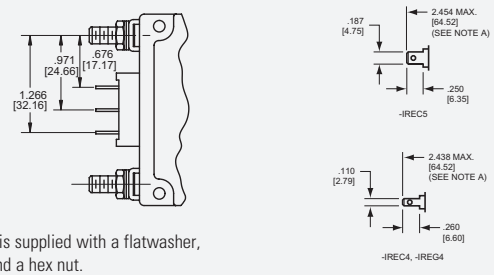
STUD TERMINAL TYPES

Screw Stud Thread	Dimension "A"	Dimension "B"
M6	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
1/4 -20	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]
M5	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
10-32	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]

Shunt and Dual Coil



Spacing for VDE Switch



Note: Each outer terminal is supplied with a flatwasher, tooth lockwasher and a hex nut.

CONFIGURATIONS (CONT.)

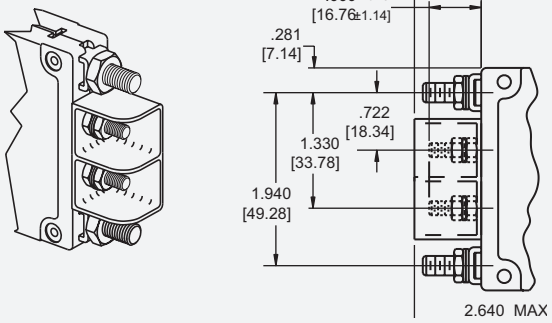
Relay Trip

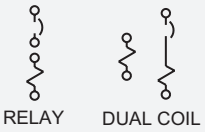
This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

Voltage Trip

Sometimes called “dump circuits” or “panic trip circuits,” these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt or relay configurations.

Relay and Dual Coil





Notes:
Tolerance ± .015 [.39] unless noted. Dimensions in brackets [ ] are millimeters.

A Terminal protrusion dimensions are referenced from back of mounting panel.

B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.

C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).

Barriers

FIG.1

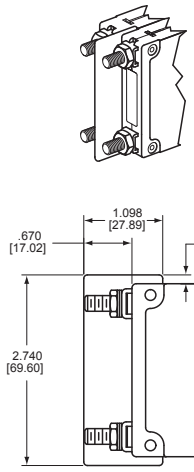


FIG.2

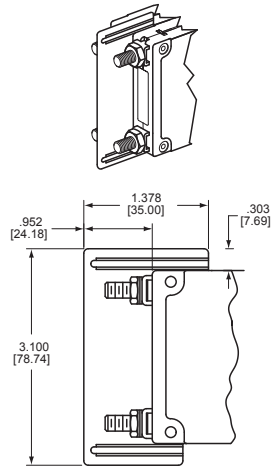


FIG.3

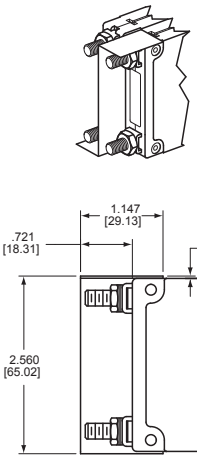
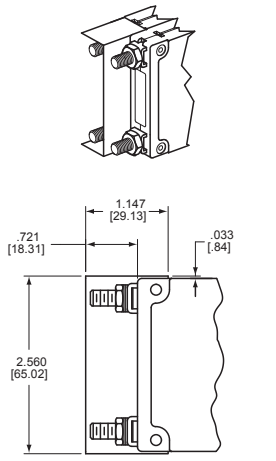


FIG.4



NOTE:
THIS BARRIER CAN BE FLIPPED TO COVER EITHER POLE. PLEASE CONTACT FACTORY FOR SPECIFIC PART NUMBER

BARRIER OPTIONS

Rating Option	Standard Barrier	Optional Barrier
IEL		
240/415 VAC	Fig. 1	Fig. 2, 3 & 4
415 VAC (VDE)		
277/480 VAC		
1/4-20, M6 studs for AC		
120/240 VAC multi-pole	Fig. 2	Fig. 3 & 4
125VDC		
LEL		
All multi-pole 50/60 Hz	Fig. 2	Fig. 3 & 4
All multi-pole 80 VDC, if opposite polarity	Fig. 2	Fig. 3 & 4
125VDC	Fig. 2	Fig. 3 & 4

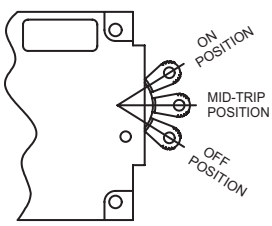
Note: Optional barrier available with factory assigned part number. Contact factory for assistance.

Mid-Trip Indication
Circuit protection, rapid fault location and alarm capability are blended together in the Airpax mid-trip indication option. This option is designed for automatic handle movement to a middle position upon electrical overload, allowing for easier detection of the fault circuitand minimizing downtime due to the overload condition.

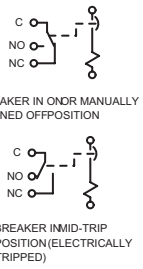
In the optional auxiliary switch configuration, the switch allows an alarm or signal to be forwarded when the breaker trips and the handle moves to the middle position. The alarm can be disengaged by the manual actuation of the handle to the OFF position. Once the fault has been corrected, the circuit breaker can be reset to the ON position. The mid-trip option is available in one, two or three pole toggle handle packages and in either standard panel screw or snap-in mounting. Please see specification tables of specific product for available ratings.

Snap-In Mounting
The snap-in mounting adapter allows for simplified mounting of most IEL/LEL toggle handle products. Prior to shipment, the adapter is attached to the circuit breaker during our final product assembly, allowing you to securely snap the unit into a rectangular panel cut-out. This eliminates the need for panel mounting hardware and associated assembly costs.

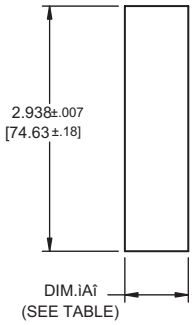
Available for units up to three poles, with or without an option handle guard.

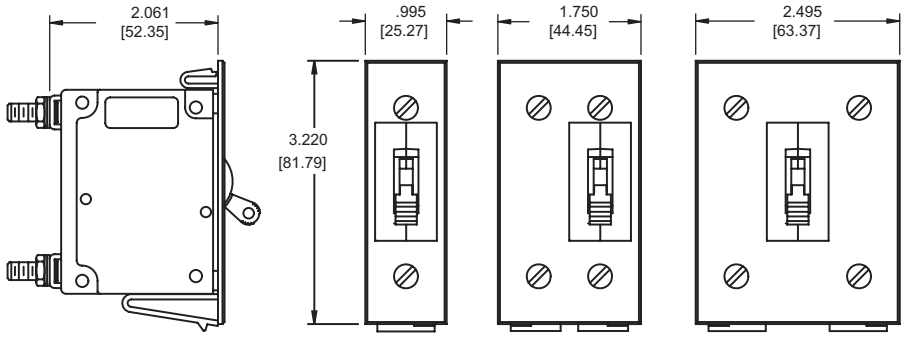


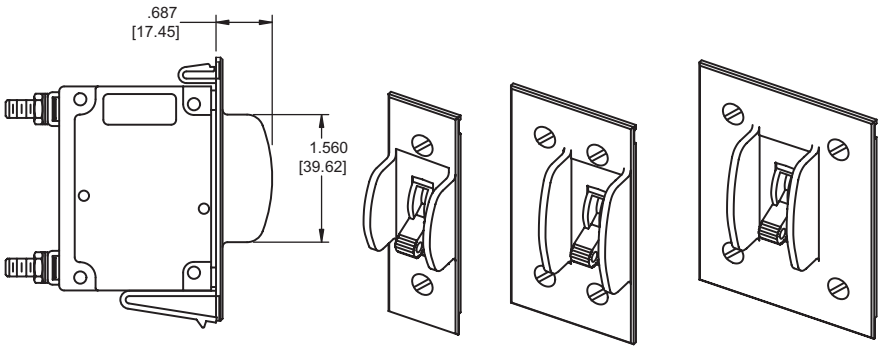
Mid-Trip Handle Positions



Panel Mounting Detail







PANEL MOUNTING OPTIONS		
# of Poles	**Dimension "A"**	**Panel Thickness**
1 pole	.760 ± .007 [19.30 ± .18]	.062 ± .005 [1.57 ± .13]
2 pole	1.530 ± .007 [38.86 ± .18]	.062 ± .005 [1.57 ± .13]
3 pole	2.280 ± .007 [57.91 ± .18]	.062 ± .005 [1.57 ± .13]

Note: Tolerance ± .015 [.39] unless noted.
Dimensions in brackets [ ] are millimeters.

Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

OPERATING CHARACTERISTICS

NOMINAL DCR /IMPEDANCE

Current Ratings (Amps)	Resistance (ohms)	Impedance (ohms)	Impedance (ohms)
	DC Delays	AC, 50/60Hz Delays	AC, 400Hz Delays
	51, 52, 53, 59	***61, 62, 63, 69***	***41, 42, 43, 49***
0.20	45.8	28.5	71.94
1.0	1.38	1.10	2.85
2.0	0.371	0.29	0.76
5.0	0.055	0.51	0.12
10.0	0.017	0.016	0.032
20.0	0.006	0.006	0.010
30.0	0.003	0.004	0.006
50.0	0.0019	0.0018	0.006
60.0	0.00142	0.00121	—
70.0	0.00138	0.00118	—
80.0	0.00133	0.00112	—
90.0	0.00127	0.00107	—
100.0	0.00127	0.00107	—
125.0	0.0005	—	—
150.0**	0.0005	—	—
165.0**	0.0004	—	—
175.0**	0.0004	—	—
200.0**	0.0004	—	—
250.0**	0.0004	—	—
400**	0.0003	—	—

Notes:
DCR and impedance based on 100% rated current applied and stablized a minimum of one hour.
No 53 delay on 125 amp single pole or 400 amp four pole devices
Tolerance: .02 amperes to 2.5 amperes, ± 20%; 2.6 amperes to 20 amperes, ± 25%; 21 amperes to 50 amperes, ± 50%. Consult factory for special values and for coil impedance of delays not shown
*** Paralleled poles only, 400 amps only available on CELHP*

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Delay	100%	125% (Note A)	150%	200%	400%	600%	800%	1000%
41*	No Trip	May trip	.5 to 8	.15 to 1.9	.02 to .4	.006 to .25	.004 to .1	.004 to .05
42*	No Trip	May trip	5 to 70	2.2 to 25	.40 to 5	.012 to 2	.006 to .2	.006 to .15
43*	No Trip	May trip	35 to 350	12 to 120	1.5 to 20	.012 to 2.2	.01 to .22	.01 to .1
49*	No Trip	May trip	.100 max.	.050 max.	.020 max.	.020 max.	.020 max.	.020 max.
51	No Trip	.5 to 6.5	.3 to 3	.1 to 1.2	.031 to .5	.011 to .25	.004 to .1	.004 to .08
52	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2	.04 to 1	.008 to .5	.006 to .1
53**	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.23 to 9	.015 to .55	.012 to .2
59	No Trip	.120 max.	.100 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
61	No Trip	.7 to 12	.35 to 7	.130 to 3	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3	.02 to 2	.015 to .8	.01 to .25
63	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.013 to .85	.013 to .5
69	No Trip	.120 max	.100 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max

Notes:
All trip curves and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of +25° C. Protectors do not carry current prior to application of overload. A: Ratings above 30 amps may deviate from the above limits by approximately 10% (130% for delay 49).
*** No 53 delay on 125 amp single pole or 400 amp four pole devices*

DELAY CURVES

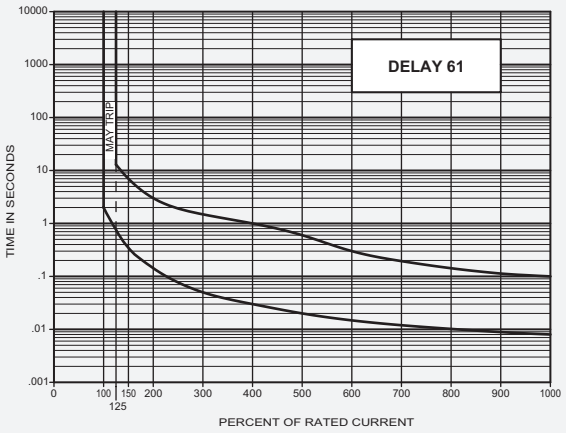
400Hz, DC, 50/60Hz Delay Curves (typ)

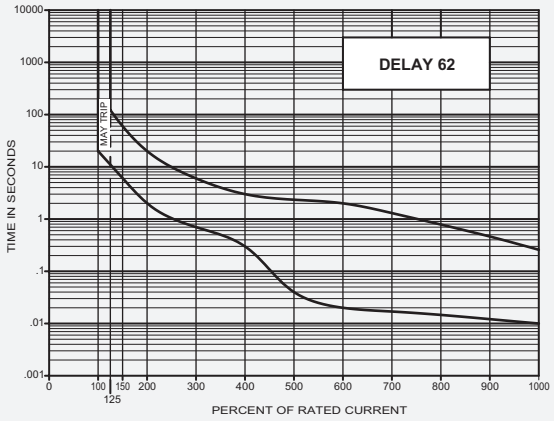
A choice of delays is offered for DC, 50/60Hz, 400Hz, or combined DC/50/60Hz applications. Delays 49, 59, 69 and 79 provide fast-acting, instantaneous tripping and are often used to protect sensitive electronic equipment (not recommended where a known inrush exists). Delays 41, 51, 61 and 71 have a short delay for general purpose applications. Delays 42, 52, 62 and 72 are long enough for most transformers and capacitor loads. Delays 43, 53, 63 and 73 are extra long for special motor applications.

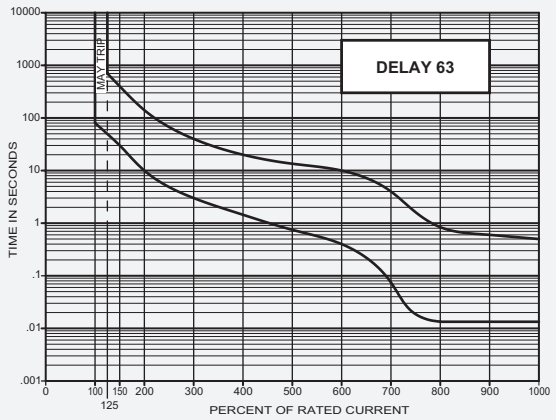
Inrush Pulse Tolerance

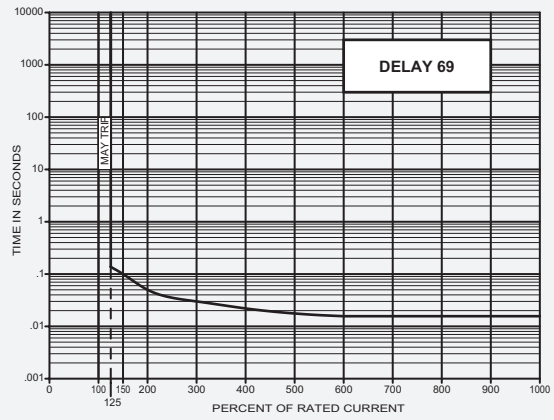
Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker.

The table on page 171 provides a guide to determine if the inertia delay feature is required. Consult factory for further assistance.



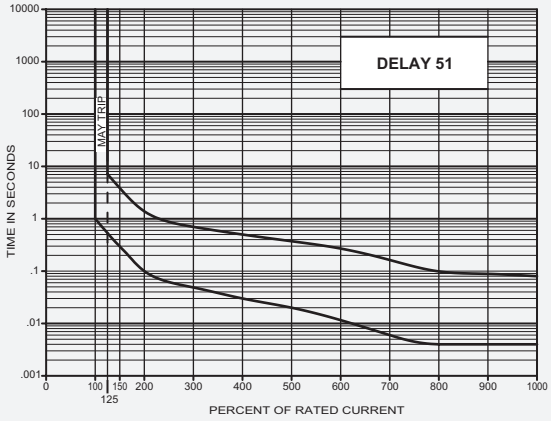


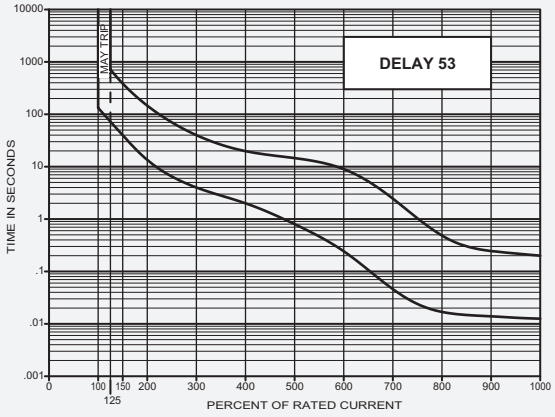


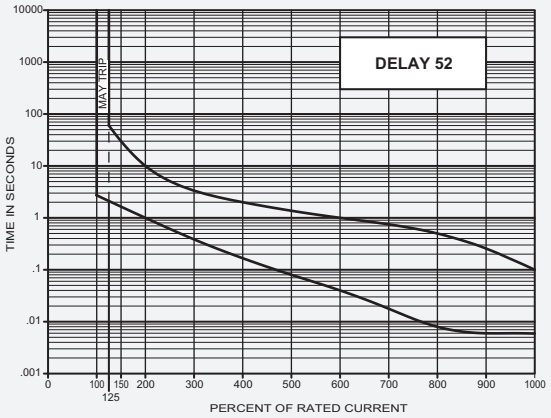


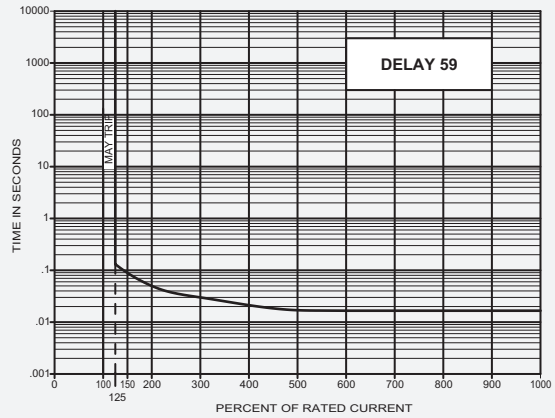
DC Delay Curves (typ)

PULSE TOLERANCES	
Delay	**Pulse Tolerance**
61, 62, 63, 71, 72, 73	10 times (approx.) rated current
61F, 62F, 63F, 71F, 72F, 73F	12 times (approx.) rated current
64, 65, 66 (0 - 50A)	25 times (approx.) rated current
64, 65, 66 (>50 - 80A)	20 times (approx.) rated current
64, 65, 66 (>80 - 100A)	18 times (approx.) rated current

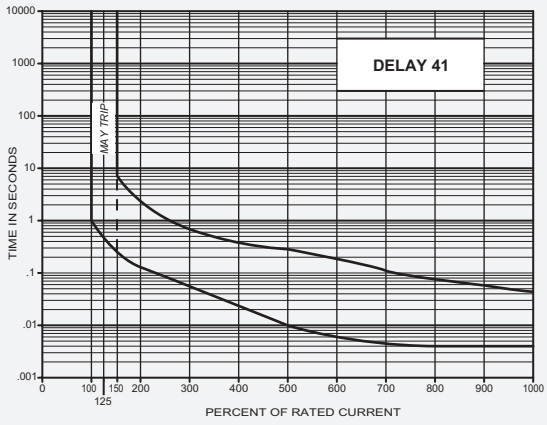


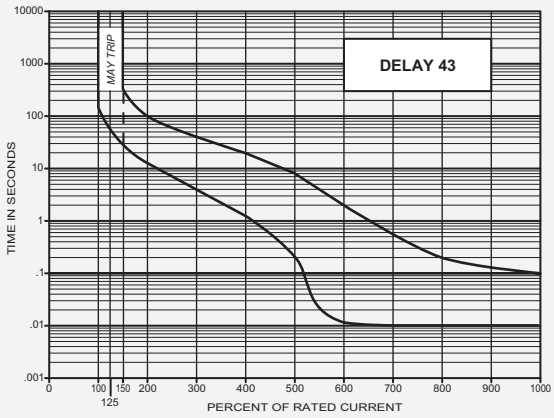


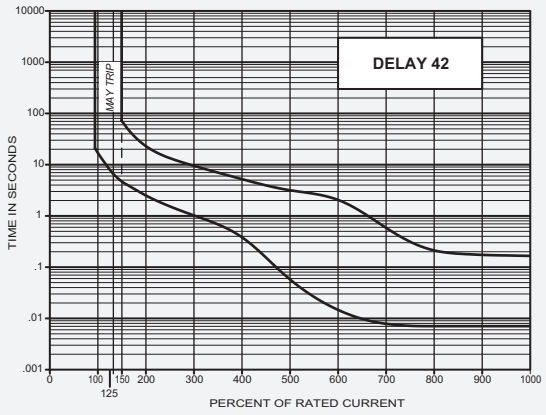


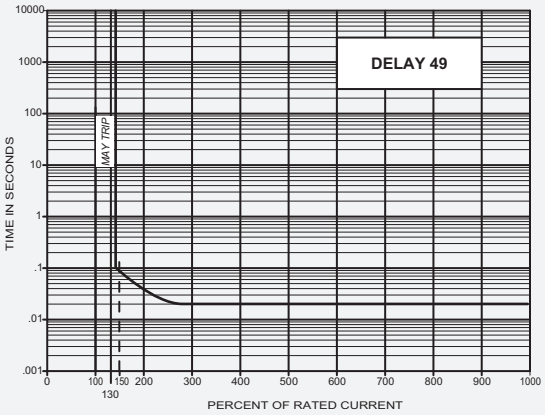


400Hz Delay Curves (typ)
*Available only in IAL/IUL/IEL; not available in LEL.

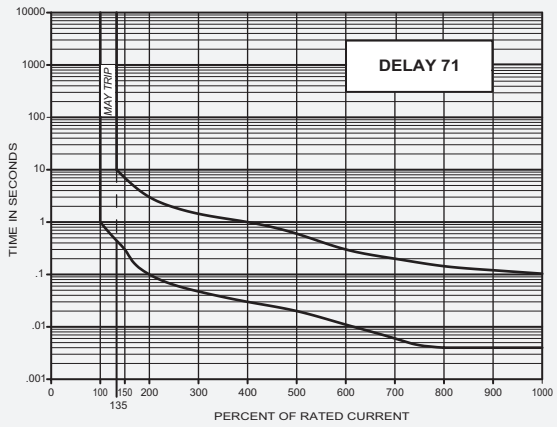


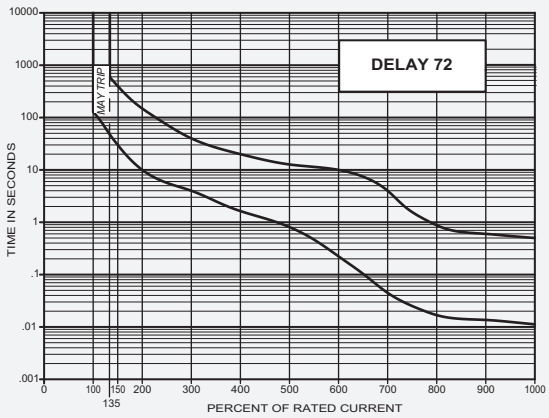


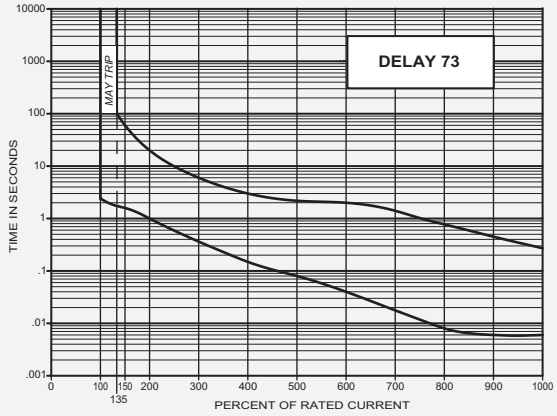


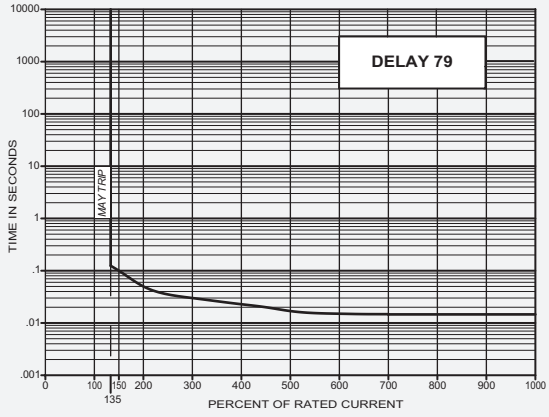


DC/50/60Hz Dual-frequency Delay Curves (typ)









IAL/IUL/IEL/IDL/LEL SPECIFICATIONS

Trip Free
Will trip open on overload even when forcibly held in the ON position. This prevents the operator from damaging the circuit by holding the breaker on.

Trip Indication
The operating handle moves positively to the OFF or mid-trip position on electrical overload.

Ambient Operation
IAL/IUL/IEL protectors operate in temperatures between –40°C to +85°C.

Insulation Resistance
Not less than 100 megohms at 500 volts DC.

Dielectric Strength
IAL/IUL/IEL protectors withstand 3750Vac (1250Vac for LEL), 60Hz for 60 seconds between all electrically isolated terminals except auxiliary switch terminals shall withstand 600Vac, 60Hz for REG and REC types. Four terminal dual coil and relay construction (not offered in the LEL) will withstand 1500Vac.

Endurance
Operating as a switch, the operating life exceeds 10,000 operations, 6000 at rated load, 4000 without load, at a rate of 6 per minute.

Electrical Characteristics
.050-100 amperes 80Vdc, 240Vac Max., 240/415Vac at 50 amperes Max., 50/60Hz and 400Hz. Consult factory for specific product ratings. Units rated for 240/415Vac and above 50 amperes are not suitable for across-the-line motor starting.

Poles
One through six poles available.

Construction
Series, shunt, relay dual coil and series with auxiliary switch available in various delays and combinations.

Auxiliary Switch
When supplied shall be S.P.D.T. configuration. Non VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz; 3.0 amperes, 50 volts DC (REC type) or 0.1 amperes, 125 volts, 60Hz (REG type).

VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz (REC type); or 0.1 amperes, 125 volts, 60Hz (REG; type). The maximum VDE ratings are 1.0 amperes, 125 volts, 60Hz (REC type); 0.1 amperes, 125 volts, 60Hz (REG type).

Salt Spray (Corrosion)
Meet the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-STD-202.

Moisture Resistance
Meet all the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-STD-202.

Shock
Circuit protectors shall not trip when tested per MIL-STD-202, Method 213, Test Condition I with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

Vibration
Circuit protectors shall not trip when vibrated per MIL-STD-202, Method 204, Test Condition A with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

UL-1500 (Marine Ignition Protected)
The IDL/IDLH is approved for Marine Ignition Protection (series configuration only), covering ignition protected circuit breakers. This specification requires devices to be used in accordance with the requirementsof U.S. Coast Guard and Fire Protection Standard for Pleasure and Commercial Motor Craft, ANSI/MFPA #302.

APPROXIMATE WEIGHT PER POLE	
Ounces	**Grams**
3.1	90

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
10-32 Screw Terminals	14 to 15
M5 Terminal Screws	14 to 15
10-32 Stud Terminals	13 to 14
M5 Stud Terminals	13 to 14
1/4 - 20 Stud Terminals	40 to 45
M6 Stud Terminals	40 to 45
1/2 - 32 Mounting Bushing	30 to 35
Where applicable, mechanical support must be provide to the terminals when applying torque	

IAL/IUL/IEL/IDL/LEL/LELHP SPECIFICATIONS

AGENCY APPROVALS - IAL/IUL/IEL

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
65	DC	-	1	1	1	.02-100	.10-70	U2, 7500	4000
65(4)	DC	-	1	1	1	.02-100	-	U2, 3000	-
65(4)	DC	-	1	1	1	.02-50	-	U2, 5000	-
65	DC	-	2**	2	1	101-150	-	U2, 7500	-
80	DC	-	1	1	1	.02-70	.10-50	U2, 7500	4000
80	DC	-	1	1	1	70.1-100	-	U2, 5000	-
80	DC	-	2	1	1	101-150	-	U1, 10000	-
80	DC	-	3	1	0	251-300	-	U2, 7500	-
125	DC	-	2	1	0	.02-100	-	U2, 5000	-
250	DC	-	2+	1	0	.02-50	-	U1, 5000	-
300	DC	-	3++	1	0	.02-50	.10-50	U2, 1000	5000
125	50/60	1	1	1	0	.02-70	-	U2, 5000	-
125	50/60	1	1	1	1	.02-100	-	U1, 3000	-
125(5)	50/60	1	1	1	1	.02-100	-	U3, 1500	-
120/240	50/60	1	2	2	1	.02-100	-	U1, 2000	-
125/250(5)	50/60	1	2 only	1	1	.02-100	-	U3, 1500	-
240	50/60	1&3	1	1	0	.02-70	-	U1, 2000	-
240	50/60	3	2	1	1	.02-100	-	U2, 2000	-
250	50/60	3	1	1	1	.02-50	.10-100	U2, 3000	2000
250	50/60	3	1	1	1	.02-50	.10-100	C2, 5000(1)	2000
250	50/60	1	1	1	1	.02-50	.10-100	C2, 5000(2)	2000
250	50/60	3	2	1	0	.02-80	.10-100	U1, 1000	2000
250	50/60	3	1	1	0	.02-60	.10-100	U1, 5000	2000
250(5)	50/60	3	3 only	1	1	.02-100	-	U3, 2000	-
277	50/60	1	1	1	1	.02-50	-	U2, 2000	-
277	50/60	1&3	1	2	1	.02-50	-	C2, 5000(1)	-
240/415	50/60	3	2	2	0	.02-50	.10-50	U2, 2000	2000
240/415	50/60	1	2	2	0	.02-50	.10-50	C2, 5000(1)	2000
277/480	50/60	3	2	2	1	.02-30	-	U2, 2000	-
277/480	50/60	3	2	2	1	.02-50	-	U2, 1200	-
277/480	50/60	3	2	1	1	.02-30	-	C2, 5000(3)	-
277480	50/60	1&3	2	1	0	.02-50	-	C2, 5000(3)	-
480	50/60	1&3	2	1	1	.02-30	-	C2, 5000(3)	-
480	50/60	3	2	1	0	.02-50	-	C2, 5000(3)	-
250	400	1&3	1	2	1	.02-50	-	U2, 1500	-

AGENCY APPROVALS - LEL/LELHP

Voltage	Frequency (Hz)	Phase	Min. Poles	UL/CSA	VDE (amps)	UL489 (AIC)	VDE (AIC)
65	DC	-	1	.05-50	-	7500	-
65	DC	-	2**	101-150	-	50 000	-
65	DC	-	3**	175-200	-	50000	-
80	DC	-	1	.05-100	.10-100	10000	2000
80	DC	-	1	.05-100	-	50000	-
80	DC	-	2**	125-150	125-150	10000	2000
80	DC	-	3**	175-200	151-200	10000	2000
125	DC	-	1	.05-70	.05-70	5000	3000
125/250	DC	-	2	.05-50	-	5000	-
125	50/60	1&3	1	.05-40	-	10000	-
125	50/60	1&3	1	.05-50	.10-50	5000	2000
120/240	50/60	1	2	.05-70	.10-50	5000	2000
240	50/60	1&3	1	.05-20	-	5000	-

AGENCY APPROVALS - CELHP

80	DC	-	4	400	-	10000 AIC (UL489A)	-

AGENCY APPROVALS - CEL/CELP (COMMUNICATIONS)

Voltage	Frequency (Hz)	Phase	Min. Poles	UL/CSA	VDE (amps)	UL 489A (AIC)	VDE (AIC)
65	DC	-	1	.05-50	-	7500	-
65	DC	-	2**	101-150	-	50000	-
80	DC	-	1	.05-100	-	50000	-
80	DC	-	2**	101-200	-	10000	-
80	DC	-	3**	201-250	-	10000	-
125	DC	-	1	.05-70	-	5000	-
80	DC	-	1	125	-	10000	-

AGENCY APPROVALS - IDL/IDLP (MARINE)

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
48	DC	-	1	1	1	.02-100	-	U1, 5000	-
48	DC	-	2**	1	1	101-150	-	U1, 5000	-
65	DC	-	1	1	1	.02-60	-	U1, 1000	-
80	DC	-	1	1	1	.02-100	-	U2, 1500	-
125	50/60	1	1	1	1	.02-100	-	U 1, 1500	-
250	50/60	1	2	1	1	.02-100	-	U2, 1500	-
250	50/60	1&3	1	1	1	.02-60	-	U1, 1000	-

AGENCY APPROVALS - IULQ (TAPPED COIL)

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
125/250	50/60	1	1	1	1	2/1-30/15	-	C2, 5000(1)	-

AGENCY APPROVALS - IULD (DUST SEALED)

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
250	50/60	1&3	1	1	1	.02-100	-	C2, 5000(3)	-
277	50/60	1	1	1	1	.02-30	-	C2, 5000(3)	-

Notes:
** Paralleled poles; + 2 poles in series; ++ 3 poles in series; (1) With 125 A max. series fuse; (2) Series combination with 209 or 229 series (100 A max.); (3) With 100 A max. series fuse; (4) With blocked vent construction (5) Non-standard construction. "Fit for further use" approval

General notes:

- All supplementary protectors are of the overcurrent (OC) type
- The family of protectors has been evaluated for end use application for use groups (UG) A, B, C and D
- The terminals (FW) are suitable for factory wiring only (0)
- The maximum voltage ratings for which the protectors have been tested are shown in the chart
- The current is the amperage range that the protectors have been tested
- The tripping current (TC) for all of the protectors is either either "1" (in the range of 125% to 135% of ampere rating) or "2" (more than 135% of ampere rating)
- The overload rating (OL) – designates whether the protector has been tested for general use or motor starting applications.

0 – tested at 1.5 times amp rating for general use

1 – tested at 6 times AC rating or 10 times DC rating for motor starting

- The short circuit current rating (SC) – The short circuit rating in amperes following a letter and number designating the test conditions and any calibration following the short circuit test is defined below:

C – Indicates short circuit test was conducted with series overcurrent protection

U – Indicates short circuit test was conducted without series overcurrent protection

1 – Indicates a recalibration was not conducted as part of the short circuit testing

2 – Indicates a recalibration was performed as part of the short circuit testing

3 – Indicates recalibration was performed along with the dielectric and voltage withstand for "Suitable for Further Use" rating

IAL/IUL/IEL DECISION TABLES

The ordering code for IAL/IUL/IEL/LEL circuit protectors may be determined by following the decision steps in the appropriate part number decision table subsequent to this page.

The coding given permits a self-assigning part number but with certain limitations. Special applications may require a factory assigned part number. Typical examples are units with mixed ratings, combinations of styles, or constructions not listed in the third decision table, etc. With these, it is suggested that order entry be by description and/or drawings, and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit breaker for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example the code shown is the code for a single pole breaker with a series construction and auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay, rating of 20 amperes and a marked black handle, and is VDE approved.

To determine the ordering number for your particular IAL/IUL/IEL unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

1 First Decision

Select Type and Terminal

Type	Description
IAL **IUL ***IEL	One handle per unit
IALH **IULH ***IELH	One handle per pole
IALN ***IULN	One handle per unit panel seal
IALX **IULX ***IELX	One handle per unit, rocker, bracket mounting
IALZX **IULZX ***IELZX	One handle per unit, rocker, integral mounting
*IDL	One handle per unit UL 1500
*IDLH	One handle per pole UL 1500
***IML	One handle per unit mid trip indication
***IMLH	One handle per pole mid trip indication
IALBX **IULBX ***IELBX	One handle per unit, rocker, accidental-off protection
**IMLBX	One handle per unit, mid trip indication, rocker, accidental-off protection

*UL Recognized
**UL Recognized, CSA Certified
***UL Recognized, CSA Certified, VDE Approved

Terminal	
	Standard screw terminal, no designation required
K	Stud terminals
C	Clip terminals
B	Bullet terminals

2 Second Decision

Poles

1	Single pole
11	Two pole
111	Three pole
1111	Four pole*

*Not available in toggle seal handle type. Consult factory for 5 and 6 pole IEL part number.

Example:

IEL 1 - 1REC4 - 61 - 20.0 - 01 - V

1 2 3 4 5 7

3 Third Decision

Internal Configuration

-0	Switch only *(50, 70 or 100 amp switch)*
-1	Series
-1REC4	Series with auxiliary switch* .110 quick connect
-1REC5	Series with auxiliary switch* .187 quick connect
-1REG4	Series with auxiliary switch .110 quick connect
-1RS4	Series with alarm switch, electrical trip, .110 quick connect terminals
-1RLS4	Series with alarm switch, electrical trip, .110 quick connect terminals (mid-trip only)
-1RS5	Series with alarm switch, electrical trip, .187 quick connect terminals
-3	Shunt
-4	Relay (not available in IEL/IELX)

* Only one auxiliary switch is normally supplied on two or three pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Frequency & Delay

SW	Switch only
-41	400Hz short delay
-42	400Hz long delay
-43	400Hz motor start
-49	400Hz 150% instant trip
-51	DC short delay
-52	DC long delay
-53	DC motor start
-59	DC 125% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip
-71	DC/60Hz short delay
-72	DC/60Hz long delay
-73	DC/60Hz motor start
-79	DC/60 Hz 135% instant trip

For addition of inertial delay, add an iFt to any delay numeral.

C = CCC Approved

This approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

Note: CCC Approval is pending.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

Note: CCC Approval is pending.

Notes:
IEL, IELH and IELX circuit protectors are designed to meet 8mm creepage clearance requirements for installation Category 111, Pollution Degree 3, Case A as measured in IEC 664. Intended for use in equipment to comply with IEC 950, 601 and VDE 0804 & 0805.

5 Fifth Decision

Rated Current

Use three numbers to print required current value between .100 amps minimum and 100.0 amps maximum.

For example, use:
.100 or 2.00 or 10.0

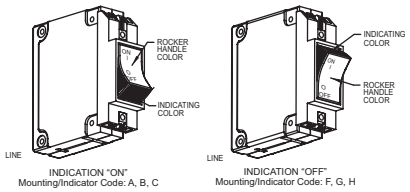
The VDE (Ith) will be 95% of the UL/CSA rated current.

6 Sixth Decision

Optional

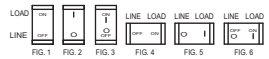
	Standard hardware. No designation required.
-A	Metric thread mounting inserts and terminals
-B	Barrier
-C	277V (50/60Hz only) (See note 3)
-D	240/415V (50/60Hz only)
-E	277V/480V (50/60Hz only) (See note 4)
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-K	1/4 - 20 stud (M6 stud when -A option is selected) (<=70A requires -K, if >70A do not use -K)
-L	Handle lock
-M	Handle in opposite pole
-P	Snap-in face plate adapter
-U	120/240V 50/60Hz
-W	Wire clamp supplied (VDE approved up to and including 16.0 amps)
-X	Handle guard with no actuation feature (BX rocker only)
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this is not used, table one may be substituted and U.S. thread and two lockwashers will be supplied. Unit will be rated at 250V (50/60Hz only.)
3. VDE approved at 250Vac
4. VDE approved at 415Vac

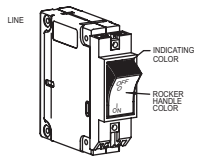


INDICATION "ON"
Mounting/Indicator Code: A, B, C

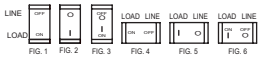
INDICATION "OFF"
Mounting/Indicator Code: F, G, H



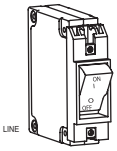
MARKING DETAIL "A" (SEE TABLE)



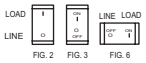
INDICATION "ON"
Mounting/Indicator Code: J, K, L



MARKING DETAIL "B" (SEE TABLE)



INDICATION "OFF"
Mounting/Indicator Code: M, N, P, R



MARKING DETAIL "C" (SEE TABLE)

7 Seventh Decision

Handle Color and Marking Selection

IAL, IUL, IEL, IALH,
IULH, IELH - Toggle Handle

Color	Unmarked	Marked* ON-OFF I-O
Black	-00	-01 (STD)
Yellow	-10	-11
Red	-20	-21
Blue	-30	-31
Green	-40	-41
Orange	-60	-61
White	-90	-91

7 Seventh Decision

Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

IALX, IULX, IELX, IALZX, IULZX, IELZX Rocker Handle (Single Rocker Color)

					Vertical Mounting			Horizontal Mounting			
Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	On-Off Fig.1	I-O Fig.2	On-Off I-O Fig.3	On-Off Fig.4	I-O Fig.5	On-Off I-O Fig.6	Marking Detail
Black	N/A	White	N/A	-00	-01	-02	-03	-04	-05	-06	A
Red	N/A	White	N/A	-20	-21	-22	-23	-24	-25	-26	
Grey	N/A	Black	N/A	-40	-41	-42	-43	-44	-45	-46	
Orange	N/A	Black	N/A	-50	-51	-52	-53	-54	-55	-56	
White	N/A	Black	N/A	-90	-91	-92	-93	-94	-95	-96	
IALZX, IULZX, IELZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	-A0	-A1	-A2	-A3	-A4	-A5	-A6	A
Black	Red	White	On	-B0	-B1	-B2	-B3	-B4	-B5	-B6	
Black	Green	White	On	-C0	-C1	-C2	-C3	-C4	-C5	-C6	
Black	White	White	Off	-F0	-F1	-F2	-F3	-F4	-F5	-F6	
Black	Red	White	Off	-G0	-G1	-G2	-G3	-G4	-G5	-G6	
Black	Green	White	Off	-H0	-H1	-H2	-H3	-H4	-H5	-H6	
Black	White	White	On	-J0	-J1	-J2	-J3	-J4	-J5	-J6	B
Black	Red	White	On	-K0	-K1	-K2	-K3	-K4	-K5	-K6	
Black	Green	White	On	-L0	-L1	-L2	-L3	-L4	-L5	-L6	
IALBX, IULBX, IELBX, LELBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	-M0	N/A	-M2	-M3	N/A	N/A	-M6	C
Black	Red	Red	Off	-N0	N/A	-N2	-N3	N/A	N/A	-N6	
Black	Green	Green	Off	-P0	N/A	-P2	-P3	N/A	N/A	-P6	
Black	Yellow	Yellow	Off	-R0	N/A	-R2	-R3	N/A	N/A	-R6	

Notes: A. Bezels of IALBX, IULBX, IELB, IELBX are black.
B. Consult factory for other marking options.

LEL DECISION TABLES

1 First Decision

Select Type and Terminal

Type	Description
LEL	One handle per unit
LELH	One handle per pole
LML	One handle per unit, mid-trip indication
LMLH	One handle per pole, mid-trip indication
LELZX	One handle per unit, rocker, integral mounting
LMLZX	One handle per unit, rocker, mid-trip indication, integral mounting
LELBX	One handle per unit, rocker, accidental-off protected
LMLBX	One handle per unit, rocker, mid-trip indication, accidental-off protected

Note: Other options available, consult factory.

Terminal	
	Standard screw terminal, no designation required
K	Stud terminals
C	Clip terminals
B	Bullet terminals

Example:

LEL 1 - 1REC4 - 61 - 20.0 - 01 - V

1 2 3 4 5 7

2 Second Decision

Poles

1	Single pole
11	Two pole
111	Three pole

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1REC5	Series with auxiliary switch .187 quick connect
-1REG4	Series with auxiliary switch (gold contacts) .110 quick connect
-1RS4	Series with alarm switch, electrical trip, .110 quick connect
-1RLS4	Series with alarm switch, electrical trip, .110 quick connect*

* Used only with mid-trip.

4 Fourth Decision

Frequency and Delay

-51	DC short delay
-52	DC long delay
-53*	DC motor start
-59	DC 125% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip

For addition of inertial delay, add an "F" to any delay numeral.
*Not available above 100 amps.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

C = CCC Approved

The approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

5 Fifth Decision

Rated Current

Use three numbers to print (.050 or 1.50 or 100) Value between **.050** amps and **100** amps.

6 Sixth Decision

Optional

-A	Metric thread mounting inserts and terminals
-B	Barrier
-F	240V 50/60Hz
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-K	1/4 - 20 Stud (M6 Stud when -A option is selected) (50A requires -K, >50A do not use -K)
-L	Handle Lock
-M	Handle in opposite pole
-P	Snap-in mounting plate adapter
-U	120/240Vac, 5000 A.I.C., 70A max. 2 pole only with barrier (VDE 250Vac)
-V	125VDC
-X	Handle guard with no actuate "off" feature (see detail C)
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.
3. If (M5 or M6) studs are required, use "A" only on an LELK.

7 Seventh Decision

LEL Toggle Handle Color Selection

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See alternate 7th Decision for ZX and BX Rocker Handles.

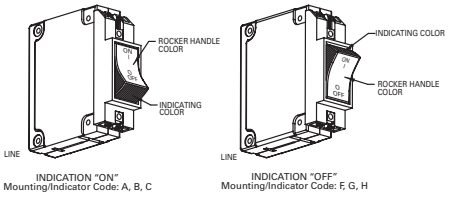
Notes: The LEL family of circuit breakers are designed to meet 8mm creepage and clearance requirements for installation Category 111, pollution degree 3, Case A as measured in IEC 664. Intended for use in equipment designed to comply with IEC 380, 435, 601 AND VDE 0730, 0804 & 0805.

7 Seventh Decision

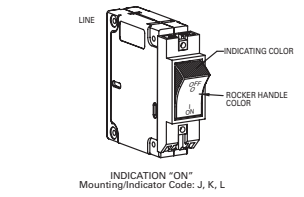
Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	Vertical Mounting: On-Off Fig.1	Vertical Mounting: I-O Fig.2	Vertical Mounting: On-Off I-O Fig.3	Horizontal Mounting: On-Off Fig.4	Horizontal Mounting: I-O Fig.5	Horizontal Mounting: On-Off I-O Fig.6	Marking Detail
LELZX & LMLZX Rocker Handle (Single Rocker Color)											
Black	N/A	White	N/A	**-00**	**-01**	**-02**	**-03**	**-04**	**-05**	**-06**	A
Red	N/A	White	N/A	**-20**	**-21**	**-22**	**-23**	**-24**	**-25**	**-26**	
Grey	N/A	Black	N/A	**-40**	**-41**	**-42**	**-43**	**-44**	**-45**	**-46**	
Orange	N/A	Black	N/A	**-50**	**-51**	**-52**	**-53**	**-54**	**-55**	**-56**	
White	N/A	Black	N/A	**-90**	**-91**	**-92**	**-93**	**-94**	**-95**	**-96**	
LELZX & LMLZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	**-A0**	**-A1**	**-A2**	**-A3**	**-A4**	**-A5**	**-A6**	A
Black	Red	White	On	**-B0**	**-B1**	**-B2**	**-B3**	**-B4**	**-B5**	**-B6**	
Black	Green	White	On	**-C0**	**-C1**	**-C2**	**-C3**	**-C4**	**-C5**	**-C6**	
Black	White	White	Off	**-F0**	**-F1**	**-F2**	**-F3**	**-F4**	**-F5**	**-F6**	
Black	Red	White	Off	**-G0**	**-G1**	**-G2**	**-G3**	**-G4**	**-G5**	**-G6**	
Black	Green	White	Off	**-H0**	**-H1**	**-H2**	**-H3**	**-H4**	**-H5**	**-H6**	
Black	White	White	On	**-J0**	**-J1**	**-J2**	**-J3**	**-J4**	**-J5**	**-J6**	B
Black	Red	White	On	**-K0**	**-K1**	**-K2**	**-K3**	**-K4**	**-K5**	**-K6**	
Black	Green	White	On	**-L0**	**-L1**	**-L2**	**-L3**	**-L4**	**-L5**	**-L6**	
LELBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	**-M0**	**N/A**	**-M2**	**-M3**	**N/A**	**-M5**	**-M6**	C
Black	Red	Red	Off	**-N0**	**N/A**	**-N2**	**-N3**	**N/A**	**-N5**	**-N6**	
Black	Green	Green	Off	**-P0**	**N/A**	**-P2**	**-P3**	**N/A**	**-P5**	**-P6**	
Black	Yellow	Yellow	Off	**-R0**	**N/A**	**-R2**	**-R3**	**N/A**	**-R5**	**-R6**	

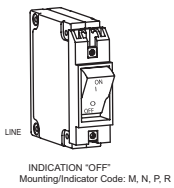
Notes: A. Bezels of IALBX, IULBX, IELB, IELBX are black.
B. Consult factory for other marking options.



MARKING DETAIL "A" (SEE TABLE)



MARKING DETAIL "B" (SEE TABLE)



MARKING DETAIL "C" (SEE TABLE)

CEL DECISION TABLES

1 First Decision

Select Type and Terminal

Type	Description
CEL	One handle per unit, UL489A Listed
CELH	One handle per pole, UL489A Listed
CML	Single pole only, one handle per unit mid-trip construction, UL489A Listed
CMLH	One handle per pole mid-trip construction, UL489A Listed
CELZX	One handle per unit, rocker handle, UL489A Listed
CMLZX	Single pole only, one handle per unit, rocker handle w/ RLS aux switch, mid-trip construction, UL489A Listed
CELBX	One handle per unit, flat rocker handle, UL489A Listed
CMLBX	Single pole only, one handle per unit, flat rocker handle w/ RLS aux switch, mid-trip construction, UL489A Listed

Terminal	
	Standard screw terminal, no designation required
K	Stud terminals
C	Clip terminals
B	Bullet terminals

Example:

CEL 1 - 1REC4 - 51 - 20.0 - A - 01 - V

1 2 3 4 5 6 7

2 Second Decision

Poles

1	Single pole
11	Two pole
111	Three pole

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1RLS4 **	Series with auxiliary switch .110 quick connect, mid-trip only
-1REC5	Series with auxiliary switch .187 quick connect
-1RS4 **	Alarm switch, .110 quick connect

* Only one auxiliary switch is normally supplied on two and three pole units switch is located in the right hand pole (viewed from terminal end). Note, aux switch followed by "R" indicates reverse mount option
** Not available for 125 amp single pole

4 Fourth Decision

Frequency and Delay

-51	DC short delay
-52	DC long delay
-53*	DC motor start
-59	DC 125% instant trip

For addition of inertial delay, add an "F" to any delay numeral. Example: -51F
*Not available above 100 amps.

5 Fifth Decision

Rated Current

Use three numbers in build (.050 or 1.50 or 100).

Required value between **.050** amps minimum and **125** amps maximum.

6 Sixth Decision

Optional

-A	Metric thread mounting inserts and terminals
-B	Barrier
-G	Snap-in mounting plate adapter with handle guard (ZX, BX and snap-in only)
-K	1/4-20 Stud (M6 stud when metric option -A selected) 50A requires -K, >50A do not use -K
-P	Snap-in mounting plate adapter
-T	80VDC, 10000AIC, (required over 50A)
-V	125VDC
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.

7 Seventh Decision

LEL Toggle Handle Color Selection

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See alternate 7th Decision for ZX and BX Rocker Handles.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

C = CCC Approved

The approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

T = TÜV Approved

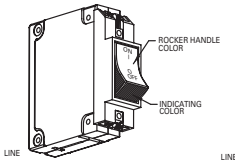
The approval requires the addition of a T at the end of the part number. The unit will only be TÜV EN60947-2 approved with a single pole, 125 amp rating configuration.

7 Seventh Decision

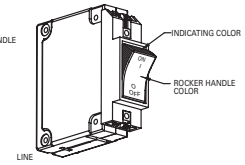
Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	Vertical Mounting On-Off Fig.1	Vertical Mounting I-O Fig.2	Vertical Mounting On-Off I-O Fig.3	Horizontal Mounting On-Off Fig.4	Horizontal Mounting I-O Fig.5	Horizontal Mounting On-Off I-O Fig.6	Marking Detail
LELZX & LMLZX Rocker Handle (Single Rocker Color)											
Black	N/A	White	N/A	**-00**	**-01**	**-02**	**-03**	**-04**	**-05**	**-06**	A
Red	N/A	White	N/A	**-20**	**-21**	**-22**	**-23**	**-24**	**-25**	**-26**	
Grey	N/A	Black	N/A	**-40**	**-41**	**-42**	**-43**	**-44**	**-45**	**-46**	
Orange	N/A	Black	N/A	**-50**	**-51**	**-52**	**-53**	**-54**	**-55**	**-56**	
White	N/A	Black	N/A	**-90**	**-91**	**-92**	**-93**	**-94**	**-95**	**-96**	
LELZX & LMLZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	**-A0**	**-A1**	**-A2**	**-A3**	**-A4**	**-A5**	**-A6**	A
Black	Red	White	On	**-B0**	**-B1**	**-B2**	**-B3**	**-B4**	**-B5**	**-B6**	
Black	Green	White	On	**-C0**	**-C1**	**-C2**	**-C3**	**-C4**	**-C5**	**-C6**	
Black	White	White	Off	**-F0**	**-F1**	**-F2**	**-F3**	**-F4**	**-F5**	**-F6**	
Black	Red	White	Off	**-G0**	**-G1**	**-G2**	**-G3**	**-G4**	**-G5**	**-G6**	
Black	Green	White	Off	**-H0**	**-H1**	**-H2**	**-H3**	**-H4**	**-H5**	**-H6**	
Black	White	White	On	**-J0**	**-J1**	**-J2**	**-J3**	**-J4**	**-J5**	**-J6**	B
Black	Red	White	On	**-K0**	**-K1**	**-K2**	**-K3**	**-K4**	**-K5**	**-K6**	
Black	Green	White	On	**-L0**	**-L1**	**-L2**	**-L3**	**-L4**	**-L5**	**-L6**	
LELBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	**-M0**	**N/A**	**-M2**	**-M3**	**N/A**	**-M5**	**-M6**	C
Black	Red	Red	Off	**-N0**	**N/A**	**-N2**	**-N3**	**N/A**	**-N5**	**-N6**	
Black	Green	Green	Off	**-P0**	**N/A**	**-P2**	**-P3**	**N/A**	**-P5**	**-P6**	
Black	Yellow	Yellow	Off	**-R0**	**N/A**	**-R2**	**-R3**	**N/A**	**-R5**	**-R6**	

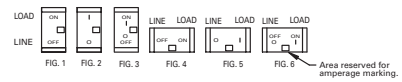
Notes: A. Bezels of IALBX, IULBX, IELB, IELBX are black.
B. Consult factory for other marking options.



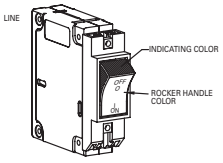
INDICATION "ON"
Mounting/Indicator Code: A, B, C



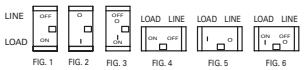
INDICATION "OFF"
Mounting/Indicator Code: F, G, H



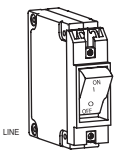
MARKING DETAIL "A" (SEE TABLE)



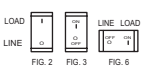
INDICATION "ON"
Mounting/Indicator Code: J, K, L



MARKING DETAIL "B" (SEE TABLE)



INDICATION "OFF"
Mounting/Indicator Code: M, N, P, R



MARKING DETAIL "C" (SEE TABLE)

LELHP DECISION TABLES

1 First Decision

Select Type with Stud Terminals

LELPK	One handle per unit
LMLPK	One handle per unit, mid-trip
LELZXPK	One ZX rocker handle per unit (integral mounting)
LMLZXPK	One ZX rocker handle per unit, mid-trip (integral mounting)
LELBXPK	One BX rocker handle per unit (integral mounting)
LMLBXPK	One BX rocker handle per unit, mid-trip (integral mounting)
LELHPK	One handle per pole
LMLHPK	One handle per pole, mid-trip

1. One toggle handle per unit on 125A to 150A units (2-parallel pole)
2. 175A to 200A (3-parallel pole) requires handle in each pole, "H" selection

V = VDE Approved

The shaded areas denote VDE approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE approved, but other approvals still apply.

Example:

LELHPK 11 - 1REC4 - 51 - 125. - A - 01 - V

1 2 3 4 5 6 7

2 Second Decision

Poles

11	Two pole (up to 150 amps)
111	Three pole (160 to 200 amps)

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1REG4	Series, aux switch (gold contacts) .110 quick connect
-1RLS4	Series with alarm aux switch .110 quick connect, mid-trip only
-1RLSG4	Series, alarm aux switch (gold contacts), .110 quick connect, mid-trip only
-1RS4	Series with alarm aux switch .110 quick connect
-1REC5	Series with aux switch .187 quick connect
-1RLS5	Series with alarm aux switch .187 quick connect, mid-trip only
-1RS4	Series with alarm aux switch .187 quick connect
-1RS5	Series with alarm aux switch .187 quick connect, mid-trip

4 Fourth Decision

Frequency and Delay

-51	DC 125% short delay (125 to 150 amp)
	DC 135% short delay (160 to 200 amp)
-52	DC 125% long delay (125 to 150 amp)
	DC 135% long delay (160 to 200 amp)
-59	DC 125% instant trip (125 to 150 amp)
	DC 135% instant trip (160 to 200 amp)

For addition of intertial delay, add an "F" to any delay option. Example: - 59 becomes -59F

5 Fifth Decision

Rated Current (Amps)

125.
130.
135.
150.
175.
200.

Additional ratings available.

6 Sixth Decision

Optional (leave entry blank if none apply)

-A	Metric thread mounting inserts and terminals
-G	Snap-in mounting plate adapter with handle guard (ZX, BX & snap-in only)
-X	Handle guard with no actuate off feature (BX only, no mid-trip)
-P	Snap-in mounting plate adapter

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.

7 Seventh Decision

Toggle Handle Color

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See LEL alternative 7th decision for ZX & BX rocker handles

CELHP DECISION TABLES

1 First Decision

Select Type		Terminal	
CELP	One toggle handle per unit		Standard screw terminal, no designation required
CELHP	One toggle handle per pole	**K**	Stud terminals
CMLHP	One toggle handle per pole, mid-trip construction	**C**	Clip terminals
CELZXP	One rocker handle per unit	**B**	Bullet terminals
CELBXP	One flat rocker handle per unit		

1. One toggle handle per unit is available only on 101A to 200A (two parallel pole construction)
2. 201A to 250A (three parallel pole constructions) require handles in each pole, "H" version first decision
3. Unit supplied with bullet terminals will not have buss bar installed, unless requested, buss bar supplied standard to 150A only.
4. One handle per unit is available for 100A to 200A (two parallel pole constructions) and 201A to 250A (three pole constructions) (ZX & BX versions only)
5. 400 amps available with toggle handes only

V = VDE Approved

The shaded areas denote VDE approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE approved, but other approvals still apply.

Example:

CELHPK 11 - 1REC4 - 51 - 125. - A - 01 - V

1 2 3 4 5 6 7

2 Second Decision

Poles

11	Two pole (up to 150 amps)
111	Three pole (160 to 250 amps)
1111	Four pole (400 amps)

3 Third Decision

Internal Configuration

-0	Switch only
-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1RLS4 *	Series with alarm aux. switch .110 quick connect, mid-trip only
-1RS4 *	Series with alarm aux. switch .110 quick connect
-1REC5	Series with auxiliary switch .187 quick connect
-1RLS5 *	Series with alarm aux. switch .187 quick connect, mid-trip only
-1RS4 *	Series with alarm aux. switch .187 quick connect

1. Only one auxiliary switch is normally supplied on two and three pole units. Switch is located in the right hand pole (viewed from terminal end panel mount position).
2. When more than one aux. switch is required, change the 1 (of the 1REC4) to 2 or 3. If switches are mixed, then use "2R" or 3R".

* Not available at 400 amps

4 Fourth Decision

Frequency and Delay

-51	DC 125% short delay (101 to 150 amp)
	DC 135% short delay (160 to 250 amp)
-52	DC 125% long delay (101 to 150 amp)
	DC 135% long delay (160 to 250 amp)
-53	DC 125% motor start (101 to 150 amp)
	DC 135% motor start (160 to 250 amp)
-59	DC 125% instant trip (101 to 150 amp)
	DC 135% instant trip (160 to 250 amp)

5 Fifth Decision

Rated Current (Amps)

125.
130.
135.
150.
175.
200.
400.
Additional ratings available.

6 Sixth Decision

Optional (leave entry blank if none apply)

-A	Metric thread mounting inserts and terminals
-B	Barrier
-G	Snap-in mounting plate adapter with handle guard (ZX, BX & snap-in only)
-X	Handle guard with no actuate off feature (BX only, no mid-trip)
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.

7 Seventh Decision

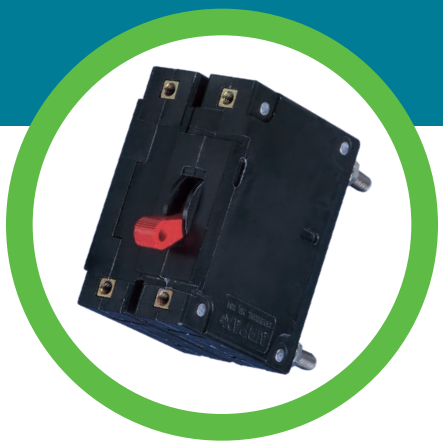
Toggle Handle Color

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See LEL alternative 7th decision for ZX & BX rocker handles

AIRPAX®

IAL/CEL/LEL Series
Magnetic Circuit Protectors



AIRPAX® | IAL/CEL/LEL Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

IAL/IUL/IEL/LEL magnetic circuit protectors provide low-cost power switching, reliable circuit protection and accurate circuit control for equipment in the international marketplace.

IAL models are for those applications where the unit's inherent attributes are desired, but compliance with the various standards is not required.

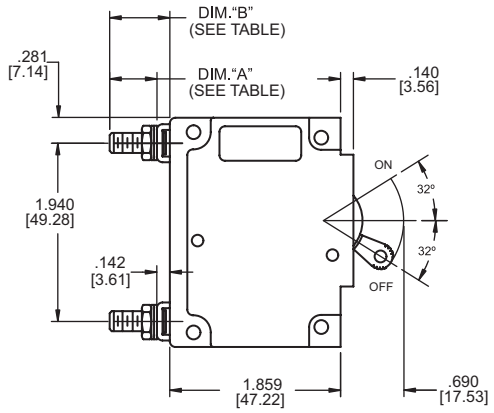
IUL models have been tested and approved in accordance with UL 1077 requirements for UL recognition.

IEL/LEL models are VDE approved to VDE 0660, part 101. They meet IEC spacing requirements, mandatory for equipment which must comply with IEC specifications 601 and 950, and VDE specifications 0804 and 0805. In addition, the IEL models are UL recognized to UL 1077 as supplementary protectors and the LEL models are UL listed under the conditions of UL 489. Both are CSA certified and CCC Approved. The IEL is CSA certified as a supplementary protector per CSA C22.2–No. 235.

The CEL model has achieved two new enhancements, including a single pole, 125 amp rating with TÜV approval, and a parallel 4-pole version with 400 amp rating.

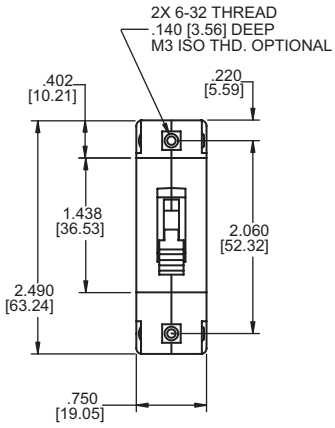
Airpax™ IAL/CEL/LEL circuit protectors are available in a wide variety of configurations, including series, series with auxiliary switch, shunt and relay with choice of delays and ratings in DC and/or 50/60Hz or 400Hz versions. Single or multi-pole versions are available with a variety of pole arrangements to meet your specifications. Please see the appropriate product specification table for ratings and limitations.

SINGLE POLE, STANDARD STUD TERMINAL

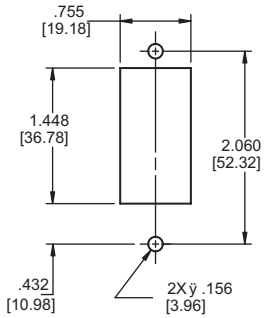


STUD TERMINAL TYPES		
Screw Stud Thread	**Dimension "A"**	**Dimension "B"**
M6	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
1/4 -20	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]
M5	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
10-32	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]

Single Pole

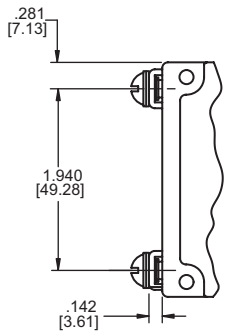


Mounting Detail

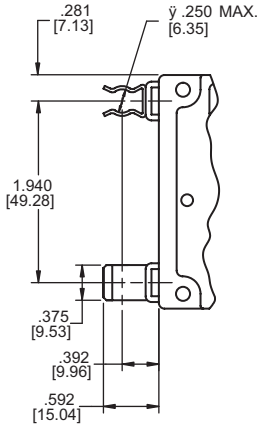


Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

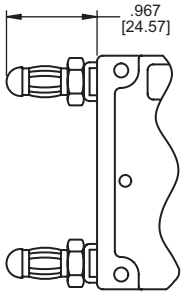
Screw Terminal



Clip Terminal



Bullet Terminal



Notes:
Tolerance ± .015 [.39] unless noted.
Dimensions in brackets [ ] are millimeters.
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312 [7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A) (<=50A for LEL),1/4-20 or M6 hex nut (>70A)(>50A for LEL).

Bullet terminal receptacle should be .312 ± .001 diameter hole not less than .250 depth. Contact Airpax for other bullet sizes.

Note: Each outer terminal is supplied with a flatwasher, tooth lockwasher and a hex nut.

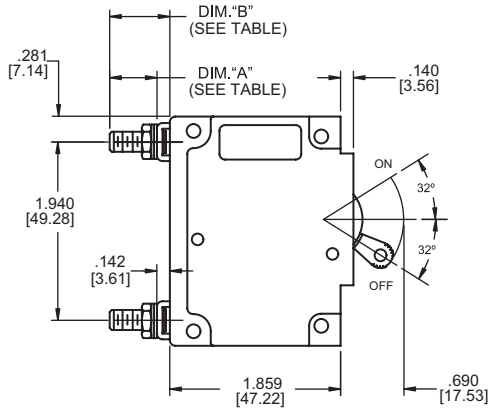
MULTI-POLE CIRCUIT PROTECTORS

Multi-pole units are combined in an assembly with the trip mechanisms internally coupled. A fault in any protected circuit opens all poles simultaneously. Applications include use in polyphase circuits, single-phase three-wire systems, or in two or more related but electrically isolated circuits. A mix of delays, ratings and configurations are offered. The auxiliary switch is offered with either gold or silver contacts and is available when a series construction pole is specified.

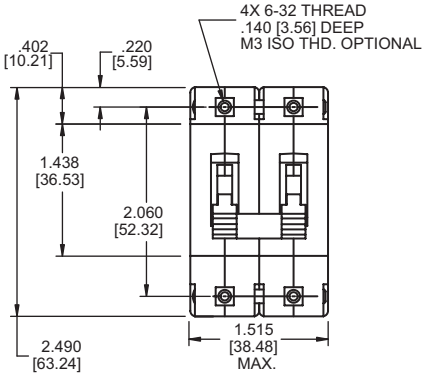
Two Pole Units

An assembly consisting of two single pole units, having their trip mechanisms internally coupled, is available with either a single toggle handle or with a handle per pole. Please see decision one of the part number decision tables. Individual poles may vary in ratings, delays and internal configurations. If the poles are of series construction, an auxiliary switch may be included in either or both poles, allowing you to mix SELV and hazardous voltages.

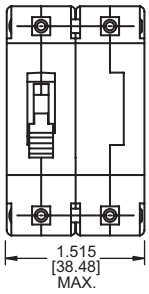
Two Pole



IELH11



IEL11

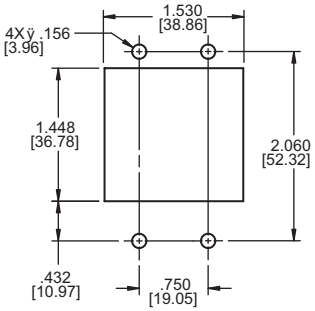


Note:
Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

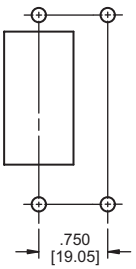
M6	.510	.652
1/4 - 20	.545	.687
M5	.510	.652
10 - 32	.545	.687
Screw stud thread	Dim. ìAî (± .045)	Dim. ìBî (± .035)

Note:
Each outer terminal is supplied with a flatwasher, tooth lockwasher and a hex nut.

Two Pole*



Two Pole*



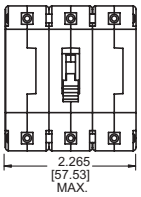
Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

Note:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312 [7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).

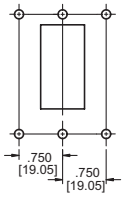
Three Pole and Four Pole Units
The three pole structure consists of three single pole units assembled with an internal mechanical interlock which actuates all units simultaneously. The units are available with either a single toggle handle or with a handle per pole. Units with four pole construction operate with a minimum of two center toggle handles or with a handle per pole. Please see decision one of the part number decision tables. Mixing of delays, ratings and configurations is available in each individual pole. The auxiliary switch is offered in any series trip pole.

Breaker poles are numbered consecutively when viewed from the terminal side, with the ON position up, starting with pole #1 on the left side and proceeding to the right.

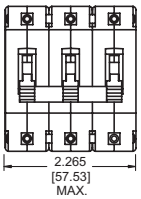
Three Pole
IEL111



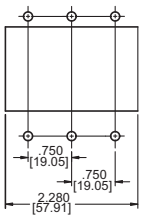
Mounting Detail*



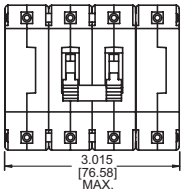
Three Pole
IELH111



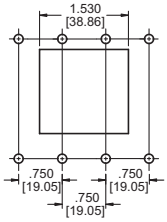
Mounting Detail*



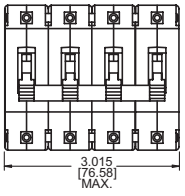
Four Pole
IEL1111



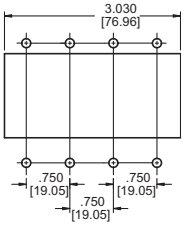
Mounting Detail*



Four Pole
IELH1111



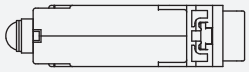
Mounting Detail*

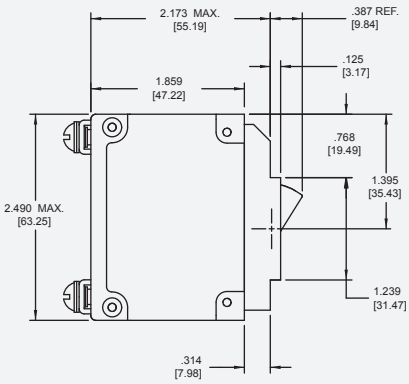


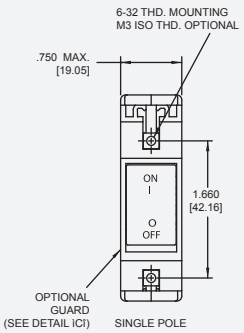
Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

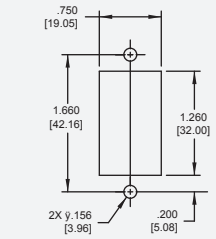
BX STYLE CIRCUIT PROTECTORS

The innovative new design of our IAL/CEL/LEL BX Style circuit protectors features a flat rocker that will satisfy your aesthetic needs while guarding against accidental actuation, providing the highest degree of circuit protection and quality. Only Airpax offers this new standard in user interface. Available on a variety of versions with a full range of agency approvals, the IEL BX style circuit protectors meet or exceed all current performance specifications, including interrupting capacities up to 50,000 amperes.

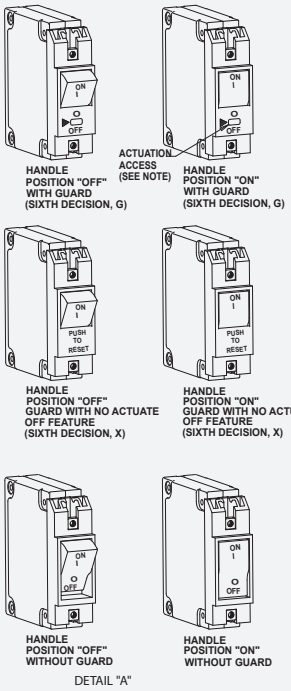








Panel Mounting Detail
Mounting Detail Tolerance:
±.005 [.13] unless noted



NOTE: ACCESS IS LIMITED TO A DEVICE SMALLER THAN THE UNDERWRITERS LABORATORY "ARTICULATED PROBE" DEFINED IN UL-489 FIG. 11.1.7.2.1.

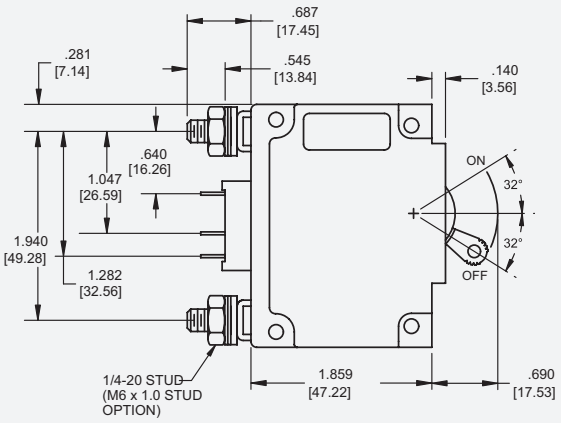
Note:
Tolerance ± .015 [.39] unless noted. Dimensions in brackets [ ] are millimeters.
*See Single Pole Mounting Detail for Hole Sizes and Locations.

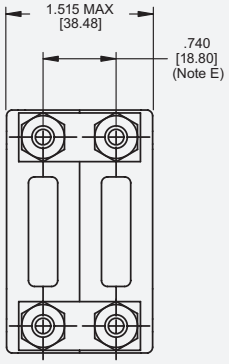
LELHP/CELHP CIRCUIT PROTECTORS

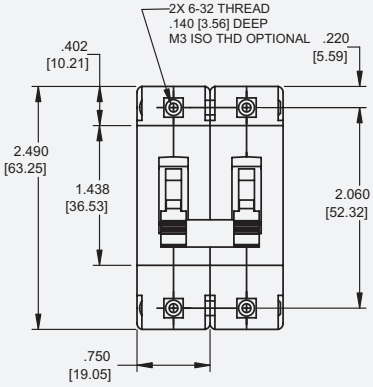
The Airpax™ LELHP/CELHP high current magnetic circuit protector compliments our entire series of LEL circuit protectors. Its unique, parallel current sensing design provides precise current overload protection and reliability in the compact size of a two pole LEL. The unit is ideal for high power DC applications such as drive motor systems and telecommunication power systems.

LEL is available in series and series with auxiliary switch configurations with a choice of delays for DC ratings of 125, 150, 175 and 200 amperes. The CEL has been enhanced to include these same ratings plus a 4-pole, parallel 400 amp rating for UL489A. The LELHP is UL listed under the conditions of UL489 and CSA certified. The CELHP is UL listed under the conditions of UL489A. Mid-trip handle indication, voltage trip and remote operator options complete the LELHP/CELHP circuit breaker series. Please see the individual product tables for approved ratings.

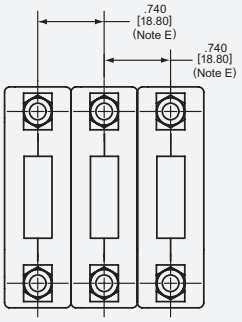
Two Pole

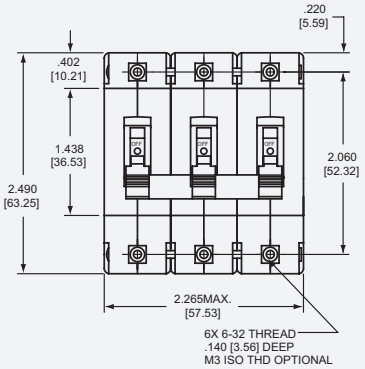






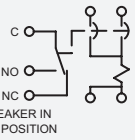
Three Pole (Note D)



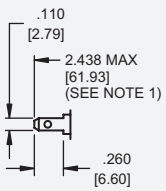


Series Parallel

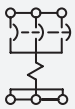
Series Parallel with optional
1REC4 Auxiliary switch



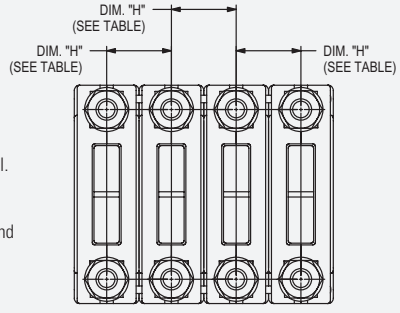
-REC4

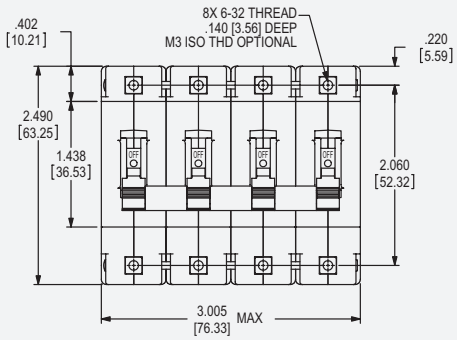


175/200 Parallel Pole



Four Pole (CEL _ _ P and CML _ _ P only)





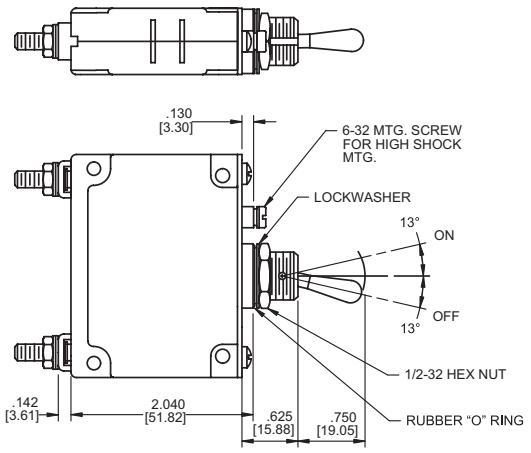
Notes:
Tolerance ± .015 [.39] unless noted. Dimensions in brackets [ ] are millimeters.

A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).
D Units are supplied without bus bars must have a minimum copper strap (1 31/32 x 1/2 x 1/16) of appropriate length to accommodate connections tying each set of terminals together.
E Other spacing available upon request. Contact factory for assistance.

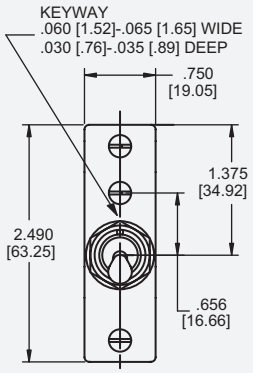
IALN/IULN PANEL SEAL CIRCUIT PROTECTORS

The IALN/IULN family is a sealed toggle version of the IAL/IUL family. The silicone rubber seal around the handle assures panel seal integrity and makes this style a natural for harsh environments.

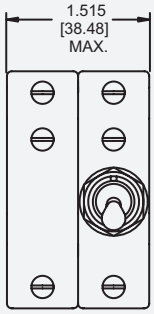
This sealed toggle family is available in one to three pole models with ratings of .050 to 100 amperes.



Single Pole

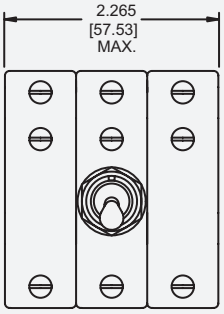


Two Pole



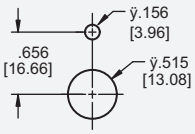
(Optional handle may be in pole 2 instead of pole 1.)

Three Pole

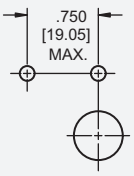


Panel Mounting Details: Tolerance ±.005 [.13] Unless noted.

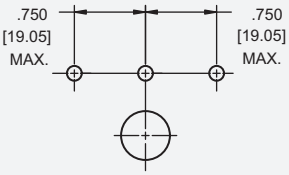
Single Pole



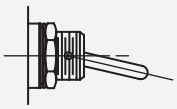
Two Pole*



Three Pole*



Optional handle



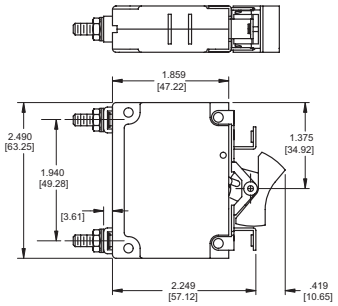
*See Single Pole Mounting Detail for Hole Sizes and Locations.

Notes:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).

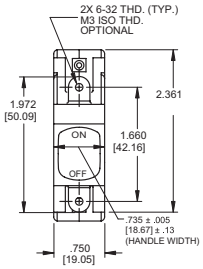
IALX/IULX/IELX ROCKER HANDLE STYLES

The rocker style is available in one to four poles. Choose either vertical or horizontal mounting with ON-OFF, international markings or a combination of both.

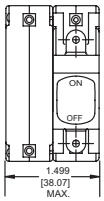
Five front panel enhancing colors including black, white, red, grey and orange are available.



Single Pole

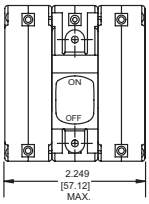


Two Pole

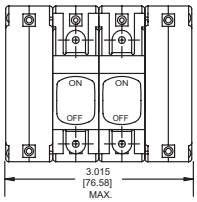


(Optional handle may be in Pole 2 instead of Pole 1.)

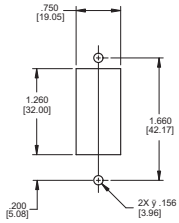
Three Pole



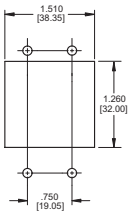
Four Pole



Panel Mounting Detail*
Single,Two & Three Pole



Four Pole**

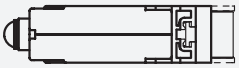


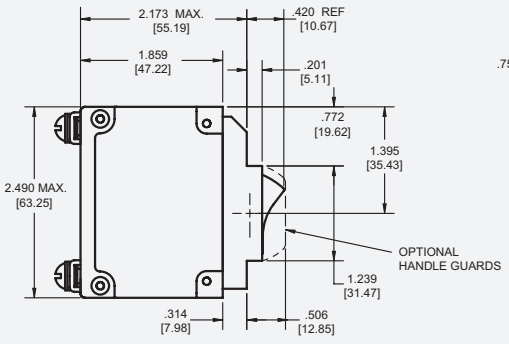
*Mounting detail tolerance ±.005 [.13] Unless noted.
**See single mounting detail for hole sizes and locations.

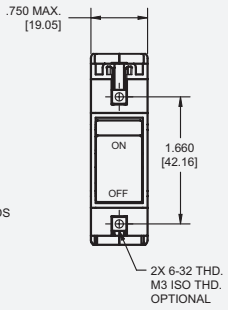
Note:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lock washer and a 10-32 or M5 hex nut (<=70A), °-20 or M6 hex nut (>70A).

IALZX/IULZX/IELZX ROCKER HANDLE STYLES

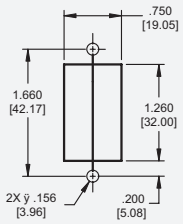
The IALZX/IULZX/IELZX style adds our rocker handle options of contrasting dual color rocker actuators, affording a clear visual indication of the handle position and integrated handle guards, to help prevent accidental turn-on and turn-off of the unit. Available with a black rocker and white, red or green indicator color for either ON or OFF indication.







Panel Mounting Detail



Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

CONFIGURATIONS

Series Trip
The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an on-off switch.

Shunt Trip
The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

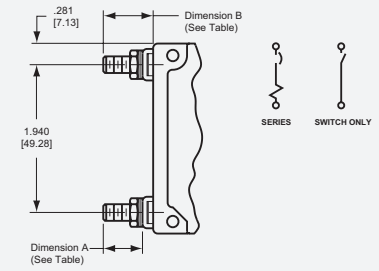
Dual Coil
By combining two electrically independent coils on a common magnetic circuit, it is possible to provide contact opening when either an over-current or trip voltage is applied to the respective coils. One coil will be a current trip coil with standard specifications. The second, or dual coil, can be used to provide a control function permitting contact opening from a remote interlock or other transducer functions. Standard coils are 6, 12, 24, 48, 120 and 240 volts. Tripping is instantaneous and must be removed (usually self-interrupting) after trip.

Auxiliary Switch (Applies to Series Trip Only)
This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.

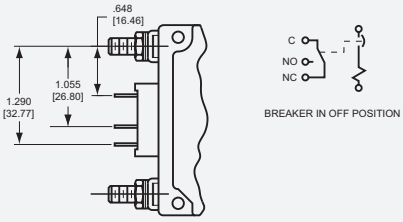
Auxiliary switch contacts actuate simultaneously with the main breaker contacts, and will open regardless of whether the breaker contacts are opened manually or electrically. For auxiliary switch ratings below 6Vac or 5Vdc, an auxiliary switch with gold contacts, designated as REG is available. Gold contacts are not recommended for load current above 100 milliamps.

Note:
A Terminal protrusion dimensions are referenced from back of mounting panel.
B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.
C Stud terminals are supplied with a flatwasher, external tooth lock washer and a 10-32 or M5 hex nut (<=70A), 1/4-20 or M6 hex nut (>70A).

Series and Switch Only



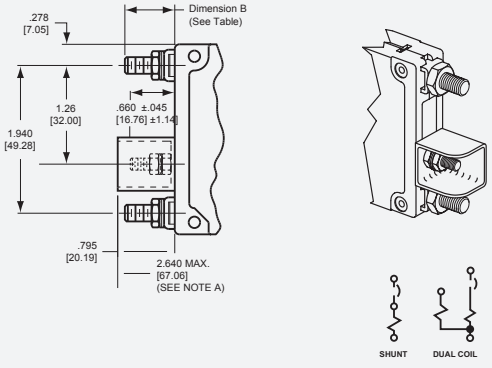
Series with Auxiliary Switch



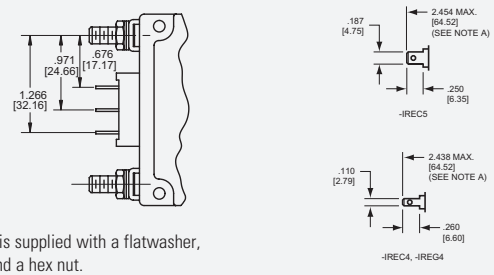
STUD TERMINAL TYPES

Screw Stud Thread	Dimension "A"	Dimension "B"
M6	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
1/4 -20	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]
M5	.510 ± .045 [12.95 ± 1.14]	.652 ± .035 [16.56 ± 0.89]
10-32	.545 ± .045 [13.84 ± 1.14]	.687 ± .035 [17.45 ± 0.89]

Shunt and Dual Coil



Spacing for VDE Switch



Note: Each outer terminal is supplied with a flatwasher, tooth lockwasher and a hex nut.

CONFIGURATIONS (CONT.)

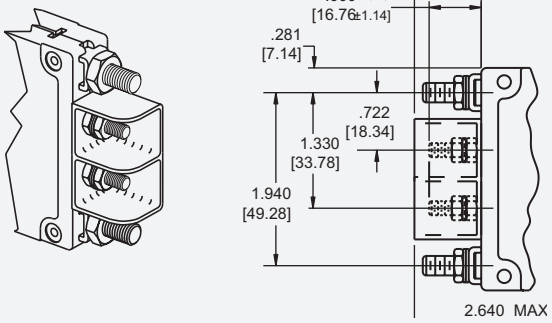
Relay Trip

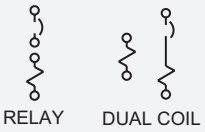
This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

Voltage Trip

Sometimes called “dump circuits” or “panic trip circuits,” these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt or relay configurations.

Relay and Dual Coil





Notes:
Tolerance ± .015 [.39] unless noted. Dimensions in brackets [ ] are millimeters.

A Terminal protrusion dimensions are referenced from back of mounting panel.

B Each screw terminal is supplied with a 10-32x.312[7.92] or M5 x 8mm screw, flatwasher and external tooth lockwasher.

C Stud terminals are supplied with a flatwasher, external tooth lockwasher and a 10-32 or M5 hex nut (<=70A), 1/4 -20 or M6 hex nut (>70A).

Barriers

FIG.1

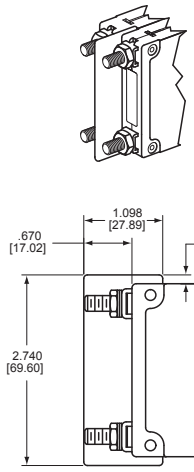


FIG.2

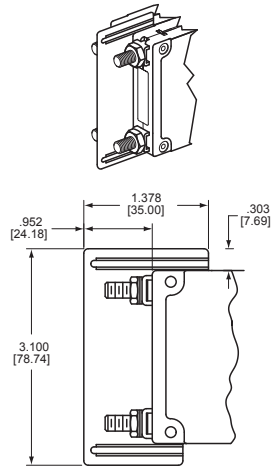


FIG.3

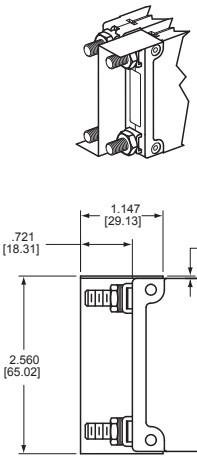
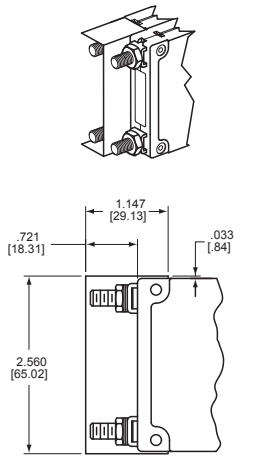


FIG.4



NOTE:
THIS BARRIER CAN BE FLIPPED TO COVER EITHER POLE. PLEASE CONTACT FACTORY FOR SPECIFIC PART NUMBER

BARRIER OPTIONS

Rating Option	Standard Barrier	Optional Barrier
IEL		
240/415 VAC	Fig. 1	Fig. 2, 3 & 4
415 VAC (VDE)		
277/480 VAC		
1/4-20, M6 studs for AC		
120/240 VAC multi-pole	Fig. 2	Fig. 3 & 4
125VDC		
LEL		
All multi-pole 50/60 Hz	Fig. 2	Fig. 3 & 4
All multi-pole 80 VDC, if opposite polarity	Fig. 2	Fig. 3 & 4
125VDC	Fig. 2	Fig. 3 & 4

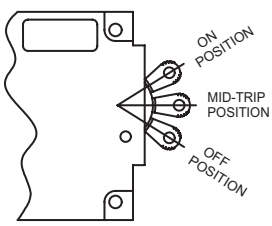
Note: Optional barrier available with factory assigned part number. Contact factory for assistance.

Mid-Trip Indication
Circuit protection, rapid fault location and alarm capability are blended together in the Airpax mid-trip indication option. This option is designed for automatic handle movement to a middle position upon electrical overload, allowing for easier detection of the fault circuitand minimizing downtime due to the overload condition.

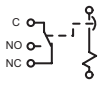
In the optional auxiliary switch configuration, the switch allows an alarm or signal to be forwarded when the breaker trips and the handle moves to the middle position. The alarm can be disengaged by the manual actuation of the handle to the OFF position. Once the fault has been corrected, the circuit breaker can be reset to the ON position. The mid-trip option is available in one, two or three pole toggle handle packages and in either standard panel screw or snap-in mounting. Please see specification tables of specific product for available ratings.

Snap-In Mounting
The snap-in mounting adapter allows for simplified mounting of most IEL/LEL toggle handle products. Prior to shipment, the adapter is attached to the circuit breaker during our final product assembly, allowing you to securely snap the unit into a rectangular panel cut-out. This eliminates the need for panel mounting hardware and associated assembly costs.

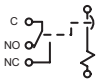
Available for units up to three poles, with or without an option handle guard.



Mid-Trip Handle Positions

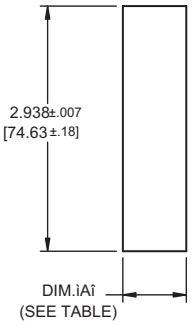


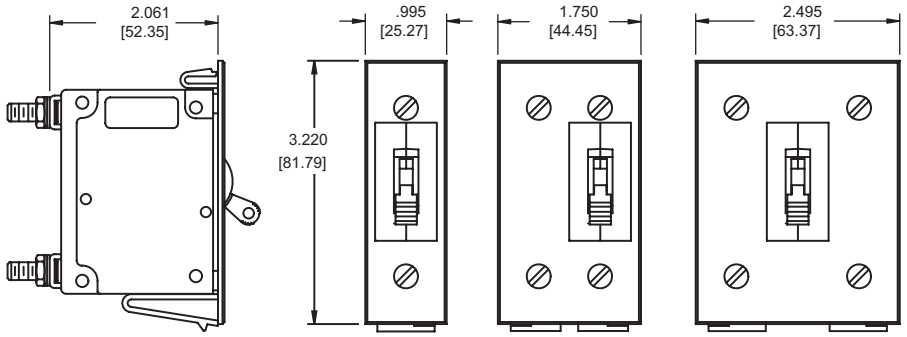
BREAKER IN ONOR MANUALLY TURNED OFFPOSITION

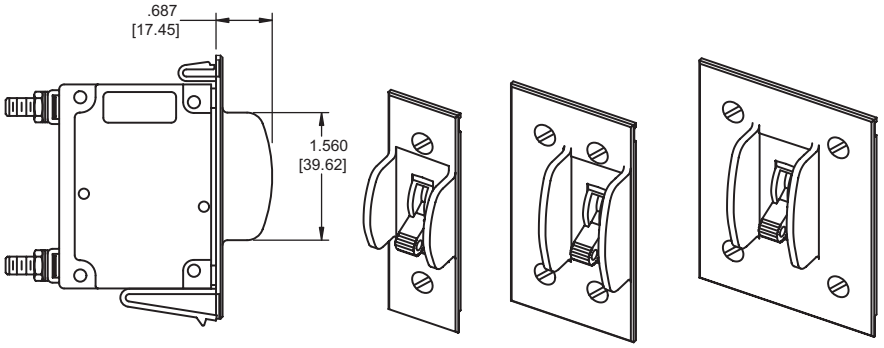


BREAKER INMID-TRIP POSITION(ELECTRICALLY TRIPPED)

Panel Mounting Detail







PANEL MOUNTING OPTIONS

# of Poles	Dimension "A"	Panel Thickness
1 pole	.760 ± .007 [19.30 ± .18]	.062 ± .005 [1.57 ± .13]
2 pole	1.530 ± .007 [38.86 ± .18]	.062 ± .005 [1.57 ± .13]
3 pole	2.280 ± .007 [57.91 ± .18]	.062 ± .005 [1.57 ± .13]

Note: Tolerance ± .015 [.39] unless noted.
Dimensions in brackets [ ] are millimeters.

Panel Mounting Detail
Tolerance ±.005 [.13] unless noted.

OPERATING CHARACTERISTICS

NOMINAL DCR /IMPEDANCE

Current Ratings (Amps)	Resistance (ohms)	Impedance (ohms)	Impedance (ohms)
	DC Delays	AC, 50/60Hz Delays	AC, 400Hz Delays
	51, 52, 53, 59	***61, 62, 63, 69***	***41, 42, 43, 49***
0.20	45.8	28.5	71.94
1.0	1.38	1.10	2.85
2.0	0.371	0.29	0.76
5.0	0.055	0.51	0.12
10.0	0.017	0.016	0.032
20.0	0.006	0.006	0.010
30.0	0.003	0.004	0.006
50.0	0.0019	0.0018	0.006
60.0	0.00142	0.00121	—
70.0	0.00138	0.00118	—
80.0	0.00133	0.00112	—
90.0	0.00127	0.00107	—
100.0	0.00127	0.00107	—
125.0	0.0005	—	—
150.0**	0.0005	—	—
165.0**	0.0004	—	—
175.0**	0.0004	—	—
200.0**	0.0004	—	—
250.0**	0.0004	—	—
400**	0.0003	—	—

Notes:
DCR and impedance based on 100% rated current applied and stablized a minimum of one hour.
No 53 delay on 125 amp single pole or 400 amp four pole devices
Tolerance: .02 amperes to 2.5 amperes, ± 20%; 2.6 amperes to 20 amperes, ± 25%; 21 amperes to 50 amperes, ± 50%. Consult factory for special values and for coil impedance of delays not shown
*** Paralleled poles only, 400 amps only available on CELHP*

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Delay	100%	125% (Note A)	150%	200%	400%	600%	800%	1000%
41*	No Trip	May trip	.5 to 8	.15 to 1.9	.02 to .4	.006 to .25	.004 to .1	.004 to .05
42*	No Trip	May trip	5 to 70	2.2 to 25	.40 to 5	.012 to 2	.006 to .2	.006 to .15
43*	No Trip	May trip	35 to 350	12 to 120	1.5 to 20	.012 to 2.2	.01 to .22	.01 to .1
49*	No Trip	May trip	.100 max.	.050 max.	.020 max.	.020 max.	.020 max.	.020 max.
51	No Trip	.5 to 6.5	.3 to 3	.1 to 1.2	.031 to .5	.011 to .25	.004 to .1	.004 to .08
52	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2	.04 to 1	.008 to .5	.006 to .1
53**	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.23 to 9	.015 to .55	.012 to .2
59	No Trip	.120 max.	.100 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
61	No Trip	.7 to 12	.35 to 7	.130 to 3	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3	.02 to 2	.015 to .8	.01 to .25
63	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.013 to .85	.013 to .5
69	No Trip	.120 max	.100 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max

Notes:
All trip curves and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of +25° C. Protectors do not carry current prior to application of overload. A: Ratings above 30 amps may deviate from the above limits by approximately 10% (130% for delay 49).
*** No 53 delay on 125 amp single pole or 400 amp four pole devices*

DELAY CURVES

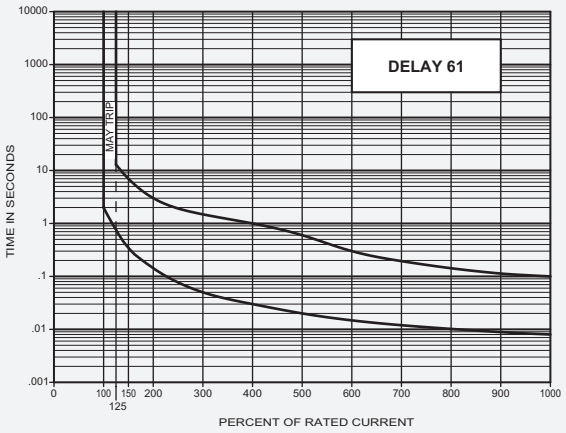
400Hz, DC, 50/60Hz Delay Curves (typ)

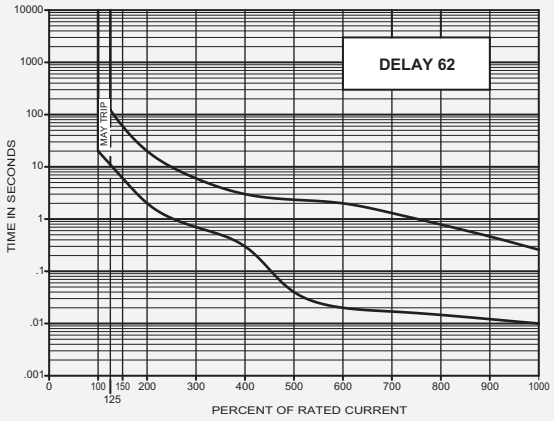
A choice of delays is offered for DC, 50/60Hz, 400Hz, or combined DC/50/60Hz applications. Delays 49, 59, 69 and 79 provide fast-acting, instantaneous tripping and are often used to protect sensitive electronic equipment (not recommended where a known inrush exists). Delays 41, 51, 61 and 71 have a short delay for general purpose applications. Delays 42, 52, 62 and 72 are long enough for most transformers and capacitor loads. Delays 43, 53, 63 and 73 are extra long for special motor applications.

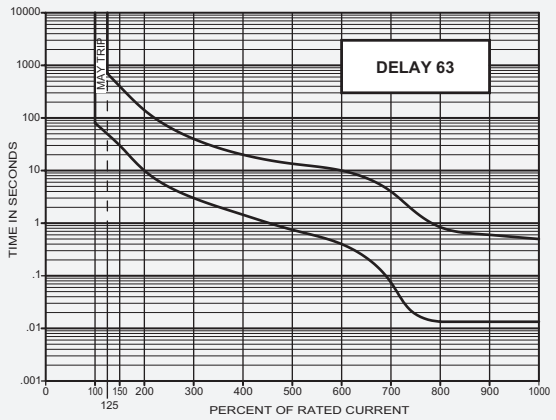
Inrush Pulse Tolerance

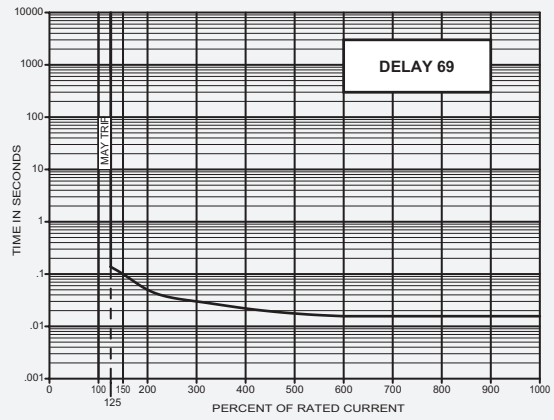
Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker.

The table on page 171 provides a guide to determine if the inertia delay feature is required. Consult factory for further assistance.



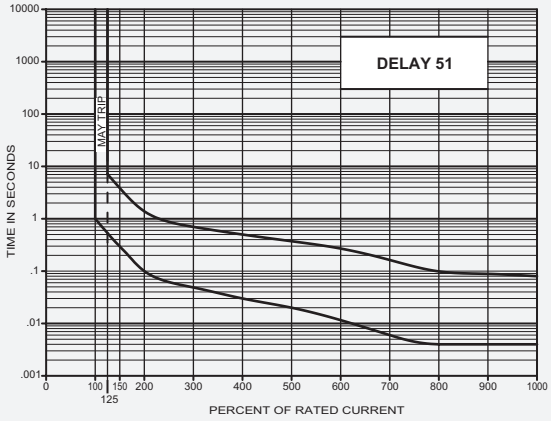


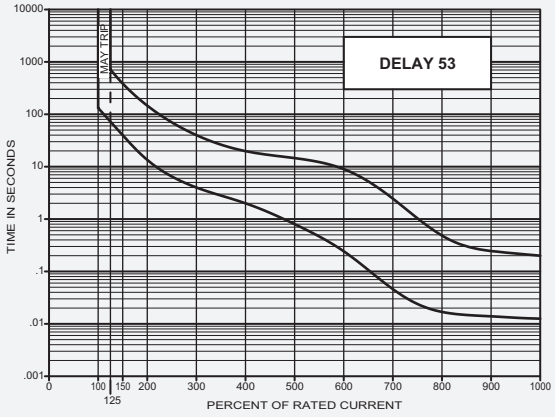


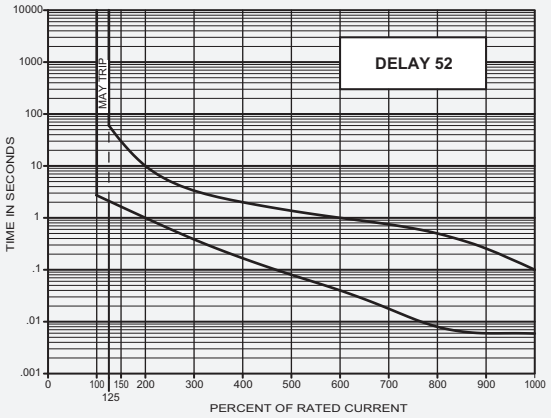


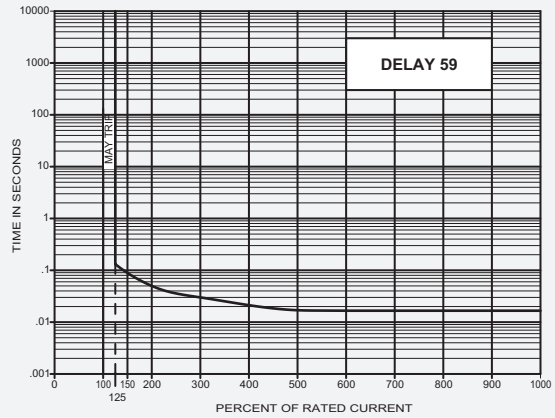
DC Delay Curves (typ)

PULSE TOLERANCES	
Delay	**Pulse Tolerance**
61, 62, 63, 71, 72, 73	10 times (approx.) rated current
61F, 62F, 63F, 71F, 72F, 73F	12 times (approx.) rated current
64, 65, 66 (0 - 50A)	25 times (approx.) rated current
64, 65, 66 (>50 - 80A)	20 times (approx.) rated current
64, 65, 66 (>80 - 100A)	18 times (approx.) rated current

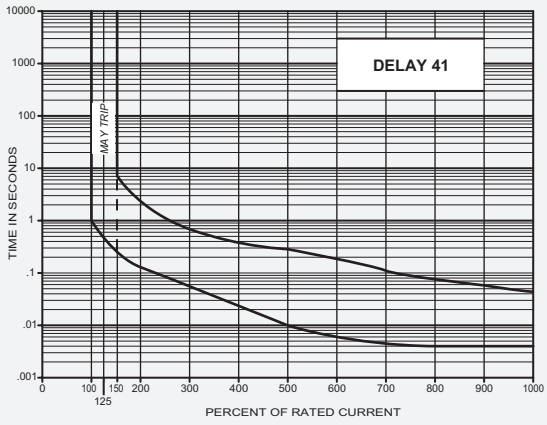


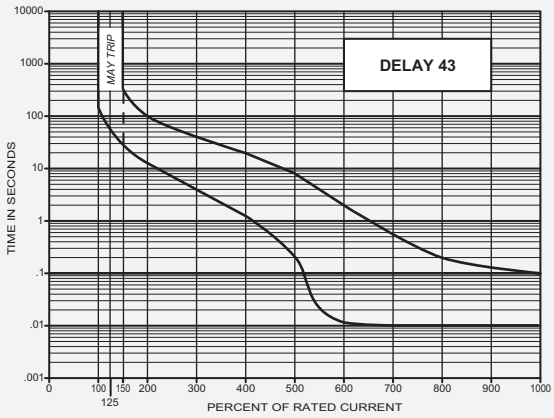


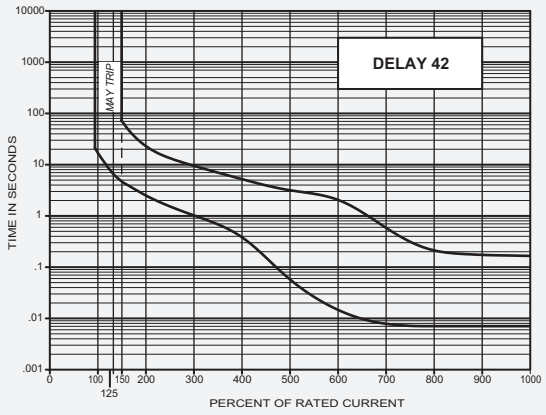


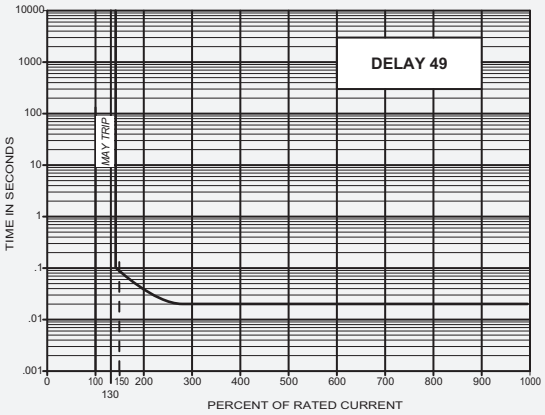


400Hz Delay Curves (typ)
*Available only in IAL/IUL/IEL; not available in LEL.

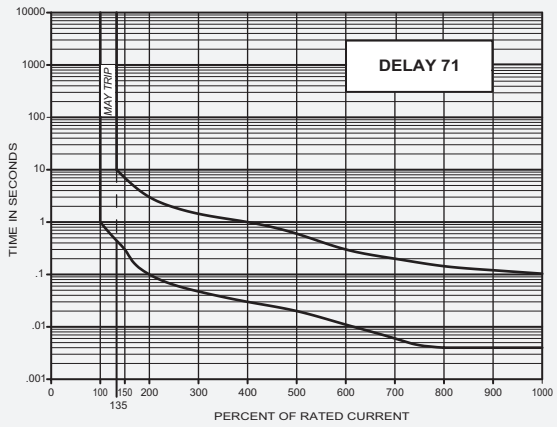


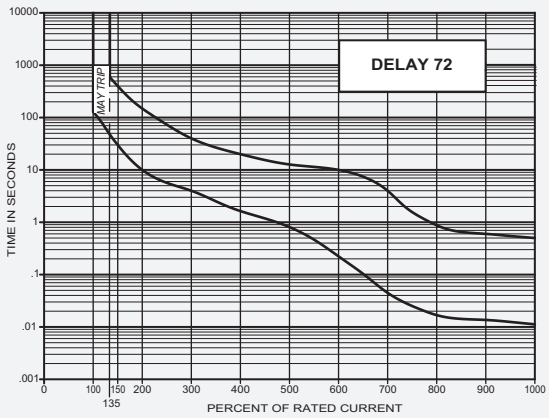


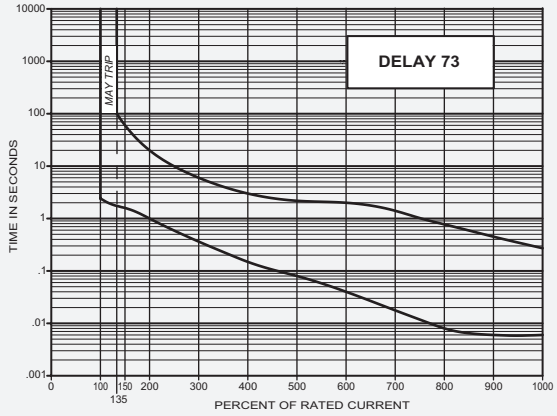


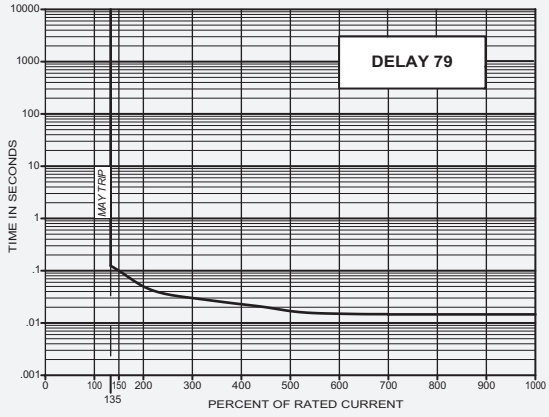


DC/50/60Hz Dual-frequency Delay Curves (typ)









IAL/IUL/IEL/IDL/LEL SPECIFICATIONS

Trip Free
Will trip open on overload even when forcibly held in the ON position. This prevents the operator from damaging the circuit by holding the breaker on.

Trip Indication
The operating handle moves positively to the OFF or mid-trip position on electrical overload.

Ambient Operation
IAL/IUL/IEL protectors operate in temperatures between –40°C to +85°C.

Insulation Resistance
Not less than 100 megohms at 500 volts DC.

Dielectric Strength
IAL/IUL/IEL protectors withstand 3750Vac (1250Vac for LEL), 60Hz for 60 seconds between all electrically isolated terminals except auxiliary switch terminals shall withstand 600Vac, 60Hz for REG and REC types. Four terminal dual coil and relay construction (not offered in the LEL) will withstand 1500Vac.

Endurance
Operating as a switch, the operating life exceeds 10,000 operations, 6000 at rated load, 4000 without load, at a rate of 6 per minute.

Electrical Characteristics
.050-100 amperes 80Vdc, 240Vac Max., 240/415Vac at 50 amperes Max., 50/60Hz and 400Hz. Consult factory for specific product ratings. Units rated for 240/415Vac and above 50 amperes are not suitable for across-the-line motor starting.

Poles
One through six poles available.

Construction
Series, shunt, relay dual coil and series with auxiliary switch available in various delays and combinations.

Auxiliary Switch
When supplied shall be S.P.D.T. configuration. Non VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz; 3.0 amperes, 50 volts DC (REC type) or 0.1 amperes, 125 volts, 60Hz (REG type).

VDE approved switches have a maximum UL rating of 10.0 amperes, 250 volts, 60Hz (REC type); or 0.1 amperes, 125 volts, 60Hz (REG; type). The maximum VDE ratings are 1.0 amperes, 125 volts, 60Hz (REC type); 0.1 amperes, 125 volts, 60Hz (REG type).

Salt Spray (Corrosion)
Meet the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-STD-202.

Moisture Resistance
Meet all the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-STD-202.

Shock
Circuit protectors shall not trip when tested per MIL-STD-202, Method 213, Test Condition I with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

Vibration
Circuit protectors shall not trip when vibrated per MIL-STD-202, Method 204, Test Condition A with 100% rated current applied to delayed units and 80% rated current to instantaneous units.

UL-1500 (Marine Ignition Protected)
The IDL/IDLH is approved for Marine Ignition Protection (series configuration only), covering ignition protected circuit breakers. This specification requires devices to be used in accordance with the requirementsof U.S. Coast Guard and Fire Protection Standard for Pleasure and Commercial Motor Craft, ANSI/MFPA #302.

APPROXIMATE WEIGHT PER POLE	
Ounces	**Grams**
3.1	90

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
10-32 Screw Terminals	14 to 15
M5 Terminal Screws	14 to 15
10-32 Stud Terminals	13 to 14
M5 Stud Terminals	13 to 14
1/4 - 20 Stud Terminals	40 to 45
M6 Stud Terminals	40 to 45
1/2 - 32 Mounting Bushing	30 to 35
Where applicable, mechanical support must be provide to the terminals when applying torque	

IAL/IUL/IEL/IDL/LEL/LELHP SPECIFICATIONS

AGENCY APPROVALS - IAL/IUL/IEL

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
65	DC	-	1	1	1	.02-100	.10-70	U2, 7500	4000
65(4)	DC	-	1	1	1	.02-100	-	U2, 3000	-
65(4)	DC	-	1	1	1	.02-50	-	U2, 5000	-
65	DC	-	2**	2	1	101-150	-	U2, 7500	-
80	DC	-	1	1	1	.02-70	.10-50	U2, 7500	4000
80	DC	-	1	1	1	70.1-100	-	U2, 5000	-
80	DC	-	2	1	1	101-150	-	U1, 10000	-
80	DC	-	3	1	0	251-300	-	U2, 7500	-
125	DC	-	2	1	0	.02-100	-	U2, 5000	-
250	DC	-	2+	1	0	.02-50	-	U1, 5000	-
300	DC	-	3++	1	0	.02-50	.10-50	U2, 1000	5000
125	50/60	1	1	1	0	.02-70	-	U2, 5000	-
125	50/60	1	1	1	1	.02-100	-	U1, 3000	-
125(5)	50/60	1	1	1	1	.02-100	-	U3, 1500	-
120/240	50/60	1	2	2	1	.02-100	-	U1, 2000	-
125/250(5)	50/60	1	2 only	1	1	.02-100	-	U3, 1500	-
240	50/60	1&3	1	1	0	.02-70	-	U1, 2000	-
240	50/60	3	2	1	1	.02-100	-	U2, 2000	-
250	50/60	3	1	1	1	.02-50	.10-100	U2, 3000	2000
250	50/60	3	1	1	1	.02-50	.10-100	C2, 5000(1)	2000
250	50/60	1	1	1	1	.02-50	.10-100	C2, 5000(2)	2000
250	50/60	3	2	1	0	.02-80	.10-100	U1, 1000	2000
250	50/60	3	1	1	0	.02-60	.10-100	U1, 5000	2000
250(5)	50/60	3	3 only	1	1	.02-100	-	U3, 2000	-
277	50/60	1	1	1	1	.02-50	-	U2, 2000	-
277	50/60	1&3	1	2	1	.02-50	-	C2, 5000(1)	-
240/415	50/60	3	2	2	0	.02-50	.10-50	U2, 2000	2000
240/415	50/60	1	2	2	0	.02-50	.10-50	C2, 5000(1)	2000
277/480	50/60	3	2	2	1	.02-30	-	U2, 2000	-
277/480	50/60	3	2	2	1	.02-50	-	U2, 1200	-
277/480	50/60	3	2	1	1	.02-30	-	C2, 5000(3)	-
277480	50/60	1&3	2	1	0	.02-50	-	C2, 5000(3)	-
480	50/60	1&3	2	1	1	.02-30	-	C2, 5000(3)	-
480	50/60	3	2	1	0	.02-50	-	C2, 5000(3)	-
250	400	1&3	1	2	1	.02-50	-	U2, 1500	-

AGENCY APPROVALS - LEL/LELHP

Voltage	Frequency (Hz)	Phase	Min. Poles	UL/CSA	VDE (amps)	UL489 (AIC)	VDE (AIC)
65	DC	-	1	.05-50	-	7500	-
65	DC	-	2**	101-150	-	50 000	-
65	DC	-	3**	175-200	-	50000	-
80	DC	-	1	.05-100	.10-100	10000	2000
80	DC	-	1	.05-100	-	50000	-
80	DC	-	2**	125-150	125-150	10000	2000
80	DC	-	3**	175-200	151-200	10000	2000
125	DC	-	1	.05-70	.05-70	5000	3000
125/250	DC	-	2	.05-50	-	5000	-
125	50/60	1&3	1	.05-40	-	10000	-
125	50/60	1&3	1	.05-50	.10-50	5000	2000
120/240	50/60	1	2	.05-70	.10-50	5000	2000
240	50/60	1&3	1	.05-20	-	5000	-

AGENCY APPROVALS - CELHP

80	DC	-	4	400	-	10000 AIC (UL489A)	-

AGENCY APPROVALS - CEL/CELP (COMMUNICATIONS)

Voltage	Frequency (Hz)	Phase	Min. Poles	UL/CSA	VDE (amps)	UL 489A (AIC)	VDE (AIC)
65	DC	-	1	.05-50	-	7500	-
65	DC	-	2**	101-150	-	50000	-
80	DC	-	1	.05-100	-	50000	-
80	DC	-	2**	101-200	-	10000	-
80	DC	-	3**	201-250	-	10000	-
125	DC	-	1	.05-70	-	5000	-
80	DC	-	1	125	-	10000	-

AGENCY APPROVALS - IDL/IDLP (MARINE)

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
48	DC	-	1	1	1	.02-100	-	U1, 5000	-
48	DC	-	2**	1	1	101-150	-	U1, 5000	-
65	DC	-	1	1	1	.02-60	-	U1, 1000	-
80	DC	-	1	1	1	.02-100	-	U2, 1500	-
125	50/60	1	1	1	1	.02-100	-	U 1, 1500	-
250	50/60	1	2	1	1	.02-100	-	U2, 1500	-
250	50/60	1&3	1	1	1	.02-60	-	U1, 1000	-

AGENCY APPROVALS - IULQ (TAPPED COIL)

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
125/250	50/60	1	1	1	1	2/1-30/15	-	C2, 5000(1)	-

AGENCY APPROVALS - IULD (DUST SEALED)

Voltage	Frequency (Hz)	Phase	Min. Poles	TC	OL	UL/CSA	VDE (amps)	UL 1077 & CSA (AIC)	VDE (AIC)
250	50/60	1&3	1	1	1	.02-100	-	C2, 5000(3)	-
277	50/60	1	1	1	1	.02-30	-	C2, 5000(3)	-

Notes:
** Paralleled poles; + 2 poles in series; ++ 3 poles in series; (1) With 125 A max. series fuse; (2) Series combination with 209 or 229 series (100 A max.); (3) With 100 A max. series fuse; (4) With blocked vent construction (5) Non-standard construction. "Fit for further use" approval

General notes:

- All supplementary protectors are of the overcurrent (OC) type
- The family of protectors has been evaluated for end use application for use groups (UG) A, B, C and D
- The terminals (FW) are suitable for factory wiring only (0)
- The maximum voltage ratings for which the protectors have been tested are shown in the chart
- The current is the amperage range that the protectors have been tested
- The tripping current (TC) for all of the protectors is either either "1" (in the range of 125% to 135% of ampere rating) or "2" (more than 135% of ampere rating)
- The overload rating (OL) – designates whether the protector has been tested for general use or motor starting applications.

0 – tested at 1.5 times amp rating for general use

1 – tested at 6 times AC rating or 10 times DC rating for motor starting

- The short circuit current rating (SC) – The short circuit rating in amperes following a letter and number designating the test conditions and any calibration following the short circuit test is defined below:

C – Indicates short circuit test was conducted with series overcurrent protection

U – Indicates short circuit test was conducted without series overcurrent protection

1 – Indicates a recalibration was not conducted as part of the short circuit testing

2 – Indicates a recalibration was performed as part of the short circuit testing

3 – Indicates recalibration was performed along with the dielectric and voltage withstand for "Suitable for Further Use" rating

IAL/IUL/IEL DECISION TABLES

The ordering code for IAL/IUL/IEL/LEL circuit protectors may be determined by following the decision steps in the appropriate part number decision table subsequent to this page.

The coding given permits a self-assigning part number but with certain limitations. Special applications may require a factory assigned part number. Typical examples are units with mixed ratings, combinations of styles, or constructions not listed in the third decision table, etc. With these, it is suggested that order entry be by description and/or drawings, and a part number will be established. Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a circuit breaker for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example the code shown is the code for a single pole breaker with a series construction and auxiliary switch, designed for operation in a 50/60Hz circuit. It has a short time delay, rating of 20 amperes and a marked black handle, and is VDE approved.

To determine the ordering number for your particular IAL/IUL/IEL unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

1 First Decision

Select Type and Terminal

Type	Description
IAL **IUL ***IEL	One handle per unit
IALH **IULH ***IELH	One handle per pole
IALN ***IULN	One handle per unit panel seal
IALX **IULX ***IELX	One handle per unit, rocker, bracket mounting
IALZX **IULZX ***IELZX	One handle per unit, rocker, integral mounting
*IDL	One handle per unit UL 1500
*IDLH	One handle per pole UL 1500
***IML	One handle per unit mid trip indication
***IMLH	One handle per pole mid trip indication
IALBX **IULBX ***IELBX	One handle per unit, rocker, accidental-off protection
**IMLBX	One handle per unit, mid trip indication, rocker, accidental-off protection

*UL Recognized
**UL Recognized, CSA Certified
***UL Recognized, CSA Certified, VDE Approved

Terminal	
	Standard screw terminal, no designation required
K	Stud terminals
C	Clip terminals
B	Bullet terminals

2 Second Decision

Poles

1	Single pole
11	Two pole
111	Three pole
1111	Four pole*

*Not available in toggle seal handle type. Consult factory for 5 and 6 pole IEL part number.

Example:

IEL 1 - 1REC4 - 61 - 20.0 - 01 - V

1 2 3 4 5 7

3 Third Decision

Internal Configuration

-0	Switch only *(50, 70 or 100 amp switch)*
-1	Series
-1REC4	Series with auxiliary switch* .110 quick connect
-1REC5	Series with auxiliary switch* .187 quick connect
-1REG4	Series with auxiliary switch .110 quick connect
-1RS4	Series with alarm switch, electrical trip, .110 quick connect terminals
-1RLS4	Series with alarm switch, electrical trip, .110 quick connect terminals (mid-trip only)
-1RS5	Series with alarm switch, electrical trip, .187 quick connect terminals
-3	Shunt
-4	Relay (not available in IEL/IELX)

* Only one auxiliary switch is normally supplied on two or three pole units. Switch is located in the right-hand pole (viewed from terminal end) unless otherwise specified.

4 Fourth Decision

Frequency & Delay

SW	Switch only
-41	400Hz short delay
-42	400Hz long delay
-43	400Hz motor start
-49	400Hz 150% instant trip
-51	DC short delay
-52	DC long delay
-53	DC motor start
-59	DC 125% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip
-71	DC/60Hz short delay
-72	DC/60Hz long delay
-73	DC/60Hz motor start
-79	DC/60 Hz 135% instant trip

For addition of inertial delay, add an iFt to any delay numeral.

C = CCC Approved

This approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

Note: CCC Approval is pending.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

Note: CCC Approval is pending.

Notes:
IEL, IELH and IELX circuit protectors are designed to meet 8mm creepage clearance requirements for installation Category 111, Pollution Degree 3, Case A as measured in IEC 664. Intended for use in equipment to comply with IEC 950, 601 and VDE 0804 & 0805.

5 Fifth Decision

Rated Current

Use three numbers to print required current value between .100 amps minimum and 100.0 amps maximum.

For example, use:
.100 or 2.00 or 10.0

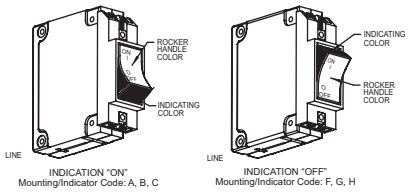
The VDE (Ith) will be 95% of the UL/CSA rated current.

6 Sixth Decision

Optional

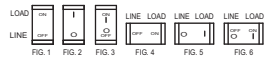
	Standard hardware. No designation required.
-A	Metric thread mounting inserts and terminals
-B	Barrier
-C	277V (50/60Hz only) (See note 3)
-D	240/415V (50/60Hz only)
-E	277V/480V (50/60Hz only) (See note 4)
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-K	1/4 - 20 stud (M6 stud when -A option is selected) (<=70A requires -K, if >70A do not use -K)
-L	Handle lock
-M	Handle in opposite pole
-P	Snap-in face plate adapter
-U	120/240V 50/60Hz
-W	Wire clamp supplied (VDE approved up to and including 16.0 amps)
-X	Handle guard with no actuation feature (BX rocker only)
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this is not used, table one may be substituted and U.S. thread and two lockwashers will be supplied. Unit will be rated at 250V (50/60Hz only.)
3. VDE approved at 250Vac
4. VDE approved at 415Vac

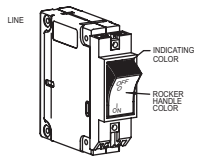


INDICATION "ON"
Mounting/Indicator Code: A, B, C

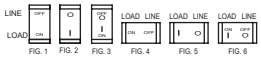
INDICATION "OFF"
Mounting/Indicator Code: F, G, H



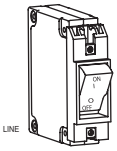
MARKING DETAIL "A" (SEE TABLE)



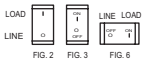
INDICATION "ON"
Mounting/Indicator Code: J, K, L



MARKING DETAIL "B" (SEE TABLE)



INDICATION "OFF"
Mounting/Indicator Code: M, N, P, R



MARKING DETAIL "C" (SEE TABLE)

7 Seventh Decision

Handle Color and Marking Selection

IAL, IUL, IEL, IALH,
IULH, IELH - Toggle Handle

Color	Unmarked	Marked* ON-OFF I-O
Black	-00	-01 (STD)
Yellow	-10	-11
Red	-20	-21
Blue	-30	-31
Green	-40	-41
Orange	-60	-61
White	-90	-91

7 Seventh Decision

Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

IALX, IULX, IELX, IALZX, IULZX, IELZX Rocker Handle (Single Rocker Color)

					Vertical Mounting			Horizontal Mounting			
Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	On-Off Fig.1	I-O Fig.2	On-Off I-O Fig.3	On-Off Fig.4	I-O Fig.5	On-Off I-O Fig.6	Marking Detail
Black	N/A	White	N/A	-00	-01	-02	-03	-04	-05	-06	A
Red	N/A	White	N/A	-20	-21	-22	-23	-24	-25	-26	
Grey	N/A	Black	N/A	-40	-41	-42	-43	-44	-45	-46	
Orange	N/A	Black	N/A	-50	-51	-52	-53	-54	-55	-56	
White	N/A	Black	N/A	-90	-91	-92	-93	-94	-95	-96	
IALZX, IULZX, IELZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	-A0	-A1	-A2	-A3	-A4	-A5	-A6	A
Black	Red	White	On	-B0	-B1	-B2	-B3	-B4	-B5	-B6	
Black	Green	White	On	-C0	-C1	-C2	-C3	-C4	-C5	-C6	
Black	White	White	Off	-F0	-F1	-F2	-F3	-F4	-F5	-F6	
Black	Red	White	Off	-G0	-G1	-G2	-G3	-G4	-G5	-G6	
Black	Green	White	Off	-H0	-H1	-H2	-H3	-H4	-H5	-H6	
Black	White	White	On	-J0	-J1	-J2	-J3	-J4	-J5	-J6	B
Black	Red	White	On	-K0	-K1	-K2	-K3	-K4	-K5	-K6	
Black	Green	White	On	-L0	-L1	-L2	-L3	-L4	-L5	-L6	
IALBX, IULBX, IELBX, LELBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	-M0	N/A	-M2	-M3	N/A	N/A	-M6	C
Black	Red	Red	Off	-N0	N/A	-N2	-N3	N/A	N/A	-N6	
Black	Green	Green	Off	-P0	N/A	-P2	-P3	N/A	N/A	-P6	
Black	Yellow	Yellow	Off	-R0	N/A	-R2	-R3	N/A	N/A	-R6	

Notes: A. Bezels of IALBX, IULBX, IELB, IELBX are black.
B. Consult factory for other marking options.

LEL DECISION TABLES

1 First Decision

Select Type and Terminal

Type	Description
LEL	One handle per unit
LELH	One handle per pole
LML	One handle per unit, mid-trip indication
LMLH	One handle per pole, mid-trip indication
LELZX	One handle per unit, rocker, integral mounting
LMLZX	One handle per unit, rocker, mid-trip indication, integral mounting
LELBX	One handle per unit, rocker, accidental-off protected
LMLBX	One handle per unit, rocker, mid-trip indication, accidental-off protected

Note: Other options available, consult factory.

Terminal	
	Standard screw terminal, no designation required
K	Stud terminals
C	Clip terminals
B	Bullet terminals

Example:

LEL 1 - 1REC4 - 61 - 20.0 - 01 - V

1 2 3 4 5 7

2 Second Decision

Poles

1	Single pole
11	Two pole
111	Three pole

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1REC5	Series with auxiliary switch .187 quick connect
-1REG4	Series with auxiliary switch (gold contacts) .110 quick connect
-1RS4	Series with alarm switch, electrical trip, .110 quick connect
-1RLS4	Series with alarm switch, electrical trip, .110 quick connect*

* Used only with mid-trip.

4 Fourth Decision

Frequency and Delay

-51	DC short delay
-52	DC long delay
-53*	DC motor start
-59	DC 125% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip

For addition of inertial delay, add an "F" to any delay numeral.
*Not available above 100 amps.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

C = CCC Approved

The approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

5 Fifth Decision

Rated Current

Use three numbers to print (.050 or 1.50 or 100) Value between **.050** amps and **100** amps.

6 Sixth Decision

Optional

-A	Metric thread mounting inserts and terminals
-B	Barrier
-F	240V 50/60Hz
-G	Handle guard, (available in ZX, BX and snap-in versions only)
-K	1/4 - 20 Stud (M6 Stud when -A option is selected) (50A requires -K, >50A do not use -K)
-L	Handle Lock
-M	Handle in opposite pole
-P	Snap-in mounting plate adapter
-U	120/240Vac, 5000 A.I.C., 70A max. 2 pole only with barrier (VDE 250Vac)
-V	125VDC
-X	Handle guard with no actuate "off" feature (see detail C)
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.
3. If (M5 or M6) studs are required, use "A" only on an LELK.

7 Seventh Decision

LEL Toggle Handle Color Selection

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See alternate 7th Decision for ZX and BX Rocker Handles.

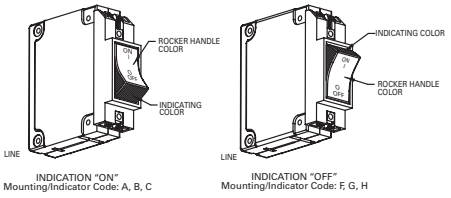
Notes: The LEL family of circuit breakers are designed to meet 8mm creepage and clearance requirements for installation Category 111, pollution degree 3, Case A as measured in IEC 664. Intended for use in equipment designed to comply with IEC 380, 435, 601 AND VDE 0730, 0804 & 0805.

7 Seventh Decision

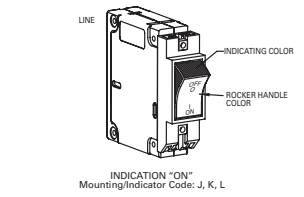
Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	Vertical Mounting: On-Off Fig.1	Vertical Mounting: I-O Fig.2	Vertical Mounting: On-Off I-O Fig.3	Horizontal Mounting: On-Off Fig.4	Horizontal Mounting: I-O Fig.5	Horizontal Mounting: On-Off I-O Fig.6	Marking Detail
LELZX & LMLZX Rocker Handle (Single Rocker Color)											
Black	N/A	White	N/A	**-00**	**-01**	**-02**	**-03**	**-04**	**-05**	**-06**	A
Red	N/A	White	N/A	**-20**	**-21**	**-22**	**-23**	**-24**	**-25**	**-26**	
Grey	N/A	Black	N/A	**-40**	**-41**	**-42**	**-43**	**-44**	**-45**	**-46**	
Orange	N/A	Black	N/A	**-50**	**-51**	**-52**	**-53**	**-54**	**-55**	**-56**	
White	N/A	Black	N/A	**-90**	**-91**	**-92**	**-93**	**-94**	**-95**	**-96**	
LELZX & LMLZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	**-A0**	**-A1**	**-A2**	**-A3**	**-A4**	**-A5**	**-A6**	A
Black	Red	White	On	**-B0**	**-B1**	**-B2**	**-B3**	**-B4**	**-B5**	**-B6**	
Black	Green	White	On	**-C0**	**-C1**	**-C2**	**-C3**	**-C4**	**-C5**	**-C6**	
Black	White	White	Off	**-F0**	**-F1**	**-F2**	**-F3**	**-F4**	**-F5**	**-F6**	
Black	Red	White	Off	**-G0**	**-G1**	**-G2**	**-G3**	**-G4**	**-G5**	**-G6**	
Black	Green	White	Off	**-H0**	**-H1**	**-H2**	**-H3**	**-H4**	**-H5**	**-H6**	
Black	White	White	On	**-J0**	**-J1**	**-J2**	**-J3**	**-J4**	**-J5**	**-J6**	B
Black	Red	White	On	**-K0**	**-K1**	**-K2**	**-K3**	**-K4**	**-K5**	**-K6**	
Black	Green	White	On	**-L0**	**-L1**	**-L2**	**-L3**	**-L4**	**-L5**	**-L6**	
LELBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	**-M0**	**N/A**	**-M2**	**-M3**	**N/A**	**-M5**	**-M6**	C
Black	Red	Red	Off	**-N0**	**N/A**	**-N2**	**-N3**	**N/A**	**-N5**	**-N6**	
Black	Green	Green	Off	**-P0**	**N/A**	**-P2**	**-P3**	**N/A**	**-P5**	**-P6**	
Black	Yellow	Yellow	Off	**-R0**	**N/A**	**-R2**	**-R3**	**N/A**	**-R5**	**-R6**	

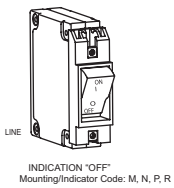
Notes: A. Bezels of IALBX, IULBX, IELB, IELBX are black.
B. Consult factory for other marking options.



MARKING DETAIL "A" (SEE TABLE)



MARKING DETAIL "B" (SEE TABLE)



MARKING DETAIL "C" (SEE TABLE)

CEL DECISION TABLES

1 First Decision

Select Type and Terminal

Type	Description
CEL	One handle per unit, UL489A Listed
CELH	One handle per pole, UL489A Listed
CML	Single pole only, one handle per unit mid-trip construction, UL489A Listed
CMLH	One handle per pole mid-trip construction, UL489A Listed
CELZX	One handle per unit, rocker handle, UL489A Listed
CMLZX	Single pole only, one handle per unit, rocker handle w/ RLS aux switch, mid-trip construction, UL489A Listed
CELBX	One handle per unit, flat rocker handle, UL489A Listed
CMLBX	Single pole only, one handle per unit, flat rocker handle w/ RLS aux switch, mid-trip construction, UL489A Listed

Terminal	
	Standard screw terminal, no designation required
K	Stud terminals
C	Clip terminals
B	Bullet terminals

Example:

CEL 1 - 1REC4 - 51 - 20.0 - A - 01 - V

1 2 3 4 5 6 7

2 Second Decision

Poles

1	Single pole
11	Two pole
111	Three pole

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1RLS4 **	Series with auxiliary switch .110 quick connect, mid-trip only
-1REC5	Series with auxiliary switch .187 quick connect
-1RS4 **	Alarm switch, .110 quick connect

* Only one auxiliary switch is normally supplied on two and three pole units switch is located in the right hand pole (viewed from terminal end). Note, aux switch followed by "R" indicates reverse mount option
** Not available for 125 amp single pole

4 Fourth Decision

Frequency and Delay

-51	DC short delay
-52	DC long delay
-53*	DC motor start
-59	DC 125% instant trip

For addition of inertial delay, add an "F" to any delay numeral. Example: -51F
*Not available above 100 amps.

5 Fifth Decision

Rated Current

Use three numbers in build (.050 or 1.50 or 100).

Required value between **.050** amps minimum and **125** amps maximum.

6 Sixth Decision

Optional

-A	Metric thread mounting inserts and terminals
-B	Barrier
-G	Snap-in mounting plate adapter with handle guard (ZX, BX and snap-in only)
-K	1/4-20 Stud (M6 stud when metric option -A selected) 50A requires -K, >50A do not use -K
-P	Snap-in mounting plate adapter
-T	80VDC, 10000AIC, (required over 50A)
-V	125VDC
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.

7 Seventh Decision

LEL Toggle Handle Color Selection

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See alternate 7th Decision for ZX and BX Rocker Handles.

V = VDE and CCC Approved

The shaded areas denote VDE and CCC (if applicable) approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE or CCC Approved, but other approvals still apply.

C = CCC Approved

The approval requires the addition of a C at the end of the part number. The unit will not be VDE Approved.

T = TÜV Approved

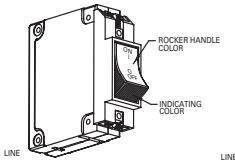
The approval requires the addition of a T at the end of the part number. The unit will only be TÜV EN60947-2 approved with a single pole, 125 amp rating configuration.

7 Seventh Decision

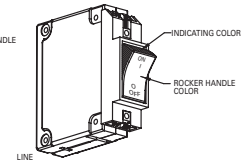
Rocker Handle Color, Indicator Color and Marking Selection (See Notes)

Rocker Handle Color	Indicating Color	Marking Color	Indicates:	Unmarked	Vertical Mounting On-Off Fig.1	Vertical Mounting I-O Fig.2	Vertical Mounting On-Off I-O Fig.3	Horizontal Mounting On-Off Fig.4	Horizontal Mounting I-O Fig.5	Horizontal Mounting On-Off I-O Fig.6	Marking Detail
LELZX & LMLZX Rocker Handle (Single Rocker Color)											
Black	N/A	White	N/A	**-00**	**-01**	**-02**	**-03**	**-04**	**-05**	**-06**	A
Red	N/A	White	N/A	**-20**	**-21**	**-22**	**-23**	**-24**	**-25**	**-26**	
Grey	N/A	Black	N/A	**-40**	**-41**	**-42**	**-43**	**-44**	**-45**	**-46**	
Orange	N/A	Black	N/A	**-50**	**-51**	**-52**	**-53**	**-54**	**-55**	**-56**	
White	N/A	Black	N/A	**-90**	**-91**	**-92**	**-93**	**-94**	**-95**	**-96**	
LELZX & LMLZX Rocker Handle (Dual Rocker Color)											
Black	White	White	On	**-A0**	**-A1**	**-A2**	**-A3**	**-A4**	**-A5**	**-A6**	A
Black	Red	White	On	**-B0**	**-B1**	**-B2**	**-B3**	**-B4**	**-B5**	**-B6**	
Black	Green	White	On	**-C0**	**-C1**	**-C2**	**-C3**	**-C4**	**-C5**	**-C6**	
Black	White	White	Off	**-F0**	**-F1**	**-F2**	**-F3**	**-F4**	**-F5**	**-F6**	
Black	Red	White	Off	**-G0**	**-G1**	**-G2**	**-G3**	**-G4**	**-G5**	**-G6**	
Black	Green	White	Off	**-H0**	**-H1**	**-H2**	**-H3**	**-H4**	**-H5**	**-H6**	
Black	White	White	On	**-J0**	**-J1**	**-J2**	**-J3**	**-J4**	**-J5**	**-J6**	B
Black	Red	White	On	**-K0**	**-K1**	**-K2**	**-K3**	**-K4**	**-K5**	**-K6**	
Black	Green	White	On	**-L0**	**-L1**	**-L2**	**-L3**	**-L4**	**-L5**	**-L6**	
LELBX Rocker Handle (Dual Rocker Color)											
Black	White	White	Off	**-M0**	**N/A**	**-M2**	**-M3**	**N/A**	**-M5**	**-M6**	C
Black	Red	Red	Off	**-N0**	**N/A**	**-N2**	**-N3**	**N/A**	**-N5**	**-N6**	
Black	Green	Green	Off	**-P0**	**N/A**	**-P2**	**-P3**	**N/A**	**-P5**	**-P6**	
Black	Yellow	Yellow	Off	**-R0**	**N/A**	**-R2**	**-R3**	**N/A**	**-R5**	**-R6**	

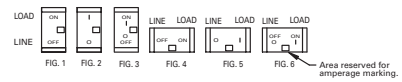
Notes: A. Bezels of IALBX, IULBX, IELB, IELBX are black.
B. Consult factory for other marking options.



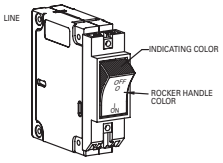
INDICATION "ON"
Mounting/Indicator Code: A, B, C



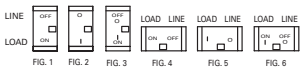
INDICATION "OFF"
Mounting/Indicator Code: F, G, H



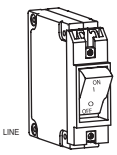
MARKING DETAIL "A" (SEE TABLE)



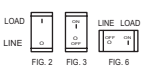
INDICATION "ON"
Mounting/Indicator Code: J, K, L



MARKING DETAIL "B" (SEE TABLE)



INDICATION "OFF"
Mounting/Indicator Code: M, N, P, R



MARKING DETAIL "C" (SEE TABLE)

LELHP DECISION TABLES

1 First Decision

Select Type with Stud Terminals

LELPK	One handle per unit
LMLPK	One handle per unit, mid-trip
LELZXPK	One ZX rocker handle per unit (integral mounting)
LMLZXPK	One ZX rocker handle per unit, mid-trip (integral mounting)
LELBXPK	One BX rocker handle per unit (integral mounting)
LMLBXPK	One BX rocker handle per unit, mid-trip (integral mounting)
LELHPK	One handle per pole
LMLHPK	One handle per pole, mid-trip

1. One toggle handle per unit on 125A to 150A units (2-parallel pole)
2. 175A to 200A (3-parallel pole) requires handle in each pole, "H" selection

V = VDE Approved

The shaded areas denote VDE approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE approved, but other approvals still apply.

Example:

LELHPK 11 - 1REC4 - 51 - 125. - A - 01 - V

1 2 3 4 5 6 7

2 Second Decision

Poles

11	Two pole (up to 150 amps)
111	Three pole (160 to 200 amps)

3 Third Decision

Internal Configuration

-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1REG4	Series, aux switch (gold contacts) .110 quick connect
-1RLS4	Series with alarm aux switch .110 quick connect, mid-trip only
-1RLSG4	Series, alarm aux switch (gold contacts), .110 quick connect, mid-trip only
-1RS4	Series with alarm aux switch .110 quick connect
-1REC5	Series with aux switch .187 quick connect
-1RLS5	Series with alarm aux switch .187 quick connect, mid-trip only
-1RS4	Series with alarm aux switch .187 quick connect
-1RS5	Series with alarm aux switch .187 quick connect, mid-trip

4 Fourth Decision

Frequency and Delay

-51	DC 125% short delay (125 to 150 amp)
	DC 135% short delay (160 to 200 amp)
-52	DC 125% long delay (125 to 150 amp)
	DC 135% long delay (160 to 200 amp)
-59	DC 125% instant trip (125 to 150 amp)
	DC 135% instant trip (160 to 200 amp)

For addition of intertial delay, add an "F" to any delay option. Example: - 59 becomes -59F

5 Fifth Decision

Rated Current (Amps)

125.
130.
135.
150.
175.
200.

Additional ratings available.

6 Sixth Decision

Optional (leave entry blank if none apply)

-A	Metric thread mounting inserts and terminals
-G	Snap-in mounting plate adapter with handle guard (ZX, BX & snap-in only)
-X	Handle guard with no actuate off feature (BX only, no mid-trip)
-P	Snap-in mounting plate adapter

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.

7 Seventh Decision

Toggle Handle Color

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See LEL alternative 7th decision for ZX & BX rocker handles

CELHP DECISION TABLES

1 First Decision

Select Type		Terminal	
CELP	One toggle handle per unit		Standard screw terminal, no designation required
CELHP	One toggle handle per pole	**K**	Stud terminals
CMLHP	One toggle handle per pole, mid-trip construction	**C**	Clip terminals
CELZXP	One rocker handle per unit	**B**	Bullet terminals
CELBXP	One flat rocker handle per unit		

1. One toggle handle per unit is available only on 101A to 200A (two parallel pole construction)
2. 201A to 250A (three parallel pole constructions) require handles in each pole, "H" version first decision
3. Unit supplied with bullet terminals will not have buss bar installed, unless requested, buss bar supplied standard to 150A only.
4. One handle per unit is available for 100A to 200A (two parallel pole constructions) and 201A to 250A (three pole constructions) (ZX & BX versions only)
5. 400 amps available with toggle handes only

V = VDE Approved

The shaded areas denote VDE approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE approved, but other approvals still apply.

Example:

CELHPK 11 - 1REC4 - 51 - 125. - A - 01 - V

1 2 3 4 5 6 7

2 Second Decision

Poles

11	Two pole (up to 150 amps)
111	Three pole (160 to 250 amps)
1111	Four pole (400 amps)

3 Third Decision

Internal Configuration

-0	Switch only
-1	Series
-1REC4	Series with auxiliary switch .110 quick connect
-1RLS4 *	Series with alarm aux. switch .110 quick connect, mid-trip only
-1RS4 *	Series with alarm aux. switch .110 quick connect
-1REC5	Series with auxiliary switch .187 quick connect
-1RLS5 *	Series with alarm aux. switch .187 quick connect, mid-trip only
-1RS4 *	Series with alarm aux. switch .187 quick connect

1. Only one auxiliary switch is normally supplied on two and three pole units. Switch is located in the right hand pole (viewed from terminal end panel mount position).
2. When more than one aux. switch is required, change the 1 (of the 1REC4) to 2 or 3. If switches are mixed, then use "2R" or 3R".

* Not available at 400 amps

4 Fourth Decision

Frequency and Delay

-51	DC 125% short delay (101 to 150 amp)
	DC 135% short delay (160 to 250 amp)
-52	DC 125% long delay (101 to 150 amp)
	DC 135% long delay (160 to 250 amp)
-53	DC 125% motor start (101 to 150 amp)
	DC 135% motor start (160 to 250 amp)
-59	DC 125% instant trip (101 to 150 amp)
	DC 135% instant trip (160 to 250 amp)

5 Fifth Decision

Rated Current (Amps)

125.
130.
135.
150.
175.
200.
400.
Additional ratings available.

6 Sixth Decision

Optional (leave entry blank if none apply)

-A	Metric thread mounting inserts and terminals
-B	Barrier
-G	Snap-in mounting plate adapter with handle guard (ZX, BX & snap-in only)
-X	Handle guard with no actuate off feature (BX only, no mid-trip)
-1	Silver 5/16" (.312") bullet
-2	Gold 5/16" (.312") bullet

Notes:
1. One or more descriptions may be used as required.
2. When this decision is not used, decision 7 may be substituted and U.S. thread will be supplied.

7 Seventh Decision

Toggle Handle Color

-01	Black w/ white markings
-11	Yellow w/ black markings
-21	Red w/ white markings
-31	Blue w/ white markings
-41	Green w/ white markings
-61	Orange w/ black markings
-91	White w/ black markings

See LEL alternative 7th decision for ZX & BX rocker handles

AIRPAX®

APL/UPL Series
"Existing Design-In Only"

AIRPAX® | APL/UPL Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

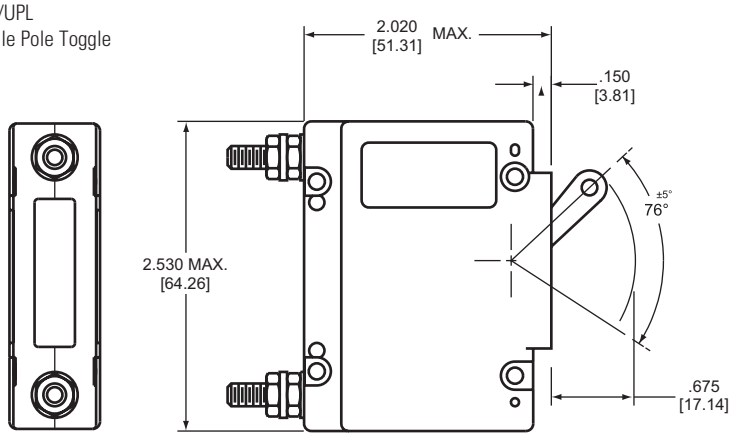
IMPORTANT NOTICE: *The APL/UPL is a legacy product and no new design-in orders are being accepted. We are also discontinuing the 205 series (APL with dust proof enclosure). If the specifications for any of these products are necessary for your system, Sensata Technologies recommends utilizing the Airpax™ IAL series.*

The APL/UPL magnetic circuit protector provides reliable, low-cost power switching, circuit protection and circuit control. The handle opens and closes a circuit, under normal load conditions, similar to an ON-OFF switch. Upon overload, the internal mechanism trips, opens the contacts and forcibly returns the handle to the OFF position. Since the protector is "trip free," the internal contacts will not remain closed in the presence of an overload, even though the handle is held in the ON position.

The APL/UPL line offers many configurations including series, shunt and relay with a choice of delays and ratings. APL/UPL multi-pole assemblies are available with a mix of current ratings, delays and internal circuit configurations.

While designed for industrial, military and information processing applications, the APL is suitable for use in any situation where precision operation is required. Most versions of the APL family are recognized by UL per UL STD. 1077 as supplementary protectors and certified by CSA per CSA STD. C22.2–No. 235 as supplementary protectors and are designated with the UPL prefix.

APL/UPL
Single Pole Toggle

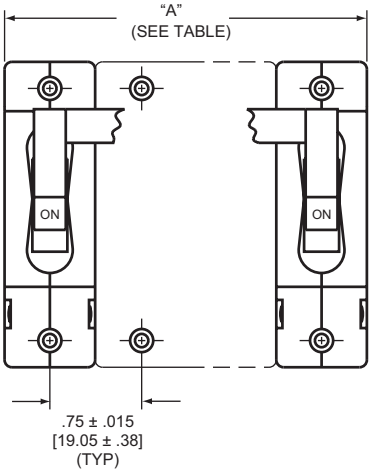


Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

MULTI-POLE CIRCUIT PROTECTORS

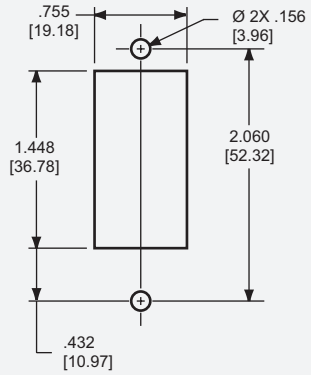
Multi-pole protectors are combined in an assembly with the actuating handles linked and the trip mechanisms internally coupled. A fault in either protected circuit opens all poles simultaneously. Applications include use in two-phase circuits, single-phase three-wire systems or in two or more related but electrically isolated circuits. A mix of delays, ratings and configurations is possible, with the series type having any of the auxiliary switches listed. Combinations up to nine poles are available.

MULTI-POLE DIMENSIONS	
2 pole "A"	1.515 [38.48] max
3 pole "A"	2.265 [57.53] max
4 pole "A"	3.015 [76.58] max
5 pole "A"	3.765 [95.63] max
6 pole "A"	4.515 [114.68] max
7 pole "A"	5.265 [133.73] max
8 pole "A"	6.015 [152.78] max
9 pole "A"	6.765 [171.83] max
Note: Dimension "A" varies with # of poles	

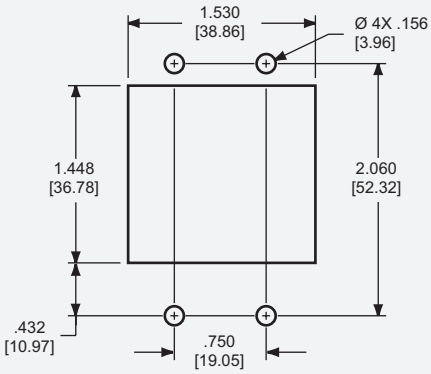


Mounting Details

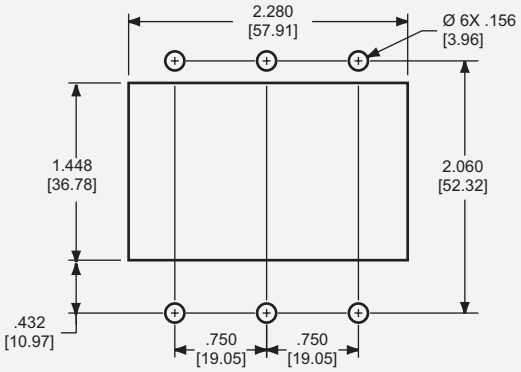
One Pole



Two Pole



Three Pole



Panel Mounting Tolerances: ±.005 [.13] unless noted.

APL/UPL CONFIGURATIONS

Series Trip

The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional over-current protection, it's simultaneously used as an on-off switch.

Auxiliary Switch

(Applies to Series Trip Only)

This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's on-off status.

Auxiliary switch contacts actuate simultaneously with the main breaker contacts, and will open regardless of whether the breaker contacts are opened manually or electrically. For auxiliary switch ratings below 6Vac or 5Vdc, an auxiliary switch with gold contacts is available. Gold contacts are not recommended for load current above 100 milliamps.

The contacts on our optional RS auxiliary switch will open only in the event of an electrical trip of the circuit breaker.

Shunt Trip

The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

Relay Trip

This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed immediately upon tripping.

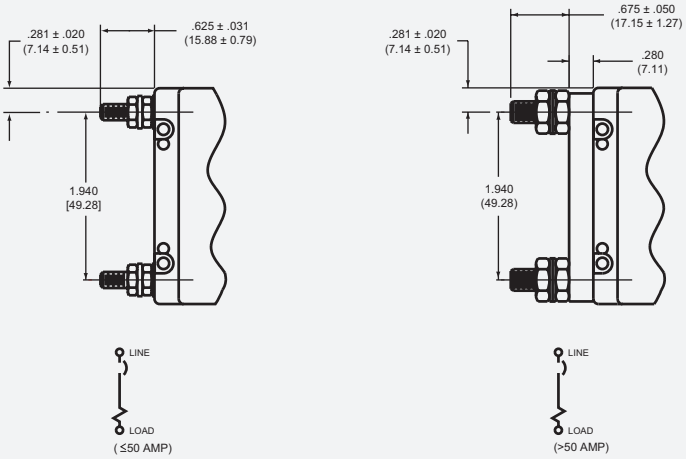
Dual Coil

Dual coil protectors provide remote shut down option and normal overcurrent protection in the confines of a single breaker pole. This construction saves space by eliminating the need for an additional pole for the voltage trip function.

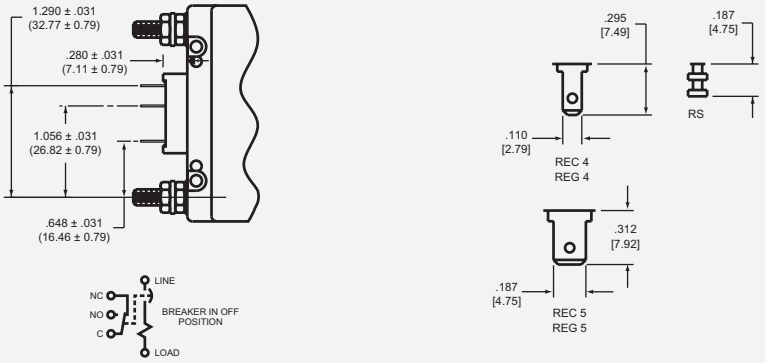
Voltage Trip

Sometimes called "dump circuits" or "panic trip circuits," these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems. Available in series, shunt, relay or dual coil configurations.

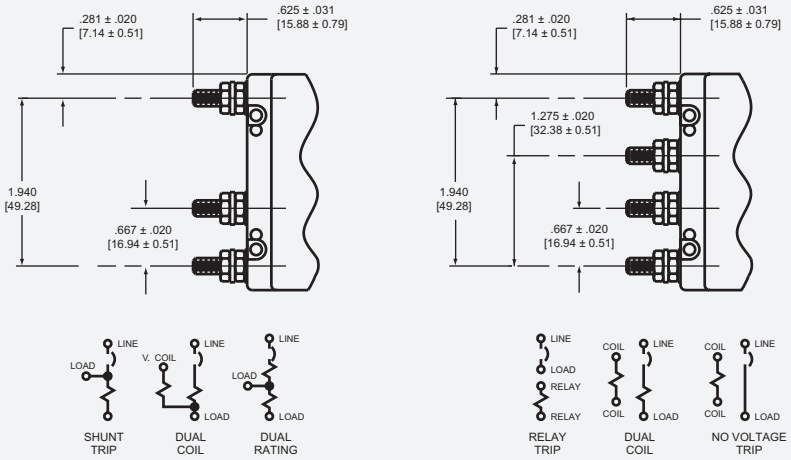
Series Trip (See Note A)



Series Trip with Auxiliary Switch



Shunt, Relay and Dual Coil



Notes:
Tolerance ± .015 [.38] unless noted.
Dimensions in brackets [ ]
are millimeters.

A Terminal sizes: 10-32 THD (≤50 AMP), ¼ - 28 THD (≥50 AMP) Metric Terminals (Optional), M5 x 0.8 THD (≤50 AMP).

B Minimum useable thread length: 10-32 THD (.250 on breakers without terminal boards, .160 with terminal boards) ¼ - 28 THD (.200).

APL/UPL OPERATING CHARACTERISTICS

0.050 AMPS TO 50 AMPS - PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Voltage	Delay	100%	125% (Note A)	150%	200%	400%	600%	800%	1000%
400 Hz	40	No Trip	May trip	.050 max.	.040 max.	.030 max.	.025 max.	.020 max.	.018 max.
	41	No Trip	May trip	.6 to 7	.2 to 2	.020 to .4	.007 to .25	.004 to .15	.004 to .040
	42	No Trip	May trip	5 to 70	2 to 22	.4 to 3.8	.015 to 2	.006 to .4	.004 to .1
	43	No Trip	May trip	40 to 280	9 to 70	1.3 to 15	.2 to 3.75	.023 to .6	.010 to .050
	49	No Trip	.180 max.	.120 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
DC	50	No Trip	May trip	.032 max.	.024 max.	.020 max.	.018 max.	.016 max.	.015 max.
	51	No Trip	.70 to 8	.40 to 4	.1 to 1.7	.02 to .30	.008 to .15	.004 to .06	.004 to .030
	52	No Trip	8 to 100	3 to 30	.7 to 10	.18 to 2.5	.030 to 1	.004 to .5	.004 to .3
	53	No Trip	80 to 600	30 to 300	10 to 100	1.5 to 15	.1 to 5	.008 to .3	.007 to .07
	59	No Trip	.100 max.	.070 max.	.032 max.	.020 max.	.016 max.	.016 max.	.016 max.
50/60 Hz	60	No Trip	May trip	.040 max.	.035 max.	.030 max.	.025 max.	.020 max.	.018 max.
	61	No Trip	1 to 18	.4 to 4	.180 to 1.8	.03 to .3	.009 to .15	.003 to .1	.003 to .08
	62	No Trip	10 to 120	6 to 60	2 to 22	.2 to 2	.05 to .75	.015 to .15	.01 to .10
	69	No Trip	.180 max.	.120 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
	64	No Trip	.7 to 10	.35 to 4.5	.15 to 1.5	.05 to .4	.025 to .3	.020 to .22	.015 to .15
	65	No Trip	8 to 80	5.5 to 55	2 to 20	.5 to 5	.2 to 2	.06 to 1	.016 to .60
	66	No Trip	50 to 700	30 to 350	10 to 100	1.5 to 20	.7 to 7	.1 to 3	.02 to 2
DC 50/60 Hz	70	No Trip	May trip	.040 max	.035 max.	.030 max.	.025 max.	.020 max.	.018 max.
	71	No Trip	.35 to 14	.18 to 7.5	.10 to 3	.025 to 1	.015 to .30	.01 to .15	.007 to .10
	72	No Trip	6.5 to 115	3 to 65	1.2 to 20	.08 to 3	.018 to 2.5	.015 to .80	.009 to .25
	73	No Trip	45 to 700	25 to 400	10 to 175	.75 to 20	.12 to 4.5	.025 to 1	.01 to .25

ABOVE 50 AMPS - PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Voltage	Delay	100%	125% (Note A)	150%	200%	400%	600%	800%	1000%
DC	50	No Trip	May trip	.100 max.	.070 max.	.032 max.	.020 max.	.020 max.	.020 max.
	51	No Trip	.5 to 8	.3 to 4	.1 to 1.7	.02 to .3	.08 to .150	.004 to .060	.004 to .03
	52	No Trip	2.5 to 100	1.5 to 40	.62 to 15	.15 to 2.5	.03 to 1	.004 to .5	.004 to .3
	59	No Trip	.100 max.	.070 max.	.032 max.	.020 max.	.016 max.	.016 max.	.016 max.
50/60 Hz	60	No Trip	May trip	.120 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
	61	No Trip	.7 to 18	.35 to 4	.130 to 1.8	.030 to .3	.008 to .150	.003 to .1	.003 to .08
	62	No Trip	10 to 120	6 to 60	2 to 22	.2 to 2	.050 to .750	.007 to .15	.005 to .10
	69	No Trip	.180 max.	.120 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
	64	No Trip	May trip	.2 to 8	.15 to 7.6	.05 to .73	.025 to .3	.020 to .22	.015 to .15
	65	No Trip	May trip	3 to 55	2 to 20	.3 to 5	.13 to 2	.06 to 1	.016 to .60

Notes: All trip curves and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of +25° C. Protectors do not carry current prior to application of overload. A: 130% for delays 49, 135% for delays 71, 72 and 73

Inrush Pulse Tolerance (typ)

The following table provides a comparison of inrush pulse tolerance with and without the inertial delay feature for each of the 50/60Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker.

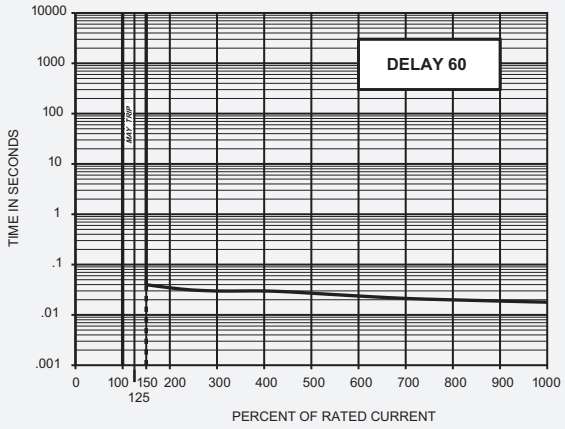
All trip curves and trip currents are specified with the breaker mounted in the normal vertical position at ambient temperature of +25°C. Protectors do not carry current prior to application of overload.

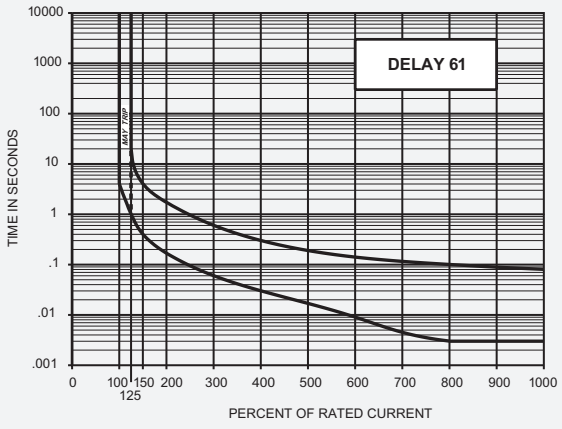
PULSE TOLERANCES

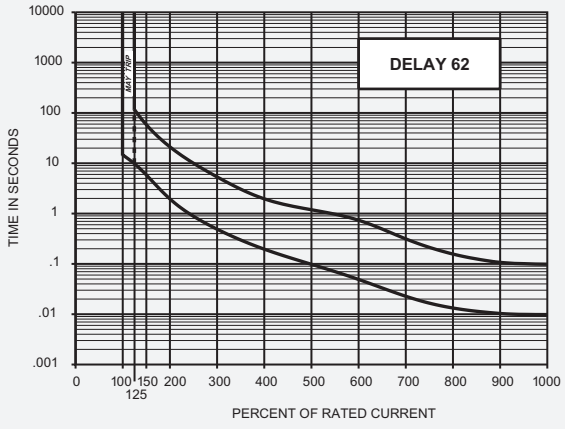
Delay	Pulse Tolerance
61, 62	12 times (approx.) rated current
61F, 62F	20 times (approx.) rated current
64, 65, 66	20 times (approx.) rated current
64F, 65F, 66F	35 times (approx.) rated current
Note: These limits do not apply to dual coil and tapped coil units	

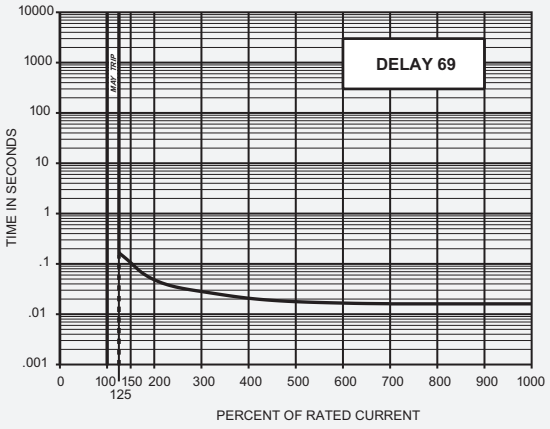
60Hz Delay Curves (typ)

A choice of delays are offered for 60Hz applications. Delays 60 and 69 are fast acting non-delayed tripping to protect sensitive electronic equipment (not recommended where known inrush exists). Delay 61 has a short delay for general purpose applications. Delay 62 is long enough to start certain types of motors and most transformers and capacitor loads. Delay 63 is an extra long delay primarily for special motor applications.



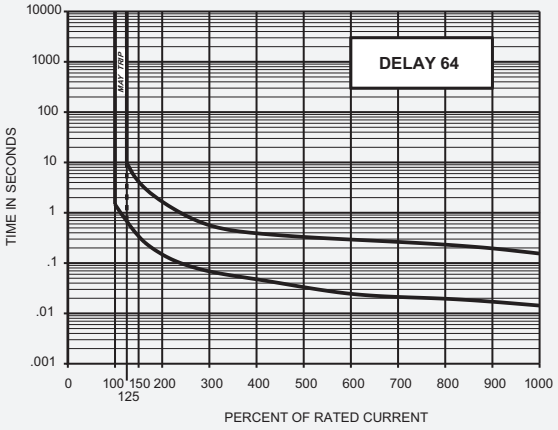


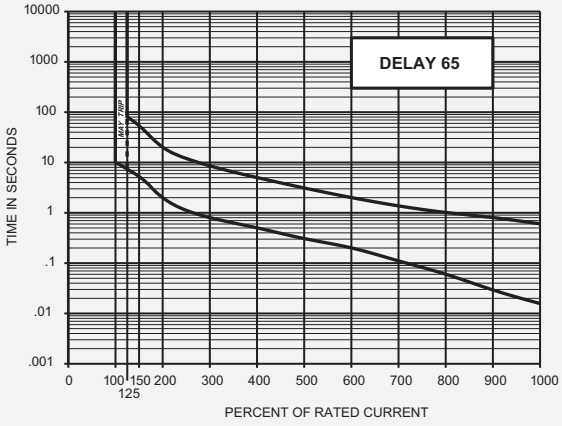


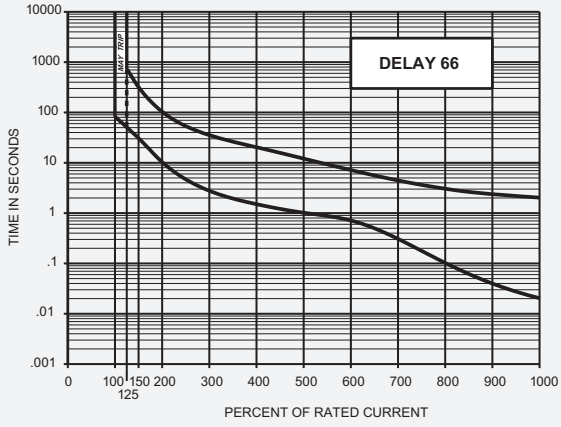


Delays 64, 65 and 66

Delays 64, 65 and 66 are the latest 50/60Hz delays with short, medium and long trip times respectively. The patented protector design provides both increased tolerance to high inrush induced nuisance tripping and longer trip times at 600 percent. These delays are ideally suited for applications where thermal devices are presently used, such as motor protection or where short duration, high inrush currents are experienced. As shown in a typical motor start-up curve, the delay 66 will provide locked rotor and overload protection. Nuisance tripping is avoided since acceptable short periods of overload will not trip the protector.

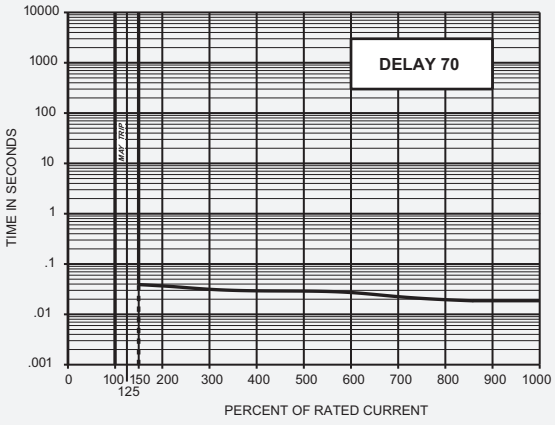


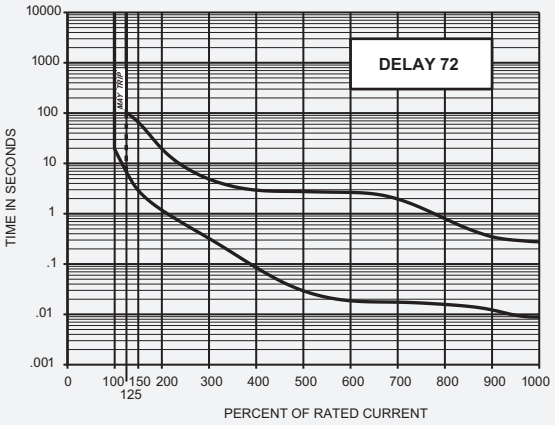


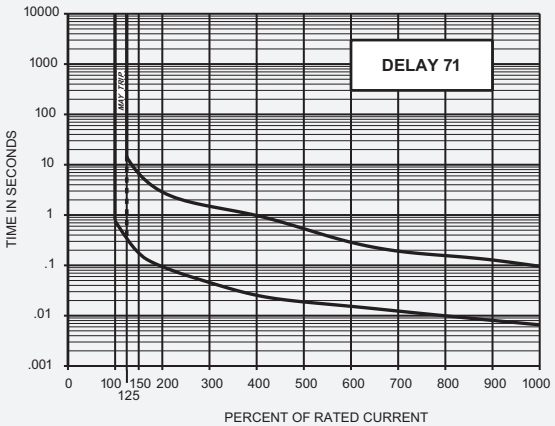


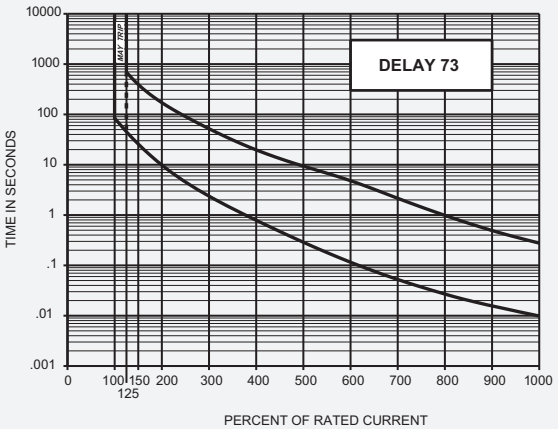
DC/50/60Hz Delay Curves (typ)
(Multi-frequency)

A choice of delays is offered for combined DC and 50/60Hz operation. Delay 70 is fast acting, non-delayed tripping to protect sensitive electronic equipment (not recommended where known inrush exists). Delay 71 has a short delay for general purpose applications. Delay 72 is long enough to start certain types of motors and most transformer and capacitor loads. Delay 73 is an extra long delay primarily for special motor applications.



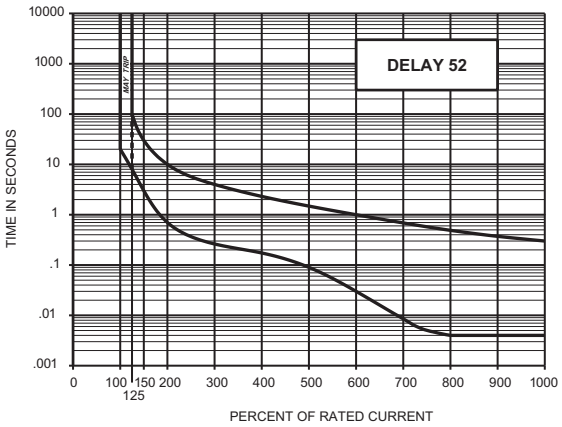


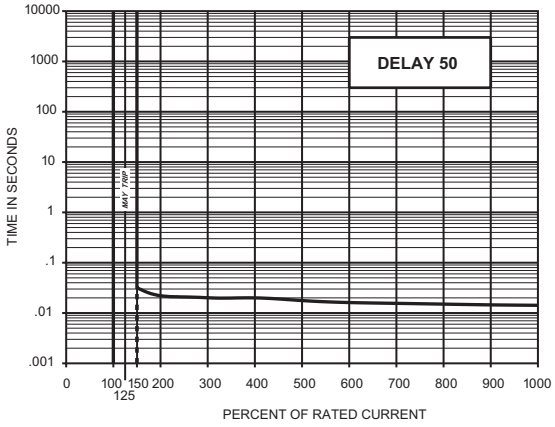


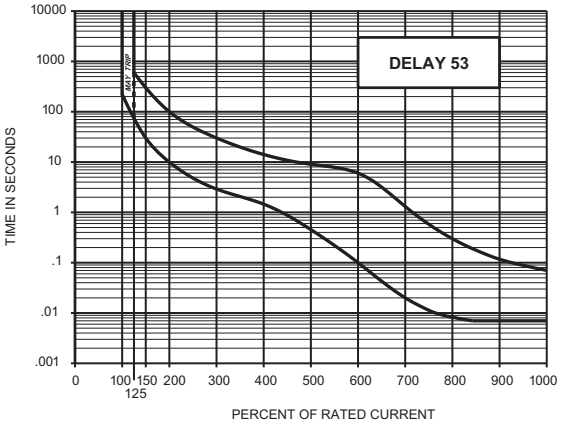


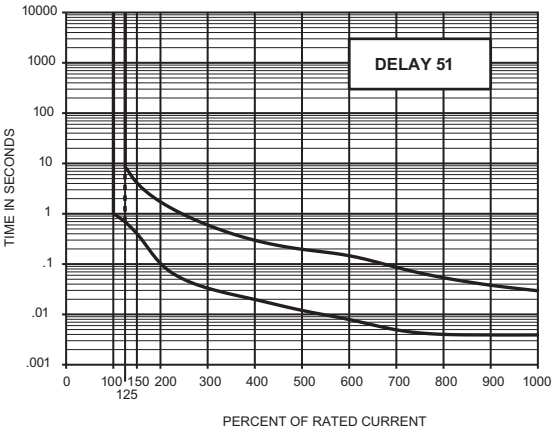
DC Delay Curves (typ)

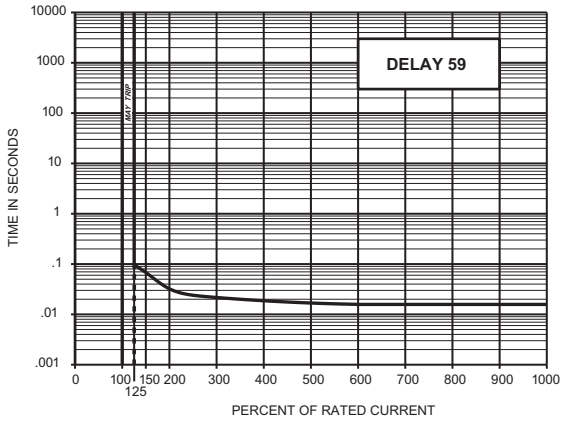
A choice of delays is offered for DC applications. Delays 50 and 59 provide fast acting, non-delayed tripping to protect sensitive electronic equipment (not recommended where known inrush exists). Delay 51 has a short delay for general purpose applications. Delay 52 is long enough to start certain types of motors. Delay 53 is an extra long delay used primarily for special motor applications.





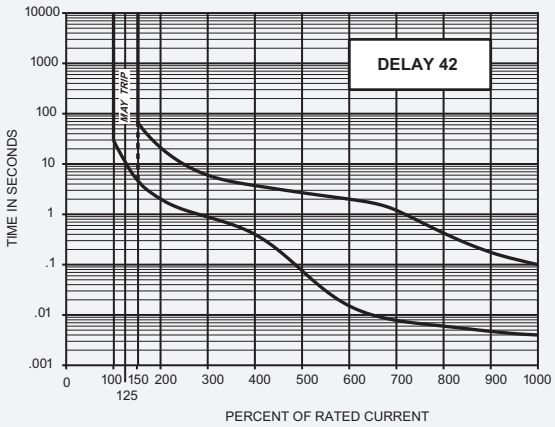


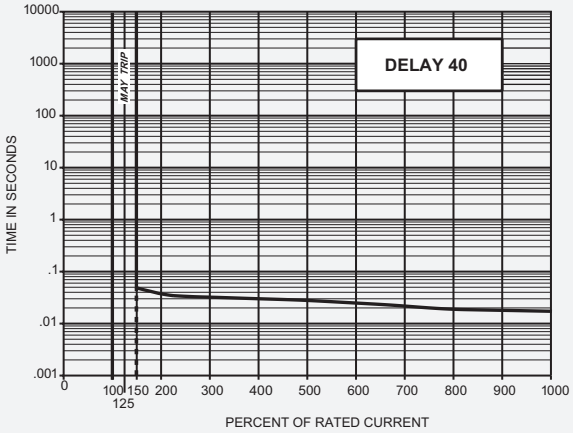


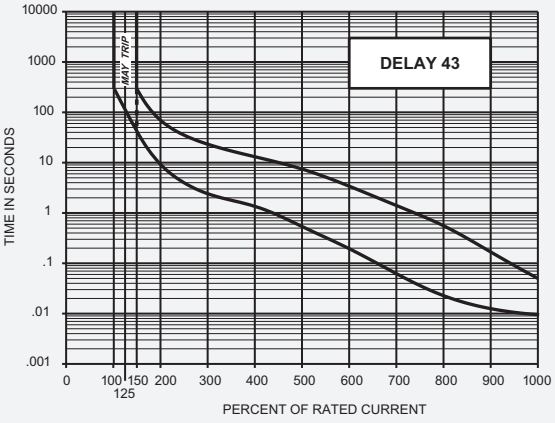


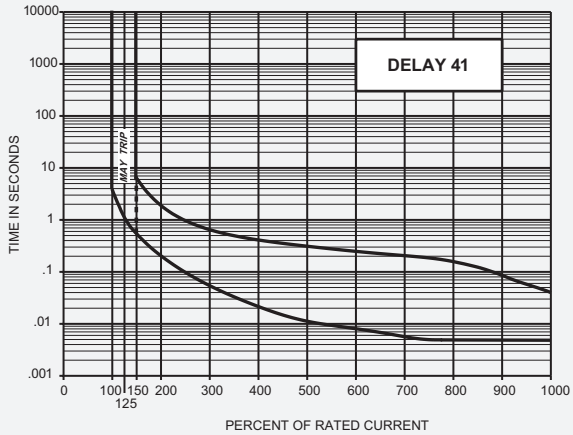
400Hz Delay Curves (typ)

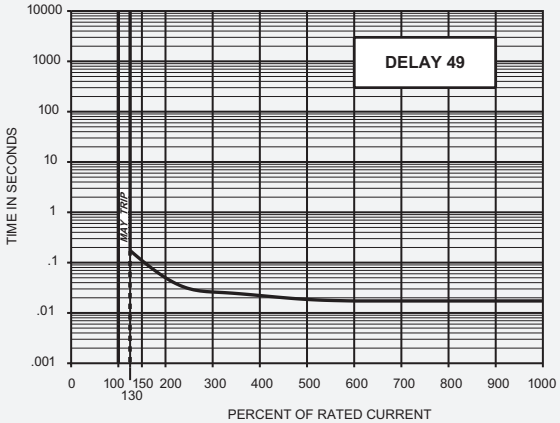
A choice of delays is offered for 400Hz applications. Delays 40 and 49 are fast acting, non-delayed tripping to protect sensitive electronic equipment (not recommended where known inrush exists). Delay 41 has a short delay for general purpose applications. Delay 42 is long enough to start certain types of motor and most transformers and capacitor loads. Delay 43 is an extra long delay primarily for special motor applications.











APL/UPL SPECIFICATIONS

Trip Free
Will trip open on overload, even when the handle is forcibly held on or restrained. This prevents operator from damaging the circuit by holding the handle in the ON position.

Trip Indication
The operating handle moves positively to the OFF position on overload.

Ambient Operation
Operates normally in temperatures between –40°C and +85°C.

Insulation Resistance
Not less than 100 megohms at 500Vdc.

Dielectric Strength
Withstands 1500Vac at 60Hz for 60 seconds or 1800Vac for one second from terminal to terminal, and from auxiliary switch terminal to main terminal.

Endurance
Per UL 1077 (6000 operations at rated load plus 4000 operations with no load). Tested at a maximum rate of 6 times per minute. Rating above 50 amperes operate a minimum of 5000 operations.

Shock
Withstands 100G or more without tripping while carrying full rated current per MIL-Std-202, Method 213, Test Condition I. Instantaneous types (delay 40, 50, 60 and 49, 59, 69) and dual coil configurations are tested at 80% of rated current. Protectors mounted in the handle down position are to be tested with no current applied (per MIL-PRF-55629).

Vibration
Withstands 10G without tripping while carrying full rated current per MIL-Std-202, Method 204, Test Condition A. Instantaneous types (delay 40, 50, 60 and 49, 59, 69) and dual coil configurations are tested at 80% of rated current.

Dual Coil Ratings
5-65Vdc and 5-250Vac for three terminal configurations. 5-120Vac and 5-120Vdc for four terminal configurations. Not available in delays 64, 65 and 66.

APL Ratings

0.050-50 amperes, 65Vdc, 250Vac maximum, 50/60Hz or 400Hz. 51-100 amperes at 65Vdc and 120Vac maximum. Ratings of 0.050-20 amperes at 277Vac, 50/60Hz are available upon request.

Auxiliary Switch Ratings
REC4 and REC5 are rated at 10 amperes, 250Vac or 3 amperes, 50Vdc. REG4 and REG5 are rated at 0.1 amperes, 125Vac.

UPL Ratings
UPL protectors are UL STD. 1077 (File No. E-66410) and CSA STD. C22.2–No. 235 (File No. LR-26229) recognized as supplementary protectors in the following configurations and ratings. Consult factory for further information.

Configurations
Series, Shunt, Relay, Auxiliary Switch, Switch Only, Dual Coil, No Voltage.

Poles
One through nine.

Moisture Resistance
Designed to meet the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-Std-202.

Salt Spray (Corrosion)
Designed to meet the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-Std-202.

APPROXIMATE WEIGHT PER POLE	
Ounces	**Grams**
3.7	103

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
10-32 Screw Terminals	13 to 14
M5 Stud Terminals	13 to 14
1/4 - 20 Stud Terminals	25 to 30
Where applicable, mechanical support must be provide to the terminals when applying torque	

APL/UPL - NOMINAL DCR / IMPEDANCE

Current Ratings (Amps)	Resistance (ohms)				Impedance (ohms)				Impedance (ohms)	
	DC Delays				AC, 50/60Hz Delays				AC, 400Hz Delays	
	50	***59***	***51, 52, 53***	***Dual Coil 51, 52, 53***	***60***	***69***	***600, 61, 62 71, 72, 73***	***64, 65, 66 Dual Coil 61, 62***	***40, 49***	***41, 42, 43***
0.05	162	540	460	640	174	419	582	691	1975	1195
0.10	35.4	105	155	150	42.5	103.4	119.0	160	495	284
0.50	1.2	4.2	4.5	5.6	1.9	4	4.1	6.2	22	12
1.0	.236	1.02	1.2	1.41	.41	.955	1.08	1.56	5.01	2.72
5.0	.021	.048	.059	.070	.030	.045	.048	.068	.240	.140
10.0	.0060	.0121	.0140	.0160	.0075	.0105	.0134	.0174	.0520	.0283
15.0	.0040	.0067	.0092	.0100	.0038	.0068	.0070	.0120	.0260	.0140
20.0	.0032	.0047	.0052	.0070	.0024	.0049	.0050	.0069	.0140	.0088
30.0	.0021	.0036	.0036	.0040	.0022	.0032	.0035	.0037	.0079	.0043
50.0	.0020	.0024	.0026	.0023	.0020	.0020	.0025	.0030	.0036	.0028

Notes: DCR and impedance based on 100% rated current applied and stablized a minimum of one hour.
Tolerance: .02 amperes to 2.5 amperes, ± 20%; 2.6 amperes to 20 amperes, ± 25%; 21 amperes to 50 amperes, ± 50%. Consult factory for special values and for coil impedance of delays not shown

APL/UPL - RATINGS

Configurations	Current Ratings (Amps)	Maximum Voltage Ratings	Interrupting Capacity (Amps)	Series Fuse
Series and Shunt	0.050 - 50	65Vdc	5000	None
	0.050 - 100	65Vdc	3000	None
	0.050 - 60	120Vac (50/60Hz)	1000	None
	0.050 - 50	120Vac (50/60Hz)	5000	4X (120 max.)
	0.050 - 20	277Vac (50/60Hz)	5000	4X
	0.050 - 50	250Vac (50/60Hz)	5000	4X (120 max.)
	0.050 - 50	120Vac (400Hz)	1500	None
	21 - 50	250Vac (400Hz)	1000	None
	0.050 - 20	250Vac (400Hz)	2100	None
Relay	0.050 - 50	50Vdc	—	—
	0.050 - 50	120Vac (50/60Hz)	—	—
	0.050 - 50	120Vac (400Hz)	—	—
	0.050 - 50	250Vac (50/60Hz-400Hz)	—	—
Switch Only	50 amperes max. 65Vdc	—	—	—
	100 amperes max. 32Vdc	—	—	—
	50 amperes max. 250Vac (50/60Hz)	—	—	—
	50 amperes max. 250Vac (400Hz)	—	—	—

Notes: DC units do not require series fusing.
277Vac: A circuit protector with this voltage rating is intended for 277Vac per pole single phase source only usage. (e.g.) If a two or three pole breaker is marked 277Vac, all line terminals must be connected to the same phase, assuming the 277Vac is taken from line to neutral of a three phase 277/480Vac system.

MPL SPECIFICATIONS

Moisture Resistance
Designed to meet the requirements of MIL-PRF-55629 when tested in accordance with Method 106 of MIL-Std-202.

Salt Spray (Corrosion)
Designed to meet the requirements of MIL-PRF-55629 when tested in accordance with Method 101 of MIL-Std-202.

MPL Ratings
MPL protectors are UL (File No. E-41607) and CSA (File No. LR-26229) recognized as manual, across the line starters, in the following configurations and ratings. Consult factory for further information.

Configurations
Series only with and without auxiliary switch.

Poles
One, two or three.

Shock
Withstands 100G or more without tripping while carrying full rated current per MIL-Std-202, Method 213, Test Condition I. Instantaneous types (delay 40, 50, 60 and 49, 59, 69) are tested at 80% of rated current. Breakers mounted in the handle down position are to be tested with no current applied (per MIL-PRF-55629).

Vibration
Withstands 10G without tripping while carrying full rated current per MIL-Std-202, Method 204, Test Condition A. Instantaneous types (delay 40, 50, 60 and 49, 59, 69) are tested at 80% of rated current.

RECOMMENDED TORQUE SPECIFICATIONS	
Component	**Torque (in-lbs)**
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
10-32 Screw Terminals	13 to 14
M5 Stud Terminals	13 to 14
1/4 - 20 Stud Terminals	25 to 30
Where applicable, mechanical support must be provide to the terminals when applying torque	

APPROXIMATE WEIGHT PER POLE	
Ounces	**Grams**
3.7	103

MPL - RATINGS

Current Ratings (Amps)	Maximum Voltage Ratings	Horsepower, Single Phase	Ratings Three Phase (Note A)
0.050 - 50	65Vdc	1	—
0.050 - 50	120Vac (50/60Hz)	3	7.5
0.050 - 20	240Vac (50/60Hz)	3	5
0.050 - 20	277Vac (50/60Hz)	3	5

Note: AC units require maximum of 4X rated series fusing: DC units do not require series fusing.
A: Two or three poles breaking

APL/UPL DECISION TABLES

How to Order

The ordering code for APL/UPL circuit protectors may be determined by following the steps in the decision tables shown here.

The coding given permits a self-assigning part number; other configurations may require a factory assigned part number. Typical examples are units with mixed ratings, combinations of styles or constructions not listed in the third decision table, etc.

With these, it is suggested that order entry be by description and/or drawings and a part number will be assigned. Additionally, it is a standard policy to establish a factory assigned part number wherever a descriptive drawing exists to provide cross reference, traceability and manufacturing control.

When specifying a protector for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection.

For example, the code shown is the code for a two pole UPL protector with series trip, 20 ampere rating, 50/60Hz. short time delay construction in all poles.

To determine the ordering number for your particular APL/UPL unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

Notes:

A The most common current values for 100% of rated current are those listed. Please consult an Airpax office orsales representative for other values.

B All APL/UPL protectors are constructed with stainless steel springs and plated parts. As noted in the specifications, all meet normal requirements for moisture and salt spray resistance. If fungus resistance is required in addition to moisture and salt spray resistance, special procedures and markings are employed.

C Terminals will be supplied as #10-32 threaded studs up to 50 amperes. Above this amperage terminals will be ¼-28 threaded studs. All standard units will be supplied with a hex nut and two flat washers on each threaded terminal.

D When metric threaded inserts are specified, breakers rated at 50 amperes and below will be supplied with metric threaded terminals. For breakers rated above 50 amperes, ¼ -28 threaded terminals will be supplied.

E Black handle standard.

Example:

UPL 11 - 1 - 61 - 20 3

1 2 3 4 5

1 First Decision

Type

APL	Magnetic circuit protector in a molded phenolic case
UPL	UL and CSA recognized as a supplementary protector
MPL	UL and CSA recognized as a "manual across the line starter"

2 Second Decision

Poles

0*	Switch only
1	Single pole unit
11	Two pole unit
111	Three pole unit
1111	Four pole unit

*Use 0 in place of 1 when ordering switch only.

3 Third Decision

Internal Configuration

-0	Switch only (omit 4th and 5th decisions)
-1	Series
-1REC4	Series with auxiliary switch *.110 quick connect terminals
-1REC5	Series with auxiliary switch *.187 quick connect terminals
-1REG4	Series with auxiliary switch (gold contacts) *.110 quick connect terminals
-1RS	Series with alarm switch electrical trip turret terminals
-3	Shunt
-5	Relay

Multi-pole units with mixed construction, poles numbered left to right when viewed from terminal end.

*Can be used for Solder Terminals also.

4 Fourth Decision

Hz and Delay

40*	400Hz 150% instant trip
41*	400Hz short delay
42*	400Hz long delay
43*	400Hz motor start
49*	400Hz 130% instant trip
50	DC 150% instant trip
51	DC short delay
52	DC long delay
53*	DC motor start
59	DC 125% instant trip
60	50/60Hz 150% instant trip
61	50/60Hz short delay
62	50/60Hz long delay
64	50/60Hz short delay (high pulse)
65	50/60Hz long delay (high pulse)
66*	50/60Hz motor start (high pulse)
69	50/60Hz 125% instant trip
70*	DC-50/60Hz 150% instant trip
71*	DC-50/60Hz short delay
72*	DC-50/60Hz long delay
73*	DC-50/60Hz motor start delay

For addition of inertial delay, add an "F" to any delay number, except 40, 50, 60 and 70.

*Not available above 50 amperes.

5 Fifth Decision (Note A)

Nominal Amperage Rating

Current Code	Ratings (Amps)
101	.100
251	.250
501	.500
751	.750
102	1.00
252	2.50
502	5.0
752	7.50
103	10.0
153	15.0
203	20.0
303	30.0
353	35.0
403	40.0
503	*50.0
603	60.0
703	70.0
803	80.0
903	90.0
104	*100.0

Standard current ratings listed.
For other ratings, please consult the factory.

*Switch only ratings.

6 Sixth Decision

Optional

A	Metric thread mounting inserts and terminals (Note D)
B	Barrier (multi-pole only)
C	277Vac 50/60Hz
M	Fungus (note B)
H	International handle markings
9	White handle (note E)

AIRPAX®

IELR Rail-Mount Series
Magnetic Circuit Protectors

AIRPAX® | IELR Series

Hydraulic Magnetic Circuit Protectors

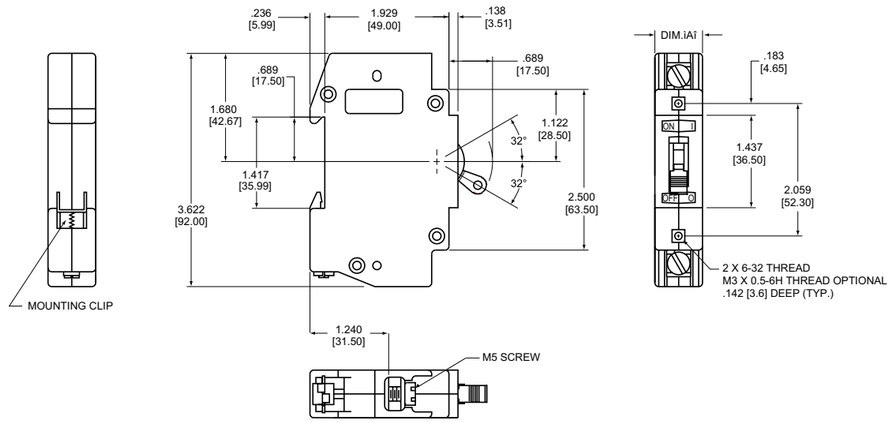
INTRODUCTION

Designed specifically for the 35mm symmetrical DIN rail, Airpax IALHR, IULHR and IELHR series Rail-Mount Magnetic circuit protectors offer the advantages of quick and easy mounting or removal which results in efficient and economical wiring, while conserving space.

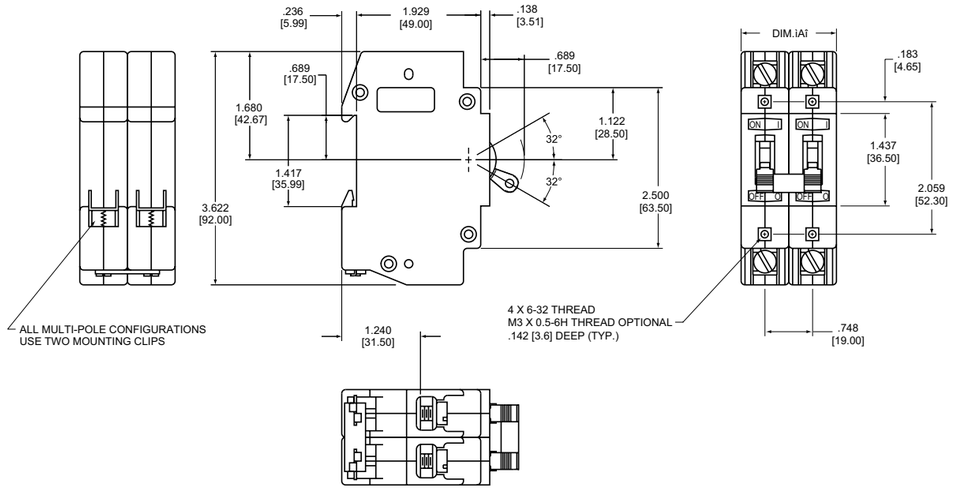
These circuit protectors are available in 1, 2, 3 and 4 pole models, with a choice of handle colors with on/off and international I/O markings. These protectors comply with UL and CSA standards and meet IEC and VDE spacing requirements. Typical applications include computers and peripherals, telecommunications, medical equipment, machine tools and process control instrumentation. They provide the reliable performance associated with magnetic circuit protection.

Mounting - These circuit protectors are designed to mount on standard 35mm DIN rails, such as 35x7.5 or 35x15 per DIN EN50022. Other specialty rails are available from suppliers that provide a means of mounting non DIN mount components by means of special captive jam nuts.

Single Pole



Two Pole



Note: Tolerance ± .015 [.38] unless noted.
Dimensions in brackets [ ] are millimeters.

MULTI-POLE DIMENSIONS - DIM "A"	
1 pole	.750 ± .02 [19.05 ± .5] max
2 pole	1.515 [38.48] max
3 pole	2.265 [57.53] max
4 pole	3.015 [76.58] max
Note: Dimension "A" varies with # of poles	

IELR SPECIFICATIONS

Series Trip
The most popular configuration for magnetic protectors is the series trip where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an on-off switch.

Switch Only
In the event that over-current protection is not desired, the coil mechanism can be deleted, providing an excellent low cost, single or multi-pole power switch.

Insulation Resistance
100 megohm minimum at 500Vdc between all electrically isolated terminals.

Dielectric Strength
3750Vac (3750V~) shall withstand AC voltages 50/60Hz for 60 seconds between all electrically isolated terminals.

Endurance
Circuit breakers shall operate a minimum of 10,000 operations; 6,000 with rated current and voltage and 4,000 with no load.

Operating Temperature
–40°C to +85°C.

IEC 144 Classification
Type handle spacings–IP40. Terminals–IP00.

Moisture Resistance
10 days, 95 percent relative humidity at 40°C in accordance with IEC68-2-3, test C.

Salt Spray
Five percent solution at 35°C in accordance with IEC68-2-11, test K, 48 hours.

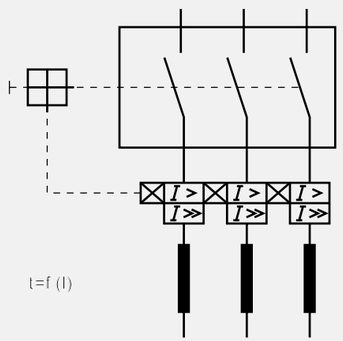
Shock
50g, 11m sec, half sine with rated current, except no current with handle down. Instantaneous units use 80 percent rated current. Test in accordance with IEC68-2-27, test E_a. This assumes that adequate end stops are used to prevent longitudinal movement of the circuit protector.

Vibration
4g, 5–500Hz (maximum double amplitude displacement 1.5mm) with rated current except no current with handle down. Instantaneous units use 80 percent rated current, in accordance with IEC68-2-6, test F, method A, one hour per plane. This assumes that adequate end stops will be used to prevent longitudinal movement of the circuit protector.

Series

Switch Only

Three Pole Schematic Diagram



IELR OPERATING CHARACTERISTICS

APL/UPL - NOMINAL DCR / IMPEDANCE

Current Ratings (Amps)	Resistance (ohms) DC Delays *51, 52, 53, 59*	Impedance (ohms) AC, 50/60Hz Delays *61, 62, 63, 69*	Impedance (ohms) AC, 400Hz Delays *41, 42, 43, 49*
0.20	45.8	28.5	71.94
1.0	1.38	1.10	2.85
5.0	.371	.29	.76
10.0	.055	.051	.12
15.0	.017	.016	.032
20.0	.006	.006	.010
30.0	.003	.004	.006
50.0	.0019	.0018	.0019
60.0	.00157	.00134	—
70.0	.00147	.00133	—

Notes: DCR and impedance based on 100% rated current applied and stabilized for a minimum of one hour. Tolerance .05-2.5 amperes ± 20%; 2.6-20 amperes ± 25%; 21-70 amperes ± 50%. Consult factory for special values and for coil impedance of delays not shown.

Inrush Pulse Tolerance
Pulse tolerance is defined as a single pulse of half sine wave 50/60Hz peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker.

PULSE TOLERANCES

Delay	Pulse Tolerance
61, 62, 63 (.1 to 70 amps)	12 times (approx.) rated current
61F, 62F, 63F (.1 to 25 amps)	20 times (approx.) rated current
61F, 62F, 63F (25.1 to 70 amps)	18 times (approx.) rated current

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Delay	100%	125% (Note A)	150%	200%	400%	600%	800%	1000%
41	No Trip	May trip	.5 to 8	.15 to 1.9	.02 to 4	.006 to .25	.004 to .1	.004 to .05
42	No Trip	May trip	5 to 70	2.2 to 25	.40 to 5	.012 to 2	.006 to .2	.006 to .15
43	No Trip	May trip	35 to 350	12 to 120	1.5 to 20	.012 to 2.2	.01 to .22	.01 to .1
49	No Trip	May trip	.100 max.	.050 max.	.020 max.	.020 max.	.020 max.	.020 max.
51	No Trip	.5 to 6.5	.3 to 3	.1 to 1.2	.031 to .5	.011 to .25	.004 to .1	.004 to .08
52	No Trip	2 to 60	1.8 to 30	1 to 10	.15 to 2	.04 to 1	.008 to .5	.006 to .1
53	No Trip	80 to 700	40 to 400	15 to 150	2 to 20	.23 to 9	.018 to .55	.012 to .2
59	No Trip	.120 max.	.100 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
61	No Trip	.7 to 12	.35 to 7	.130 to 3	.030 to 1	.015 to .3	.01 to .15	.008 to .1
62	No Trip	10 to 120	6 to 60	2 to 20	.2 to 3	.02 to 2	.015 to .8	.01 to .25
63	No Trip	50 to 700	30 to 400	10 to 150	1.5 to 20	.4 to 10	.013 to .85	.013 to .5
69	No Trip	.120 max.	.100 max.	.050 max.	.022 max.	.017 max.	.017 max.	.017 max.
71	No Trip	.44 to 10	.3 to 7	.1 to 3	.03 to 1	.012 to .3	.004 to .15	.004 to .1
72	No Trip	1.8 to 100	1.7 to 60	1 to 20	.15 to 3	.04 to 2	.008 to .79	.006 to .28
73	No Trip	50 to 600	30 to 400	10 to 150	1.8 to 20	.22 to 10	.18 to .88	.011 to .5
79	No Trip	.120 max.	.100 max.	.050 max.	.023 max.	.016 max.	.015 max.	.015 max.

Notes: All trip times and trip currents are specified with the protector mounted in the normal vertical position at ambient temperature of 25 C. Protectors do not carry current prior to application of overload.
A: 135% for delays 71, 72, 73 and 79.

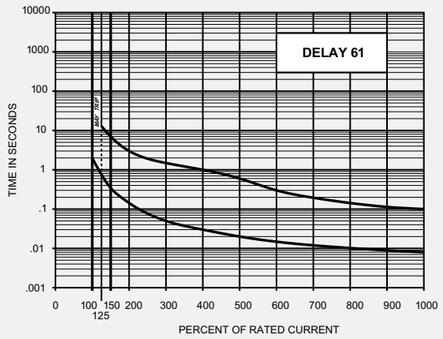
IELR DELAY CURVES

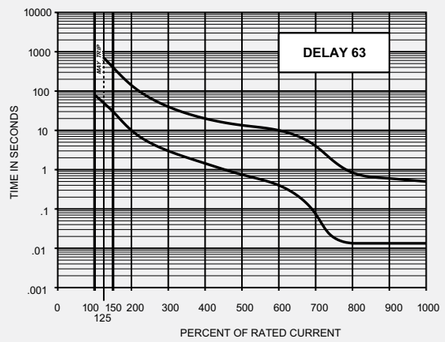
400Hz, DC, 50/60Hz Delay Curves (typ)

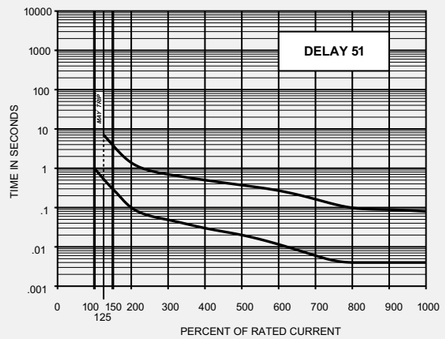
A choice of delays is offered for DC, 50/60Hz, 400Hz, or combined DC/50/60Hz applications. Delays 49, 59, 69 and 79 provide fast acting, instantaneous tripping and are often used to protect sensitive electronic equipment (not recommended where a known inrush exists). Delays 41, 51, 61 and 71 have a short delay for general purpose applications. Delays 42, 52, 62 and 72 are long enough for most transformers and capacitor loads. Delays 43, 53, 63 and 73 are extra long for special motor applications.

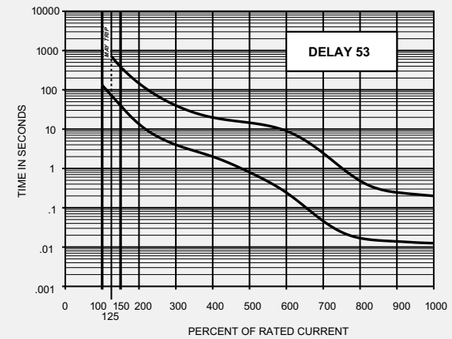
DC Delay Curves (typ)

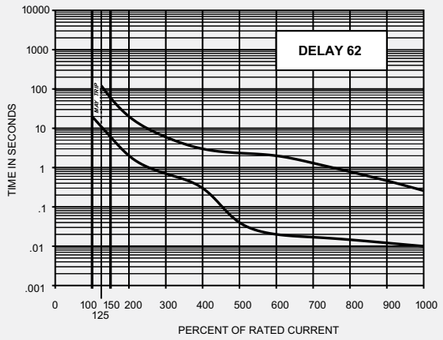
50/60Hz Delay Curves (typ)

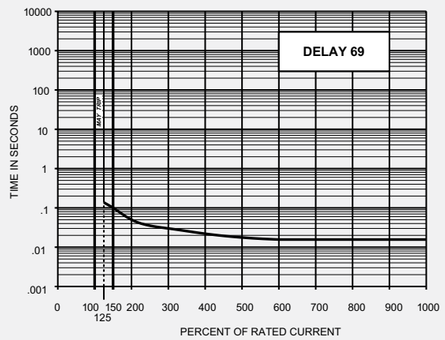


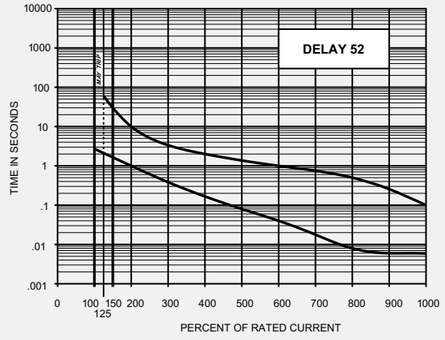


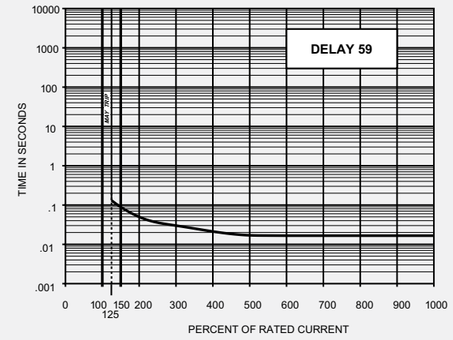




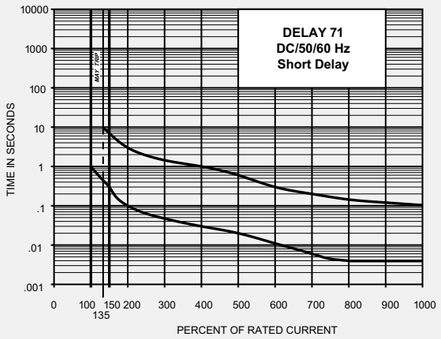


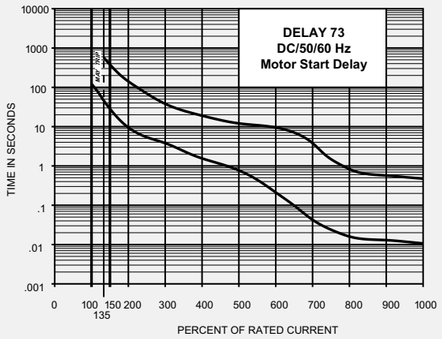


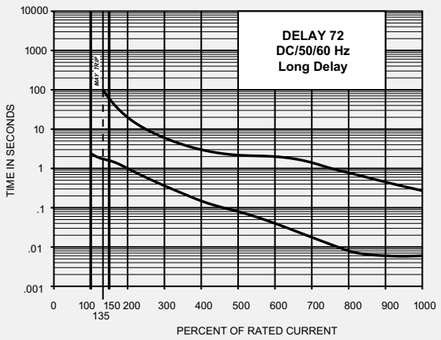


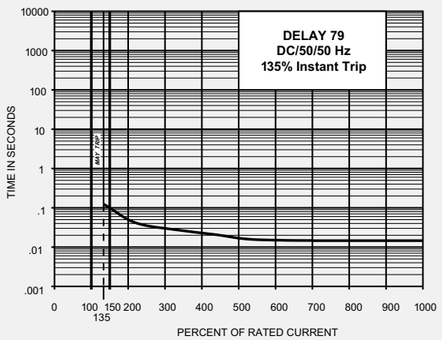


DC/50/60Hz Delay Curves (typ)
(Multi-Frequency)

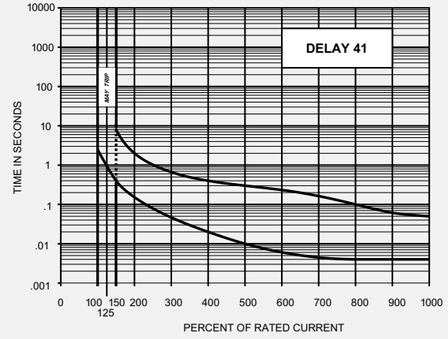


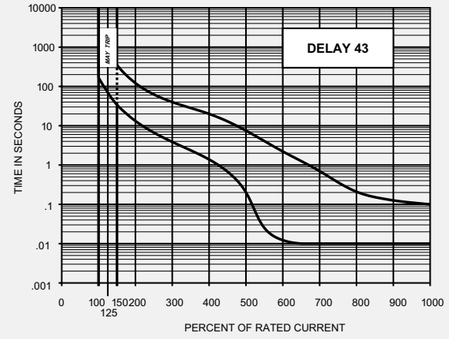


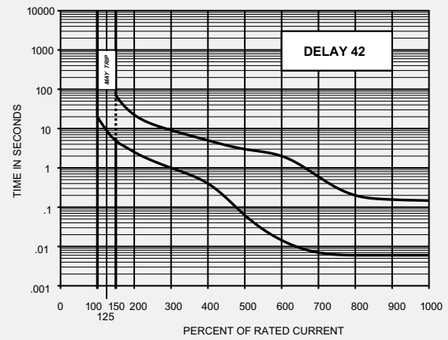


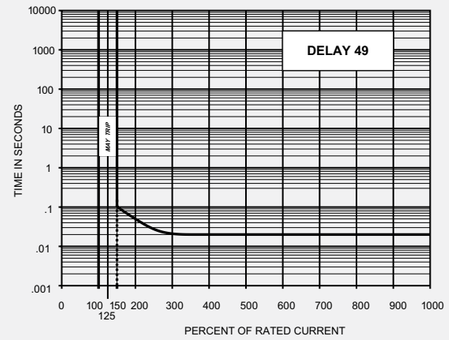


400Hz Delay Curves (typ)









AGENCY APPROVALS

Voltage (Volts)				Rated Current (Amps)		Interrupting Capacity, Amps	
Max Voltage	Frequency (Hz)	Phase	Min Poles	UL/CSA	VDE	UL1077 & CSA	VDE
80	DC	—	1	.05 to 50	.10 - 50	u2, 1000	4000
80	DC	—	1	.05 to 100	—	u2, 5000	—
250	50/60	1 & 3	1	.05 to 50	.10 - 50	3500	2000
250	50/60	1 & 3	1	.05 to 70	—	2000	—
250	50/60	1 & 3	1	.05 to 50	—	5000 (1)	—
250	50/60	1 & 3	1	.05 to 70	—	5000 (1)	—
277	50/60	1	1	.05 to 50	—	2000	—
277	50/60	1	1	.05 to 50	—	5000 (1)	—
240/415	50/60	1 & 3	2	.05 to 50	.10 - 30	2000	2000
240/415	50/60	1 & 3	2	.05 to 50	—	5000 (1)	—
277/480	50/60	3	2	.05 to 30	—	2000	—
250	400	1 & 3	1	.05 to 50	—	1750	—

Note: (1) with 125A max series fuse.

IELR DECISION TABLES

How to Order

The ordering code for IELR circuit protectors may be determined by following the steps in the decision tables shown here.

The coding given permits a self-assigning part number, but with limitations. Using the illustrated coding system, it will automatically be assumed that all poles are identical. When all poles of a multi-pole protector are not identical, please contact an Airpax sales representative or the factory for a part number. One great virtue of magnetic circuit protectors is their adaptability to complex circuits. Thus, variations from pole to pole can become the rule rather than the exception. Descriptive drawings are recommended to avoid confusion.

When specifying a protector for AC motor start or high inrush applications, it is helpful to know the peak amplitude and surge duration for proper protector selection.

Notes:
When poles are not identical, each pole is to be described and a special Airpax number will be assigned.

Thomas & Betts (T&B) Narrow Tongue Lug P/N 54108NT is recommended for units rated above 50A. The T&B lug or an equivalent must be used on units rated 70A and above.

Example:

IELR 1 - 1 - 61 - 20.0 - 01 - V
(1) (2) (3) (4) (5) (7)

1 First Decision — Type

IALHR	One handle per pole (multi-pole only)
IULHR	One handle per pole (multi-pole only) UL Recognized, CSA Certified and VDE Approved ratings
IELHR	One handle per pole (multi-pole only) UL Recognized, CSA Certified and VDE Approved ratings
IALR	One handle per unit
IULR	One handle per unit UL Recognized and CSA Certified ratings
IELR	One handle per unit UL Recognized, CSA Certified and VDE Approved ratings
IMLR	Mid-trip indication, One handle per unit
IMLHR	Mid-trip indication, One handle per pole

2 Second Decision — Poles

1	Single pole
11	Two pole
111	Three pole
1111	Four pole

3 Third Decision — Configuration

-0	Switch only (Omit 4th decision)
-1	Series

V = VDE Approved

The shaded areas denote VDE Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE approved, but other approvals still apply.

4 Fourth Decision — Frequency & Delay

SW	Switch Only
-41	400Hz short delay
-42	400Hz long delay
-43	400Hz motor start
-49	400Hz 150% instant trip
-51	DC short delay
-52	DC long delay
-53	DC motor start
-59	DC 125% instant trip
-61	50/60Hz short delay
-62	50/60Hz long delay
-63	50/60Hz motor start
-69	50/60Hz 125% instant trip
-71	DC/50/60 Hz short delay
-72	DC/50/60 Hz long delay
-73	DC/50/60 Hz motor start
-79	DC/50/60 Hz 135% instant trip

For addition of inertial delay, add an "F" to any delay numeral.

5 Fifth Decision — Rated Current

Standard ratings listed. For other ratings, please contact the factory.

.100	10.0
.250	15.0
.500	20.0
.750	30.0
1.0	35.0
2.5	40.0
5.0	50.0
7.5	60.0
	70.0

Use three numbers to print required value between .050 amperes minimum and 70.0 amperes maximum.

6 Sixth Decision — Optional

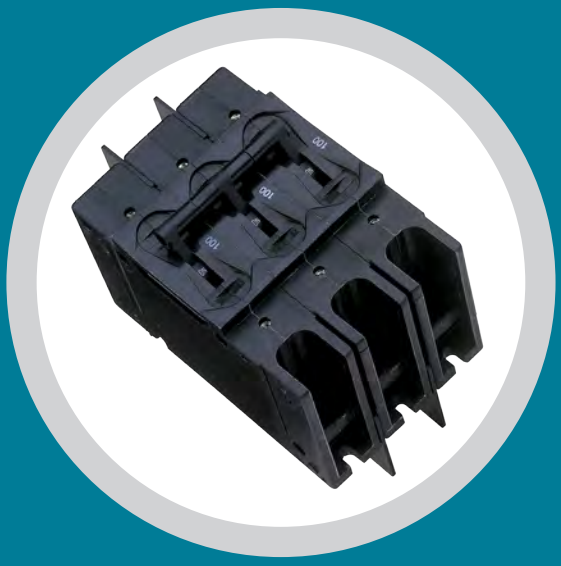
	Standard hardware. No designation necessary.
-A	Metric thread mounting inserts
-C	277V (50/60Hz only)
-D	240/415V (50/60Hz only)

7 Seventh Decision — Handle Color Selection

	Unmarked
-00	Black
-10	Yellow
-20	Red
-30	Blue
-40	Green
-60	Orange
-90	White
	Marked (Combination On - Off / I-O)
-01	Black with white markings
-11	Yellow with black markings
-21	Red with white markings
-31	Blue with white markings
-41	Green with white markings
-61	Orange with black markings
-91 (Std.)	White with black markings

AIRPAX®

209/219/229/249/279 Series
Magnetic Circuit Protectors



AIRPAX® | 209/219/229/279 Series

Hydraulic Magnetic Circuit Protectors

INTRODUCTION

The 209, E-Frame circuit breaker combines power switching with accurate, reliable circuit protection in a compact single or multi-pole unit. The unit is ideal for branch circuit applications such as EDP, air conditioners, panel boards and lighting controls.

The 209 is actually a family of circuit breakers available in one through six pole assemblies with a variety of configurations and terminal styles to meet your application needs. First in this family is the 209, a general purpose E-Frame circuit breaker which complies with UL Standard 489. Other members of the family include the 219, for manual controller applications, which complies to UL Standard 508, the 229, for supplementary protectors applications, which complies to UL Standard 1077, and the 299, a Special Construction version.

Utilizing the hydraulic-magnetic principle, the 209 family adapts itself to local applications and environments. Temperature conditions, which affect fuses and other thermal devices, are not a concern. The magnetic /ampere turn principle minimizes nuisance tripping due to temperature variations.

Inrush currents, due to ferroresonant transformers, lamps and capacitive filters, are now becoming more significant. Recognizing the need for this type of protection, Airpax offers the unique inertial delay which is standard for all 50/60Hz time delay units, but may be deleted where inrush is not a problem. No extra cost or special order is required.

The 209 family of circuit breakers withstands high pulses without tripping or affecting normal delay curves. This performance, however, does not derate or sacrifice protection.

209/219/229 MAGNETIC CIRCUIT PROTECTORS

Terminal Style

209 E-Frame circuit breakers may be specified with either screw terminals, stud or solderless connectors.

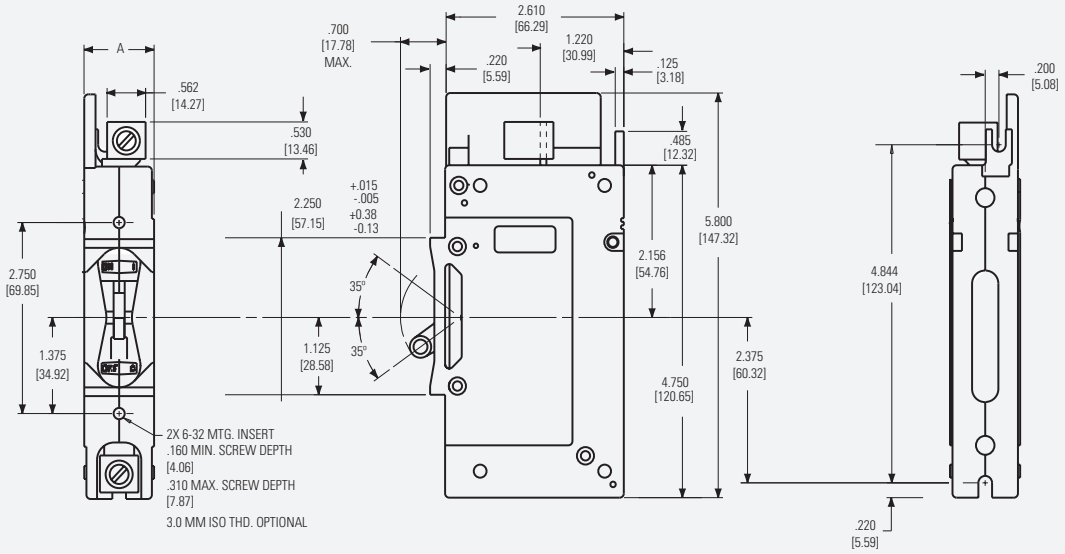
A choice of front or back connected terminal styles is available. The back connected terminal style is available with stud terminals only. Front terminal style is available with either screw terminals or solderless connectors.

Refer to Sixth Decision Table for front connected terminal information.

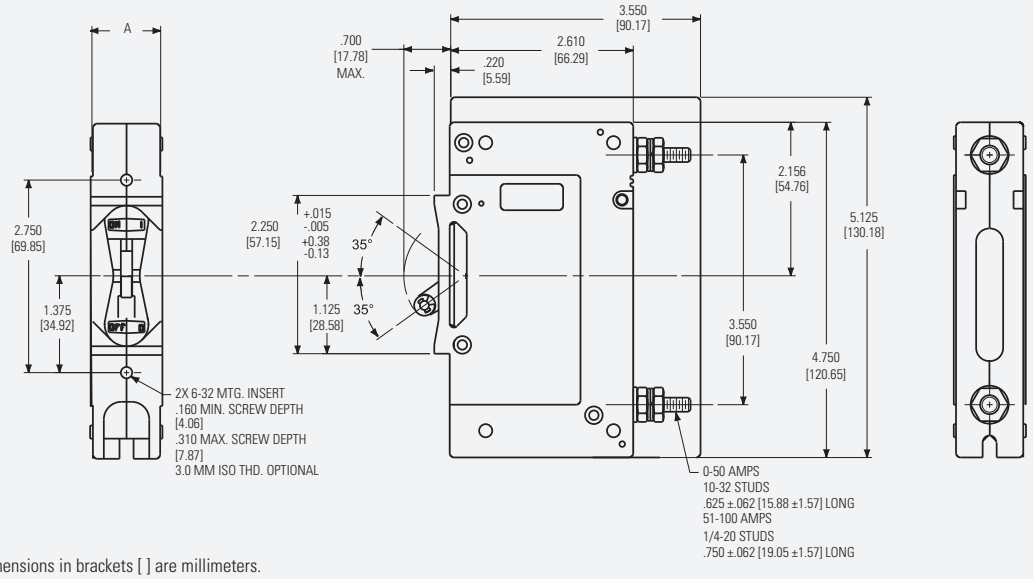
Barriers for back connected terminal styles are supplied on multi-pole units only. Line and load connections may be made to either terminal and terminals will be identified as shown.

DIMENSION "A"	
Number of Poles	**Dimensions "A"**
1	1.026 ± .010 [26.06 ± 3.30]
2	2.072 [52.63] Max
3	3.108 [78.94] Max
4	4.144 [105.26] Max
5	5.180 [131.57] Max
6	6.216 [157.89] Max

Front Connected Solderless Connector
(Back Mounted)



Back Connected Stud Terminal
(Front Mounted)



Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

249 POWER SELECTOR BREAKER SYSTEM

The 249 Power Selector Breaker System combines magnetic-hydraulic branch circuit overload protection and a power system selector switch in one device.

The 249 is designed to allow selection of any one of two, three or four independent power systems. This is accomplished with fool-proof sliding-gate handle covers. The number of sliding covers is one less than the number of power systems. With this arrangement, it is impossible to switch "ON" more than one power system at a time.

Since the 249 Power Selector Breaker System is listed as a Branch Circuit Breaker per UL 489 and power switching is accomplished by UL listed breakers, it is usually not necessary to include additional branch service protection.

Standard options available include terminals for front or back connections, choice of trip time delay, current ratings to 100 amperes and single or multi-pole sections.

Trip Time Delay

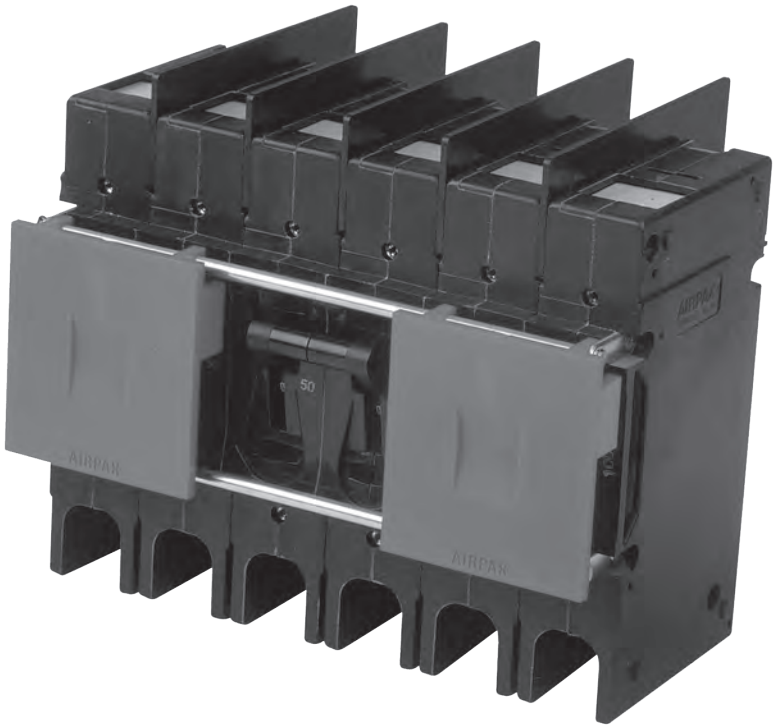
Three inverse time delays are available to permit close coordination with various loads. Delays 51 and 61 are short delays for electronic loads. Delays 52 and 62 are medium delays for mixed loads. Delays 53 and 63 are long delays for motor loads.

Current and Voltage Ratings

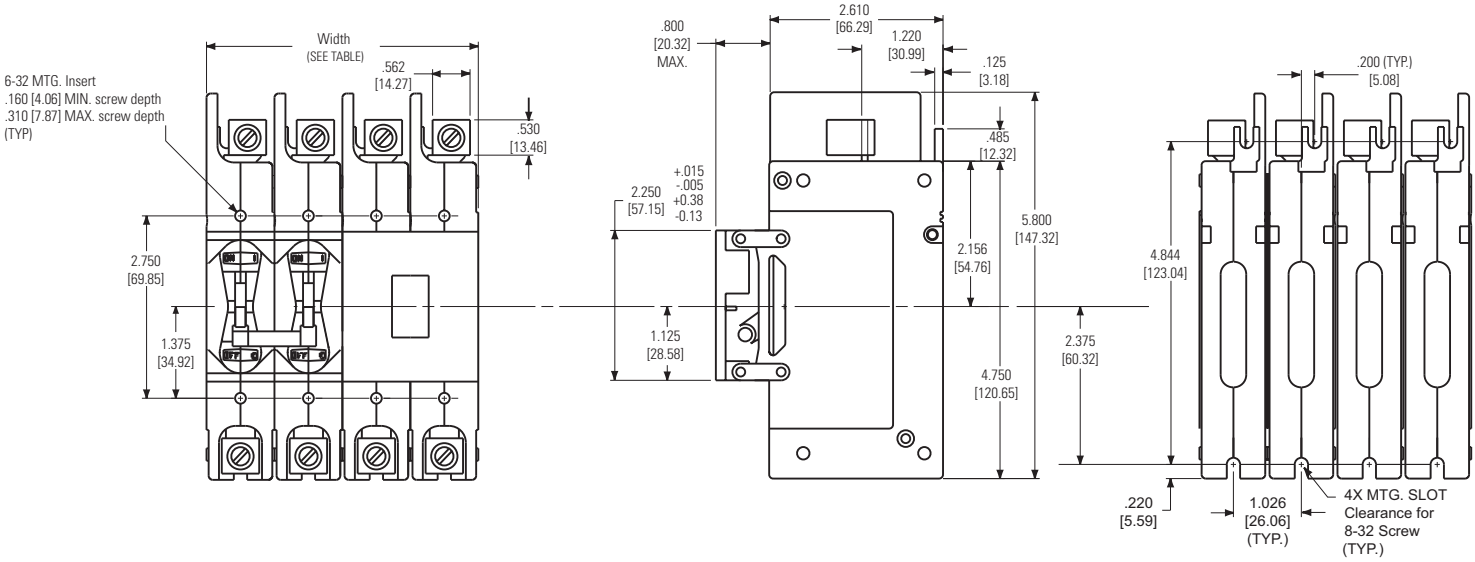
Single pole and multi-pole breaker ratings are available up to 100 amperes, 240Vac or 125Vdc. The special configuration for Marine use has a 120V/240Vac rating for current rating up to 100 amperes.

Master Drawing

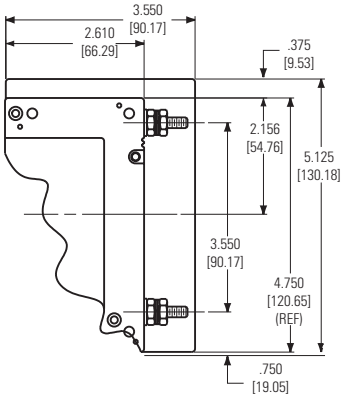
Standard circuit breaker terminal and configurations are shown. For other types, consult factory.



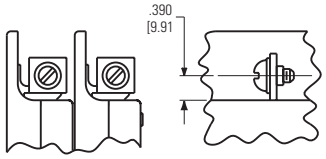
249 Master Drawing



1/4 - 20 Studs



10 - 32 or 1/4 - 20 Screw Terminals



DIMENSIONS	
Number of Poles	**Width**
9	9.324 [236.83] Max
8	8.288 [210.52] Max
6	6.216 [157.89] Max
4	4.144 [105.26] Max
2	2.072 [52.63] Max

Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.

Common-Trip Construction

All multi-pole protectors contain an internal trip bar which opens all poles in the event of an overload in any pole. Handles are ganged externally for simultaneous actuation.

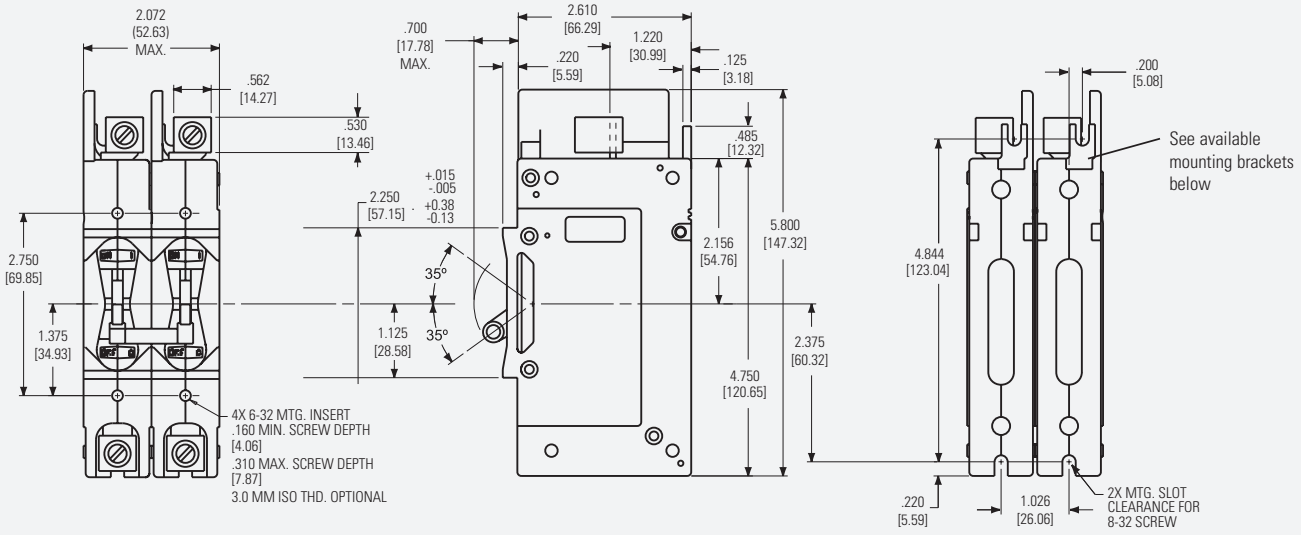
Individual poles may differ in ratings, delays and configurations, providing an almost limitless number of combinations.

Multi-pole protectors (up to 6 poles) easily satisfy special modern day circuitry. Series, shunt, relay and auxiliary switch construction add to the versatility of design engineering. Airpax's sales engineering force is ready to assist in proper unit selection, both for equipment protection and economical design.

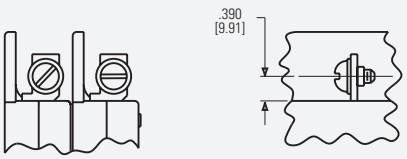
Three Phase, Four Pole Includes Control Protector

Remote shutdown of equipment is sometimes necessary or desirable in today's sophisticated equipment. The 219 four pole assembly fills this need for three phase operation. Three of the four poles are designed for the circuit's proper operating current and over-current protection. The fourth pole may be designed for instantaneous tripping by logic circuitry, interlocks or from a manual remote site or control. The control power required would be quite low, with voltages from 5 to 125Vdc, or 5 to 240Vac available. The fourth pole construction is optional. It may be either series, shunt or relay, depending on the application required. When specifying, both the minimum trip voltage and Hz are required. Factory consultation is readily available.

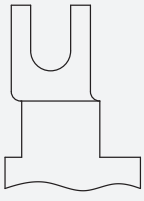
Front Connected Solderless Connector
(Back Mounted)



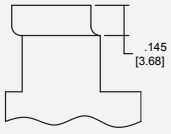
10 - 32 or 1/4 - 20 Screw Terminals



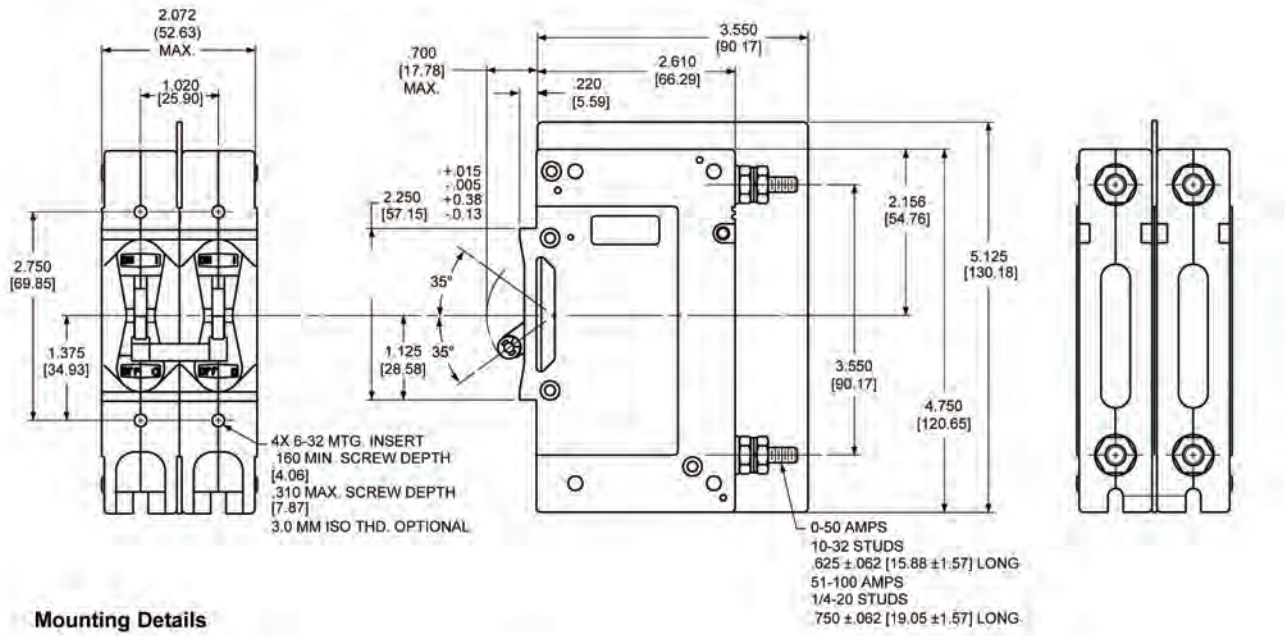
Slotted Mounting Bracket
terminal codes -2, -3, -5, -7, -3M, -5M, -7M



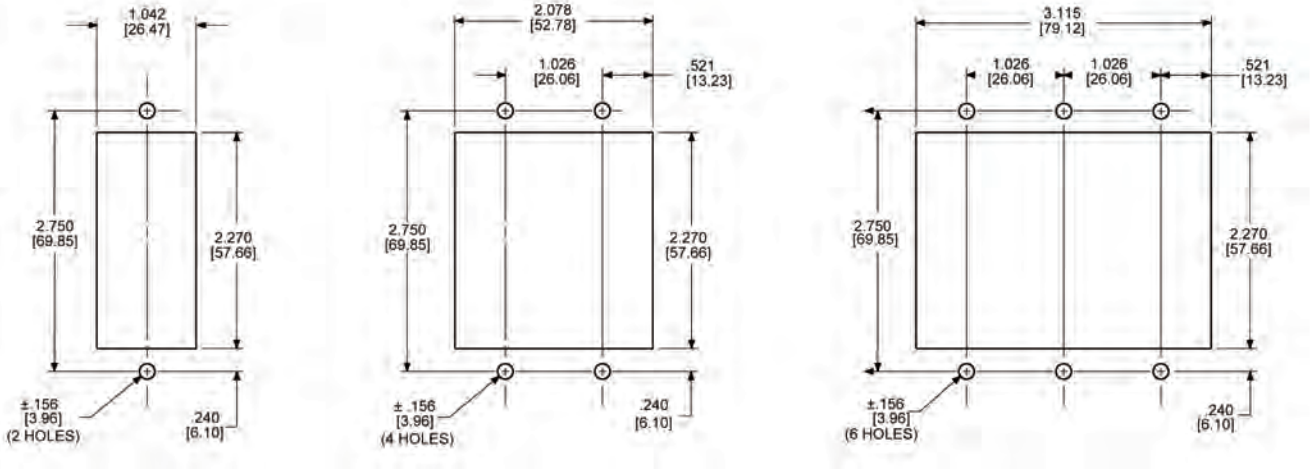
Short Mounting Bracket
terminal codes -2C, -3C, -5C, -7C



Back Connected Stud Terminal
(Front Mounted)



Mounting Details



DIMENSIONS	
Number of Poles	**Width**
1	1.026 ± .010 [26.06 ± .254]
2	2.072 [52.63] Max
3	3.108 [78.94] Max
4	4.144 [105.26] Max
5	5.180 [131.57] Max
6	6.216 [157.89] Max

Note: Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters
Caution: Elongation of mounting holes may be necessary for units with more than 6 poles and units up to 12 poles due to tolerance compounding

229D (MARINE) & 279 (COMMUNICATION) CIRCUIT PROTECTORS

UL-1500 Ignition Protection

The 229D family is certified to UL-1500 which covers Ignition Protected circuit protectors. This specification requires devices to be used in accordance with the requirements of U.S. Coast Guard and Fire Protection Standard for Pleasure and Commercial Motor Craft, ANSI/ MFPA No. 302.

The ratings available are 100 amperes or less at 65Vdc or 240Vac. Maximum IC, 1000 amperes. Consult factory for application details.

The 299D series is available with interlocking to prevent on board and shore power being used simultaneously.

Combination of ON-OFF switching the protection function offers a simplified solution for your electrical systems.

UL 489A Communications Equipment Protection

The 279 Series complies with the requirements of UL 489A, Circuit Breakers for use in Communication Equipment, meeting the need for protection at higher DC voltages.

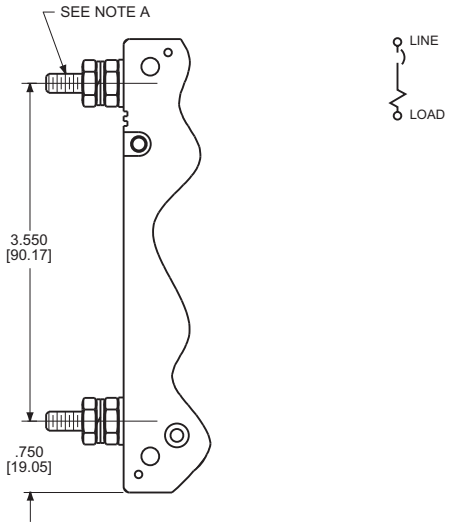
The available ratings are 100 amperes or less at 160Vdc. Maximum short circuit interrupting current is 5000 amperes. The 279 series available only in a series trip configuration.

Please consult Sensata for specific application details.

209/219/229 CONFIGURATIONS

Series Trip

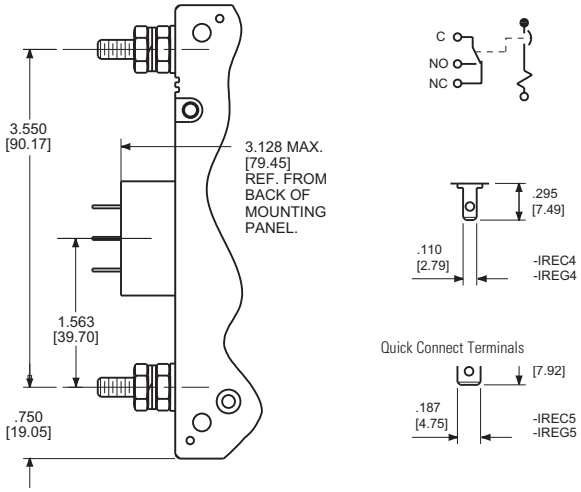
The most popular configuration for magnetic protectors is the series trip, where the sensing coil and contacts are in series with the load being protected. The handle position conveniently indicates circuit status. In addition to providing conventional overcurrent protection, it's simultaneously used as an ON-OFF switch.



Auxiliary Switch

This is furnished as an integral part of a series pole in single or multi-pole assemblies. Isolated electrically from the protector's circuit, the switch works in unison with the power contacts and provides indication at a remote location of the protector's ON-OFF status.

(Applies to Series Trip Only)



219/229 CONFIGURATIONS

Relay Trip

This permits the overload sensing coil to be placed in a circuit which is electrically isolated from the trip contacts. The coil may be actuated by sensors monitoring pressure, flow, temperature, speed, etc. Other typical applications include crowbar, interlock and emergency/rapid shutdown circuitry. Trip may be accomplished by voltage or current, which must be removed after trip.

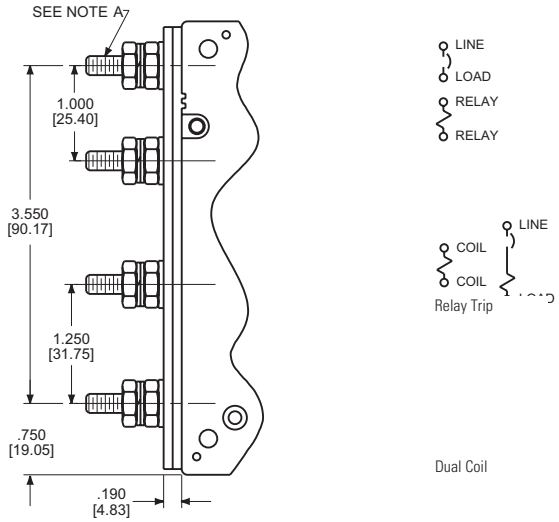
Dual Coil

Providing for both a voltage trip and a current trip function in a magnetic circuit protector is common practice. These two coil protectors provide remote or automatic opening of one or more circuits with a low level signal.

The voltage coil will trip the protector instantaneously while the current coil provides normal inverse time delays. The voltage coil is not rated for continuous duty and therefore, the voltage must be removed when the breaker trips.

Since both coils are housed within the same pole, the space savings are substantial.

This option is not available with 64, 65 or 66 delays.



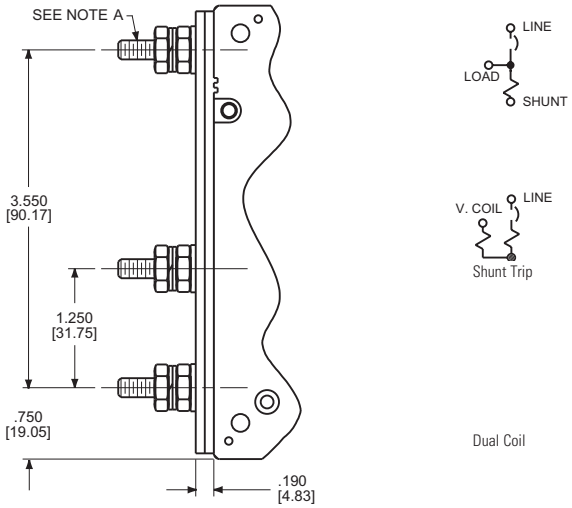
Shunt Trip

The shunt trip is designed for controlling two separate loads with one assembly. The control is established by providing overload protection for the critical load. When the current through this load becomes excessive and reaches the trip point, the protector will open and remove power from both loads simultaneously. The total current rating of both loads must not exceed the maximum contact rating.

Voltage Trip

Sometimes called “dump circuits” or “panic trip circuits,” these units make it possible to open main power contacts with lower power inputs from one or more sources. This configuration is becoming increasingly more important for sensitive circuitry and denser packaging in automation systems.

Available in series, shunt or relay configurations.



Note:
Tolerance ± .015 [.38] unless noted. Dimensions in brackets [ ] are millimeters.
A: 0-50 Amps, 10-32 Studs .625 ± .062 [15.88 ± .157] Long, 51-100 Amps, 1/4 - 20 Studs, .750 ± .062[19.05 ± .157] Long.

Inrush Pulse Tolerance

The table shown above provides a comparison of inrush pulse tolerance with and without the inertial delay feature for each of the 50/60Hz delays. Pulse tolerance is defined as a single pulse of half sine wave peak current amplitude of 8 milliseconds duration that will not trip the circuit breaker.

The table at right provides a reference guide for selecting the inertial delay feature. Consult factory for further assistance.

INRUSH PULSE TOLERANCE

Delay	Pulse Tolerance
61, 62, 63	8 times rated current
64	minimum 20 times rated current
65	minimum 25 times rated current
66	minimum 30 times rated current

Note: These limits do not apply to dual coil and tapped coil units

PERCENTAGE OF RATED CURRENT VS TRIP TIME IN SECONDS AT +25°C

Delay	100%	125%	150%	200%	400%	600%	800%	1000%
41 & 41F	No Trip	May Trip	.6 to 7	.2 to 2	.03 to .40	.01 to .1	.009 to .060	.008 to .050
42 & 42F	No Trip	May Trip	7 to 70	2 to 20	.1 to 3	.01 to .2	.009 to .09	.008 to .08
43 & 43F	No Trip	May Trip	60 to 500	20 to 200	2 to 30	.01 to .1	.009 to .09	.008 to .08
51 & 51F	No Trip	.4 to 7	.2 to 2	.12 to 1	.03 to .3	.012 to .1	.009 to .07	.008 to .05
52 & 52F	No Trip	8 to 80	2.5 to 45	.7 to 20	.2 to 3	.05 to 1	.01 to .5	.009 to .08
53 & 53F	No Trip	100 to 900	50 to 500	20 to 200	2 to 25	.015 to 5	.01 to .15	.009 to .09
61	No Trip	.6 to 5	.3 to 2	.1 to .8	.03 to .3	.015 to .1	.01 to .07	.009 to .06
62	No Trip	12 to 120	6 to 55	2 to 18	.3 to 3	.05 to 1	.016 to .1	.01 to .08
63	No Trip	70 to 800	45 to 450	20 to 200	2 to 30	.3 to 4	.02 to .25	.012 to .15
64	No Trip	.6 to 5	.3 to 3	.1 to 1.5	.03 to .5	.02 to .4	.01 to .3	.008 to .25
65	No Trip	12 to 100	6 to 50	2 to 18	.3 to 3	.05 to 2	.016 to 1.6	.01 to 1
66	No Trip	70 to 800	45 to 450	20 to 200	2 to 30	.3 to 9	.02 to 5	.013 to 3

*Notes: *279 is available only with DC delays*

209/219/229 DELAY CURVES

50/60 Hz Delay Curves (typ)

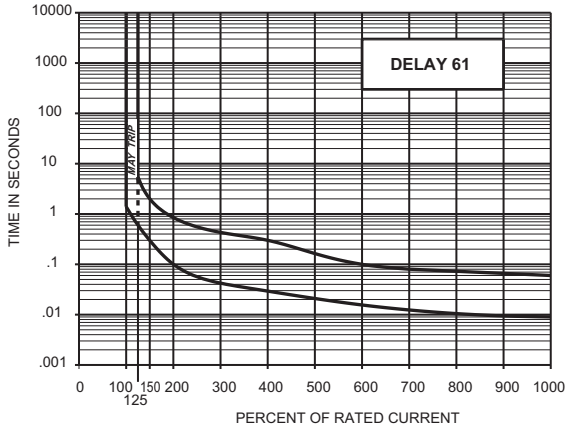
A choice of delays is offered for 50/60Hz applications.

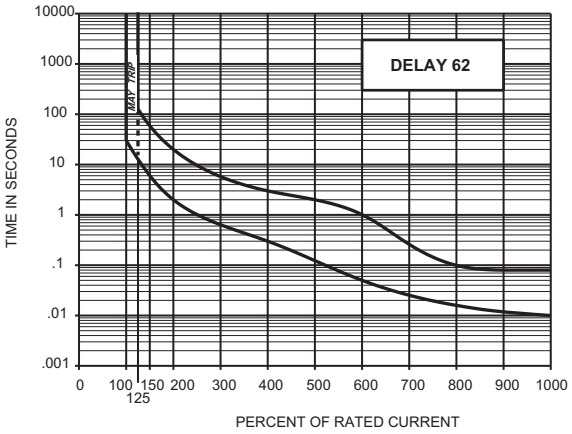
Delay 61 is a short delay for general purpose applications. Delay 62 is long enough to start certain types of motors and most transformer and capacitor loads.

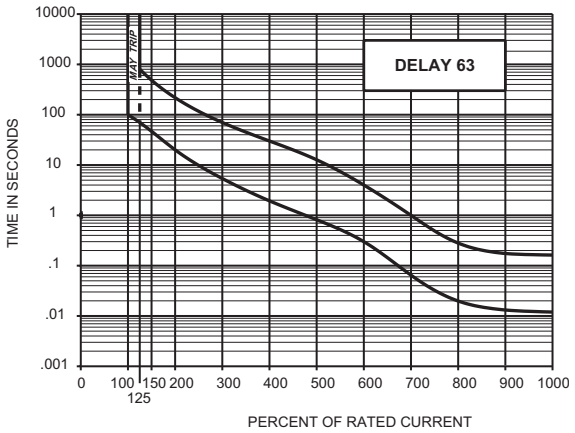
Delay 63 is a long delay for special motor applications.

Delays 64, 65 and 66 are the latest 50/60Hz delays with short, medium and long trip times respectively. The patented breaker design provides both increased tolerance to high inrush induced nuisance tripping and longer trip times at 600 percent. These delays are ideally suited for applications where thermal devices are presently used, such as motor protection or where short duration, high inrush currents are experienced. As shown in a typical motor start-up curve, the delay 66 will provide locked rotor and overload protection. Nuisance tripping is avoided, since acceptable short periods of overload will not trip the breaker.

All trip curves and trip currents are specified with the breaker mounted in the normal vertical position at ambient temperature of +25°C. For test and measurement purposes, the breakers should not carry current prior to application of overload for calibration test. For other than vertical mount position, consult factory.

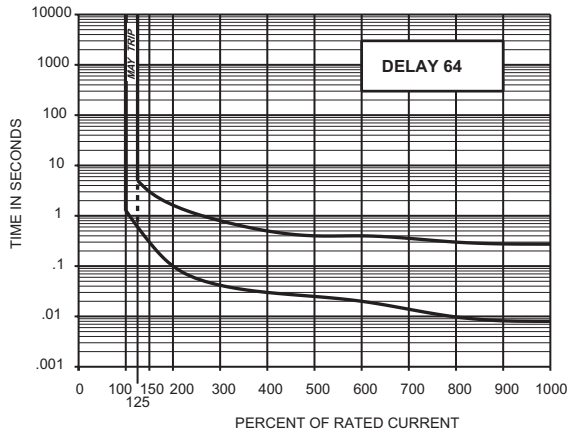


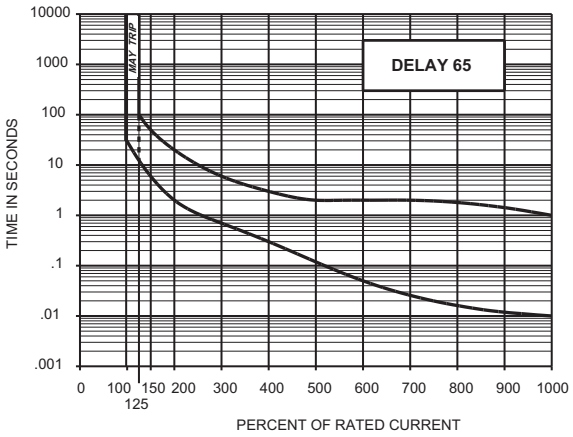


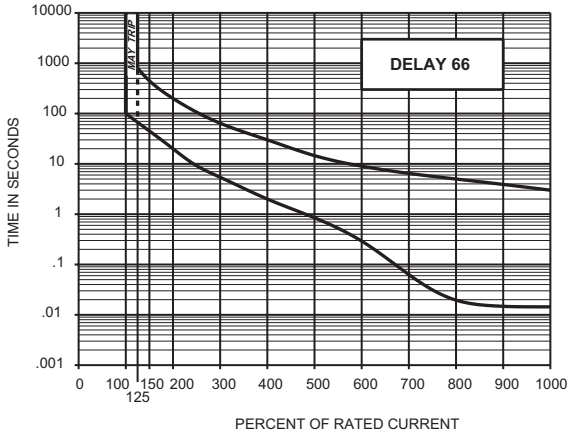


209/219/229/279 DELAY CURVES

60Hz Delay Curves (typ)

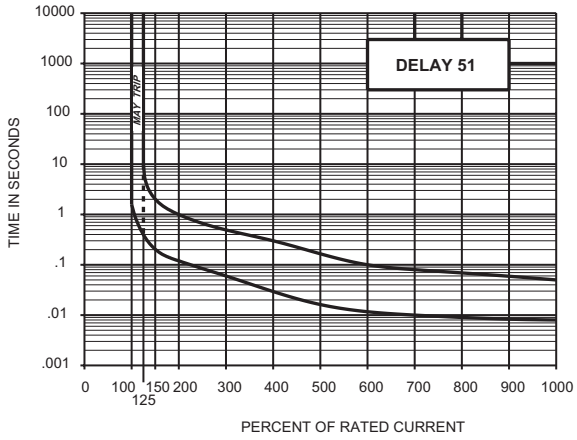




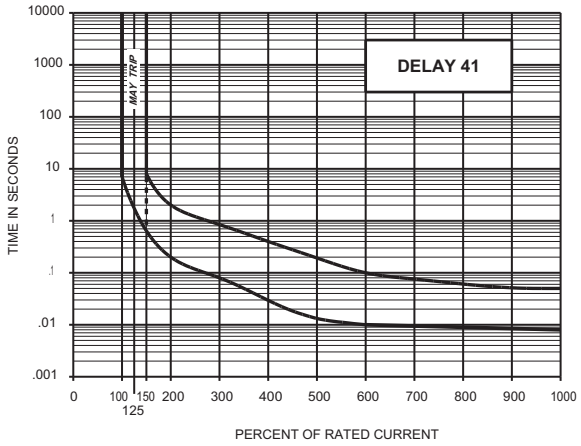


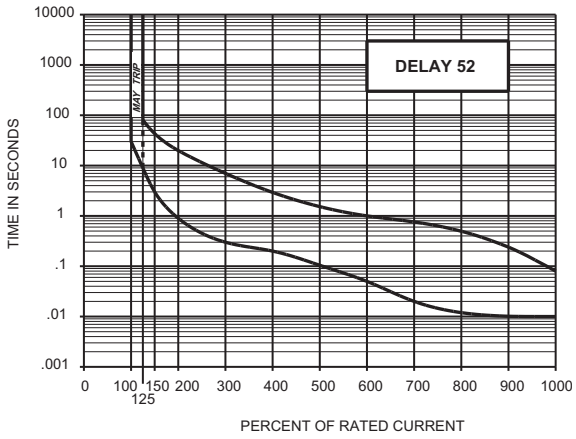
209/219/229 DELAY CURVES

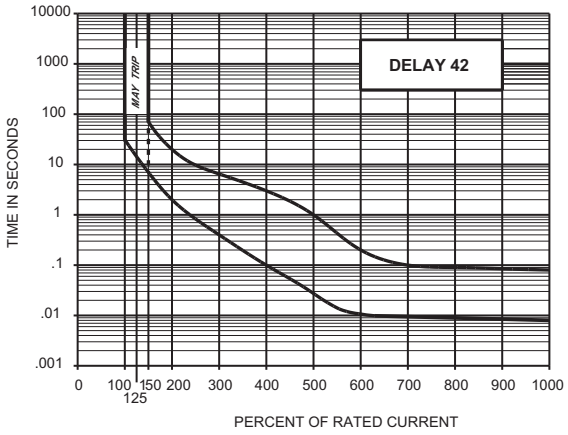
DC Delay Curves (typ)
(279 is available only with DC delays)

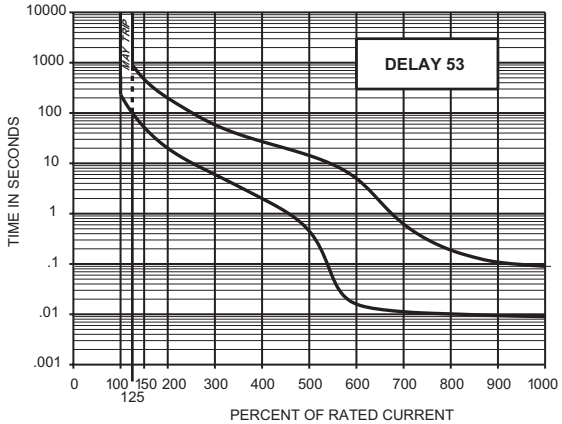


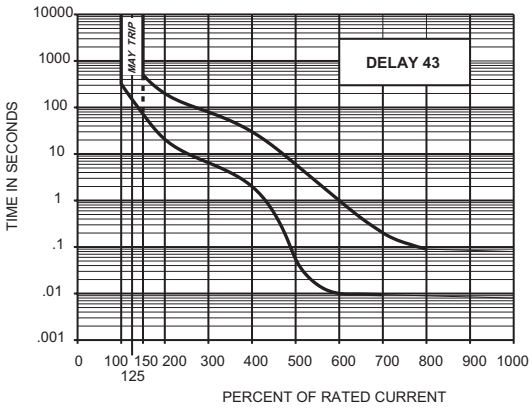
400Hz Delay Curves(typ)











NOMINAL DCR / IMPEDANCE

Current Ratings (Amps)	Resistance (ohms) DC Delays *51, 52, 53*	Impedance (Ohms) AC, 50/60Hz Delays *61, 62, 63*
0.05	460	582
0.10	155	119.0
0.50	4.5	4.1
1.0	1.2	1.08
5.0	.059	.048
10.0	.0140	.0134
15.0	.0092	.0070
20.0	.0052	.0050
30.0	.0036	.0035

Notes: DCR and impedance based on 100% rated current applied and stablized a minimum of one hour.
Tolerance: .1 amperes to 1.0 amperes, ± 10%; 1.1 amperes to 5.0 amperes, ± 15%; 5.1 amperes to 15 amperes, ± 50%.

APPROXIMATE CIRCUIT BREAKER WEIGHT

# of Poles	Ounces
1	9 oz
2	1 lb, 3 oz
3	2 lb
4	2 lb, 7 oz
5	3 lb
6	3 lb, 12 oz

RECOMMENDED TORQUE SPECIFICATIONS

Component	Torque (in-lbs)
6-32 Mounting Inserts	6 to 8
M3 Mounting Screws	4 to 5
1/4-20 Screw Terminals	35 to 40
10-32 Stud Terminals	13 to 14
M5 Stud Terminals	13 to 14
1/4 - 20 Stud Terminals	40 to 45

Where applicable, mechanical support must be provide to the terminals when applying torque

Trip Free

Will trip open on overload, even when forcibly held on. This prevents the operator from damaging the circuit by holding the handle in the ON position.

Trip Indication

The operating handle moves positively to the OFF position on overload.

Environmental Specifications

Moisture and fungus resistance is provided by the use of moisture resistant finishes. Special springs and treatment for all ferrous parts eliminate inherent moisture-related problems. The use of fungi inert cases and handles avoids fungus-related problems.

Current Ratings

209/219/229 may be supplied with these ratings: DC, 50/60Hz, 400Hz, 0.1 to 100 amperes. 279 types may be supplied with DC ratings only, 0.1 to 100 amperes.

Voltage Ratings

On 209/219/229, voltages up to and including 240Vac, 50/60Hz or 400Hz, or 125Vdc are available. Multi-pole units can be supplied for 277Vac/480Vac, 50/60Hz. 279 types are available with a voltage of 160Vdc. All units will be marked with the standard maximum voltage. UL Listed breakers will be labeled with the UL listed voltage.

Auxiliary Switch Ratings

When supplied shall be S.P.D.T. configuration with a maximum rating of 10 amperes 250Vac.

Mounting Considerations

A three-inch spacing must be provided between the circuit breaker and vent and any conductive surface. If closer than three inches is necessary, then an insulator must be installed on the conductive surface.

Solderless Connectors

Connectors are rated AL9 CU. and accept either copper or aluminum conductors. Units are suitable for use with both 60° and 75° wire. Optional pressure plate for fine stranded wire is available. Contact factory for details.

209 SERIES AGENCY APPROVALS

Volts (Volts)			Rated Current (Amps)		Interrupting Capacity (Amps)	
Voltage (V)	Frequency (Hz)	Min. Poles	UL/CSA	VDE	UL 489 & CSA	VDE
65	DC	1	.10-100	-	25000	-
125	DC	1	.10-125	.10-100	10000	4000
125/250	DC	2	.10-20	-	5000	-
120	50/60	1 only	.10-50	-	10000	-
120/240	50/60	2	.10-100	-	5000	-
120/240	50/60	2 only	.10-50	-	10000	-
240	50/60	1	.10-100	.10-100	5000	4000
240	400	1	.10-100	-	2500	-
239 Circuit Breakers (Marine)						
Voltage (V)	*Frequency (Hz)*	*Min. Poles*	*UL/CSA*	*VDE*	*UL489 & CSA*	*VDE*
125	DC	1	.10-100	-	5000	-
279 Circuit Breakers for use in Communications Equipment						
Voltage (V)	*Frequency (Hz)*	*Min. Poles*	*UL/CSA*	*VDE*	*UL489A*	*VDE*
160	DC	1	.10-100	-	5000	-

219 MANUAL MOTOR CONTROLLERS AGENCY APPROVALS

Volts (Volts)			Rated Current (Amps)		Interrupting Capacity (Amps)	
Voltage (V)	Frequency (Hz)	Min. Poles	UL	VDE	UL 508	VDE
125	DC	1	.10-100	.10-100	5000	4000
120/240	50/60	2	.10-100	-	5000	-
120/240	50/60	2	.10-100	-	10000	-
240	50/60	1	.10-100	.10-100	5000	4000
240/415	50/60	2	-	.10-100	-	4000
277	50/60	1	.10-100	-	5000	-
277/480	50/60	2	.10-100	-	5000	-
277/480	50/60	2	.10-100	-	10000(1)	-
480	50/60	2	.10-100	-	10000(1)	-
600	50/60	2	.10-77	-	10000(1)	-
250	400	1	.10-100	-	5000	-
Notes: (1) With 225 A maximum series fuse						

229 SUPPLEMENTARY PROTECTORS* AGENCY APPROVALS

Volts (Volts)								Rated Current (Amps)		Interrupting Capacity (Amps)	
Voltage (V)	Frequency (Hz)	UG	FW	Phase	Min. Poles	TC	OL	UL/CSA	VDE	UL 1077 & CSA No. 235	VDE
125	DC	A, D	0	-	1	1	0	.10-100	.10-100	U2, 10000 / U1, 5000	4000
125	DC	A, D	0, 3	-	1	1	0	.10-120	.10-100	U2, 5000 / U1, 5000	4000
125/250	DC	A, D	0, 3	-	2	1	1	.10-20	-	U1, 5000	-
300	DC	A, D	0, 3	-	2	1	0	.10-100	-	U1, 5000	-
125/250	50/60	A, D	0	1	2	1	1	.10-115	-	U2, 5000	-
125/250	50/60	A, D	0	1	2	1	0	.10-100	-	U1, 10000	-
250	50/60	A, D	0, 3	1	1	1	0	.10-100	-	U1, 5000	-
277	50/60	A, D	0, 3	1	1	1	1	.10-100	-	U1, 5000	-
277/480	50/60	A, D	0	1 & 3	2	1	1	.10-100	-	C2, 10000(1) / C1, 10000	-
277/480	50/60	A, D	0, 3	1 & 3	2	1	0	.10-100	-	U2, 5000 / U1, 5000	-
347/600	50/60	A, D	0	1 & 3	2	1	0	.10-100	-	C1, 10000(1)	-
347/600	50/60	A, D	0, 3	1 & 3	2	1	0	.10-100	-	U1, 5000	-
480	50/60	A, D	0	3	3	1	0	.10-100	-	C2, 10000(1) / C1, 10000	-
600	50/60	A, D	0	3	3	1	0	.10-77	-	C2, 10000(1) / C1, 10000	-
125/250	400	A, D	0, 3	1	2	2	0	.10-100	-	U2, 1500 / U1, 2000	-
229D Supplementary Protectors (Ignition Protected)											
Voltage (V)	Frequency (Hz)	UG	FW	Phase	Min. Poles	TC	OL	UL/CSA	VDE	UL1500 & CSA	VDE
65	DC	A, D	0, 3	-	1	1	1, (0, CSA)	.10-100	-	U2, 1000/U1,1000	-
250	50/60	A, D	0, 3	1	1	1	1, (0, CSA)	.10-100	-	U2, 1000/U1, 1000	
229G Supplementary Protectors (Generator Use – UL489 Field wired)											
Voltage (V)	Frequency (Hz)	UG	FW	Phase	Min. Poles	TC	OL	UL/CSA	VDE	UL1077 & CSA	VDE
277/480	50/60	A, D	0, 3	3	3	1	1	.10-100	-	U2, 2500	-
347/600	50/60	A, D	0, 3	3	3	1	1	.10-77	-	U2, 2000	-
239 Supplementary Protectors (Marine)											
Voltage (V)	Frequency (Hz)	UG	FW	Phase	Min. Poles	TC	OL	UL/CSA	VDE	UL1077 & CSA	VDE
250	50/60	A, D	0, 3	1 & 3	1	1	1	.10-100	-	U1, 5000	-
125/250	50/60	A, D	0, 3	1	2	1	1	.10-100	-	U1, 5000	-
240	50/60	-	-	1 & 3	1	-	-	-	.10-100	-	4000
240/415	50/60	-	-	3	3	-	-	-	.10-100	-	4000
Notes: (1) With 225A maximum series fuse											

*219 also applicable for CSA approval only.

General notes

All supplementary protectors are of the overcurrent (OC) type
The family of protectors has been evaluated for end use application for use group (UG) A and D

The terminals (FW) – Terminals are coded as follows:
0 – Suitable for factory wiring only
1 – Line terminals evaluated for field wiring
2 – Load terminals evaluated for field wiring
3 – Line and Load terminals evaluated for field wiring

The maximum voltage ratings for which the protectors have been tested are shown in the chart

The current is the amperage range that the protectors have been tested

The tripping current (TC) – Tripping Current is coded as a percentage of the ampere rating:
0 – Tripping current is less than 125% of ampere rating
1 – Tripping current is in the range of 125% to 135% of ampere rating
2 – Tripping current is more than 135% of ampere rating
3 – Tripping current is 135% and meets MCCB trip time requirements

The overload rating (OL) - Designates whether the protector or family of protectors has been tested for general use or motor starting applications.
0 – tested at 1.5 times amp rating for general use
1 – tested at 6 times AC rating or 10 times DC rating for motor starting

The short circuit current rating (SC) – The short circuit rating in amperes following a letter and number designating the test conditions and any calibration following the short circuit test is defined below:
C – Indicates short circuit test was conducted with series overcurrent protection
U – Indicates short circuit test was conducted without series overcurrent protection
1 – Indicates a recalibration was not conducted as part of the short circuit testing
2 – Indicates a recalibration was performed as part of the short circuit testing
3 – Indicates recalibration was performed along with the dielectric and voltage withstand for "Suitable for Further Use" rating

209/219/229/279 DECISION TABLES

How to Order

The ordering code for 209, E-Frame Circuit Breakers may be determined by following the steps in the decision tables shown here.

The coding given permits a self-assigning part number for standard configurations. Factory part numbers are assigned to units with mixed ratings, combinations of styles or construction not listed in the Third Decision Table, etc. With these, it is suggested that order entry be by description and/or drawings, and a part number will be established.

Additionally, it is standard policy to establish a factory-assigned part number whenever a descriptive drawing exists to insure cross reference, traceability and manufacturing control.

When specifying a breaker for AC motor start or high inrush applications, the peak amplitude and surge duration should be specified for factory assistance in rating selection. 209 and 239 are UL listed circuit breakers under file no. E53739 per UL 489.

279 is a UL listed under file no. E192808 per UL 489A.

219 is a UL recognized "Manual Motor Controller" under file no. E41607 per UL 508.

229 is a UL recognized supplementary protector under file no. E66410 per UL 1077.

For example, the following is the code for a single pole breaker with series trip, 50/60Hz, medium inertial delay, 120/240Vac maximum voltage ratings, solderless connector with mounting foot added to the line side of the breaker to facilitate back panel mounting and a current rating of 10.0 amperes.

To determine the ordering number of your particular 209 unit, simply follow the steps shown. You may use this number to place an order or as a reference for further questions you may have.

1 First Decision

Type

209*	Magnetic Branch Circuit Breaker, UL 489 Listed
219	Manual Motor Controller, UL 508 Recognized
229	Supplementary protector, UL 1077 Recognized
279**	Magnetic Circuit Breakers for use in Communication Equipment, UL 489A Listed
229D	Marine Ignition Protection, UL 1500 Recognized
239*	Magnetic Branch Circuit Breaker, UL 489 Listed (marine) DC only.
299	Special Construction, not UL Listed or Recognized

* UL 489 Listed units are rated to 125Vdc maximum.
** UL 489A Listed units are rated to 160Vdc maximum.

2 Second Decision

Poles

-1	Single pole unit
-2	Two pole unit
-3	Three pole unit
-4	Four pole unit
-5	Five pole unit
-6	Six pole unit

Notes:

A 6-32 inserts for front mounting are provided on all units. M3 ISO metric mounting inserts are available and are specified by adding -A at the end of the ordering code above.

B The auxiliary switch is located on the right-hand pole (viewed from terminal end) unless specified otherwise. Auxiliary switches are available on all front or back panel mounts (series construction only). If more than one auxiliary switch is specified use "2R" through "6R" as required.

C Line terminals are 10-32 screws for bus connection to 100 amperes. Load terminals are 10-32 screws to 50 amperes and solderless connectors from 50 to 100 amperes.

D An anti-flashover barrier is supplied between poles on all multi-pole versions with 10-32 stud and 1/4-20 stud terminals per UL requirement.

E The standard current values for 100% of rated current are those listed in the Seventh Decision Table. Non-listed values can be readily supplied, in general without delayed delivery. Please contact an Airpax office or sales representative.

3 Third Decision

-0	Switch only
-1	Series
-1REC4	Auxiliary switch* (std.) .110 quick connect
-1REG4	Auxiliary switch* .110 quick connect†
-1REC5	Auxiliary switch* .187 quick connect
-3	Shunt (up to 50 amp only)**
-4	Relay (up to 50 amp only)**

† Gold contacts
* Switch is located in the right hand pole (viewed from terminal end) unless otherwise specified.
** Not available in 209 type.

6 Sixth Decision

Terminal Selection

	Terminal	Terminal Connect	Panel Mount
-1	Solderless connector	front	front (Note A)
-2	Solderless connector	front	back*
-2C	Solderless connector	front	back**
-3	10-32 screw (100 amps max.)	bus connect	back (Note C)*
-3C	10-32 screw (100 amps max.)	bus connect	back (Note C)**
-4	10-32 screw (50 amps max.)	front	front
-5	10-32 screw (50 amps max.)	front	back*
-5C	10-32 screw (50 amps max.)	front	back**
-6	1/4 - 20 screw (100 amps max.)	front	front
-7	1/4 - 20 screw (100 amps max.)	front	back*
-7C	1/4 - 20 screw (100 amps max.)	front	back**
-8	10 - 32 stud (50 amps max.)	back	front (Note D)
-9	1/4 - 20 stud (100 amps max.)	back	front (Note D)
-3M	M5 x 0.8 screw (100 amps max.)	bus connect	back (Note C)*
-4M	M5 x 0.8 screw (50 amps max.)	front	front
-5M	M5 x 0.8 screw (50 amps max.)	front	back*
-6M	M6 x 1.0 screw (100 amps max.)	front	front
-7M	M6 x 1.0 screw (100 amps max.)	front	back*
-8M	M5 x 0.8 stud (50 amps max.)	back	front (Note D)
-9M	M6 x 1.0 stud (100 amps max.)	front	front (Note D)

* Back panel mount style supplied with slotted mounting bracket. Solderless connector will accept #14 through 0 copper or #12 through 0 aluminum wire.
** Back panel mount style supplied with short mounting bracket.

Example:

209 - 1 - 1 - 65 - 3 - 2 - 10 - H - V

1 2 3 4 5 6 7 8

4 Fourth Decision

Hz and Delay

Standard		Option
41	400Hz short delay	41F
42	400Hz medium delay	42F
43	400Hz long delay	43F
50	DC instant trip	
51	DC short delay	51F
52	DC medium delay	52F
53	DC long delay	53F
60	50/60Hz instant trip	
61	50/60Hz short delay	
62	50/60Hz medium delay	
63	50/60Hz long delay	
64	50/60Hz short delay (high pulse)	
65	50/60Hz long delay (high pulse)	
66	50/60Hz motor delay (high pulse)	
SW	Switch only (no delay)	

An "F" after any delay denotes high pulse tolerance construction.

5 Fifth Decision

Voltage and Current

	Maximum Voltage	Maximum Current (Amperes)
-1	65Vdc††	100
-2	125Vdc	100
-3	120/240Vac	100
-4	240Vac	100
-5*	277/480Vac†	100
-6	277Vac	100
-7*	600Vac	77
-8*	480Vac †††	100
-9**	160 Vdc	100

* Multi-pole only
** For 279 ratings only
† 240/415Vac iWyeî only for VDE
†† For 229D ratings only
††† Two poles breaking minimum

V = VDE Approved

The shaded areas denote VDE Approval options. This approval requires the addition of a V at the end of the part number. The V will be added to any part number formed entirely from shaded decisions. If non-shaded areas are selected, the unit will not be VDE Approved, but other approvals still apply.

7 Seventh Decision

Current Ratings

Amps	Amps
.1	10
.25	15
.5	20
1	25
2	30
2.5	50*
3	60
5	70
7.5	100 *

Non-Standard currents are available. (Note E).
*Switch only ratings.

8 Eighth Decision

Optional

A	Metric mounting inserts M3 (Note A)
H	International handle markings

Multi-pole units with mixed construction poles numbered left to right when viewed from terminal end.

How to Order

To evolve a convenient ordering system for most applications, the following code has been developed. If a system is required which is not covered below, please consult factory or describe in detail. The number shown as an example describes a 120 volt, three section system, such as may be used on a boat with a port and starboard shore power receptacle and an AC generator. The breaker rating for the shore power is 30 amperes and for the generator 20 amperes in this example. 1/4 -20 screw type terminals and a medium time delay are specified.

Example:

249 - 6 -C -20 -30 - 30 - 2 - 62 - 1

1 2 3 3 3 4 5 6

1 First Decision

Total Number of Poles

-2	2
-4	4
-6	6
-8	8
-9	9

2 Second Decision

Total Number of Poles

Code	Number of Selections	Breaker Poles Per Section
-A	2	1
-B	2	2
-C	3	2
-D	4	2
-E	2	3
-F	3	3

3 Third Decision

Current Rating (Each Section)

Indicate the actual rating from the list below for each section (left to right when viewed from front.)
-10, -15, -20, -25, -30, -50, -60, -70, -100

4 Fourth Decision

Terminals

-1*	Box type solderless wire connect
-2	1/4 - 20 screw
-3	1/4 - 20 stud (for back connection)

* -1 box type connector not supplied on 239 marine applications.

5 Fifth Decision

Trip Time Delay

-51 or 51F	Short DC
-52 or 52F	Medium DC
-53 or 53F	Long DC
-61	Short AC
-62	Medium AC
-63	Long AC
-64	Short AC (high pulse)
-65	Medium AC (high pulse)
-66	Long AC (high pulse)

6 Sixth Decision

Application

-1	Marine (239 Breaker)
-2	Industrial (209 Breaker)