KLIXON

APD Series Circuit Breakers

Arc Fault Protection Device

Features

- Small and lightweight
- Current ratings 1-25 amperes
- Detects arcs over considerable distances
- Senses small arc currents in presence of large current loads
- Insensitive to RFI/EMI and cross talk signals
- Differentiates between normal load current and arc current
- Immune to load start up transients
- Retrofitable – fits into existing panel designs

Overview

The Arc Fault Circuit Breaker series has been developed by Texas Instruments to meet the evolving needs of the aerospace industry. Traditional circuit breakers were only designed to detect over-current (I^2t) conditions. However, many serious electrical incidents are caused by low level arc fault conditions resulting from damaged or aging wire which present generation circuit breakers are not designed to detect or protect against.

TI recognizes the evolving requirements of the aerospace industry and the need for supplemental arc fault protection. TI developed a small, lightweight package configuration based around proven Klixon® commercial and mil-spec circuit breaker designs, integrating the traditional over-current trip features of today's circuit breakers with new supplemental arc fault detection and protection features. shut down for motor, fan, strobe light, or fluorescent light.

The two arc fault catalog pages represent the first generation of arc fault circuit breakers that will be used in the commercial aerospace market. The first generation design is based upon the industry need to support 120VAC, 400 Hz aircraft applications.

Future design considerations for the arc fault circuit breakers under development by TI comprehend and include:

- Arc fault trip indication
- 28VDC
- Operating temperature range expansion
- Single phase 30–100A
- Three–phase development
- Ground fault detection
- Variable voltage and frequency options

Ambient Temperature Compensation

The arc fault series of circuit breakers are based on the design of our existing ambient compensated circuit breakers product family permitting system designers to specify smaller gauge wire where the circuit breaker and wiring are exposed to different ambient temperatures. The arc fault circuit breakers can operate over a temperature range of -54°C to 71°C however, care should be taken to understand the specification limits at elevated ambient temperatures.

Trip Free

The complete line of arc fault series circuit breakers is trip free. The circuit breaker cannot be maintained closed during an overload, even when the actuator is held closed.

High Short Circuit Capacity

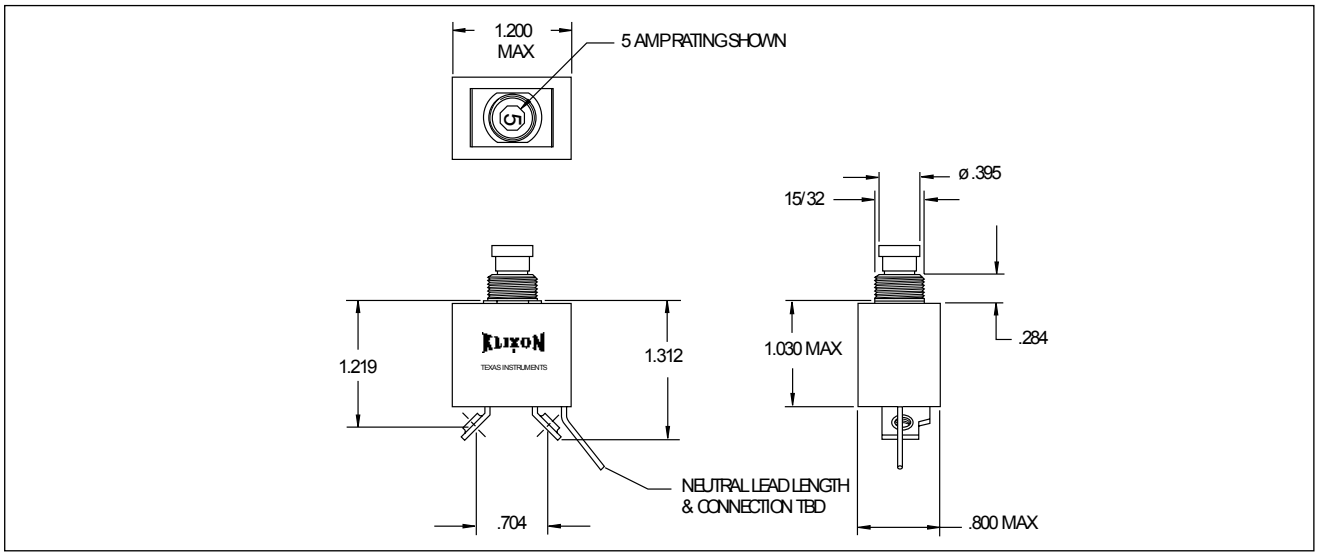
The arc fault series of circuit breakers offers unusually high short circuit current interrupting capacity. Depending on the device, overloads of up to 3500 amps at 120VAC, 400 Hz can be safely interrupted.

Options

Longer push buttons
High vibration
Random vibration capability
U.S. terminals (offset/inline)
Metric mounting threads

Characteristics

Arc Fault



Calibration: 1-25 amps

TEMP °C	MIN ULT TRIP	MAX ULT TRIP	TRIP TIME - SECONDS		
			200%	500%	1000%
+25	115%	138%	4-16	.4-1.6	.10-.40
-54	115%	165%	7-35	.6-3.0	.15-.70
+121	85%	145%	2-13	.25-1.0	.06-.25

Vibration*..... 10 G's minimum, 50 - 500 Hz
Mechanical Shock..... 50 G's
Acceleration..... 10 G's
Weight..... 42 gm max

Interrupt Current

1-20 amps: 6000 amps at 28 VDC
25 amps: 1625 amps at 28 VDC
1-15 amps: 2500 amps at 120 VAC, 400 Hz
20 amps: 2000 amps at 120 VAC, 400 Hz
25 amps: 1800 amps at 120 VAC, 400 Hz

Endurance

2500 cycles 120 VAC, 400 Hz Inductive
5000 cycles 120 VAC, 400 Hz Resistive
2500 cycles 30 VDC Inductive
5000 cycles 30 VDC Resistive
10,000 cycles Mechanical, no load

* Other vibration levels available. Contact factory for details.

Performance:

Discrimination (resistance to nuisance trips)
Devices manufactured by TI have demonstrated success on start up, bus transfer, and shut down for motor, fan, strobe light, and fluorescent light.

Detail performance per test document 76508
Phase to Phase and Phase to Ground 400 Hz, 120/205VAC

Guillotine Arc Test:
Guillotine Arc Current .....Less than 700% RC rms
Steady State Load .....None to rated current
Maximum Arcing Cycles ....Eight
Arcing Time Duration .....Less than 100ms

Loose Terminal Arc Detection
Steady State Load .....Less than 40% RC rms
Tripping Time: .....Less than 2 minutes
Vibration Source .....Eccentric motor vibratory table

Wet Arc Detection
MIL-STD-2223 Method 3005, wire per MIL-W-81381/11

Approximate Time-Current Curves – APD Circuit Breakers