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DIN rail MCB/RCD/Fuse Holder

ABB offerings and product application

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Tanvi is the Product Marketing Specialist for ABB Miniature circuit breakers (MCB), Residual current devices (RCD) and Fuse holders. I joined ABB in September 2022 and leads the go-to-market strategy and positioning for her product lines.

I have 11 years of experience in the electrification industry and began her career as a test engineer for DIN rail products in India. Later worked for Schneider Electric for more than 5 years as a design engineer for enclosures and RCDs.

Received my MBA from the Institute of Management Technology and Bachelor's in Electrical Engineering India.

Agenda

- MCB function and types
- RCD function, application and types
- Fuse holders features and types
- Links to useful Resources
- Q&A

MCB

Types, function and portfolio

Hugo Stotz

A pioneer of the MCB

1923 provided a historical milestone in pioneering electrical technology. Hugo Stotz and his team designed and successfully patented a device that would revolutionize circuit protection worldwide. The idea of Hugo Stotz and his design engineer Heinrich Schachtner was to produce an automatic tripping device that combined a bimetallic thermal overload together with a magnetic trip.

The miniature circuit breaker that the electrical industry relies upon today has evolved from the fundamental design and patent of Hugo Stotz

The Stotz company became part of BBC in 1918, further BBC and ASEA mergerd as the ABB group in 1988 and has been continuously producing miniature circuit breakers since.

Hugo Stotz

This miniature circuit breaker design continued to be in production for 22 years up until 1950

MCB and its types

Overview

Miniature Circuit Breaker is an electro-mechanical mechanism of action. It provides protection of circuits against overload and short circuit. It is an automatic switch that opens when excessive current flows through the circuit.

A branch circuit breaker, according to UL 489

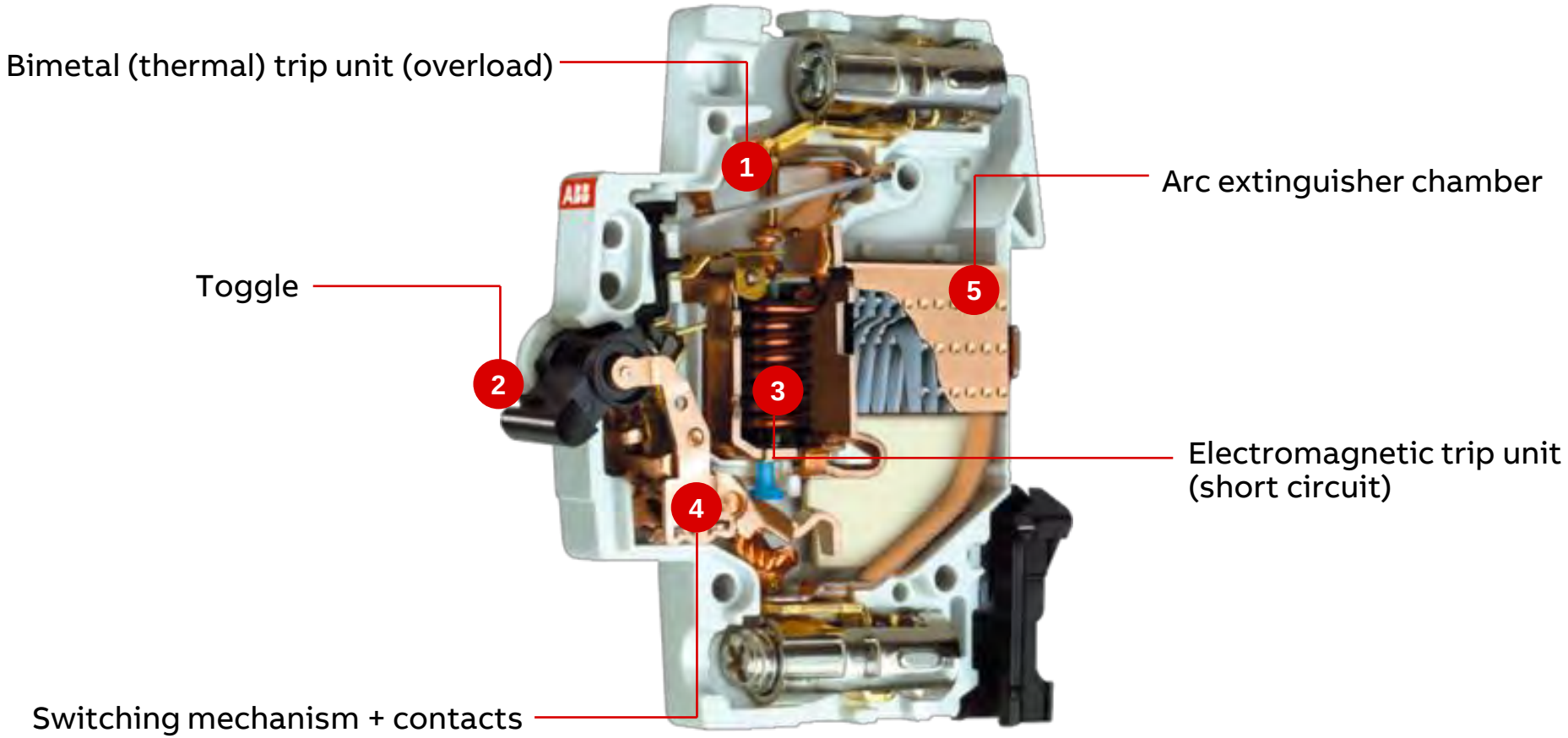
Self-contained independent protection device

A supplementary protector, according to UL 1077

Helps in selectivity of upstream and downstream breaker

Internal Design of MCB

Function of the two trip units



Tripping Characteristics

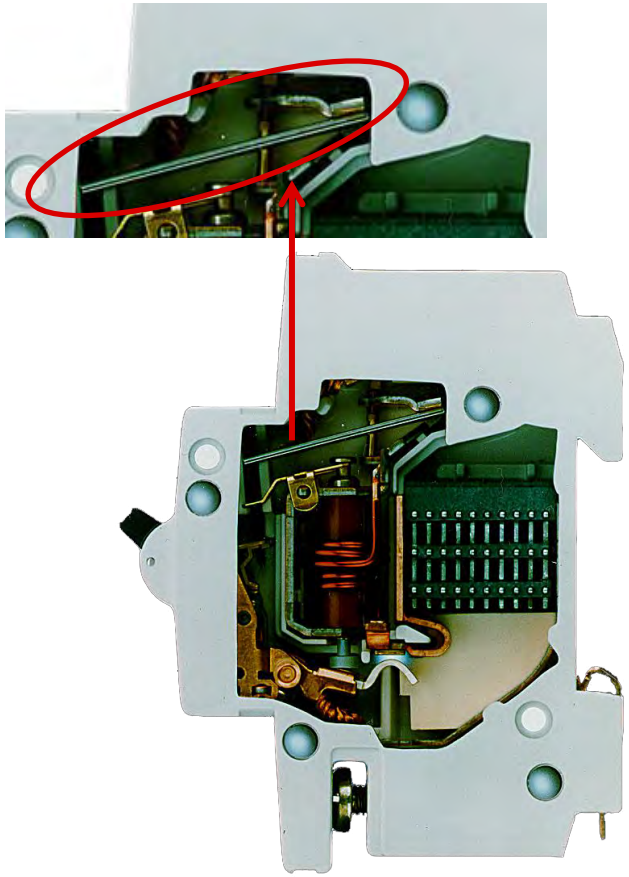
UL 489 / UL 1077: Thermal Tripping

7.1.2.3 135 percent calibration test

7.1.2.3.1 A circuit breaker carrying 135 percent of its rated current … shall trip within 1 hour for a device rated at 50 A or less, and within 2 hours for a device rated at more than 50 A. Unless otherwise directed, the test sample shall be at the ambient temperature indicated …

7.1.2.4 100 percent calibration test

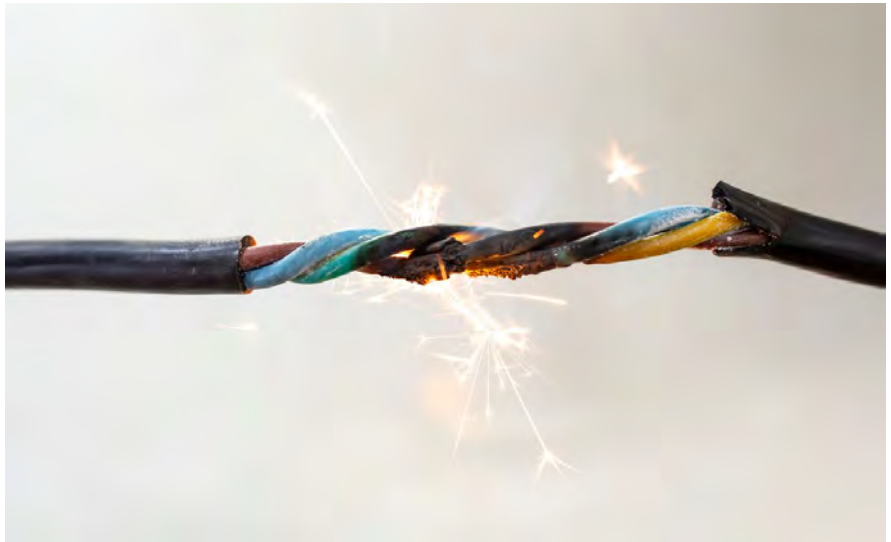
7.1.2.4.1 A circuit breaker shall be capable of carrying 100 percent of its rated current without tripping …



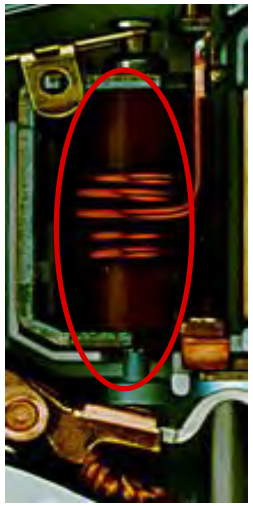
Example - Overload

Tripping Characteristics

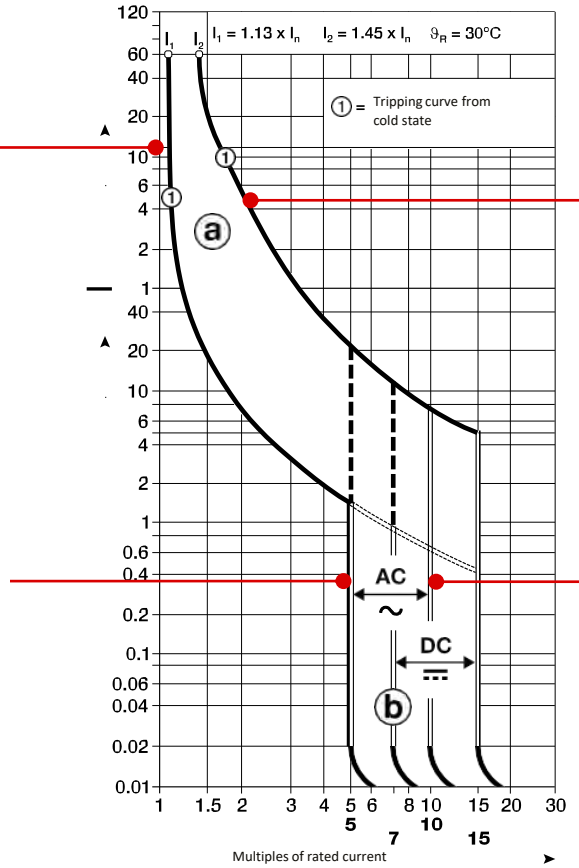
Electromagnetic tripping



Example – Short circuit



Example: C trip curve



Non-tripping threshold:
The breaker is not allowed to trip before this point

Tripping threshold:
The breaker has to trip at this point at the latest

Trip curves

B-C-D-K-Z for electromagnetic tripping

Note

- Magnetic trip curve at 50/60 Hz:
  at higher frequencies or DC delayed up to 1.5x

- Z and B curves are generally used for resistive loads where there are no inrush where as C,D, K curves are used where there are mild and high inrushes in the system

- Trip range:

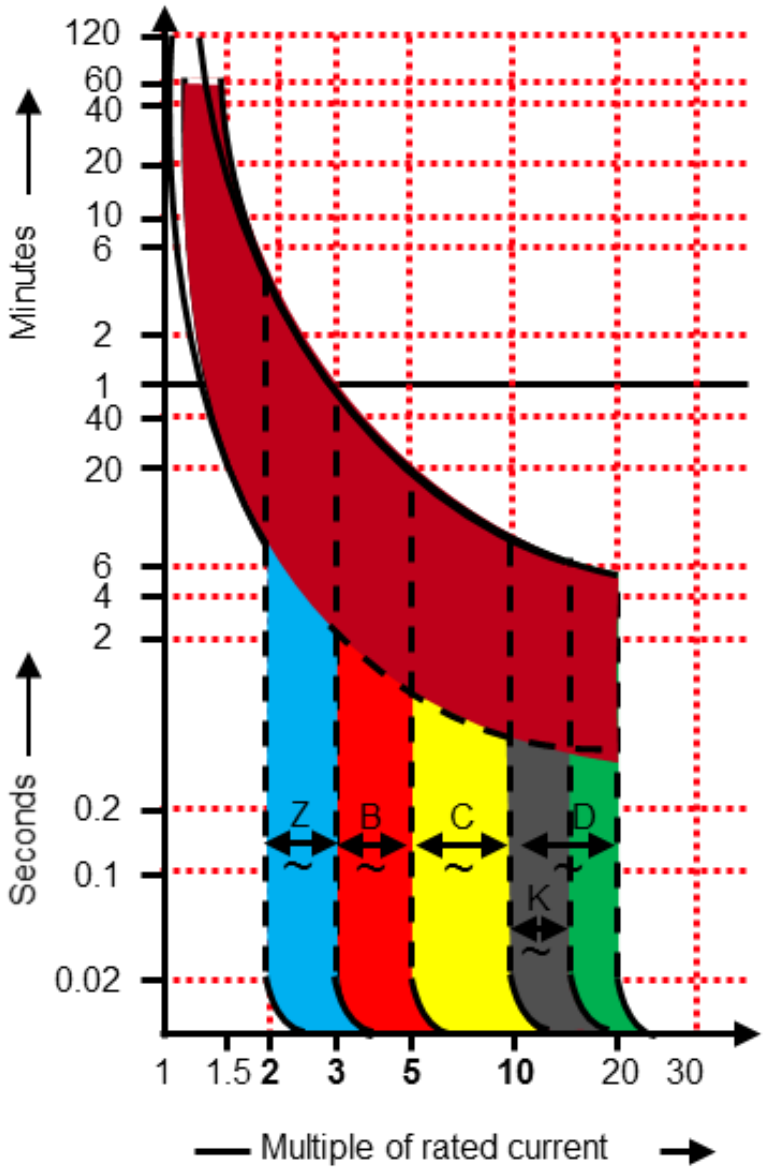
  Z curve = 2In – 3In

  B curve = 3In – 5In

  C curve = 5In – 10In

  K curve = 10In – 14In

  D curve = 10In – 20In



UL 489 Miniature Circuit Breakers

Product family overview

Technical criteria							
Product Identity	SU200M	SUP200M	SU200MR	S200UDC	SU200ML	S800U	S804U-UCZ
Interrupt Rating	10 kA	14 kA	10 kA	14 kA	14 kA	30/50kA (1-/multipole)	10kA
Current Rating	0.2 to 63A	1 to 40A (K:35)	0.2 to 63A	1 to 63A	0.2 to 63A	10 to 100A	10 to 80A
Rated Voltage	480Y/277 V AC 48/96 V DC	480Y/277 V AC	480Y/277 V AC	125/250 V DC	230 V AC	240 V AC	600 V DC
Characteristics	C,K,Z	C,K,Z	K	K,Z	C,K,Z	Z(B),K	Z(K)
Poles	1P - 4P	1P - 3P	1P - 4P	1P - 2P	1P - 4P	1P - 4P	4 in series
Max 1pole dimension (in)	2.98x0.68x4.37	2.98x0.68x4.37	2.98x0.68x4.52	3.06x0.68x3.62	2.72x0.68x3.72	3.48x1.04x3.74	3.48x4.17x5.59
Auxiliary contact	yes	yes	yes	yes	yes	yes	-
Bell alarm	yes	yes	yes	yes	yes	yes	-
Shunt trip	yes	yes	yes	yes	yes	yes	-
Special Features	-	14kA Interrupt Rating	Ring tongue terminal	Upgraded to 125/250 VDC 60/125 VDC for 50 – 63 A	Smallest/compact UL 489 MCB 230V range 14kA	Ring tongue terminal Compact for 30/50kA	-

UL 1077 Miniature Circuit Breakers

Product family overview







Product Identity	ST200M	S200MR	S200MUC	S800S	S800C	S300P	ST200MTR
Interrupt Rating	10/5 kA	10kA	up to 10kA	upto 30kA	upto 20kA	10kA	ST200MTR :6kA ST200MTR(DC) :10kA
Current Rating	0.5 to 63A	0.2 to 63A	0.2 to 63A	0.5 to 63A	10 to 100A	0.2 to 63A	0.5 to 63A
Rated Voltage	480Y/277 V AC 60/125 V DC (1-/2-pole)	480Y/277 V AC	480Y/277 V AC 250/500 V DC (1-/2-pole)	630Y/347 V AC	480Y/277 V AC upto 500 V DC	480Y/277 V AC 60/125 V DC (1-/2-pole)	480Y / 277 V AC 1P: 250 V DC and 2+4P: up to 500 VDC
Characteristics	B,C,D,K,Z	K	C,K,Z	B,C,D,K	B,C,D,K	B, C, D, K, Z	K and Z
Poles	1P - 4P	1P - 4P	1P - 4P	1P - 4P	1P - 4P	1P - 4P	1P- 4P AC 1P, 2P and 4P DC
Max 1pole dimension (in)	2.98x0.68x3.46	2.98x0.68x3.94	2.98x0.68x3.46	3.48x1.04x3.74	3.48x1.04x3.74	2.98x0.68x3.46	2.95x0.68x3.94
Auxilliary contact	yes	yes	yes	yes	yes	yes	yes
Bell alarm	yes	yes	yes	yes	yes	yes	yes
Shunt trip	yes	yes	yes	yes	yes	yes	yes
Bottom-mount aux.contact	yes	-	yes	-	-	yes	-
Busbars	yes	yes	yes	-	-	yes	Ring tongue Busbar

Key benefits and features

Rotary handle helps in cost and space reduction by eliminating the need for a disconnect switch

Field wiring terminals allow direct wiring to power supply w/o installing terminal blocks for UL 1077 breakers- cost and space saving

Bottom-mount aux. contact- reduces footprint /space/cost

Motor operator can be used to remotely turn ON-OFF the MCB - Reducing service / maintenance effort

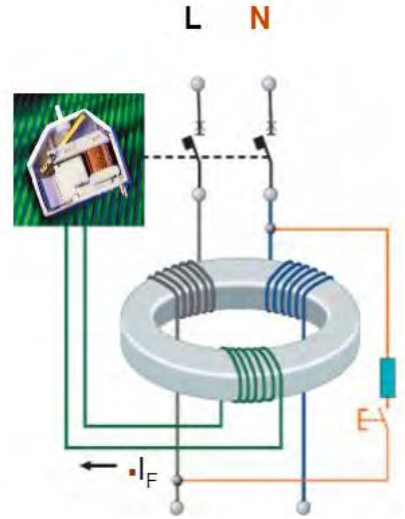
New development – LOTO with safety feature
Padlock cannot be put on when MCB is in “ON” position

RCD

How it functions, types and requirements

Product family overview- RCDs

A residual current device (RCD) is a highly sensitive device that switches off an electrical circuit in the event of a fault. If a fault occurs or the voltage goes above zero, a leakage current flows to ground, creating unevenness, which causes the toroidal transformer inside the RCD to trip the mechanism. This device is important for semiconductor manufacturers because it protects the wafer process and prevents costly downtime.



				F200 AC	F200 A	F200 A AP-R	F200 A S	F200 A 110V
	Standards			IEC/EN 61008-1; IEC/EN 61008-2-1, UL 1053 ①				IEC 61008-1; IEC 61008-2-1; UL 1053
Electrical features	Type (wave form of the earth leakage sensed)			AC	A	A	A	A
	Poles			2P ⑤, 4P (for 125 A only 4P)				2P, 4P
	Rated current In		A	16, 25, 40, 63, 80, 100, 125		25, 40, 63, 80, 100, 125	40, 63, 80, 100, 125	25, 40, 63, 80, 100
	Rated sensitivity I∆n		A	0.01-0.03-0.1-0.3-0.5		0.03	0.1-0.3-0.5-1	0.03
	Rated voltage Ue	IEC	V	230/400 - 240/415				
		UL/CSA	V	480Y/277 (up to 100 A)				-
	Insulation voltage Ui		V	500				
	Operating voltage of circuit test Ut	IEC	V	In ≤ 100; Right neutral: 110 (170 for 30mA) - 254 ⑤; Left neutral: 195 (250 for 30 mA) - 440 ⑤ In = 125 A; Right neutral: 185 (150 for 30 mA) - 440 (250 for 30 mA) ⑤; Left neutral: 195 (250 for 30 mA) - 440				110-254
		UL/CSA	V	In ≤ 100; Right neutral: 110 (170 for 30mA) - 277 ⑤; Left neutral: 195 (250 for 30 mA) - 480 ⑤④				
	Rated frequency		Hz	50...60				
	Rated conditional short-circuit current Inc=I∆⑤	SCPD - fuse gG 100 A	kA	10 (for 125 A fuse is gG 125 A)				

NEC requirements

Ground fault equipment protection

Deicing systems

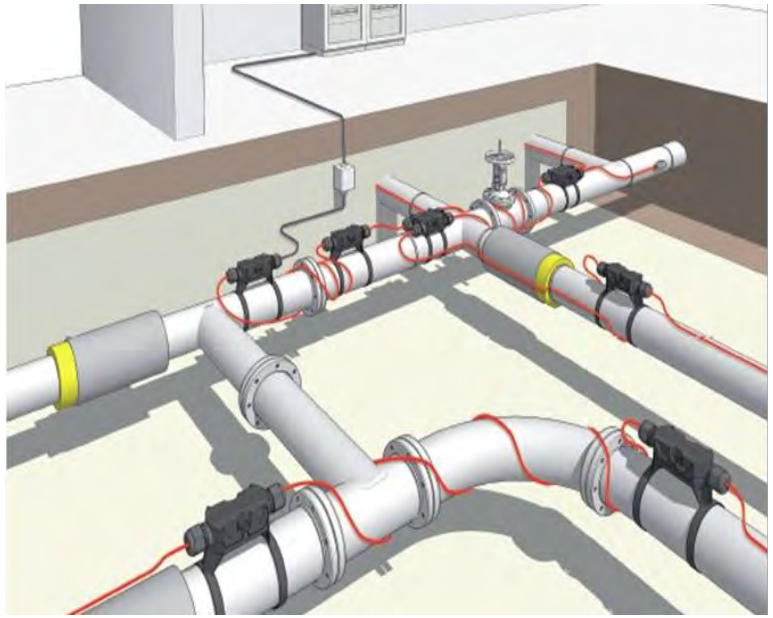
Floating buildings

Marina- Boatyards

NEC requirements

Ground fault equipment protection

Feeders/services rated 1000A & more



Heat trace and pipeline

Health care systems

GFEP opportunities

Applications

Statistics show that 80% of short circuits initially start as ground faults

There are many applications for GFEP in commercial and industrial segments:

- Oil and gas
- Water / wastewater treatment
- Pharmaceutical industry
- Semiconductor machinery
- Wind energy
- EV Chargers

DS201

UL & CSA approved RCBO (UL 1053/1077)

Product Description:
DS201 UL is a combination of a 30 mA RCD and MCB with trip curves B, C and K.

Application:
Protection of supplementary circuits against overload, short circuit and ground fault, wherever space is needed.

- ✓ **DS201 UL (6kA) Char B 6-40**
- ✓ **DS201 UL (6kA) Char C 6-40**
- ✓ **DS201 UL (6kA) Char K 10-20**

Fuse holders

Types and features

Fuse Holder

The function of a fuse holder is to integrate fuses safely in electrical circuits, ensure a robust current path

Fuses just like MCBs provides protection against overload and short circuit

MIDGET:

1. Rated I = 32A, Rated V= 600V AC/DC
2. Available in 1P,1+N,2P, 3P, 3+N, 4P

PV 1000V:

1. Rated I = 30A, Rated V= 1000V DC
2. Available in 1P and 2P

Class CC:

1. Rated I = 30A, Rated V= 600V AC/DC
2. Available in 1P,1+N,2P, 3P, 3+N, 4P
3. Rejection member provision does not allow any other class Fuse to be installed as per UL 4248-4.

Class J:

1. Used for Industrial solution, heating systems, control circuits, Motor and Transformer protection
2. Rated I = 30A and 60A, Rated V= 600V AC/DC
3. Available in 1P, 2P, 3P

PV 1500V:

1. Rated I = 32A, Rated V= 1500V DC
2. Available in 1P

Features

Reliable
Venting grooves and cooling chambers improve heat dissipation even in multiple-pole configurations. The reduced operating temperature inside fuse holders ensures durability and reliability of the devices over time.

Easy to use and operate
The fuse holder profile has been designed for maximum ease of use: the 90° flip hinge with ergonomic knob, makes the replacement of fuses easier even in small spaces or when wearing protective gloves.

Safe
To ensure protection and safety during maintenance and avoid any accidental switching, fuse holders can be sealed in closed position, and padlocked in open position.

Compact
The compact dimensions enable to close the Panels door even when the fuse holder is open, thus ensuring total safety during maintenance.

Signalling
Blown-fuse indicator makes it easy and fast to determine the location of the fault.

Q & A

Thank you for joining us!