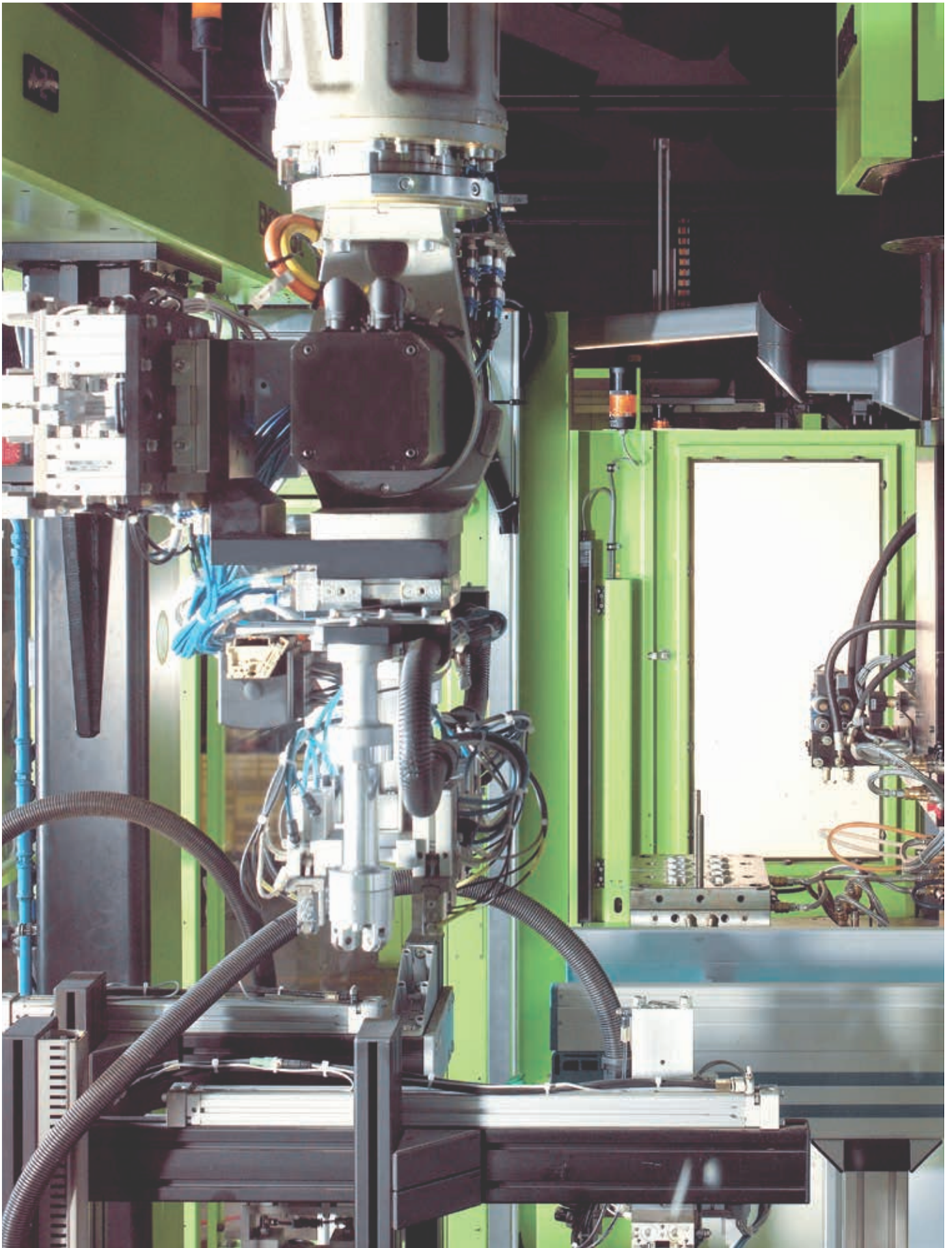




Ground Fault Equipment Protectors

Complete protection of your equipment



What is a ground fault and why it is important to detect it

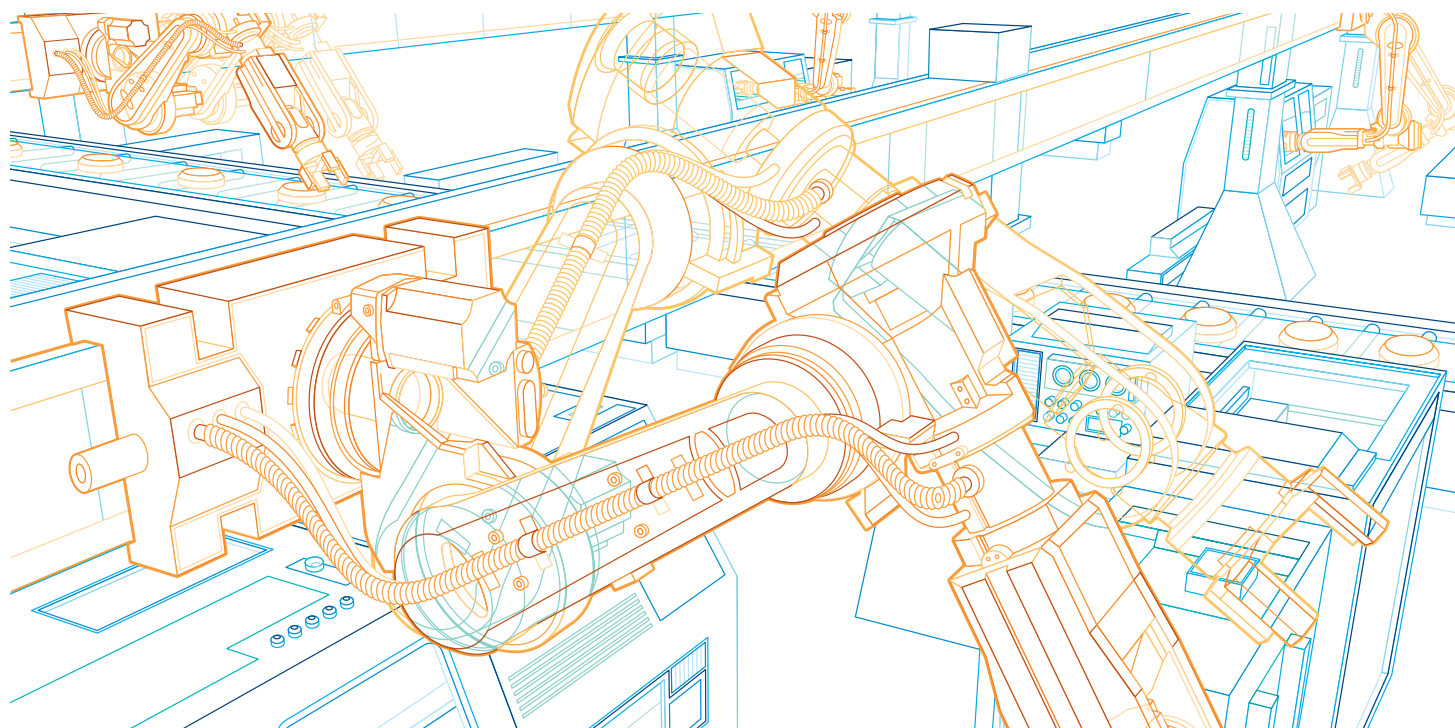
A better understanding of ground fault equipment protection ensures cost savings and increased reliability and safety.

A ground fault is caused by an insulation loss between a live conductor and an exposed conductive part that causes a flow of current to the ground.

This situation may cause serious problems to electrical systems and equipment, as most short circuits initially manifest as undetected ground faults.

A ground fault equipment protector is a device intended to provide protection of equipment against damaging line-to-ground currents by disconnecting all ungrounded conductors of the faulted circuit.

By adding a ground fault equipment protector (GFEP) to the system, ground faults are detected immediately, preventing serious damage.



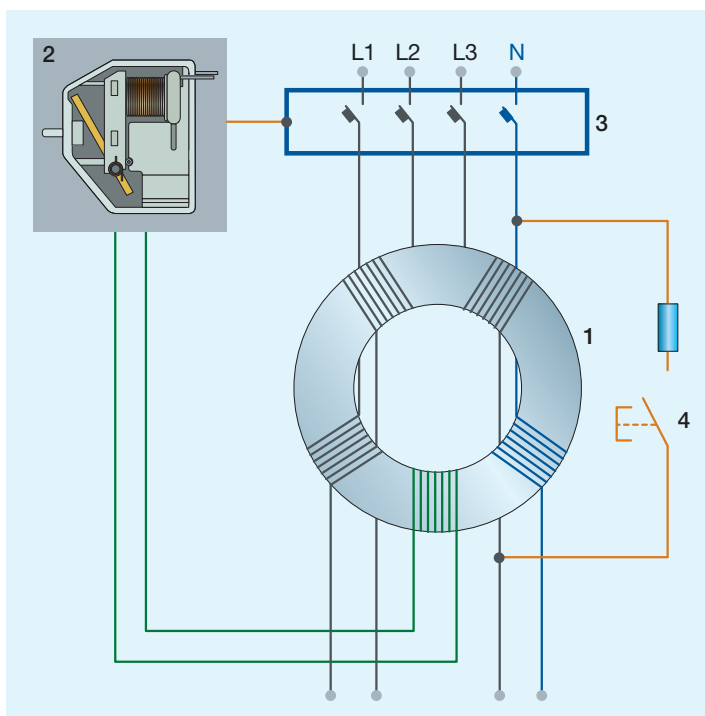
What is a GFEP and how does it work

GFEP is a protection device that trips when the system leaks a significant current to ground.

GFEP continuously measures the current balance between live conductors and the neutral using a toroidal current transformer.

The toroidal current transformer of ABB GFEP (1 in the drawing) measures the difference between the current flowing out from the live conductors and that returning through the neutral conductor. If these do not sum to zero, there is a leakage of current to ground. In the toroidal transformer there is an electro-magnetic flow that generates a current used by an internal relay (2 in the drawing) to open the GFEP contacts.

Thanks to this feature, there is no need for an external power supply, because the key component of the ABB GFEP is an internal relay able to use the limited energy developed by the toroidal transformer to open the contacts (3 in the drawing). ABB GFEPs are equipped with an internal test circuit (4 in the drawing) to verify the proper functioning of the device, using an integrated pushbutton.



The energy required by internal relay to open ABB GFEP contacts is only $25\mu\text{VA}$ (approximately $1/40.000\text{ W}$).

UL standard for GFEP

ABB GFEP are compliant to UL 1053 standard “Ground fault sensing and relaying equipment” that includes requirements that cover ground-fault current sensing devices for use in ordinary locations that will operate to cause a disconnecting device to open all ungrounded conductors at predetermined values of ground-fault current, in accordance with the National Electrical Code, ANSI/NFPA 70.



GFEP applications

By using UL 1053 F200 GFEP in series with UL 489 S200 U and S200 UP MCBs, you will ensure complete protection in a branch circuit from overload, short circuit and ground fault.

In addition, DS951 UL 1053 approved devices can be used as supplementary protectors (UL 1077) to achieve protection from overcurrent and ground fault in single phase circuits.

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

- Oil & gas
- Water/wastewater treatment
- Pharmaceutical industry
- Semiconductor facilities
- Outdoor installations such as ice melting and heat trace
- Water pumps (e.g. fountains, irrigation)
- Heating equipment

Specifically, the use of Ground Fault Equipment Protectors is mandatory for outdoor electric deicing and snow-melting equipment (as per article number 426.28 of the NEC 2011 Edition).

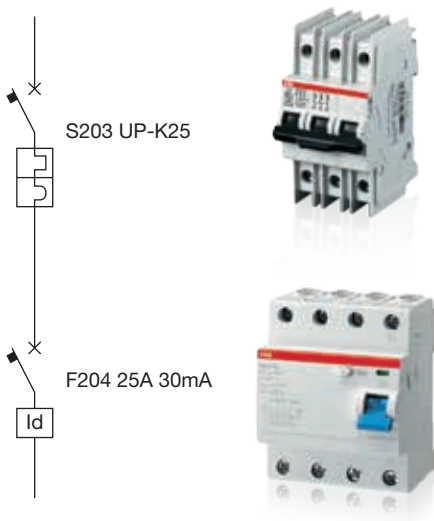
And for OEMs, a machine equipped with a GFEP will be protected, avoiding costly repairs and downtime.

How are Branch Circuits (UL489) and Supplemental Protectors (UL1077) defined?

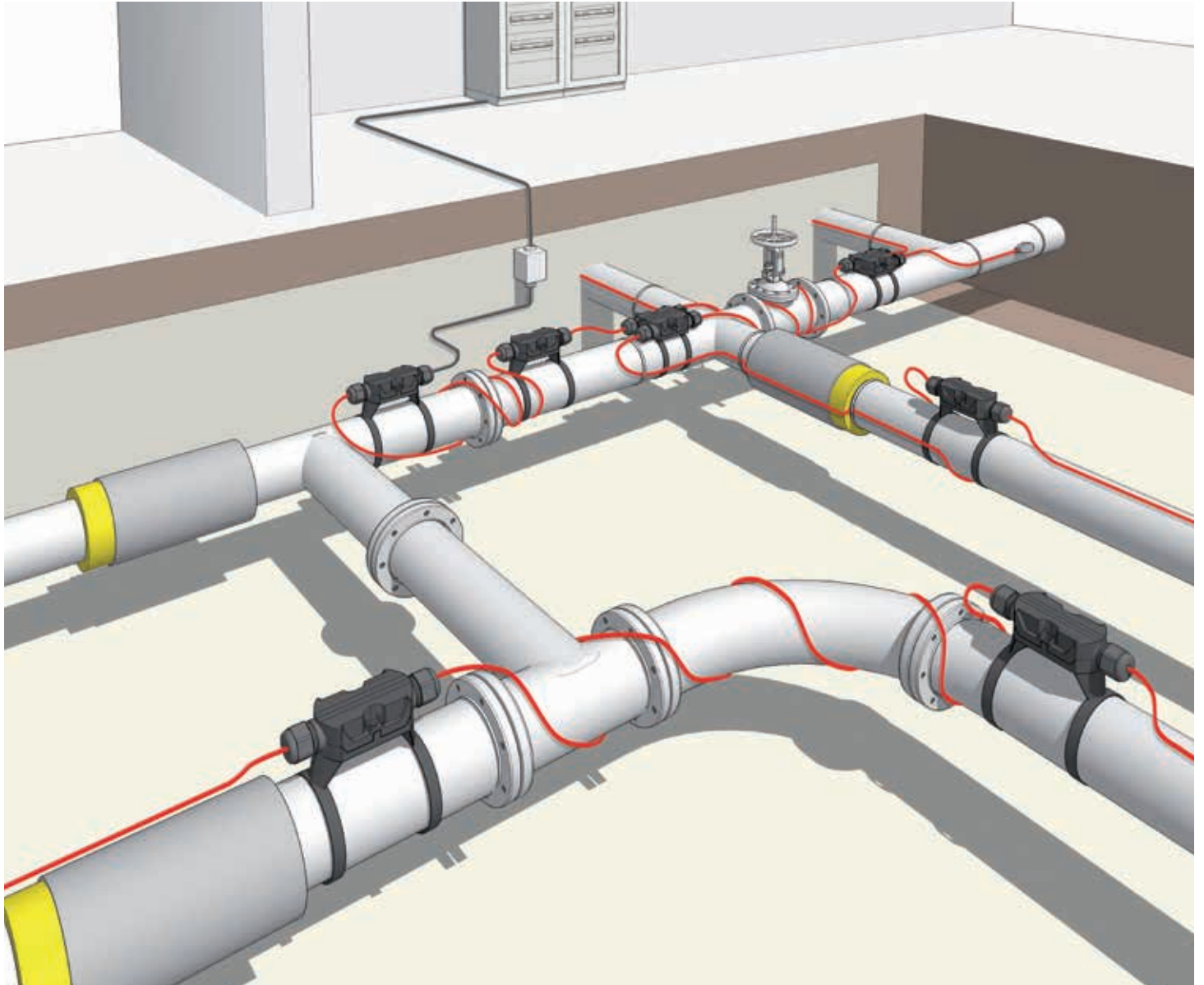
A Branch circuit is defined as a circuit which has the first overcurrent device. UL489 has additional spacing requirements (over surface, through air). Branch protection breakers also have some different spacing, and slight mechanical differences, internally to the breaker, as compared to a Supplemental protector.

A Supplemental Protector is defined as an overcurrent device for protection of the end circuit. These devices require the use of an upstream protective device, or Branch Protection.

Branch Protection is upstream of a piece of equipment, and Supplemental Protection would be an additional overcurrent device at, or in, the equipment.



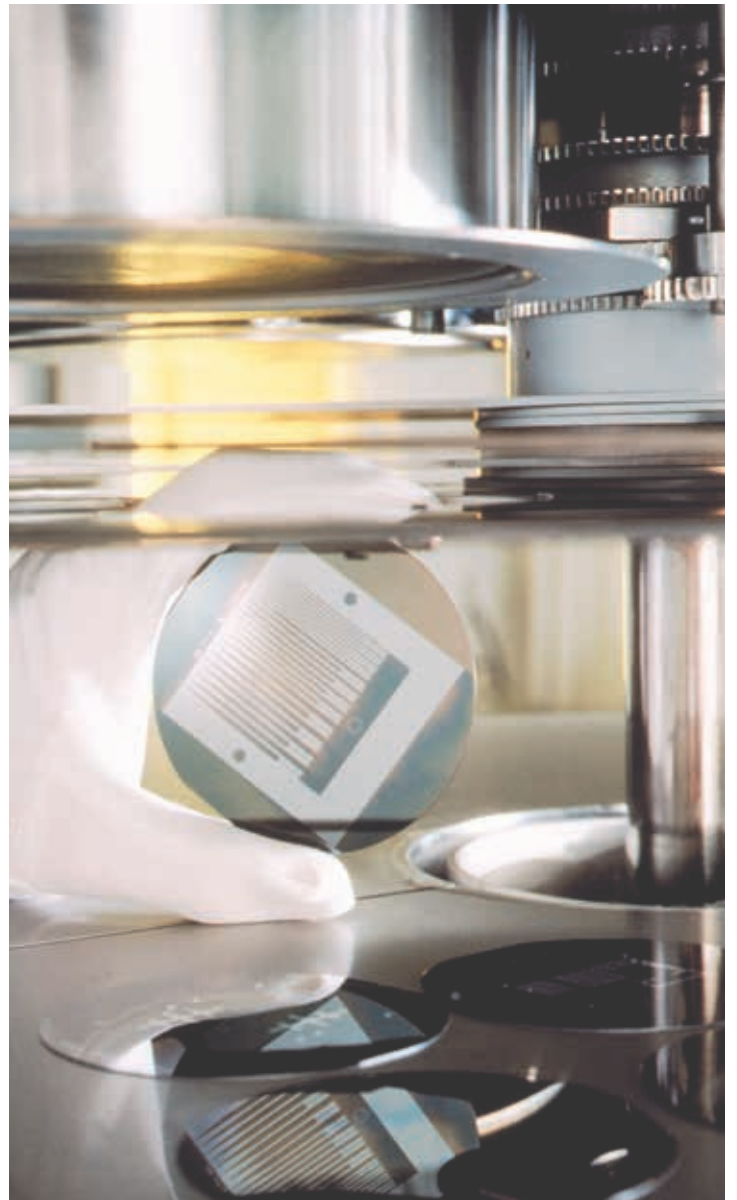
Example of application of F200 GFEP in series with UL 489 S200 UP.



GFEP applications



Industries such as pharmaceutical, oil & gas and semiconductor are prime examples where complete protection against overload, short circuit and ground fault are useful in avoiding downtime.



Main features of F200 GFEP

Details that make the difference

Bi-directional cylindrical terminals provide safe and easy connections.

Contact position indicator (CPI): to always know the status of the contacts (red: closed contacts; green: open contacts) independent of the toggle position.

Test pushbutton to verify the correct functioning of the device.

Device information is laser printed for visibility and long life.



F200 can be used in ambient conditions where the temperature of the surrounding atmosphere has values between -13° F (snowflake with -25°C laser printed on the front of the device) and +131° F.

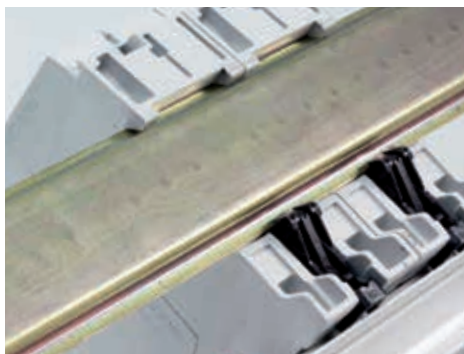


ABB F200 GFEPs are devices suitable for mounting on DIN Rail, the more flexible solution for installation.



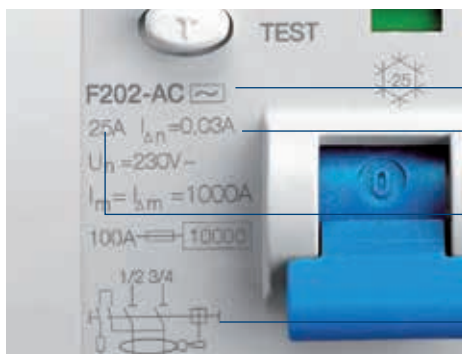
Two terminals are available, the fore one for cables up to 25 mm², the back one for cables up to 10 mm² or for busbars.



The availability of two terminals offers different connection solutions thanks to the possibility to connect two independent cables in the same device: the second terminal can be used for an auxiliary circuit or for the supply of devices with small section cables without connecting them together with the main circuit.



Approval marks in an easily visible area, even when installed.



- Type
- Rated residual current (according to IEC 61008)
- Rated current
- Wiring diagram

Device performance factors also printed:

- Rated breaking capacity and rated residual breaking capacity:
 $I_m = I_{\Delta m} = 1000 \text{ A}$
- Coordination with a 100 A rated current SCPD (short-circuit protective device, fuse) = 10000 A.

Voltage and frequency ratings suitable for installation in North America networks:

- F202 2-pole devices,
120...277 V AC, 60 Hz
- F204 4-pole devices,
120...480Y V AC, 60 Hz

ABB GFEP product range F200

F200 AC type

Protection against the effects of sinusoidal alternating ground fault currents.



No. of poles	Rated residual current according to IEC 61008-1 $I_{\Delta n}$ [mA]	Pick-up current according to UL 1053	Rated Current [A]	Catalog number
2	10	$0.65 \times I_{\Delta n}$	16	F202AC-16/0.01
			25	F202AC-25/0.03
			40	F202AC-40/0.03
			63	F202AC-63/0.03
			80	F202AC-80/0.03
			100	F202AC-100/0.03
	30		25	F202AC-25/0.1
			40	F202AC-40/0.1
			63	F202AC-63/0.1
			80	F202AC-80/0.1
			100	F202AC-100/0.1
			100	F202AC-100/0.3
	100		25	F202AC-25/0.3
			40	F202AC-40/0.3
			63	F202AC-63/0.3
			80	F202AC-80/0.3
			100	F202AC-100/0.3
			100	F202AC-100/0.5
300	25	F202AC-25/0.5		
	40	F202AC-40/0.5		
	63	F202AC-63/0.5		
	80	F202AC-80/0.5		
	100	F202AC-100/0.5		
	100	F202AC-100/0.5		
4	30	$0.65 \times I_{\Delta n}$	25	F204AC-25/0.03
			40	F204AC-40/0.03
			63	F204AC-63/0.03
			80	F204AC-80/0.03
			100	F204AC-100/0.03
			100	F204AC-100/0.03
	100		25	F204AC-25/0.1
			40	F204AC-40/0.1
			63	F204AC-63/0.1
			80	F204AC-80/0.1
			100	F204AC-100/0.1
			100	F204AC-100/0.3
	300		25	F204AC-25/0.3
			40	F204AC-40/0.3
			63	F204AC-63/0.3
			80	F204AC-80/0.3
			100	F204AC-100/0.3
			100	F204AC-100/0.5
500	25	F204AC-25/0.5		
	40	F204AC-40/0.5		
	63	F204AC-63/0.5		
	80	F204AC-80/0.5		
	100	F204AC-100/0.5		
	100	F204AC-100/0.5		



F200 A type

Protection against the effects of sinusoidal alternating and direct pulsating ground fault currents.



No. of poles	Rated residual current according to IEC 61008-1 $I_{\Delta n}$ [mA]	Pick-up current according to UL 1053	Rated Current [A]	Catalog number
2	10	$0.65 \times I_{\Delta n}$	16	F202A-16/0.01
			25	F202A-25/0.03
			40	F202A-40/0.03
			63	F202A-63/0.03
			80	F202A-80/0.03
	30		100	F202A-100/0.03
			25	F202A-25/0.1
			40	F202A-40/0.1
			63	F202A-63/0.1
			80	F202A-80/0.1
	100		100	F202A-100/0.1
			25	F202A-25/0.3
			40	F202A-40/0.3
			63	F202A-63/0.3
			80	F202A-80/0.3
	300		100	F202A-100/0.3
			25	F202A-25/0.5
			40	F202A-40/0.5
			63	F202A-63/0.5
			80	F202A-80/0.5
500	100	F202A-100/0.5		



4	30	$0.65 \times I_{\Delta n}$	25	F204A-25/0.03
			40	F204A-40/0.03
			63	F204A-63/0.03
			80	F204A-80/0.03
			100	F204A-100/0.03
	100		25	F204A-25/0.1
			40	F204A-40/0.1
			63	F204A-63/0.1
			80	F204A-80/0.1
			100	F204A-100/0.1
	300		25	F204A-25/0.3
			40	F204A-40/0.3
			63	F204A-63/0.3
			80	F204A-80/0.3
			100	F204A-100/0.3
	500		25	F204A-25/0.5
			40	F204A-40/0.5
			63	F204A-63/0.5
			80	F204A-80/0.5
			100	F204A-100/0.5

ABB GFEP product range F200

F200 A-APR type

Protection against the effects of sinusoidal alternating and direct pulsating ground fault currents, providing the best compromise between safety and continuity of service thanks to an higher resistance to nuisance trippings.



No. of poles	Rated residual current according to IEC 61008-1 $I_{\Delta n}$ [mA]	Pick-up current according to UL 1053	Rated Current [A]	Catalog number
2	30	$0.65 \times I_{\Delta n}$	25	F202A-25/0.03APR
			40	F202A-40/0.03APR
			63	F202A-63/0.03APR
			80	F202A-80/0.03APR
			100	F202A-100/0.03APR



4	30	$0.65 \times I_{\Delta n}$	25	F204A-25/0.03APR
			40	F204A-40/0.03APR
			63	F204A-63/0.03APR
			80	F204A-80/0.03APR
			100	F204A-100/0.03APR

F200 A-Selective type

Protection against the effects of sinusoidal alternating and direct pulsating ground fault currents with an intentional tripping delay.



No. of poles	Rated residual current according to IEC 61008-1 $I_{\Delta n}$ [mA]	Pick-up current according to UL 1053	Rated Current [A]	Catalog number
2	100	0.65 x $I_{\Delta n}$	40	F202AS-40/0.1
			63	F202AS-63/0.1
			100	F202AS-100/0.1
	300		40	F202AS-40/0.3
			63	F202AS-63/0.3
			100	F202AS-100/0.3
	500		40	F202AS-40/0.5
			63	F202AS-63/0.5
			100	F202AS-100/0.5
	1000		40	F202AS-40/1.0
			63	F202AS-63/1.0
			100	F202AS-100/1.0



4	100	0.65 x $I_{\Delta n}$	40	F204AS-40/0.1
			63	F204AS-63/0.1
			100	F204AS-100/0.1
	300		40	F204AS-40/0.3
			63	F204AS-63/0.3
			100	F204AS-100/0.3
	500		40	F204AS-40/0.5
			63	F204AS-63/0.5
			100	F204AS-100/0.5
	1000		40	F204AS-40/1.0
			63	F204AS-63/1.0
			100	F204AS-100/1.0

Main features of DS951

Details that make the difference

Test pushbutton to periodically verify the correct functioning of the device



Two-color operation toggle (red and green), which enables users to check the status of the device in a distance (open-close)

Blue window indicator: to clearly identify the RCBO has tripped for earth fault

Laser printed order code on the front of the device to make easier future orders

ABB offers a range of 1P+N RCBOs (Residual current devices with overcurrent protection) DS951 UL that are approved according to UL 1053 standard “Ground-Fault Sensing and Relaying Equipment” making them suitable for installation in equipments/ machines addressed to North American market.

The RCBOs DS951 UL 1053 approved in only two modules width offer complete protection against overload, short-circuit and ground fault. They are equipped with a single red/green two-color operating toggle and the intervention of the RCBO for ground fault is signalled by means of a blue indicator in a frontal window.



Information on the device are laser printed for visibility and long lasting.



UR approval laser printed in the front of the device.



There isn't any restriction on the supply side and the device can be supplied from top and bottom terminals.

ABB GFEP product range DS951

DS951 AC type

Protection of single-phase circuits against overload, short-circuit currents and against the effects of sinusoidal alternating ground fault currents.



No. of poles	Rated residual current $I_{\Delta n}$ [mA]	Pick-up current according to UL 1053	Rated current [A]	Catalog number
B characteristic				
1P+N	30	0.65 x $I_{\Delta n}$	10	DS951AC-B10/0.03
			16	DS951AC-B16/0.03
			20	DS951AC-B20/0.03
	300		10	DS951AC-B10/0.3
			16	DS951AC-B16/0.3
			20	DS951AC-B20/0.3
C characteristic				
1P+N	30	0.65 x $I_{\Delta n}$	10	DS951AC-C10/0.03
			16	DS951AC-C16/0.03
			20	DS951AC-C20/0.03
	300		25	DS951AC-C25/0.03
			10	DS951AC-C10/0.3
			16	DS951AC-C16/0.3
		20	DS951AC-C20/0.3	

DS951 A Type

Protection of single-phase circuits against overload, short-circuit currents and against the effects of sinusoidal alternating and direct pulsating ground fault currents.



No. of poles	Rated residual current $I\Delta n$ [mA]	Pick-up current according to UL 1053	Rated current [A]	Catalog number
B characteristic				
1P+N	10	$0.65 \times I\Delta n$	10	DS951A-B10/0.01
			13	DS951A-B13/0.01
			16	DS951A-B16/0.01
	30		6	DS951A-B6/0.03
			10	DS951A-B10/0.03
			13	DS951A-B13/0.03
			16	DS951A-B16/0.03
			20	DS951A-B20/0.03
			10	DS951A-B10/0.3
	300		13	DS951A-B13/0.3
			16	DS951A-B16/0.3
			20	DS951A-B20/0.3
C characteristic				
1P+N	10	$0.65 \times I\Delta n$	10	DS951A-C10/0.01
			13	DS951A-C13/0.01
			16	DS951A-C16/0.01
	30		10	DS951A-C10/0.03
			13	DS951A-C13/0.03
			16	DS951A-C16/0.03
			20	DS951A-C20/0.03
			10	DS951A-C10/0.3
			13	DS951A-C13/0.3
	300		16	DS951A-C16/0.3
			20	DS951A-C20/0.3
			K characteristic	
1P+N	30	$0.65 \times I\Delta n$	10	DS951A-K10/0.03
			16	DS951A-K16/0.03
			20	DS951A-K20/0.03
	300		10	DS951A-K10/0.3
			16	DS951A-K16/0.3
			20	DS951A-K20/0.3

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