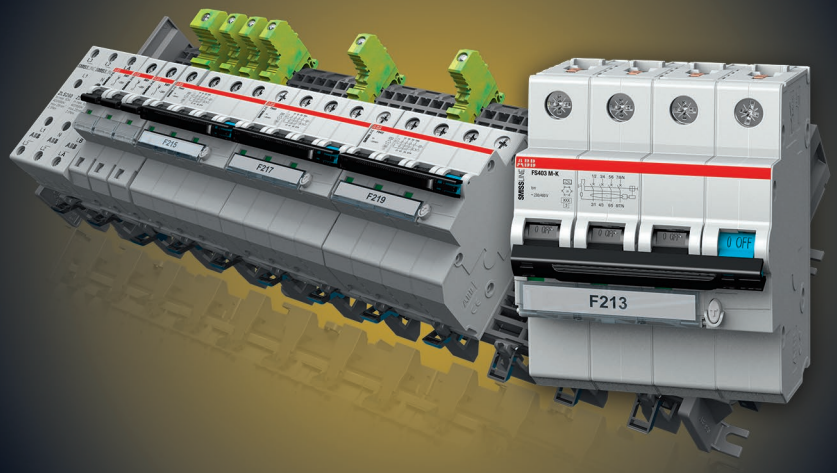
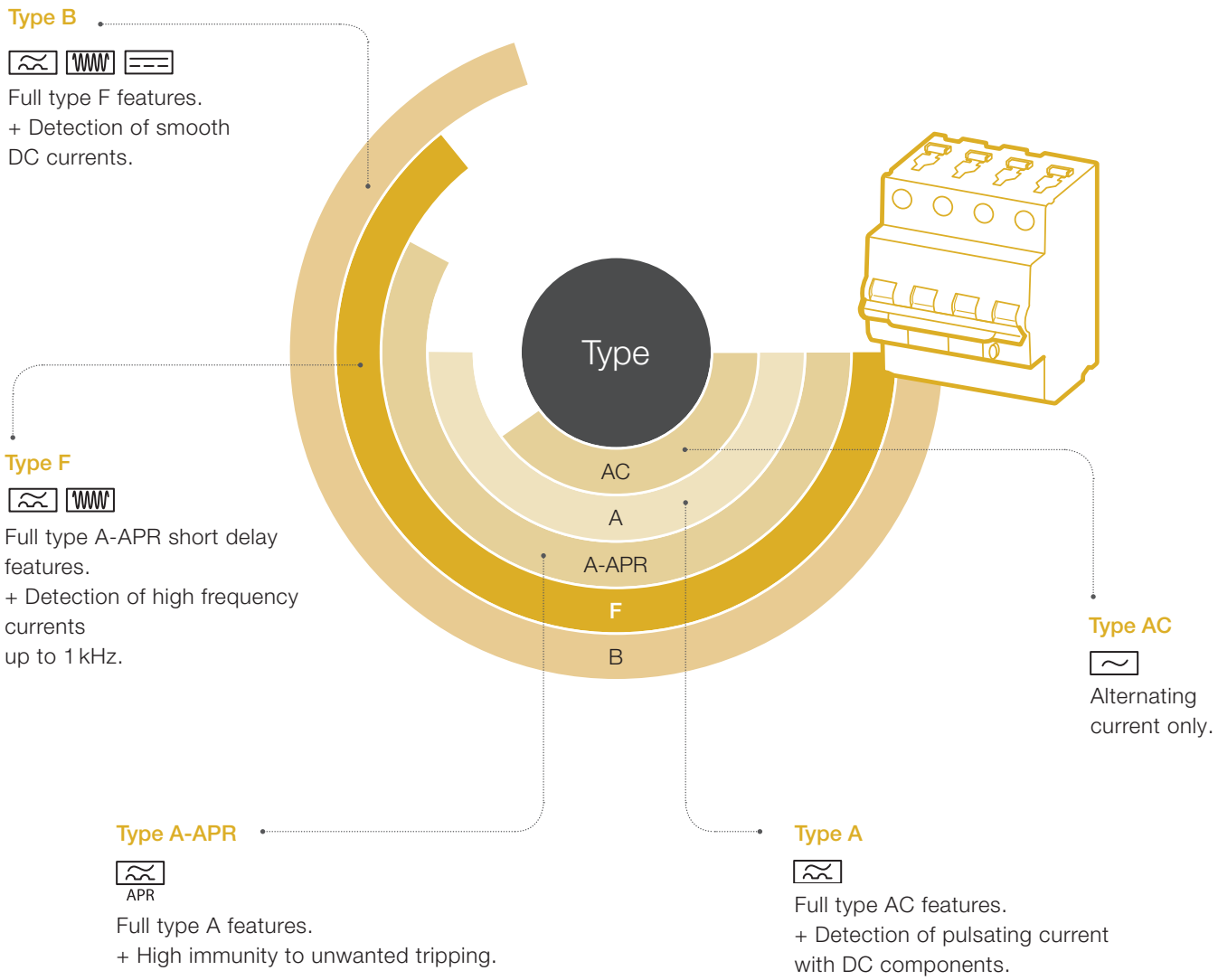


SMISSLINE TP
New RCBO range standard and Type F for FS401 and Type F range for FS403

Power and productivity
for a better world™

SMISSLINE
A world of solutions

The variety of residual current devices has continuously increased in last decades following the technology evolution and the massive introduction of electronics in all fields of applications.
According to the capability to detect different waveforms of residual current and the relative sophisticated type testing, today the spectrum of RCDs types covers from pure AC loads up to high frequency and DC related applications with an increasing level of protection passing from AC types up to F and B types.



SMISSLINE
10 kA continuous up to 32 A, extended assortment

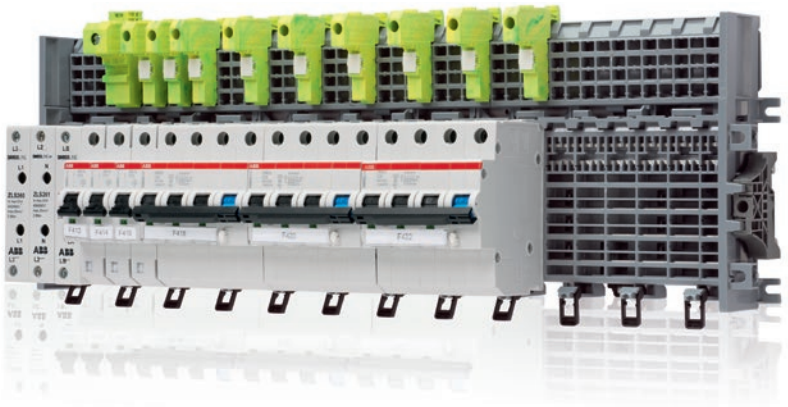
New generation of RCBO devices FS403

With the residual-current line circuit breakers in the FS403 model series, ABB is providing protecting all kinds of multiply-phase AC circuits in modern systems.

The devices simultaneously provide the following protection:
– Protection of end user single-phase circuits against overload and short-circuit currents
– Protection against the effects of sinusoidal alternating earth fault currents
– Protection against indirect contact
– Additional protection against direct contact ($I_{\Delta n}$ = 30 mA)

The FS403 Residual current circuit breaker with overcurrent protection are a technically advanced and comprehensive series with regard to dimensions, triggering characteristics, rated breaking capacity and accessories. The existing auxiliary and signal contacts of the SMISSLINE series are compatible with the new devices.

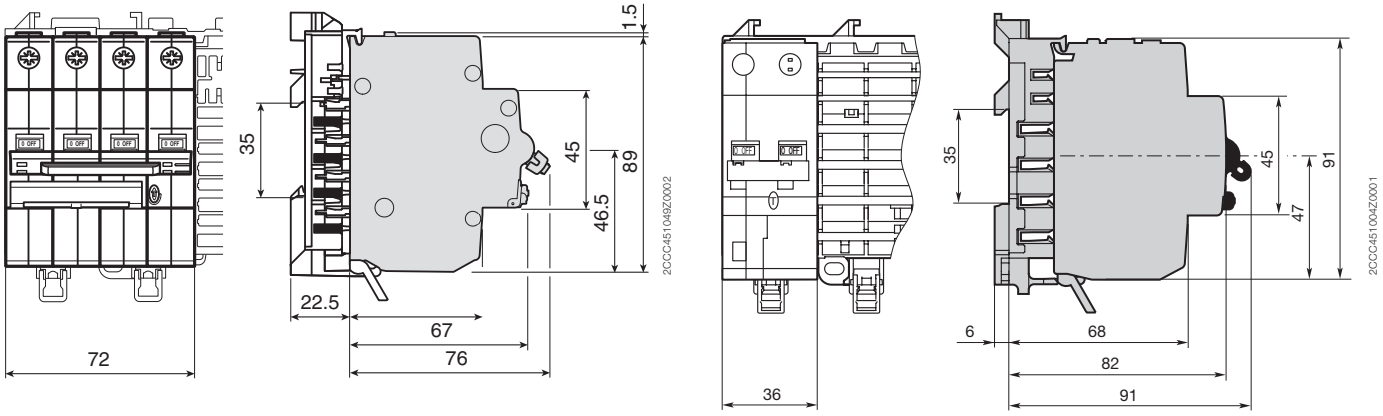
Device characteristics:
– Rated breaking capacity 10 kA according to EN/IEC 61009-1
– Position indicating device (indication of internal contact position)
– Transparent plastic flap for holding marking labels



2CCC451345F0001

Technical Data, Dimensions (in mm)

	FS403	FS401
Type RCD	Type A and F, short delay ARP	Type A and F, short delay ARP
Rated voltage U_n:	240/415 V	240 V
Number of poles:	3PN	PN
Rated frequency f_n:	50/60 Hz	50/60 Hz
Rated breaking capacity I_{cn}:	10 kA or 6 kA	10 kA or 6 kA
Current limitation class:	3	3
Total cut-off time (avarage time) acc. to IEC/EN 61009-1	EN61009 < 300 ms	EN61009 < 300 ms
Standed Cross-section of conductors (top/bottom)	Upper terminal part 0,75–35 mm^2 Lower terminalpart 0,75–10 mm^2	Upper terminal part 0,75–35 mm^2 Lower terminalpart 0,75–10 mm^2
Tightening torque:	2.8 Nm	2.8 Nm
Degree of protection:	IP20	IP20
Endurance:	> 5000	> 5000
Resistance to climate:	according to EN61009	according to EN61009
Ambient temperature:	–25 °C … +40 °C	–25 °C … +40 °C
Vibration resistance:	EN 61009-1	EN 61009-1
Plastic parts: contacts:	halogen free, according IEC 61-249-2-21 cadminum free	halogen free, according IEC 61-249-2-21 cadminum free
Approvals and standards:	EN/IEC 61009-1, VDE and SEV (in preparation) ÖVE/ÖNORM for type G (in preparation) EN/IEC 62423 for type F (in preparation)	EN/IEC 61009-1, VDE and SEV (in preparation) ÖVE/ÖNORM for type G (in preparation) EN/IEC 62423 for type F (in preparation)



Technical Data
Internal resistances and power losses, Derating

Internal resistances and power losses

Internal resistances and power losses per pole (cold resistance at room temperature)

FS403

Typ	R_i mΩ für L	R_i mΩ für N	P_v W
6A B, C	48.1	1.9	3
10A B, C	15.5	2.1	2.69
13A B, C	10.1	1.8	2.96
16A B, C	7.9	1.9	3.52
20A B, C	5.6	1.7	3.94
25A B, C	4.8	1.7	5.19
32A B, C	3.6	1.5	6.38

Performances at different ambient temperatures

Max. operating current depending on the ambient temperature of a circuit-breaker in load circuit of characteristics type B, C

B,C	Ambient temperature T (°C)							
In (A)	–25	–20	–10	0	10	20	30	40
6	7.95	7.8	7.4	7.1	6.7	6.4	6	5.6
10	11.8	11.6	11.3	11	10.7	10.3	10	9.7
13	15.65	15.4	14.9	14.4	14	13.5	13	12.5
16	18.65	18.4	17.9	17.4	17	16.5	16	15.5
20	23.1	22.8	22.2	21.7	21.1	20.6	20	19.4
25	30.8	30.3	29.2	28.2	27.1	26.1	25	23.9
32	39.3	38.6	37.3	36	34.7	33.3	32	30.7

Influence of adjacent devices Correction factor Fm

No. Of adjacent devices	correction factor
1	1
4	0.86
6	0.8
7	0.78
8	0.77
9	0.76
10	0.76

Auslösesträme

Proper functionning of residual current protective devices of type		RCD type			
		Type AC	Type A	Type F	Type B
∼	0,5 ... 1 $I_{\Delta n}$	■	■	■	■
	0,35 ... 1,4 $I_{\Delta n}$	–	■	■	■
	0,25 ... 1,4 $I_{\Delta n}$	–	■	■	■
	0,11 ... 1,4 $I_{\Delta n}$				
	max. 1,4 $I_{\Delta n}$ + 6 mA	–	■	■	■
	max. 1,4 $I_{\Delta n}$ + 10 mA	–	–	■	■
	0,5 ... 1,4 $I_{\Delta n}$	–	–	■	■
	0,5 ... 2 $I_{\Delta n}$	–	–	–	■
	0,5 ... 2,4 $I_{\Delta n}$	–	–	–	■
	0,5 ... 6 $I_{\Delta n}$				
	0,5 ... 14 $I_{\Delta n}$				

Type F – Protection of lines including loads with single phase inverters

Nowadays single phase inverters are present in many household and industrial loads, such as washing machines, hoovers, dishwashers, ventilation, pumps etc . . . .
Inverter technology is a “plus” in domestic equipment, since it helps to reach better performance reducing power consumption and improving energy efficency.

Working principle

A single phase frequency converter, also named inverter, is a commonly used electric drive which regulates the speed of an electric motor, operating on supply voltage and frequency.

During normal operation, the current generated by a single phase inverter in the downstream section is the result of the overlapping of mixed frequency components which varies from 10 Hz (motor frequency), to 50 Hz (rated frequency) and 1000 Hz (switching frequency).

RCDs type F have been specifically designed for single phase inverters applications in order to meet the requirement to assure adequate protection level in case of an earth fault with such harmonic content, offering at the same time an increased resistance to nuisance tripping.

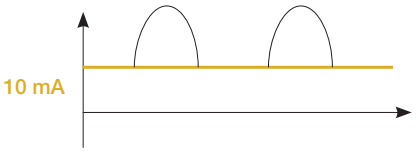
On the other side only RCD type B remain the only devices which are suitable to detect smooth DC components in the residual current caused by insulation faults in the DC section of a three phase frequency converter.

Type F features at a glance:

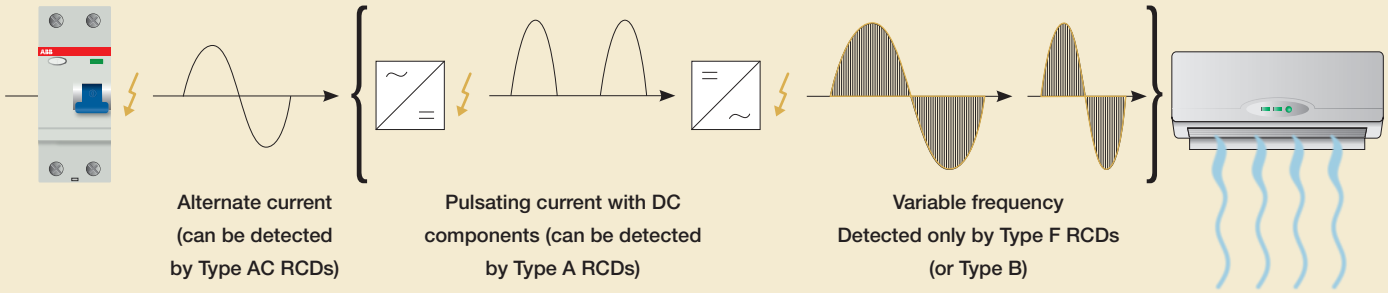
Type F RCDs offer the same range of protection and functionality as an RCD Type A APR; this means that they detect sinusoidal AC currents as well as pulsating DC currents. In addition to this, they are also tested according to IEC/EN 62423 which foresees the application of a simulated multi-frequency residual current with appropriate coefficient associated to the each level of frequency up to 1 kHz.

The intervention characteristic has a short-time delayed which prevents unwanted tripping in case pulsed leakage currents of up to ten milliseconds occur at activation of filters.

The RCDs Type F have a surge current withstand capacity of more than 3 kA and can accept superimposed smooth DC residual currents of up to 10mA without affecting their standard functionality.



Typical residual current waves that can occur in a circuit that supplies a single phase inverter:

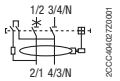


Alternate current (can be detected by Type AC RCDs)

Pulsating current with DC components (can be detected by Type A RCDs)

Variable frequency Detected only by Type F RCDs (or Type B)

FS401 LN, Type A
Residual current operated circuit breaker with overcurrent protection



B, 6 kA according to EN 61009-1

	$I_{\Delta n}$ [mA]	I_n [A]	I_{cn} [kA]	Type name	ABB IT number	EAN number 761 227	Pack-aging unit	Module	Weight in grams
new	30	10	6	FS401 E-B 10/0.03	2CCL562111E1105	147 2825	1	2	200
	30	13	6	FS401 E-B 13/0.03	2CCL562111E0135	010 8558	1	2	200
	30	16	6	FS401 E-B 16/0.03	2CCL562111E0165	010 8565	1	2	200
	30	20	6	FS401 E-B 20/0.03	2CCL562111E0205	010 9692	1	2	200
	30	25	6	FS401 E-B 25/0.03	2CCL562111E0255	010 9708	1	2	200
	30	32	6	FS401 E-B 32/0.03	2CCL562111E0325	010 9715	1	2	200

C, 6 kA according to EN 61009-1

new	30	6	6	FS401 E-C 6/0.03	2CCL562111E1064	147 2788	1	2	200
new	30	10	6	FS401 E-C 10/0.03	2CCL562111E1104	147 2801	1	2	200
	30	13	6	FS401 E-C 13/0.03	2CCL562111E0134	010 8572	1	2	200
	30	16	6	FS401 E-C 16/0.03	2CCL562111E0164	010 8589	1	2	200
	30	20	6	FS401 E-C 20/0.03	2CCL562110E0204	010 4574	1	2	200
	30	25	6	FS401 E-C 25/0.03	2CCL562110E0254	010 4581	1	2	200
	30	32	6	FS401 E-C 32/0.03	2CCL562110E0324	010 4598	1	2	200

B, 10 kA according to EN 61009-1

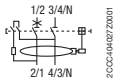
	30	6	10	FS401 M-B 6/0.03	2CCL562110E1065	147 2641	1	2	200
	30	10	10	FS401 M-B 10/0.03	2CCL562110E0105	010 9685	1	2	200
	30	13	10	FS401 M-B 13/0.03	2CCL562110E0135	010 4505	1	2	200
	30	16	10	FS401 M-B 16/0.03	2CCL562110E0165	010 4512	1	2	200
new	30	20	10	FS401 M-B 20/0.03	2CCL562110E1205	147 2689	1	2	200
new	30	25	10	FS401 M-B 25/0.03	2CCL562110E1255	147 2726	1	2	200
new	30	32	10	FS401 M-B 32/0.03	2CCL562110E1325	147 2764	1	2	200

C, 10 kA according to EN 61009-1

	30	6	10	FS401 M-C 6/0.03	2CCL562010E0064	140 6905	1	2	200
	30	10	10	FS401 M-C 10/0.03	2CCL562110E0104	010 4543	1	2	200
	30	13	10	FS401 M-C 13/0.03	2CCL562110E0134	010 4550	1	2	200
	30	16	10	FS401 M-C 16/0.03	2CCL562110E0164	010 4567	1	2	200
new	30	20	10	FS401 M-C 20/0.03	2CCL562110E1204	147 2665	1	2	200
new	30	25	10	FS401 M-C 25/0.03	2CCL562110E1254	147 2702	1	2	200
new	30	32	10	FS401 M-C 32/0.03	2CCL562110E1324	147 2740	1	2	200

Ordering details for auxiliary switch and signal contacts on page 1/22–23

FS401 LN, Typ F and short delay
Residual current operated circuit breaker with overcurrent protection



B, 10 kA according to EN 61009-1

	$I_{\Delta n}$ [mA]	I_n [A]	I_{cn} [kA]	Type name	ABB IT number	EAN number 761 227	Pack-aging unit	Module	Weight in grams
new	30	6	10	FS401 M K-B 6/0.03	2CCL562130E1035	147 2849	1	2	200
new	30	10	10	FS401 M K-B 10/0.03	2CCL562310E1105	147 2887	1	2	200
new	30	13	10	FS401 M K-B 13/0.03	2CCL562310E1135	147 2900	1	2	200
new	30	16	10	FS401 M K-B 16/0.03	2CCL562310E1165	147 2924	1	2	200
new	30	20	6	FS401 M K-B 20/0.03	2CCL562310E1205	147 2962	1	2	200
new	30	25	6	FS401 M K-B 25/0.03	2CCL562310E1255	147 3006	1	2	200
new	30	32	6	FS401 M K-B 32/0.03	2CCL562310E1325	147 3044	1	2	200

C, 10 kA according to EN 61009-1

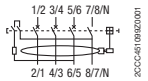
new	30	6	10	FS401 M K-C 6/0.03	2CCL562130E3034	140 4031	1	2	200
new	30	10	10	FS401 M K-C 10/0.03	2CCL562310E0104	140 4031	1	2	200
new	30	13	10	FS401 M K-C 13/0.03	2CCL562310E0134	010 4604	1	2	200
new	30	16	10	FS401 M K-C 16/0.03	2CCL562310E0164	010 4611	1	2	200
new	30	20	6	FS401 M K-C 20/0.03	2CCL562310E1204	010 4642	1	2	200
new	30	25	6	FS401 M K-C 25/0.03	2CCL562310E1254	010 4642	1	2	200
new	30	32	6	FS401 M K-C 32/0.03	2CCL562310E1324	010 4642	1	2	200

C, 10 kA according to EN 61009-1

new	30	6	10	FS401 M K-C 6/0.3	2CCL562330E1064	147 3068	1	2	200
new	30	10	10	FS401 M K-C 10/0.3	2CCL562330E1104	147 3082	1	2	200
new	30	13	10	FS401 M K-C 13/0.3	2CCL562330E1134	147 3105	1	2	200
new	30	16	10	FS401 M K-C 16/0.3	2CCL562330E1164	147 3143	1	2	200
new	30	20	6	FS401 M K-C 20/0.3	2CCL562330E1204	147 3181	1	2	200
new	30	25	6	FS401 M K-C 25/0.3	2CCL562330E1254	147 3228	1	2	200
new	30	32	6	FS401 M K-C 32/0.3	2CCL562330E1324	147 3266	1	2	200

Ordering details for auxiliary switch and signal contacts on page 1/22–23

FS403 3LN, Type A
Residual current operated circuit breaker with overcurrent protection



B, 10 kA according to EN 61009-1

$I_{\Delta n}$ [mA]	I_n [A]	I_{cn} [kA]	Type name	ABB IT number	EAN number 761 227	Pack-aging unit	Module	Weight in grams
30	6	10	FS403M-B6/0.03	2CCL564110E0065	143 4434	1	4	410
30	10	10	FS403M-B10/0.03	2CCL564110E0105	140 7612	1	4	410
30	13	10	FS403M-B13/0.03	2CCL564110E0135	140 7629	1	4	410
30	16	10	FS403M-B16/0.03	2CCL564110E0165	140 7636	1	4	410
30	20	10	FS403M-B20/0.03	2CCL563110E0205	144 2576	1	4	410
30	25	10	FS403M-B25/0.03	2CCL563110E0255	144 2590	1	4	410
30	32	10	FS403M-B32/0.03	2CCL563110E0325	144 2613	1	4	410

C, 6 kA according to EN 61009-1

30	6	6	FS403E-C6/0.03	2CCL564111E0064	141 9141	1	4	410
30	10	6	FS403E-C10/0.03	2CCL564111E0104	143 4489	1	4	410
30	13	6	FS403E-C13/0.03	2CCL564111E0134	143 4519	1	4	410
30	16	6	FS403E-C16/0.03	2CCL564111E0164	143 4601	1	4	410
30	20	6	FS403E-C20/0.03	2CCL564111E0203	140 9609	1	4	410
30	25	6	FS403E-C25/0.03	2CCL564111E0254	140 8770	1	4	410
30	32	6	FS403E-C32/0.03	2CCL564111E0324	140 8787	1	4	410

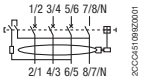
C, 10 kA according to EN 61009-1

30	6	10	FS403M-C6/0.03	2CCL564110E0064	141 9127	1	4	410
30	10	10	FS403M-C10/0.03	2CCL564110E0104	140 7674	1	4	410
30	13	10	FS403M-C13/0.03	2CCL564110E0134	140 7681	1	4	410
30	16	10	FS403M-C16/0.03	2CCL564110E0164	140 7698	1	4	410
30	20	10	FS403M-C20/0.03	2CCL563110E0204	144 2569	1	4	410
30	25	10	FS403M-C25/0.03	2CCL563110E0254	144 2583	1	4	410
30	32	10	FS403M-C32/0.03	2CCL563110E0324	144 2606	1	4	410

C, 10 kA according to EN 61009-1

100	6	6	FS403M-C6/0.1	2CCL564121E0064	142 4527	1	4	410
100	10	10	FS403M-C10/0.1	2CCL564121E0104	142 4510	1	4	410
100	13	10	FS403M-C13/0.1	2CCL563120E0134	144 2620	1	4	410
100	16	10	FS403M-C16/0.1	2CCL564120E0164	142 0109	1	4	410
100	20	10	FS403M-C20/0.1	2CCL563120E0204	144 2637	1	4	410
100	25	10	FS403M-C25/0.1	2CCL563120E0254	144 2644	1	4	410
100	32	10	FS403M-C32/0.1	2CCL563120E0324	144 2651	1	4	410

FS403 3LN, Type F short delay
Residual current operated circuit breaker with overcurrent protection



B characteristic: 30 mA

	$I\Delta_n$ (mA)	I_n (A)	I_{cn} (kA)	Type name	Order code	EAN number 761 227	VPE	Module	Weight in grams
new	30	6	10	2CCL564310E0065	FS403MK-B6/0.03	1470951	1	4	410
new	30	10	10	2CCL564310E0105	FS403MK-B10/0.03	1470999	1	4	410
new	30	13	10	2CCL564310E0135	FS403MK-B13/0.03	1471033	1	4	410
new	30	16	10	2CCL564310E0165	FS403MK-B16/0.03	1471071	1	4	410
new	30	20	10	2CCL563310E0205	FS403MK-B20/0.03	1470777	1	4	410
new	30	25	10	2CCL563310E0255	FS403MK-B25/0.03	1470814	1	4	410
new	30	32	10	2CCL563310E0325	FS403MK-B32/0.03	1470852	1	4	410

C characteristic: 30 mA

new	30	6	10	2CCL564310E0064	FS403MK-C6/0.03	1470937	1	4	410
new	30	10	10	2CCL564310E0104	FS403MK-C10/0.03	1470975	1	4	410
new	30	13	10	2CCL564310E0134	FS403MK-C13/0.03	1471019	1	4	410
new	30	16	10	2CCL564310E0164	FS403MK-C16/0.03	1471057	1	4	410
new	30	20	10	2CCL563310E0204	FS403MK-C20/0.03	1470753	1	4	410
new	30	25	10	2CCL563310E0254	FS403MK-C25/0.03	1470791	1	4	410
new	30	32	10	2CCL563310E0324	FS403MK-C32/0.03	1470838	1	4	410

Auxiliary switch and Signal contacts
Ordering codes

Auxiliary switch

	Type name	ABB IT number	EAN number 761 227	Pack-aging unit	Module	Weight in grams
1NO and 1NC	HK40011-L	2CCS500900R0081	010 0910	10	0.5	45
2NO	HK40020-L	2CCF201112R0001	011 1183	10	0.5	40
2NC	HK40002-L	2CCF201114R0001	011 1190	10	0.5	40

Signal contacts

	Type name	ABB IT number	EAN number 761 227	Pack-aging unit	Module	Weight in grams
1NO and 1NC	SK40011-L	2CCS500900R0101	010 0934	10	0.5	45
2NO	SK40020-L	2CCF201162R0001	011 1107	10	0.5	40
2NC	SK40002-L	2CCF201164R0001	011 1114	10	0.5	40

Signal contact collective alarm and auxiliary contact

	Type name	ABB IT number	EAN number 761 227	Pack-aging unit	Module	Weight in grams
1NO	SK40010-L SA	2CCS500900R0141	010 7964	10	0.5	45
1NO	HK40010-L SA	2CCF201212R0001	140 7902	10	0.5	45

Contact

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www.abb.ch

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