SACE Isomax S. The largest project in moulded-case circuit-breakers

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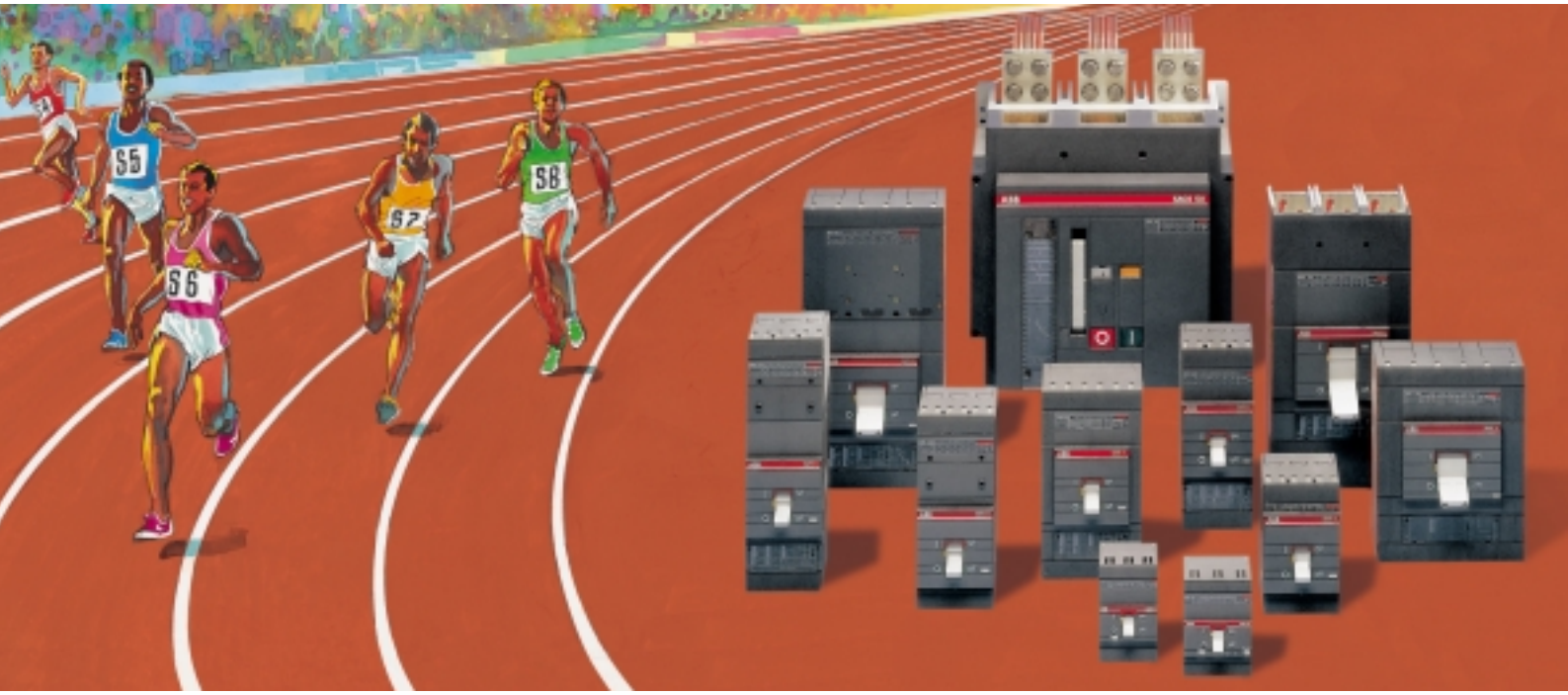


A single series of moulded-case circuit-breakers enabling infinite solutions

SACE Isomax S moulded-case low-voltage circuit-breakers offer performance features that meet the full spectrum of application requirements, from small users through to large industrial electricity distribution installations. Innovation, technology and quality have always been the principles guiding the development of ABB SACE L.V. products. Strengths that have reached outstanding levels in the SACE Isomax S series, which now offers even more solutions to meet every need, making it the most complete range of moulded-case circuit-breakers.

The SACE Isomax S series is rationally divided into eight basic models following a modular logic that converts them into different versions, creating a full spectrum of different ranges to provide an optimal dedicated response to any installation requirement. This results in a wide choice of alternating current and direct current distribution circuit-breakers, current-limiting circuit-breakers, motor protection circuit-breakers, switch-disconnectors and residual-current circuit-breakers. In addition to all these ranges, which meet the IEC 947-2 and EN 60947-2 international standards, there are also motor protection circuit-breakers and switch-disconnectors that comply with the UL489 and CSA C22.2 standards thanks to approval by the Underwriters Laboratories.

The complete system approach of the series can also be seen in the modular nature of its components: the dimensions, installation procedures and accessory options are the same irrespective of the circuit-breaker range, with significant benefits for the user.
What's more, the continuous and constant development of the series that has made the SACE Isomax S offer increasingly complete today, is an ongoing process that continues to bring many new developments.

The S2X, which is externally identical to the S2B/N/S, retaining the same dimensions, mounting systems and accessory and customisation options. Thanks to special technical solutions, such as two fixed contacts for each arcing chamber, it offers excellent performance in terms of breaking, fault current limiting and specific let-through current capacity. The S2X 80 version with 13xIth magnetic-only release is particularly suitable for motor protection, while the S2X 100 version with adjustable thermomagnetic release can be used wherever overload protection is required.

The S4 and S7 circuit-breakers, equipped with the PR212/MP electronic release specially designed for starting and protecting motors, are distinguished by complete leading-edge protection and made it possible to implement optimised coordination while benefiting from significant savings in time, space and money.

The new range for 1000 V alternating current applications raises the use barrier of moulded-case circuit breakers still higher and emblemises the ceaseless development of the SACE Isomax S series together with the outstanding technical qualities that place it in a class of its own.

The new solenoid operating mechanism for S1-S2 completes the option for remote control of the entire SACE Isomax S range. Available in various power supply voltages and two different versions for installation on the front of or alongside the circuit-breaker, it is characterised by a high trip speed and can be used for centralised installation control as well as for switching between the mains and emergency power supply networks.

Circuit-breakers
IEC 947-2



				SACE Isomax S1		SACE Isomax S2			SACE Isomax S3		
Rated uninterrupted current, **Iu**			[A]	125		160			160 - 250		
Number of poles			N°.	3-4		3-4			3-4		
Rated service voltage, **Ue**		(a.c.) 50-60 Hz	[V~]	500		690			690		
		(d.c.)	[V–]	250		500			750		
Rated impulse withstand voltage, **Uimp**			[kV]	6		6			8		
Rated insulation voltage, **Ui**			[V]	500		690			800		
Test voltage at industrial frequency for 1 minute			[V]	3000		3000			3000		
Rated limit short-circuit breaking capacity, **Icu**				B	N	B	N	S	N	H	L
	(a.c.) 50-60 Hz	220/230 V~	[kA]	25	40	25	50	65	65	100	170
	(a.c.) 50-60 Hz	**380/415 V~**	[kA]	**16**	**25**	**16**	**35** (1)	**50**	**35** (1)	**65**	**85**
	(a.c.) 50-60 Hz	440 V~	[kA]	10	16	10	20	25	30	50	65
	(a.c.) 50-60 Hz	500 V~	[kA]	8	12	8	12	15	25	40	50
	(a.c.) 50-60 Hz	690 V~	[kA]	—	—	6	8	10	14	18	20 (5)
	(d.c.)	250 V – (2 poles in series)	[kA]	16	25	16	35	50	35	65	85
	(d.c.)	500 V – (2 poles in series)	[kA]	—	—	—	—	—	35	50	65
	(d.c.)	500 V – (3 poles in series)	[kA]	—	—	16	35	50	—	—	—
	(d.c.)	750 V – (3 poles in series)	[kA]	—	—	—	—	—	20	35	50
Rated duty short-circuit breaking capacity, **Ics** (2)			[%Icu]	50%	50%	100%	75%	75%	100%	75%	75%
Rated short-circuit making capacity (415 V~), **Icm**			[kA]	32	52,5	32	74	105	74	143	187
Tripping time (415 V~)			[ms]	8	6	8	7	6	8	7	6
Rated short time withstand current (1 s), **Icw**			[kA]								
Use category (EN 60947-2)				A		A			A		
Isolation behaviour				■		■			■		
IEC 947-2, EN 60947-2				■		■			■		
Releases	thermomagnetic	T fixed, M fixed 5Ith		■	■						
		T fixed, M fixed 10Ith		■	■						
		T adjustable, M fixed 3Ith							■	■	
		T adjustable, M fixed 5Ith				■	■		■	■	■
		T adjustable, M fixed 10Ith				■	■	■	■	■	■
		T adjustable, M adjustable									
	magnetic only	M fixed			■	■	■	■	■	■	■
	microprocessor-based	PR211/P (I - LI)									
		PR212/P (LSI - LSIG)									
	Interchangeability										
Versions											
Terminals(6)	fixed			FC - R		EF - FC - FC CuAl - R			F - EF - ES - FC - FC CuAl - RC - R		
	plug-in			FC - R		FC - R			EF - FC - R		
	withdrawable (3)			—		—			EF - FC - R		
Fixing on DIN rail				DIN EN 50022		DIN EN 50022			DIN EN 50023		
Mechanical life	[No. operations / Operations per hour]			25000 / 240		25000 / 240			25000 / 120		
Electrical life (a 415 V~)	[No. operations / Operations per hour]			8000 / 120		8000 / 120			10000 (160A) - 8000 (250A) / 120		
Basic dimensions	fixed	3 / 4 poles	W[mm]	78 / 103		90 / 120			105 / 140		
			D [mm]	70		70			103,5		
			H [mm]	120		120			170		
Weights	fixed	3 / 4 poles	[kg]	0,9 / 1,2		1,1 / 1,5			2,6 / 3,5		
	plug-in	3 / 4 poles	[kg]	1 / 1,4		1,3 / 1,7			3,1 / 4,1		
	withdrawable	3 / 4 poles	[kg]	—		—			3,5 / 4,5		

Notes

1) All versions with Icu = 35 kA are certified to 36 kA.
2) The percentage Ics performance of S3 N/H/L, S4 N/H/L, S5 N/H and S6 N/S/H circuit-breakers is 25% lower at 690 V.
3) Withdrawable circuit-breakers must be fitted with the front flange for the lever operating mechanism or the accessories which are an alternative to it such as the rotary handle or motor operator.
4) The plug-in version of circuit-breaker S5 is only available for rated current 400 A.
5) The SACE S3 circuit-breaker with breaking capacity L at 690

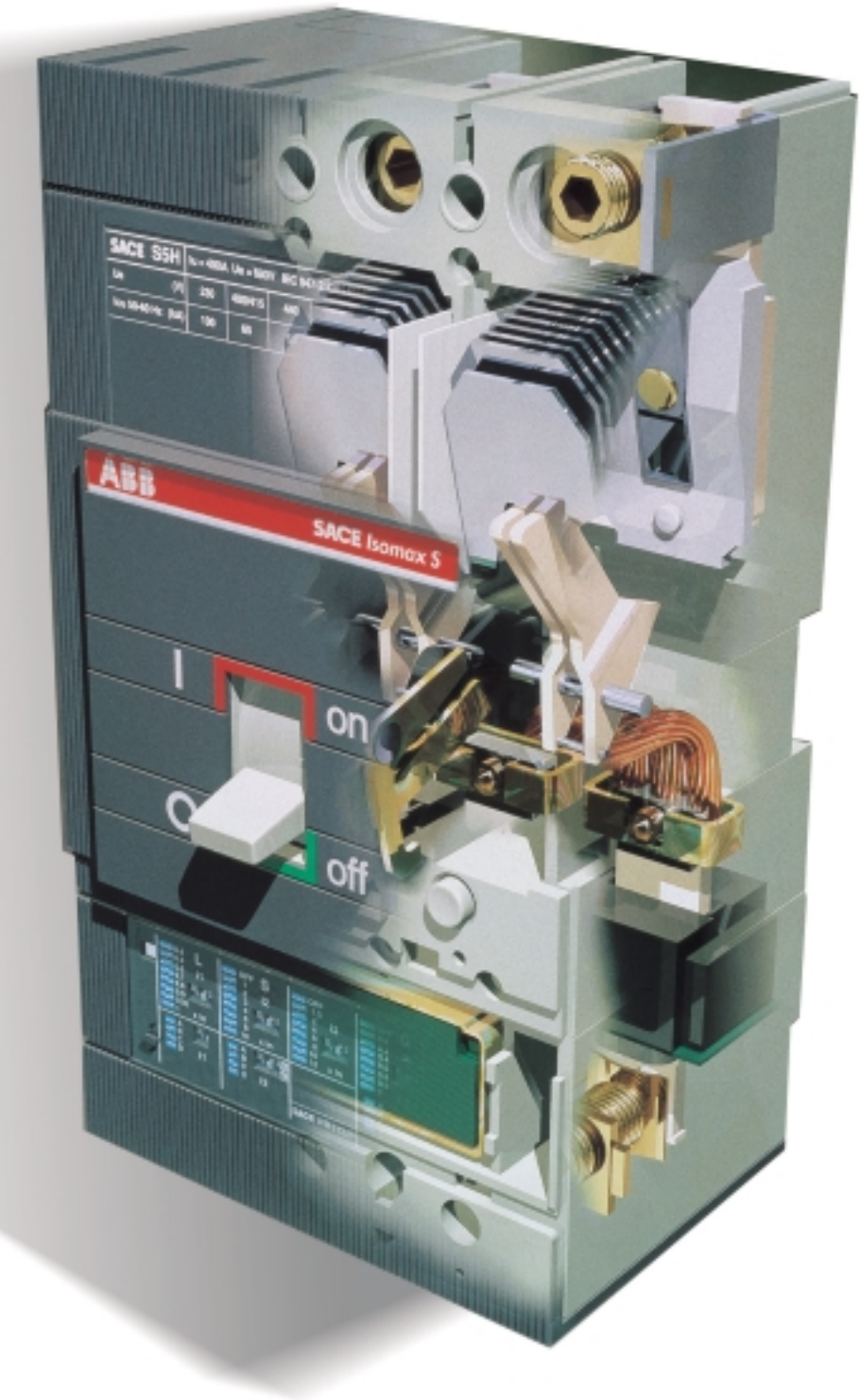




SACE Isomax S4			SACE Isomax S5			SACE Isomax S6				SACE Isomax S7			SACE Isomax S8	
160 - 250			400 - 630			630 - 800				1250 - 1600			2000-2500-3200	
3-4			3-4			3-4				3-4			3-4	
690			690			690				690			690	
—			750			750				—			—	
8			8			8				8			8	
800			800			800				800			690	
3000			3000			3000				3000			2500	
N	H	L	N	H	L	N	S	H	L	S	H	L	H	V
65	100	200	65	100	200	65	85	100	200	85	100	200	85	120
35 (1)	**65**	**100**	**35** (1)	**65**	**100**	**35** (1)	**50**	**65**	**100**	**50**	**65**	**100**	**85**	**120**
30	50	80	30	50	80	30	45	50	80	40	55	80	70	100
25	40	65	25	40	65	25	35	40	65	35	45	70	50	70
18	22	30	20	25	30	20	22	25	30	20	25	35	40	50
—	—	—	35	65	100	35	50	65	100	—	—	—	—	—
—	—	—	35	50	65	20	35	50	65	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	20	35	50	16	20	35	50	—	—	—	—	—
100%	100%	75%	100%	100%	75%	100%	100%	100%	75%	100%	75%	50%	50%	50%
74	143	220	74	143	220	74	105	143	220	105	143	220	187	264
8	7	6	8	7	6	10	9	8	7	22	22	22	20	20
			5 (400 A)			7,6 (630 A) - 10 (800 A)				15 (1250 A) - 20 (1600 A)			35	
A			B (400 A) - A (630 A)			B				B			B	
■			■			■				■			■	
■			■			■				■			■	
			■	■	■	■	■	■	■					
■	■	■	■	■	■	■	■	■	■	■	■	■		
■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	■			■			■				■			
F - EF - ES - FC - FC CuAl - RC - R			F-ES-FC-EF/FC CuAl/RC (400A)			F - EF - FC CuAl - RC - R				F-EF -FC CuAl (1250A) -HR -VR			F (2000-2500A)-VR	
EF - FC -R			EF - FC -R (4)			—				—				
EF - FC -R			EF(400)-ES -FC(400)-R-VR (630A)			EF - HR - VR				EF - HR - VR			—	
DIN EN 50023			DIN EN 50023			—				—			—	
20000 / 120			20000 / 120			20000 / 120				10000 / 120			10000/20	
10000 (160A) - 8000 (250A) / 120			7000 (400A) - 5000 (630A) / 60			7000 (630A) - 5000 (800A) / 60				7000(1250A)-5000(1600A) / 20			2500 (2500A)/20 -1500 (3200)/10	
105 / 140			140 / 184			210 / 280				210 / 280			406/556	
103,5			103,5			103,5				138,5			242	
254			254			268				406			400	
4 / 5,3			5 / 7			9,5 / 12				17 / 22			57/76	
4,5 / 5,9			6,1 / 8,4			—				—			—	
4,9 / 6,3			6,4 / 8,7			12,1 / 15,1				21,8 / 29,2			—	

6) F Front terminals
EF Extended front terminals
ES Spreaded front terminals
FC Front terminals for copper cables
FC CuAl Front terminals for copper/aluminium cables
R Rear threaded terminals
RC Rear terminals for copper/aluminium cables
HR Rear horizontal flat bar terminals
VR Rear vertical flat bar terminals

Modular strengths and outstanding performance IEC 947-2. A complete coordinated series.



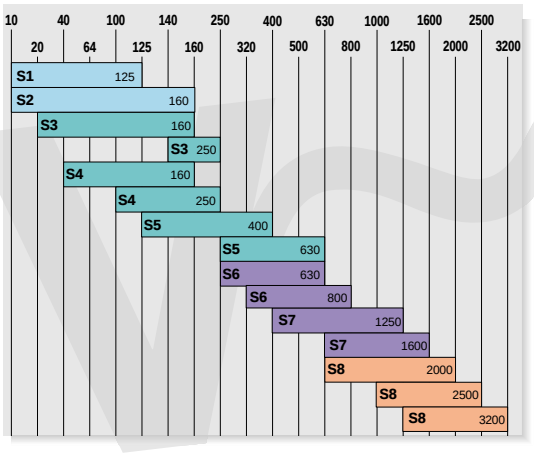
The SACE Isomax S range of moulded-case circuit-breakers conforms to IEC standard 947-2 and comprises eight basic models with rated uninterrupted currents from 125 to 3200 A and breaking capacities from 16 to 120 kA (380/415 V).
The model chosen determines the basic electrical characteristics, while the overcurrent release chosen determines the type of application.

Alternating current service
The following circuit-breakers are available for protecting alternating current networks: SACE S1, S2 and S3 fitted with thermomagnetic releases and SACE S4, S4, S6, S7, and S8 circuit-breakers fitted with SACE PR211/P and PR212/P microprocessor-based releases. They are characterised by a wide field of application, extending from 10 to 3200A and a rated voltage of 690V.

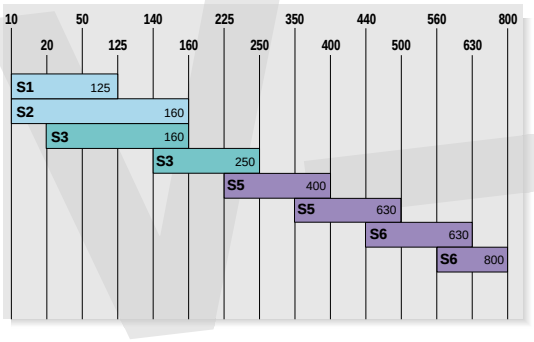
Direct current service
SACE S1, S2, S3, S5 and S6 circuit-breakers fitted with thermomagnetic releases can be used for protecting direct current networks with an application range of 10 to 800 A.

1000V in AC range

Rated uninterrupted current, Iu		[A]
No. poles		
Rated service voltage Ue (AC) 50-60 Hz		[V]
Rated impulse withstand voltage, Uimp		[kV]
Rated insulation voltage, Ui		[V]
Test voltage at industrial frequency for 1 min.		
Rated limit short-circuit breaking capacity, Icu		
(AC) 50-60 Hz 1000 V		[kA]
Rated short-circuit making capacity (1000 V AC)		[kA]
Opening time (1000 V AC)		[ms]
Rated short-time withstand current for 1 s, Icw		[kA]
Category of use (EN 60947-2)		
Isolation behaviour		
IEC 947-2, EN 60947-2		
Thermomagnetic releases T adjustable, M fixed 10 Ith		
PR211/P (I-LI) microprocessor-based releases		
PR212/P (LSI-LSIG) microprocessor-based releases		
Versions		
Terminals		
Mounting on DIN rail		
Mechanical life	[No. operations / operations per hour]	
Dimensions	W	[mm]
	D	[mm]
	H	[mm]
Weight		[kg]



Field of application of alternating current circuit-breakers



Field of application of direct current circuit-breakers

With 2 poles in series, SACE Isomax S circuit-breakers can be used with rated voltages of 250 and 500 V and breaking capacities of up to 100 kA (250 V d.c.) and 65 kA (500 V d.c.), while SACE S3, S5 and S6 circuit-breakers with 3 poles in series can reach 750 V and breaking capacities of up to 50 kA.

Generator protection
For protecting generators, which have extremely low fault currents - in the region of 3 times the rated current, you can now not only obtain the protection offered by electronic releases S4 to S7 but also that of model S3 with dedicated thermomagnetic protection, adjustable thermal current Ith = 0.7…1 x In and fixed magnetic threshold Im= 3 x In.

Range up to 1000 V
A new feature of the Isomax series is its range of circuit-breakers for alternating current applications up to 1000 V. Typical sectors of use include mines, road and railway tunnels, traction and industrial applications in general. The circuit-breakers are available in a three-pole version with electronic or adjustable thermomagnetic releases and have the same dimensions as the standard versions. They can also be used in conjunction with the main accessories available for the Isomax series.

Safety and functional efficiency
Double insulation, a compartment door lock, and the ability to rack out the circuit-breaker with the door closed are just some of the features which enable every operator to work in total safety while improving the functional efficiency of the switchgear installed in the switchboard. Furthermore, the introduction of digital electronic technology on the SACE Isomax S has made it possible to combine the traditional protection functions typical of thermomagnetic releases with others, such as selective short-circuit protection, earth fault protection, control and communication.

	SACE Isomax S3	SACE Isomax S4	SACE Isomax S6	SACE Isomax S3X	SACE Isomax S4X	SACE Isomax S6X
	160	**160-250**	**630-800**	**125**	**250**	**630**
	3	3	3	3	3	3
	1000	1000	1000	1000	1000	1000
	8	8	8	8	8	8
	1000	1000	1000	1000	1000	1000
	3000	3000	3000	3000	3000	3000
	L	**L**	**L**	**X**	**X**	**X**
	6	8	12	30	30	30
	9,2	13,6	24	63	63	63
	20	30	30	10	20	25
			7,6 (630 A) - 10 (800 A)			
	A	A	B	A	A	A
	■	■	■	■	■	■
	■	■	■	■	■	■
	■			■		
		■ (LI only)	■ (LI only)		■ (LI only)	■ (LI only)
		■	■		■	■
	F	F	F	F	F	F
	F	F	F	F	F	F
	DIN EN 50023	DIN EN 50023		DIN EN 50023	DIN EN 50023	
	25000/120	20000/120	20000/120	25000/120	20000/120	20000/120
	105	105	210	105	105	210
	103,5	103,5	103,5	103,5	103,5	103,5
	170	254	268	255	339	406
	2,6	4	9,5	3,6	5	15

IEC 947-2 current-limiting moulded-case circuit-breakers Power and speed.

SACE S2X 100, S3X, S4X and S6X circuit-breakers form the range of SACE Isomax S current-limiting moulded-case circuit-breakers for applications from 1 to 630 A.
The function of a current-limiting circuit-breaker is precisely to “limit” the specific let-through energy as much as possible in the event of a short circuit, protecting the circuits and switchgear downstream. The breaking system makes it possible to interrupt high short-circuit currents very rapidly. Furthermore, the special shape of the parts makes it possible to limit the peak values of the fault currents to values that are significantly lower than those of the prospective short-circuit currents in the point of installation. The high opening speed reduces the electrodynamic stresses to which the circuit-breakers downstream are exposed in the event of a fault. They are available in fixed, plug-in and withdrawable versions that can be fitted with all the accessories available for the corresponding circuit-breakers.

Applications
These circuit-breakers are suitable for installation in all types of installations (civil, industrial and service sector), as well as in the on-board electrical systems of boats, in mines, on oil rigs and, generally speaking, all installations where high transformer and generator powers can result in high short-circuit currents of up to
200 kA at 380/415 V a.c. They can be used as main switches downstream of power supplies as well as in installations where continuity of service is not an essential requirement, and backup protection is provided, enabling circuit-breakers with breaking capacities lower than the prospective short-circuit current in the point of installation to be used downstream.

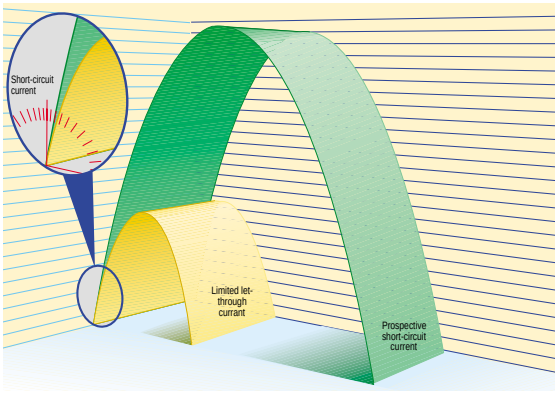
Duty voltage and breaking capacity
SACE Isomax S current-limiting circuit-breakers conform to IEC standard 947-2. They are characterised by a rated operating voltage Ue of 690V a.c. and a rated limit short-circuit breaking capacity Icu of 200 kA at 380/415 V a.c., 75 kA at 690 V a.c. for S3X, S4X, S6X and 70 kA at 440 V for S2X 100.
Selective protection can also be provided even though the circuit-breakers have very short breaking times in the event of short-circuits.

Isolation behaviour

In the open position, the circuit-breaker guarantees isolation of the circuit in conformity with IEC standard 947-2. The insulation distances ensure there are no leakage currents and guarantee the dielectric strength against any overvoltages across the input and output.

Compact dimensions

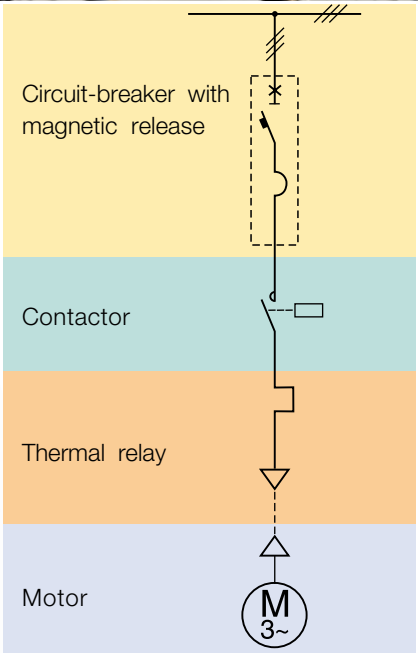
Standardisation of the depth of the circuit-breakers at 70 mm for the S2X 100 and 103.5 mm for the S3X, S4X and S6X, standardisation of their heights and a further reduction in their depths compared to those of the SACE Limitor range makes it possible to reduce the switchboard installation dimensions and standardise the support structures.



			SACE Isomax S2X 100	SACE Isomax S3X	SACE Isomax S4X	SACE Isomax S6X
Rated uninterrupted current, Iu		[A]	100	125-200	250	400-630
Number of poles			3-4	3-4	3-4	3-4
Rated service voltage, Ue (a.c.) 50-60Hz		[V]	690	690	690	690
Rated impulse withstand voltage, Uimp		[kV]	6	8	8	8
Rated insulation voltage, Ui		[V]	690	800	800	800
Test voltage at industrial frequency for 1 minute			3000	3000	3000	3000
Rated limit short-circuit breaking capacity, Icu			X	X	X	X
	(a.c.) 50-60 Hz 220/230 V	[kA]	100	300	300	300
	(a.c.) 50-60 Hz 380/415 V	[kA]	70	200	200	200
	(a.c.) 50-60 Hz 440 V	[kA]	70	180	180	180
	(a.c.) 50-60 Hz 500 V	[kA]	50	150	150	150
	(a.c.) 50-60 Hz 690 V	[kA]	10	75 (1)	75	75
Rated duty short-circuit breaking capacity, Ics (2)		[%Icu]	75%	100%	100%	100%
Rated short-circuit making capacity (415 V), Icm		[kA]	154	440	440	440
Opening time (415V)		[ms]	3,5	3,5	3,5	3,5
Use category (EN 60947-2)			A	A	A	A
Isolation behaviour			■	■	■	■
IEC 947-2, EN 60947-2			■	■	■	■
Releases thermomagnetic T adjustable, M fixed 10 Ith			■	■		
Releases microprocessor-based PR211/P (I-LI)					■	■
Releases microprocessor-based PR212/P (LSI-LSIG)					■	■
Interchangeability					■	
Versions			F-P	F-P-W	F-P-W	F-W
Terminals	Fixed		EF - FC - FC (CuAl) - R	F - EF - ES - FC - FC (CuAl) - RC - R	F - EF - ES - FC - FC (CuAl) - RC - R	F - EF - FC (CuAl) - RC - R
	Plug-in		FC-R	EF - R	EF - R	-
	Withdrawable		-	EF - R	EF - R	EF - HR - VR
Fixing on DIN rail			DIN EN 50022	DIN EN 50023	DIN EN 50023	-
Mechanical life	[No. operations / Operations per hour]		25000/240	25000/120	20000/120	20000/120
Electrical life (a 415 V)	[No. operations / Operations per hour]		8000/120	10000(125A)-8000(200A)/120	8000 / 120	7000 / 60
Basic dimensions	**fixed 3/4 poles**					
	W	[mm]	90/120	105/140	105/140	210/280
	D	[mm]	70	103,5	103,5	103,5
	H	[mm]	120	255	339	406
Weights	Fixed 3/4 poles	[kg]	1,1/1,5	3,6 / 4,8	5 / 7	15 / 20
	Plug-in 3/4 poles	[kg]	1,3/1,7	6,3 / 8,7	8,2 / 10,7	-
	Withdrawable 3/4 poles	[kg]	-	7,1 / 9,5	9 / 11,5	24,5 / 33,8

(1) For S3X with setting R 32, Icu (690 V) = 50 kA and Ics = 100%Icu. (2) The value of Ics for S3X, S4X and S6X is 25% lower at 500/690 V.

IEC 947-4 motor-protection circuit-breakers. Tailor-made protection for your motor.



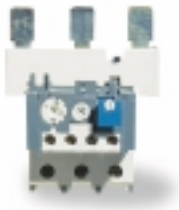
Protection and starting of three-phase asynchronous motors

The starting, switching and protection of a three-phase asynchronous motor are essential operations for it to be used correctly. The traditional system used for this purpose requires three different devices: a circuit-breaker for protecting against short circuits, a thermal relay for protecting against overloads and phase failures or imbalances and a contactor for switching the motor. All of these together are of necessity required to take the problems that arise during starting into account.
A number of different factors therefore need to be taken into account when choosing these devices, such as:
- the power of the motor
- the type of starting
- the type of motor: with cage rotor or wound rotor

			S2X 80	S3			S3X	S4		
Rated uninterrupted current, Iu		[A]	80	160 / 250			125 / 200	160 / 250		
Rated service current, In		[A]	1...80	3...125 / 160...200			3... 125 / 125...200	100, 160 / 250		
Number of poles			3	3			3	3		
Rated service voltage, Ue (AC) 50-60Hz		[V]	690	690			690	690		
Rated impulse withstand voltage, Uimp		[kV]	6	8			8	8		
Rated insulation voltage, Ui		[V]	690	800			800	800		
Test voltage at industrial frequency for 1 minute			3000	3000			3000	3000		
Rated limit short-circuit breaking capacity, Icu			X	N	H	L	X	N	H	L
	(AC) 50-60 Hz 220/230 V	[kA]	100	65	100	170	300	65	100	200
	(AC) 50-60 Hz 380/415 V	[kA]	70	35[1]	65	85	200	35[1]	65	100
	(AC) 50-60 Hz 440 V	[kA]	70	30	50	65	180	30	50	80
	(AC) 50-60 Hz 500 V	[kA]	50	25	40	50	150	25	40	65
	(AC) 50-60 Hz 690 V	[kA]	10	14	18	20	75	18	22	30
Rated duty short-circuit breaking capacity, Ics[2]		[%Icu]	75%	100%	75%	75%	100%	100%	100%	75%
Rated short-circuit making capacity (415 V), Icm		[kA]	154	74	143	187	440	74	143	220
Opening time (415V)		[ms]	3,5	8	7	6	3,5	8	7	6
Category of use (EN 60947-2)			A	A			A	A		
Isolation behaviour			■	■			■	■		
IEC 947-2, EN 60947-2			■	■			■	■		
Releases magnetic only fixed 13xIn			■	-			-	-		
Releases magnetic only adjustable 4...12xIn			-	■			■	-		
Releases microprocessor-based PR211/P (I)			-	-			-	■		
Interchangeability			-	-			-	■		
Versions			F-P	F - P - W			F - P - W	F - P - W		
Terminals	Fixed (F)		EF - FC - FC CuAl -R	F - EF - ES - FC - FC CuAl - RC - R			F - EF - ES - FC - FC CuAl - R - RC	F - EF - ES - FC - FC CuAl - R - RC		
	Plug-in (P)		FC-R	EF-FC-R			EF-R	EF-FC-R		
	Withdrawable (W)		-	EF-FC-R			EF-R	EF-FC-R		
Fixing on DIN rail			DIN EN 50022	DIN EN 50023			DIN EN 50023	DIN EN 50023		
Mechanical life	**[No. operations / Operations per hour]**		25000/240	25000/120			25000/120	20000/120		
Basic dimensions Fixed, 3 poles W		[mm]	90	105			105	105		
	D	[mm]	70	103,5			103,5	103,5		
	H	[mm]	120	170			255	254		
Weights	Fixed 3 poles	[kg]	1,1	2,6			3,6	4		
	Plug-in 3 poles	[kg]	1,3	3,1			6,3	4,5		
	Withdrawable 3 poles	[kg]	-	3,5			7,1	4,9		

[1] All versions with Icu = 35 kA are certified to 36 kA.

[2] The percentage Ics performance of S3 N/H/L, S4 N/H/L, S5 N/H and S6 N/S/H circuit-breakers is 25% lower at 690 V.



- the fault current at the point in the network where the motor is installed.

ABB SACE L.V. offers a wide range of circuit-breakers that are suitable for use inside traditional protected starters, implementing short-circuit protection only.

The new SACE S2X 80, with magnetic protection that is fixed at 13 times the rated service current, is distinguished by excellent performance in terms of breaking capacity and specific let-through energy limiting capacity.

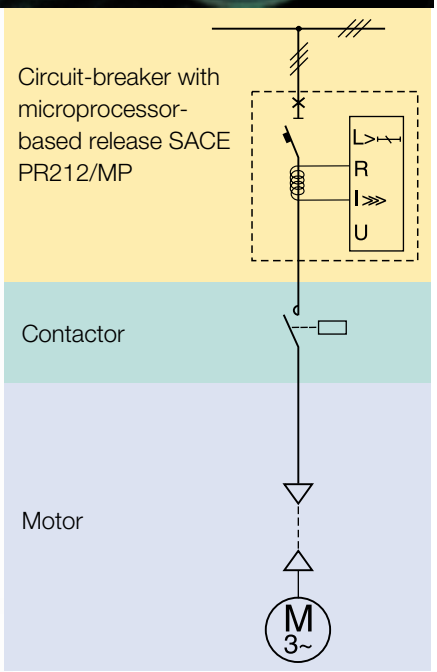
It is extremely easy and fast to install, while offering all the same accessory and customising options as the S2B/N/S circuit-breakers. It can be used in a vast field of starting applications, from 0.37 kW to 37 kW and from 400 V-50 kA up to 690 V-50 kA.

SACE S3N/H/L 160/250 circuit-breakers and the S3X 125/200 current-limiting circuit-breaker are equipped with a magnetic-only release that can be adjusted to from 4 to 12 times the rated service current. They cover coordinations from 37 to 132 kW and make it possible to provide optimal motor protection thanks to the outstanding flexibility offered by their wide magnetic threshold adjustment range.

Finally, the SACE S4 160/250, S5 400/630, S6 630/800 and S7 1250/1600 with their different N-S-H-L breaking capacity levels, like the S4X and S6X current-limiting circuit-breakers, can be equipped with the PR 211/P (I) microprocessor-based electronic release. They are above all used for protecting high-power motors and make it possible to choose the optimal trip value for any type of motor thanks to the possibility of setting the short-circuit protection to between 1.5 and 12 times.

S4X	S5			S6				S6X	S7		
250	400 / 630			630 / 800				400 / 630	1250 / 1600		
100, 160, 250	320, 400 / 630			630 / 800				320, 400 / 630	1000, 1250 / 1600		
3	3			3				3	3		
690	690			690				690	690		
8	8			8				8	8		
800	800			800				800	800		
3000	3000			3000				3000	3000		
X	N	H	L	N	S	H	L	X	S	H	L
300	65	100	200	65	85	100	200	300	85	100	200
200	35(1)	65	100	35(1)	50	65	100	200	50	65	100
180	30	50	80	30	45	50	80	180	40	55	80
150	25	40	65	25	35	40	65	150	35	45	70
75	20	25	30	20	22	25	30	75	20	25	35
100%	100%	100%	75%	100%	100%	100%	75%	100%	100%	75%	50%
440	74	143	220	74	105	143	220	440	105	143	220%
3,5	8	7	6	10	9	8	7	3,5	22	22	22
A	B(400A) A(630A)			B				A	B		
■	■			■				■	■		
■	■			■				■	■		
-	-			-				-	-		
-	-			-				-	-		
■	■			■				■	■		
■	■			■				■	■		
F -P - W	F - P(400A) - W			F - W				F - W	F - W		
F - EF - ES - FC - FC CuAl - R - RC	F - EF - ES - FC - FC CuAl - R - RC(400A)			F-EF-FC CuAl-R-RC				F-EF-FC CuAl-R-RC	F-EF-FC CuAl(125A)-HR-VR		
EF-R	EF-FC-R			-				-	-		
EF-R	EF-FC-R - VR (630A)			EF-HR-VR				EF-VR-HR	EF-VR-HR		
DIN EN 50023	DIN EN 50023			-				-	-		
20000/120	20000/120			20000/120				20000/120	10000/120		
105	140			210				210	210		
103,5	103,5			103,5				103,5	138,5		
339	254			268				406	406		
5	5			9,5				15	17		
8,2	6,1			-				-	-		
9	6,4			12,1				25,4	21,8		

SACE PR212/MP electronic releases IEC 947-4. The leading edge in motor protection



SACE Isomax S4N-H-L 160/250, S5N-H-L 400, S6N-H-L 800, S7S-H-L, S4X 250 and S6X 400/630 circuit-breakers are equipped with SACE PR212/MP electronic releases featuring microprocessor-based technology. This on the one hand makes it possible to obtain functions that ensure high operating precision, outstanding reliability and freedom from the influence of external agents, while on the other hand making it possible to implement sophisticated new protection functions that, being integrated on board the circuit-breaker, represent the leading-edge of motor starting and protection technology. SACE PR212/MP - a sophisticated design that's simple and intuitive to use. The different function curves with their many threshold and time settings make it possible to draw a global time-current curve that is really close to the motor's starting curve, optimising the protection provided.

			S4			S5			S6			S7		
Rated uninterrupted current, Iu		[A]	160 /250			400			800			1250		
Rated service current, In		[A]	100, 160 / 200			320			630			1000		
Number of poles			3			3			3			3		
Rated service voltage, Ue (AC) 50-60Hz		[V]	690			690			690			690		
Rated impulse withstand voltage, Uimp		[kV]	8			8			8			8		
Rated insulation voltage, Ui		[V]	800			800			800			800		
Test voltage at industrial frequency for 1 minute			3000			3000			3000			3000		
Rated limit short-circuit breaking capacity, Icu			N	H	L	N	H	L	N	H	L	S	H	L
	(AC) 50-60 Hz 220/230 V	[kA]	65	100	200	65	100	200	65	100	200	85	100	200
	(AC) 50-60 Hz 380/415 V	[kA]	35[1]	65	100	35	65	100	35[1]	65	100	50	65	100
	(AC) 50-60 Hz 440 V	[kA]	30	50	80	30	50	80	30	50	80	40	55	80
	(AC) 50-60 Hz 500 V	[kA]	25	40	65	25	40	65	25	40	65	35	45	70
	(AC) 50-60 Hz 690 V	[kA]	18	22	30	20	25	30	20	25	30	20	25	35
Rated duty short-circuit breaking capacity,Ics [2]		[%Icu]	100%	100%	75%	100%	100%	75%	100%	100%	75%	100%	75%	50%
Rated short-circuit making capacity (415 V), Icm		[kA]	74	143	220	74	143	220	74	143	220	105	143	220
Tripping time (415V)		[ms]	8	7	6	8	7	6	9	8	7		22	
Category of use (EN 60947-2)				A			A			B			B	
Isolation behaviour				■			■			■			■	
IEC 947-2, EN 60947-2 IEC 947-4-1, EN 60947-4-1				■			■			■			■	
Releases microprocessor-based PR212/MP (LRIU)				■			■			■			■	
Interchangeability				■			■			■			■	
Versions				F-P-W			F-P-W			F-W			F-W	
Terminals	Fixed (F)			F-EF-ES-FC-FC CuAl-R-RC			F-EF-ES-FC-FC CuAl-R-RC			F-EF-FC CuAl-R-RC			F-EF-FC CuAl-HR-VR	
	Plug-in (P)			EF-FC-R			EF-FC-R			-			-	
	Withdrawable (W)			EF-FC-R			EF-FC-R			EF-HR-VR			EF-HR-VR	
Fixing on rail DIN EN 50023				SI			SI			-			-	
Mechanical life	**[No. operations / Operations per hour]**			20000/120			20000/120			20000/120			10000/120	
Basic dimensions	**Fixed, 3 poles**													
	W		[mm]	105			140			210			210	
	D		[mm]	103,5			103,5			103,5			138,5	
	H		[mm]	254			254			268			406	
Weights	Fixed	3 poles	[kg]	4			5			9,5			17	
	Plug-in	3 poles	[kg]	4,5			6,1			-			-	
	Withdrawable	3 poles	[kg]	4,9			6,4			12,1			21,8	

[1] All versions with Icu = 35 kA are certified to 36 kA.

[2] The percentage Ics performance of S4 N/H/L, S5 N/H and S6 N/S/H circuit-breakers is 25% lower at 690 V.

OVERLOAD: FUNCTION L

A thermal model stored in the microprocessor makes it possible to correlate the overcurrents encountered in the power supply line with the temperature levels reached in the copper and in the iron of the motor (ABB SACE L.V. international patent). This protection conforms to the IEC 947-4-1 international motor protection standards and makes it possible to choose from four different starting classes: 10A, 10, 20 and 30. The protection is also temperature-compensated and sensitive to phase failure or unbalance, in compliance with the standard.

ROTOR LOCK: FUNCTION R

Function R protects the motor against rotor lock during operation.
This protection is automatically de-activated during the starting phase and subsequently re-activated. This prevents unwanted tripping due to the subtransient current while simultaneously providing protection for the motor and installation during operation.

SHORT-CIRCUIT: FUNCTION I

This protection is designed to trip in just a few milliseconds in the event of short-circuit phenomena. The microprocessor is also able to distinguish starting, preventing untimely opening of the circuit breaker with the inrush current (ABB SACE L.V. international patent).

PHASE FAILURE AND/OR UNBALANCE: FUNCTION U

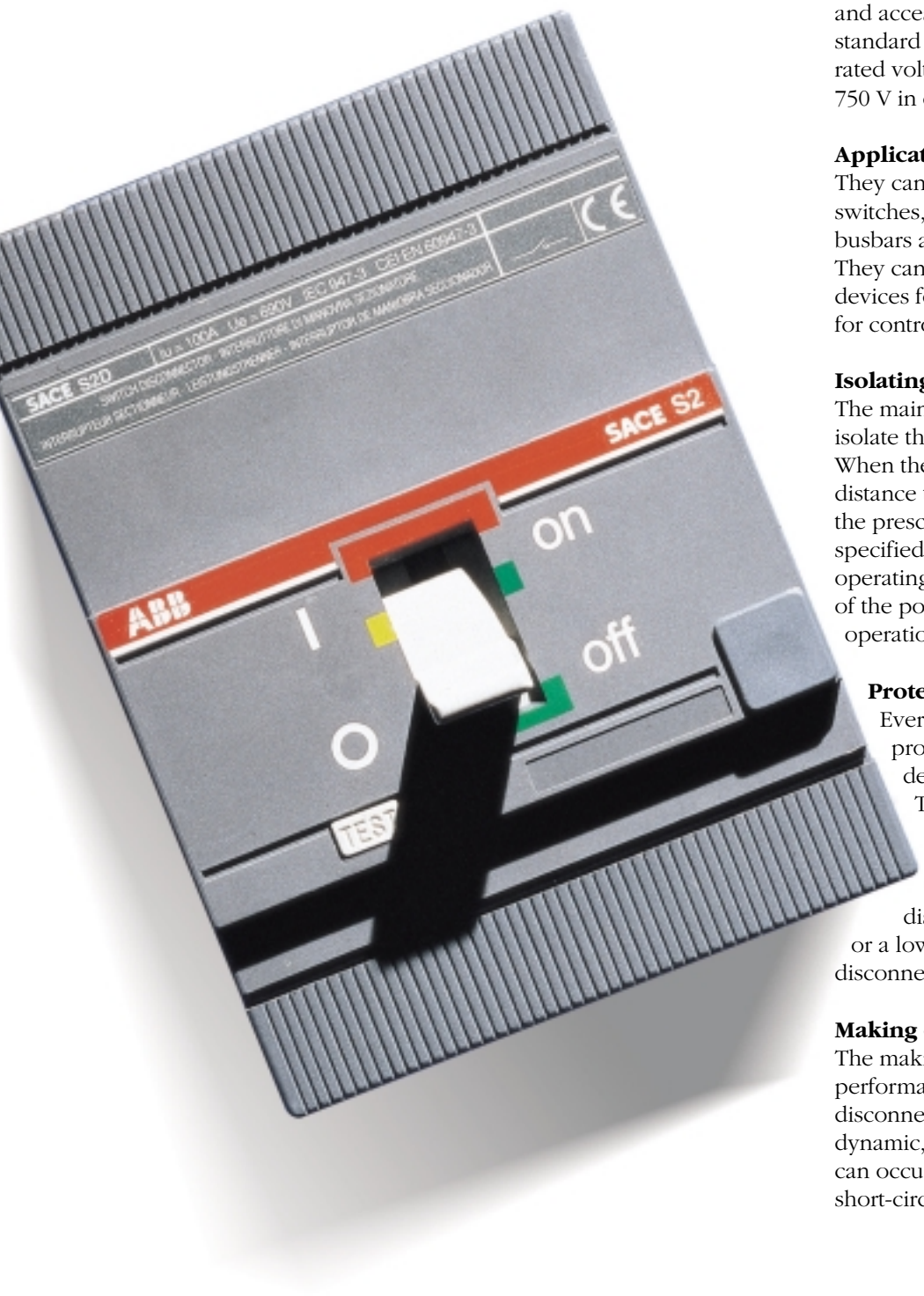
Phase failure or absorption unbalances are detected by the electronic release, which monitors all the phase currents.
Function U provides additional protection to the normal sensitivity to these phenomena, required by the standard and provided by function L. The release trips if the current in one or two phases falls below the preset threshold of 0.4 times the thermal current and stays there for more than 4 seconds.

Solutions coordinated with the ABB system
The innovative strengths of this advanced solution, comprising a starter formed by a SACE Isomax S circuit-breaker with PR212/MP and an ABB contactor, not only ensure complete and optimal motor protection but also offers other important benefits. Firstly, a significant saving in time and space as well as money, due to the fact that it isn't necessary to use an external thermal relay.
What's more, the SACE Isomax S series and new line of ABB A-Line contactors form the core of a new generation of devices that have been specially designed to provide a system of products that can be perfectly integrated to suit different application requirements.
The circuit-breaker and contactor have the same dimensions in width and depth and an exceptionally simple and compact installation system.

S4X	S6X
250	400 / 630
100, 160, 200	320 / 400, 630
3	3
690	690
8	8
800	800
3000	3000
X	X
300	300
200	200
180	180
150	150
75	75
100%	100%
440	440
3,5	3,5
A	A
■	■
■	■
■	■
■	■
F-P-W	F - W
F - EF - ES - FC - FC CuAl - R - RC	F-EF-FC CuAl-R-RC
EF-R	-
EF-R	EF-VR-HR
SI	-
20000/120	20000/120
105	210
103,5	103,5
339	406
5	15
8,2	-
9	25,4

In addition to the classic circuit-breaker/contactor/thermal relay combination, model S4 and up of the SACE Isomax S motor protection circuit-breakers can be combined with the contactor alone (with an example being the S5H with PR212/MP and a series "A" model A300-30 contactor)

Switch-disconnectors IEC 947-3. Switching in total safety.



The switch-disconnectors are based on the corresponding circuit-breakers and retain the same dimensions, versions, mounting systems and accessory options. They conform to IEC standard 947-3. They are characterised by a rated voltage of 690 V in alternating current and 750 V in direct current.

Applications
They can be used as sub-switchboard main switches, switch-disconnectors for lines, busbars and sets of switchgear or as bus-ties. They can also form part of general isolating devices for groups of machines or assemblies for controlling and protecting motors.

Isolating
The main function of these circuit-breakers is to isolate the circuits in which they are installed. When the contacts open they move to a distance that prevents arc ignition, respecting the prescriptions regarding isolation behaviour specified in the standards. The position of the operating lever provides unequivocal indication of the position of the contacts (positive operation).

Protection
Every switch-disconnector must be protected upstream by a coordinated device offering short-circuit protection. The coordination table alongside indicates the SACE Isomax S circuit-breaker able to provide this protection function for each switch-disconnector. All the units are the same or a lower model than the switch-disconnector.

Making capacity
The making capacity is an important performance parameter in that a switch-disconnector must be able to withstand the dynamic, thermal and current stresses which can occur during closing without damage, up to short-circuit closing conditions.

			S2D	S3D	S6D	S7D	S8D
Conventional thermal current at 60°C Ith		A	125-160	100-160-250-320	400-630-800	1000-1250-1600	2000-2500-3200
Poles		N°	3-4	3-4	3-4	3-4	3-4
Rated service voltage Ue	a.c. 50-60 Hz	V~	690	690	690	690	690
	d.c.	V-	500	750	750	750	750
Rated current Iu		A	125-160	100-160-250-320	400-630-800	1000-1250-1600	2000-2500-3200
Rated impulse withstand voltage, Uimp		kV	6	8	8	8	8
Rated insulation voltage, Ui		V	690	800	800	800	800
Test voltage at industrial frequency for 1 min.		V	3000	3000	3000	3000	3000
Rated short-circuit making capacity (415 V~), Icm		kA	3,1	10	30	52,5	85
Rated short-time withstand current for 1s Icw		kA	2,2	6,5	15	25	40
Isolation behaviour			■	■	■	■	■
IEC 947-3			■	■	■	■	■
Mechanical life [No. operat. / Operat. per hour]			25000/240	25000/120	20000/120	10000/120	10000/20
Terminal versions							
	Fixed		EF-FC-FC CuAl-R RC-R	F-EF-FC-FC CuAl RC-R	F-EF-FC CuAl RC-R	F-EF-FC CuAl (1250 A) HR-VR	EF (2500A)-R
	Plug-in		FC-R	F-FC-R	-	-	-
	Withdrawable		-	F-FC-R	F-HR-VR	F-HR-VR	-
Dimensions fixed	**3 poles**						
	W	mm	90	105	210	210	406
	D	mm	70	103,5	103,5	138,5	242
	H	mm	120	170	268	406	400
Dimensions fixed	**4 poles**						
	W	mm	120	140	280	280	556
	D	mm	70	103,5	103,5	138,5	242
	H	mm	120	170	268	406	400
Weight	3 poles	kg	1,1	2,6	9,5	17	57
	4 poles	kg	1,5	3,5	12	22	76

Coordination with circuit-breakers

Breaking capacities (kA) of combinations of circuit-breakers and switch-disconnectors

Maintained in closed position
Identifies the capacity to remain in the closed position for short-time overcurrents. This is an important parameter of this type of switchgear.

Type	S2D 125	S2D 160	S3D 100	S3D 160	S3D 250	S3D 320	S6D 400	S6D 630	S6D 800	S7D 1000	S7D 1250	S7D 1600	S8D 2000	S8D 2500	S8D 3200
S1 B	16		16												
S1 N	25		25												
S2 B	16	16	16	16											
S2 N	35	35	35	35											
S2S	50	50	50	50											
S3 N			35	35	35	35									
S3 H			65	65	65	65									
S5 N							35	35	35						
S5H							65	65	65						
S6 N							35	35	35						
S6 S							50	50	50						
S6 H							65	65	65						
S7 S										50	50	50			
S7 H										65	65	65			
S8 H													85	85	85
S8 V													120	120	120

Residual-current releases. A coordinated combination.

Residual-current circuit-breakers combine overcurrent protection and residual-current protection in a single device. They are tripped both by overloads / short circuits and earth leakage currents. “Pure” residual-current circuit-breakers, obtained using switch-disconnectors, are only tripped by earth fault currents.
They also enable the installation’s insulation status to be monitored continuously, ensuring effective protection against fire and explosion hazards and, in the case of devices with
IDn ≤ 30 mA, ensure protection (personal safety) against direct and indirect contacts, in addition to the compulsory measures specified in the relevant standards and safety prescriptions.

SACE RC210 polarised residual-current release
The SACE RC210/1 polarised residual-current release for horizontal installation on DIN 50022 rails is available for SACE S1 circuit-breakers. It is available in versions for residual simple harmonic alternating currents (a.c.),

with residual-current fault tripping thresholds of 300 mA and 500 mA, rated uninterrupted currents of 63 A and 125 A and operating voltages of up to 500 V.
The polarised residual-current release is available as a unit for fitting on the right-hand side of the circuit-breaker and acts directly on the tripping control. It features a test button for routine testing of the release.

SACE RC211 and RC212 residual-current releases

SACE RC211 and RC212 residual-current releases can be installed in horizontal or vertical layouts with SACE Isomax S1, S2 and S3 circuit-breakers or SACE S3D switch-disconnectors. These releases feature analogue electronic technology. They do not require an auxiliary power supply because they are powered directly from the mains through the circuit-breaker and operation is guaranteed even with only one phase live and unidirectional pulsating currents with continuous current components. A test pushbutton enables operation to be tested.
The residual-current releases are manufactured in conformity with the following standards: IEC 947-2 Appendix B, IEC 255-4 and IEC 1000 for protection against slow tripping, as well as IEC 755 for insensitiveness to continuous current components.
SACE RC211 and SACE RC212 releases act on the circuit-breaker through an opening solenoid supplied with the release to be fitted in the special slot in the zone of the third pole.

SACE RCQ residual-current switchboard release

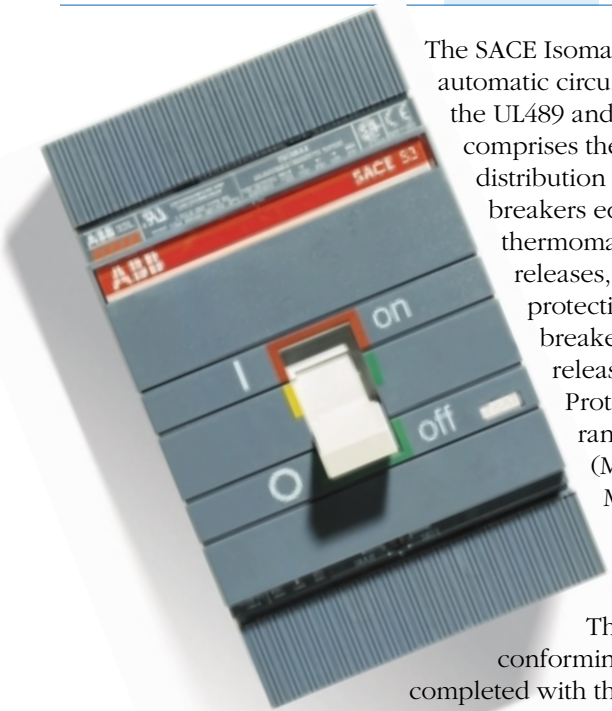
Suitable for use with solely alternating earth currents and for alternating and/or pulsating currents with continuous components, while also being suitable for implementing residual-current selectivity. It can be used in conjunction with all SACE Isomax S circuit-breakers and is installed in the switchboard with a separate toroid for external installation on the line conductors.
Particularly suitable for applications requiring a residual-current protection system that is coordinated with the various different distribution levels, from the main switchboard to the end user.

			RC210	RC211	RC212	RCQ
Technology			polarised	electronic	electronic	electronic
Installation			horizontal	horizontal-vertical	horizontal-vertical	switchboard compart.
Action			direct	with solenoid	with solenoid	with solenoid
Operating voltage	a.c.	[V~]	up to 500	220 ÷ 500	50 ÷ 500	up to 500
	d.c.	[V–]				48 ÷ 125
Operating test range		[V]	230 ÷ 500	220 ÷ 500	50 ÷ 500	80 ÷ 500 a.c. 48 ÷ 125 d.c.
Tripping thresholds $I_{\Delta n}$		[A]	0.3 - 0.5	0.03 - 0.1 - 0.3	0.03-0.1-0.3-0.5-3	0.03...30
Tripping times		[s]	instantaneous	instantaneous	0-0.1-0.25-0.5-1-1.5	0-0.1-0.2-0.3-0.5-0.7-1-2-3-5
Rated service current		[A]	up to 125	up to 250	up to 250	up to 2000
Type: AC for alternating current only			■	■	■	■
Type: A for alternating, pulsating current			—	■	■	■
Type selective			—	—	■	■
Tripping indication			—	■	■	■
Indication of pre-alarm			—	—	■	■
Dimensions W x H x D			103 x120 x 70	120 x 120 x 70	140 x 170 x 108	96x 96 x 131.5
Input for remote opening			—	—	■	■

Circuit-breakers conforming to UL/CSA Standards. Quality to conquer the New World.

Moulded Case Circuit Breakers

Circuit breaker type			S1	S3 150			S3 225			
Maximum frame continuous rated current 40 °C		[A]	100	150			225			
Poles			3	2 - 3			2 - 3			
Rated operational voltage 50-60 Hz		[V]	277/480	600			240 (B); 480 (N/H/L)			
	d.c. (3 poles in series)	[V]		600			500			
Test voltage (1min.) 50-60 Hz		[V]	3000	3000			3000			
UL/CSA short-circuit interrupting capacity		[kA rms]	N	N	H	L	B	N	H	L
	240 Vac		50	65	100	150	150	65	100	150
	480 Vac		14(for R15) / 20(for R20-R100)	25	50	85	-	25	50	65
	600 Vac		-	14	14	25	-	-	-	-
	500 Vdc (2 poles in series)		-	35	50	65	50	20	35	50
	600 Vdc (3 poles in series)		-	20	35	50	-	-	-	-
Overcurrent trip relays										
Thermal-magnetic			■	■			■			
Microprocessor based			-	-			-			
Interchangeability			-	-			-			
Fixed Version - Dimensions	H	[in/mm]	4,72 / 120	6,70 / 170			6,70 / 170			
	W	[in/mm]	3,07 / 78	4,13 / 105			4,13 / 105			
	D	[in/mm]	2,75 / 70	4,07 / 103,5			4,07 / 103,5			
Mechanical duration		[op./ frequency]	25000 / 240	25000 / 120			25000 /120			
Weights (fixed - 3P)		[lbs.]	2,42	6,75			6,75			



The SACE Isomax S offer of moulded-case automatic circuit-breakers conforming to the UL489 and CSA22.2 standards comprises the range of power distribution automatic circuit-breakers equipped with thermomagnetic or electronic releases, the range of motor protection automatic circuit-breakers with magnetic only releases (Motor Control Protection – MCP) and the range of control breakers (Moulded Case Switch – MCS) for use as isolators or switching devices for lines, busbars or parts of installations.

The SACE Isomax S offer conforming to UL/CSA standards is completed with the introduction of three new models. As a result there is a constantly increasing array of options for those customers who also operate on markets that adopt the UL/CSA standards, having any entire range of moulded-case circuit-breakers with rated currents that extend from 100 A to 2500 A and breaking capacities, at 480 V AC, that can go up to 100 kA.

The introduction of the S1 model not only extends the range of rated currents downwards but also makes it possible to meet the demands of all those applications typical of power subdistribution in which a circuit-breaker with compact dimensions that nevertheless offers high accessory and installation versatility is particularly attractive.

The choice offered is further increased by the introduction of the new rating for S3 of Iu = 225 A with three breaking capacity levels (N/H/L) up to operating voltage values of Ue=480 V AC and 500 V DC.

Finally, the new development represented by the S8 circuit-breaker conforming to the UL/CSA standards also makes it possible to complete the offer upwards to higher rated current values. The Isomax S8V 1600, 2000 and 2500 are suitable for installation immediately downstream of the power supply sources for low voltage systems and are suitable for safe operation in the most severe operating conditions required by modern installations. Their high performance, wide range of accessory options, ease of coordination with devices downstream and the possibility they offer of reducing switchboard depths thanks to the circuit-breaker's compact dimensions make the Isomax S8 a particularly advantageous solution.

S4			S5			S6			S7	S8
250			400			800			1200	1600-2000-2500
2 - 3			2 - 3			2 - 3			2 - 3	3
600			600			600			600	600
-			600			600			-	-
3000			3000			3000			3000	3000
N	H	L	N	H	L	N	H	L	H	V
65	150	200	65	150	200	65	150	200	100	120
25	65	100	35	65	100	50	65	100	65	100
18	22	35	22	22	35	25	35	42	50	85
-	-	-	35	50	65	35	50	65	-	-
-	-	-	20	35	50	20	35	50	-	-
-			■			■			-	-
■			■			■			■	■
■			■			■			■	■
10,00 / 254			10,00 / 254 (300A); 13,62 / 346 (400A)			14,25 / 268			16 / 406	15,75 / 400
4,13 / 105			5,51 / 140			8,27 / 210			8,27 / 210	15,98 / 406
4,07 / 103,5			4,07 / 103,5			4,07 / 103,5			5,45 / 138.5	9,25 / 235
20000 / 120			20000 / 120			20000 / 120			10000 / 120	10000 / 20
8,8			11			22			37,5	135

Motor Control protection - MCP

	S3 L		S4 N/H/L			S5 N/H/L			S6 N/H/L			S7 H	S8 V
Poles	3		3			3			3			3	3
Trip Unit													
Adjustable magnetic only (4...12xIn)	■												
PR211/P - I			■			■			■			■	■
Rating [A]	3...25	50...150	100-250			400	400	400	600-800	600-800	600-800	1000-1200	1600-2000-2500
	L	L	N	H	L	N	H	L	N	H	L	H	V
Interrupting capacity													
240 V a.c.	50	150	65	150	200	65	150	200	65	150	200	100	120
480 V a.c.	25	85	25	65	100	35	65	100	50	65	100	65	100
600 V a.c.	10	25	18	22	35	22	22	35	25	35	42	50	85
500 V d.c.	65 [1]	65	-	-	-	-	-	-	-	-	-	-	-
600 V d.c.	50 [1]	50	-	-	-	-	-	-	-	-	-	-	-

[1] Performance available only for the 25 A rating version

Moulded Case Switches - MCS

Type		S3H-D 225	S3H-D 150	S4H-D	S5H-D	S6H-D	S7H-D	S8V-D
Rating	[A]	225	150	250	400	800	1200	2500
Poles		3	3	3	3	3	3	3
Magnetic trip	[A]	2250	1500	3000	5000	10000	20000	35000
Rated voltage								
(a.c.) 50-60 Hz	[V~]	480	600	600	600	600	600	600
(d.c.) 3 poles in series	[V–]	500	600	600	600	600	600	600

Intelligent solutions for complete, customised installations

Compact modular designs

Reduce switchboard dimensions

The modular design of our ranges of circuit-breakers, current-limiting circuit-breakers, switch-disconnectors and motor-protection circuit-breakers makes them easy to install in the same compartments.
Thanks to the use of new materials and the careful design of the various models, SACE Isomax S circuit-breakers enable switchboard dimensions to be reduced:
• the volume occupied by the switchgear is up to 50% less than traditional units for the same performance
• the entire range is made up of eight models with just four different depths (70 mm for S1 and S2, 103.5 mm for S3 ... S6, 138.5 mm for S7 and 242mm for S8), allowing the support structures and switchboards to be standardised while enabling installation in prefabricated structures
• front flange standardised for groups of circuit-breakers (45 mm for S1 ... S5, 105 mm for S3 ... S7) enabling different models to be installed in the same switchboard compartment
• the compatible dimensions and range of connection options offered by the variety of terminals available facilitates connections using busbar systems or cables.

Any installation position

Maximum flexibility during design and installation

SACE Isomax S circuit-breakers can be installed vertically or horizontally without affecting their performance.
They can be powered using either their upper or lower terminals.
They can be installed on the base plate of the switchboard or, for all models up to S5, on DIN rails.

Protection degree

Protection against direct and accidental contacts

The protection degree is IP20 for the fixed, plug-in and withdrawable circuit-breakers, and IP30 for circuit-breakers installed in switchboards.
Adding a compartment-door-mounted rotary handle operating mechanism with transmission takes the protection degree to IP54.The fixed parts of plug-in and withdrawable circuit-breakers have a protection degree of IP20 towards the front.

New interruption system

Limits the duration and damaging potential of the arc

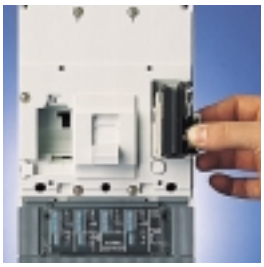
Three factors combine to extinguish the arc in the shortest time possible.
These three elements are:
• the opening speed of the contacts, which is increased thanks to a new operating system that brings them back to their open position immediately:
• the dynamic hiss action that the magnetic field exerts on the arc;
• the structure of the arcing chamber.
Thanks to the considerable reduction in opening time, the circuit-breaker drastically limits the value of the specific let-through energy, protecting the switchgear, users and conductors downstream.

Positive operation

Ensures dependable signalling

The “open” or “closed” status is indicated by the position assumed by the operating lever. The intermediate position indicates opening due to tripping of the releases. Whatever the case, the mechanical indications always correspond to the actual position of the mobile contacts of the circuit-breaker.
The circuit-breaker’s operating mechanism is of the trip-free type, which is independent of the force and speed applied to the operating lever.

Double insulation



Total segregation of power circuits and auxiliary circuits

All the circuit-breakers from model S3 up are manufactured using the double insulation technique.
The seating of every electrical accessory is completely segregated from the power circuit. This prevents any risk of contact with active parts, increasing the safety of the operators managing and inspecting the installations.
The circuit-breakers feature dual redundant insulation between their active parts, both regarding the thickness of the materials and the distances, which exceed those required by the IEC standards and conform to American practice.

Racking out with door closed

Maximum operator safety and the possibility of building internal-arc-proof switchboards

This system, incorporated in a series of moulded-case circuit-breakers for the first time and featured on models S3 and up, enables the circuit-breaker to be racked in and out with the compartment door closed.
This system increases operator safety and makes it possible to build internal-arc-proof low voltage switchboards.
Racking out is only possible when the circuit-breaker is in its open position, using a special racking-out rotary handle supplied with the withdrawable version of the circuit-breaker.

Simple and safe maintenance

Reduces maintenance times and ensures safety

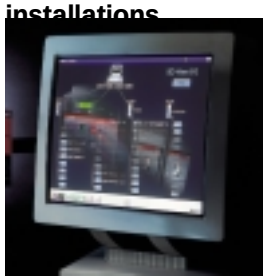
With the circuit-breaker out of service, the condition of the internal parts and active components of the circuit-breaker can be inspected directly. The arcing chambers and fixed and mobile contacts can be accessed simply by removing the circuit-breaker cover.
This operation, which is facilitated by the limited number of components, reduces maintenance times and ensures a higher level of safety.

Conformity with standards

Standards, approvals, certifications and company quality system

SACE Isomax S circuit-breakers and their accessories conform to the international standards IEC 947-2, EN 60947-2 (harmonised in 17 CENELEC countries), CEI EN 60947-2 and IEC 1000, while also conforming to the following EC directives: “Low Voltage Directives” (LVD) No. 73/23 EEC, and “Electromagnetic Compatibility Directive” (EMC) No. 89/336 EEC.
Certification of conformity with these product standards is carried out in compliance with European Standard EN 45011 by the Italian certification body ACAE (Associazione per la Certificazione delle Apparecchiature Elettriche - Association for the Certification of Electrical Equipment), a member of the European organisation LOVAG (Low Voltage Agreement Group).
The ABB SACE L.V. quality system conforms to the international standard ISO 9001 and the equivalent European standards EN ISO 9001 and Italian standard UNI EN ISO 9001. The third-party certifying body is RINA-QUACER.
The ABB SACE L.V. environmental management system is certified by RINA.

Electronics in the service of your installations

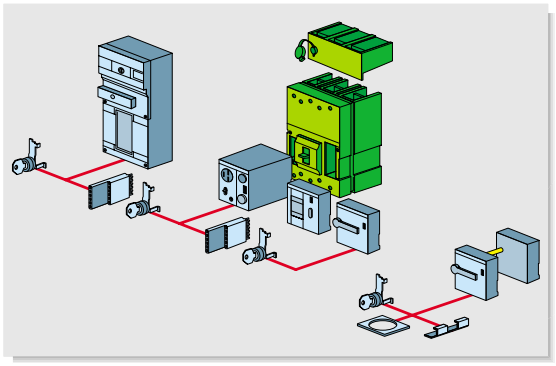


Reliability, precision and integration in monitoring systems

The microprocessor-based releases offer precision and reliability thanks to the careful design of their components and the algorithms that implement the protection functions.
Digital electronics has made it possible to provide monitoring and communication functions that enable the circuit-breakers to be fully integrated in the control logics of supervisory control systems.
ABB SACE L.V. is not only at the leading edge of supervisory control systems for the most complex electrical installations but also offers the most suitable solutions for small installations. The SD-View 810 system has been specially developed for small and medium industrial companies and can be used on personal computers without any special training. Exploiting the performance functions of microprocessor-based releases to the full, SD-View is able to “talk” to all ABB SACE L.V. circuit-breakers, enabling the status of an installation to be monitored by continuously storing data, detecting the status of the circuit-breakers and signalling faults and failures. At the same time, it also allows the operator to set the protection parameters and operating characteristics.

A complete range of accessories. Maximum freedom of customisation

The compatibility of the SACE Isomax S series enables it to offer a complete range of accessories that are standardised for groups of circuit-breakers.
The accessories are the same for all the ranges and can be fitted without removing the circuit-breaker cover. This enables the circuit-breakers ɔ be adapted “in the field” without causing ɔerating problems.
ˈsonal safety is guaranteed in all conditions ıks to the fact that the seatings of the ssories are isolated from the live parts.



Rotary handle operating mechanism

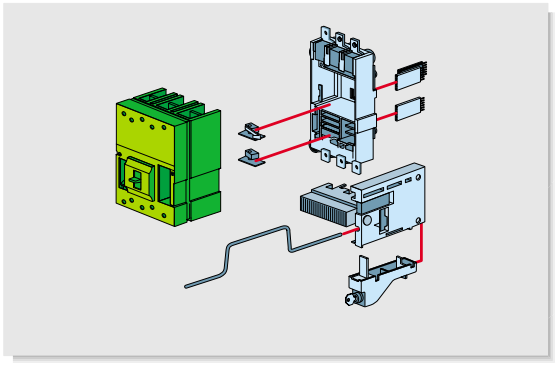
Facilitates opening and closing the circuit-breaker. Features a padlock device (standard, with option of fitting a key lock device and compartment door lock (standard for SACE S1 and S2).

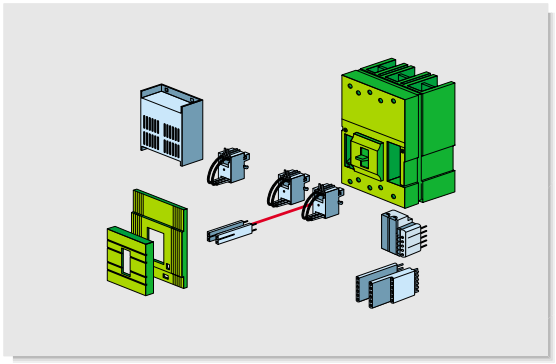
Opening release

Enables remote opening of the circuit-breaker.

Undervoltage release

Opens the circuit-breaker when there is a significant voltage drop or failure in its power supply.
Also available in a time-lag version.





Motor operating mechanism

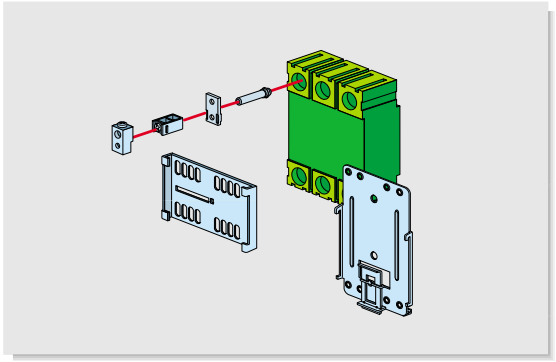
Enables remote opening and closing of the circuit-breaker. A key lock device can also be fitted.
Manufactured in a solenoid version for S1 and S2, a direct-action version for SACE S3, S4 and S5 circuit-breakers and in a stored-energy version for SACE S6 and S7 circuit-breakers.

Dialogue unit and signalling unit

Enables two-way communication with the electrical installation's management and control systems.
It is always used in conjunction with:
• an actuator unit for opening and closing the circuit-breaker from the control system.
Can be completed with:
• a signalling unit for displaying the information provided by the microprocessor-based release.

Auxiliary and position contacts

Carry the signals for showing:
• circuit-breaker open/closed;
• circuit-breaker open due to tripping of releases;
• circuit-breaker racked in/racked out.
Available as change-over contacts.

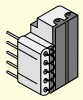


	S1		S2			S3		
	125 A		160 A			160 A		250 A
Rated voltage Ue 50/60 Hz V~	500		690			690		
Performance level	B	N	B	N	S	N	H	L
Icu kA (380 / 415 V~) 50-60 Hz	16	25	16	35	50	35	65	85

Duty releases

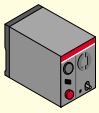
- Shunt opening releases
- Undervoltage releases
- Time-lag versions of undervoltage releases

Electrical signalling



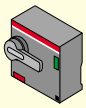
Contacts:
- 2 change-over contacts for signalling Open/Closed
- 1 en commutation Ouvert/Fermé + 1 en commutation pour signaler le déclenchement du déclencheur
- 1 open + 1 closed + 1 open for signalling release tripped
- Early auxiliary contact for undervoltage release
- For signalling circuit-breakers Racked in/Racked out

Motor operator



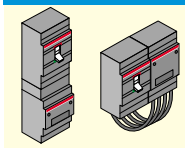
- Solenoid operator
- Direct action motor operator
- Stored-energy motor operator
- Gearmotor for automatic loading of closing springs

Operating mechanisms and locks



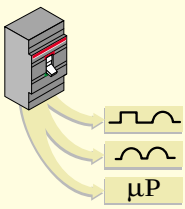
- Rotary handle operating mechanism
- IP54 protection for rotary handle
- Front flange for operating lever mechanism
- Key lock for open position
- Padlock device for operating lever
- Tamper-proof lock for thermomagnetic release
- Lock for compartment door
- Mechanical interlock across two horiz. or vert. installed CB

Residual-current releases



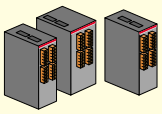
- Vertical installation — RC 211/1 - RC 212/1 | RC 211/2 - RC 212/2 | RC 211/3 - RC 212/3
- Horizontal installation — RC 210/1 - RC 211/1 - RC 212/1 | RC 211/2 - RC 212/2 | RC 211/3 - RC 212/3
- RCQ switchboard compartment

Overcurrent releases



- Thermal fixed / Magnetic fixed
- Thermal adjustable / Magnetic fixed
- Magnetic only
- Thermal adjustable / Magnetic adjustable
- Microprocessor-based PR211/P - PR212/P
- Microprocessor-based PR212/P

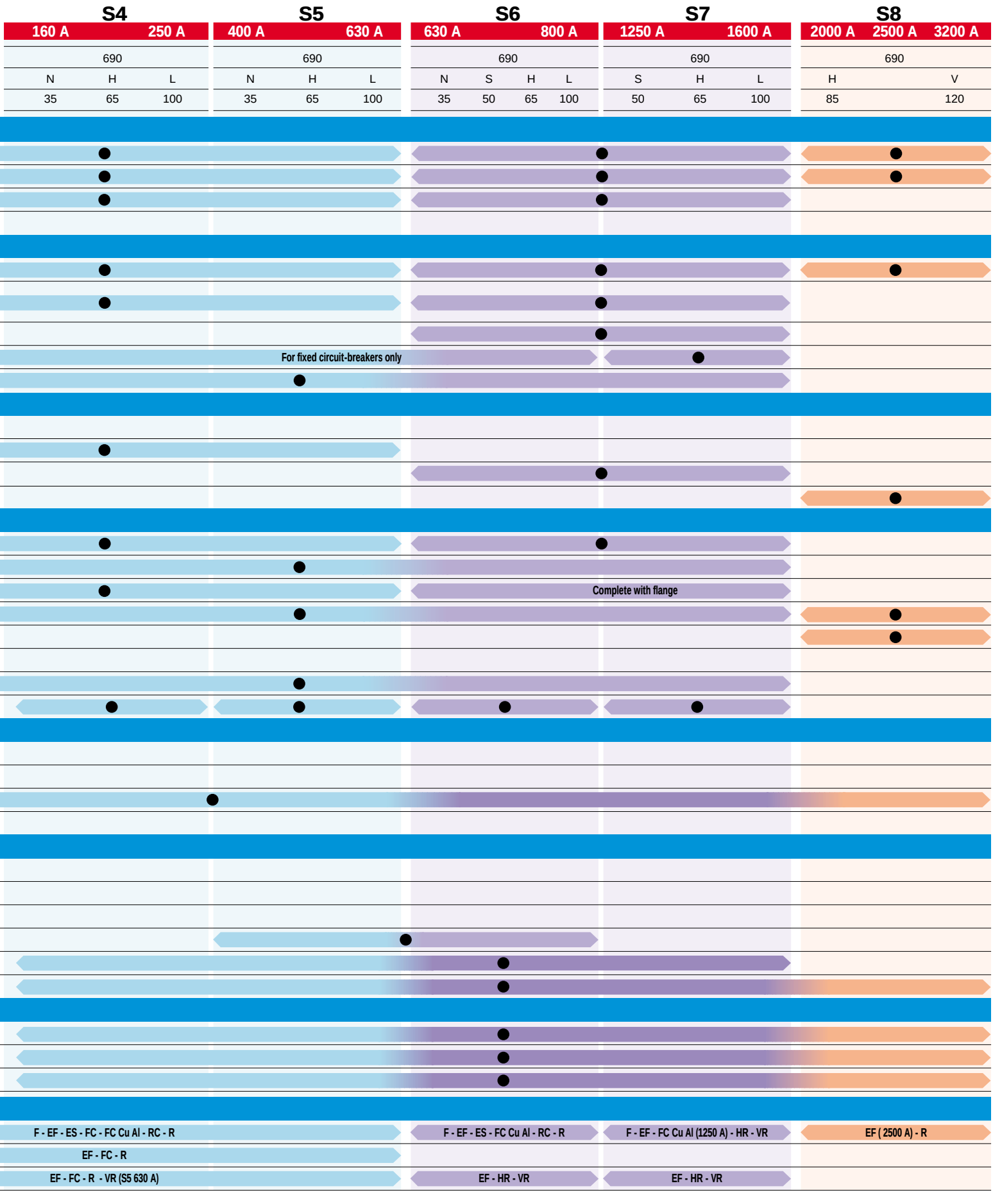
Accessories for microprocessor-based releases



- PR212/K signalling unit
- PR212/D dialogue unit
- PR212/T actuator unit

Terminals

Fixed circuit-breaker	FC - R		EF - FC - FC Cu Al -R					
Plug-in circuit-breaker	FC		FC - R					
Withdrawable circuit-breaker								


S4
S5
S6
S7
S8
160 A
250 A
400 A
630 A
630 A
800 A
1250 A
1600 A
2000 A
2500 A
3200 A
690
690
690
690
690
N
H
L
N
H
L
N
S
H
L
S
H
L
H
V
35
65
100
35
65
100
35
50
65
100
50
65
100
85
120
For fixed circuit-breakers only
Complete with flange
F - EF - ES - FC - FC Cu Al - RC - R
EF - FC - R
EF - FC - R - VR (S5 630 A)
F - EF - ES - FC Cu Al - RC - R
EF - HR - VR
F - EF - FC Cu Al (1250 A) - HR - VR
EF - HR - VR
EF (2500 A) - R

Software and slide rules. Selection and design tools.

Three highly useful work tools are available for designing and sizing electrical installations (DOC software, slide rule kit, guide to L.V. installations) which facilitate calculations, ensure the installation conforms to the relevant standards and decrease the risks of errors. They include information on different low voltage products such as: air circuit-breakers, moulded case circuit-breakers, modular circuit-breakers, contactors, thermal relays, fuse switch-disconnectors.
The three main software products developed by ABB SACE L.V. and ABB Elettrocondutture, called D.O.C. , C.A.T.s and DMB/Win have been put together on a single CD-Rom.
D.O.C. (Design Optimization & Computation) is an optimized sizing system for low voltage industrial installations and is able to recommend the best design selections for cables, busbars and protection devices. It allows the design engineer to develop clear and complete design documentation rapidly in compliance with the most recent standards.
The C.A.T.s (Computer Aided Technical selection) is both an electronic catalogue and a technical instrument for helping to select and add accessories to each single circuit-breaker. By means of guided paths, the most suitable apparatus for the requirements of individual installations can be selected, configured and ordered.
The DMB software package allows you to automate and speed up the preparation of estimates and the configuration of ABB Turati ArTu and PC series distribution switchboards mainly using ABB switchgear and materials. The package is, moreover, also perfectly compatible and interfaceable with the AutoCad applications (DMBLT3 and DMBCAD 3.0) specially developed by ABB for drawing switchboards and single-line circuit diagrams.
The ABB kit comprises four slide rules in different colours that enable rapid electrical installation sizing calculations.
They can be used to calculate:
• The sizing of cables and calculation of short-circuit currents (yellow slide rule)
• Verification of cable protection against direct contact and short-circuits (orange slide rule)
• Selective and back-up co-ordination (green slide rule)
• The sizing of motor lines and transformer outgoing feeders (blue slide rule).
The calculation methods and data on the slide rules have been obtained from the CEI, IEC and NFC Standards in force and from plant engineering practice.
The guide to low voltage installations is a summary of the legal and technical regulations based on current standards regarding the design, sizing and installation of electrical systems. The guide considers the user installation starting from the power supply (MV/LV substation) in category 1 systems.

SACE Isomax S. Technology, innovation and quality

For users. Special user-dedicated, high-performance features

ABB SACE L.V. has a proud history of continuous technological development, innovative choices and simple solutions to the needs of circuit-breaker users.
But users constantly and quite rightly demand more. They are always looking for something better, more reliable and safer. Seeing things from the user's standpoint is a strategy that has enabled ABB SACE L.V. to improve continually over the years, adapting new technical solutions to users' needs, recognising they require products that deliver high reliability over time, the ability to replace worn or damaged parts when necessary and, as is always desirable, the close compatibility of protection features with the more or less critical requirements of each application.

For designers. More integrated solutions for every possible need

It is important for designers to be able to specify switchgear that conforms to the relevant international technical standards in every respect and is able to achieve the highest performance levels reliably. A design is the result of careful analysis of a problem and the application of original solution-oriented criteria that carefully balance the factors required for functional performance, safety, reliability over time and simple but effective maintenance.
The SACE Isomax S series of circuit-breakers offers professionals solutions - in terms of size, coordination and versatility - that enable them to draw up expert designs, choosing from a range of circuit solutions that have been developed for integration in a complete system and that satisfy all plant engineering and standards requirements.

For maintenance engineers. Easy and safe maintenance

Simple, effective maintenance is an essential requirement in any installation, as dictated by the most recent European standards and directives. SACE Isomax S circuit-breakers enable accessories to be fitted from the front. On plug-in and withdrawable versions, they can be fitted and removed from the fixed part with ease.
The fact that the same accessories are used for groups of circuit-breakers makes for simple and economic spare parts warehouse management. The rational construction and modular design of the structure enables circuit-breakers to be changed in many cases without any special adaptation, even when changing from one type to another - such as from an automatic to a current-limiting circuit-breaker.

For installers. Practical convenience for each type of installation

The quality of the accessories supplied for SACE Isomax S circuit-breakers. The in-depth research behind every product. The quality of the technical documentation ABB SACE L.V. provides to support installers. These are just some of the factors that play a decisive role in making a circuit-breaker easy to use, assemble, connect and test.
Installers with high professional standards find an equally professional partner in SACE Isomax S circuit-breakers. A professionalism expressed in the highest levels of versatility and integration, designed to enable implementation of the most advanced and simplest solutions alike.

ITSLV 604030/011 en

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