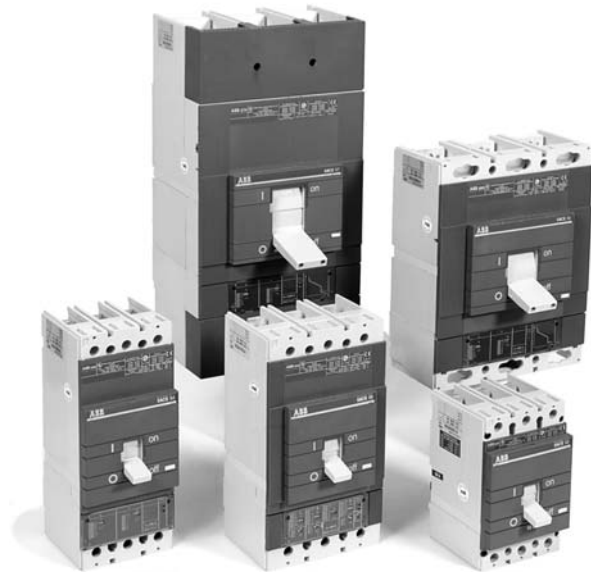


Isomax Molded case circuit breakers



Isomax Molded case circuit breakers



Introduction

ABB Isomax molded case circuit breakers are modern, innovative units designed after extensive analysis of the demands of today's market. These new units embody all the experience and advances derived from ABB's previous highly successful and acclaimed range of circuit breakers. ABB Isomax circuit breakers are designed for the total safety of both operators and systems. This complete and versatile series of circuit breakers can satisfy the most demanding system specifications.

ABB Isomax circuit breakers are ideal for all electrical power generation and distribution applications. The Isomax series maximizes safety and dependability for all power users. The new line is particularly suitable for applications involving special protection coordination needs and automated control systems.

ABB Isomax units also satisfy the most demanding requirements for rated current and fault current levels.

With the wide range of optional trip functions total system selectivity can be maximized.

- Continuous currents from 15A to 2500A
- Rated interrupting capacities from 14kA to 85kA (600VAC UL/CSA)
- Extended working life of all mechanical and electrical parts for continuity of operation
- Suitable for isolation applications
- UL/CSA 100% equipment rated versions

Frame sizes — seven basic sizes

The ABB Isomax series includes seven basic frame sizes with continuous rated currents from 15A to 2500A and with 600VAC interrupting capacities up to 85kA. The various versions have the following breaking capacity ratings:

- **B** basic breaking capacity
- **N** normal breaking capacity
- **H** high breaking capacity
- **L, V** very high breaking capacity

Derived versions

- Circuit breakers with selective and non-selective residual current protection
- Switch disconnectors
- Circuit breakers for motor control with adjustable magnetic release
- Circuit breakers for machine tools
- Circuit breakers for direct current

ABB Isomax versions

- Fixed: all models
- Plug-in: up to S5 400A (IEC)
- Withdrawable: from S3 to S7 1200A (IEC)
- UL File #E93565
- CSA File # LR90467

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General information

General ratings and specifications



Circuit-breaker type			S1	S3B	S3						
Maximum frame	40°C	A	100	225	150			225			
continuous rated current											
Rated operational voltage	50/60 Hz	V	277/480V	240	600			480			
Test voltage	1 min. 50/60 Hz	V	3000	3000	3000			3000			
Rated impulse withstand voltage		kV	6	6	6			6			
Poles		No.	3	2-3	2-3-4			2-3-4			
Performance level											
			N	B	N	H	L	B	N	H	L
UL/CSA short-circuit interrupting capacity	240VAC 480VAC	kA RMS	50 20 ^③	150 —	65 25	100 50	150 85 ^②	150 —	65 25	100 50	150 65
UL 489, File # E93565	600VAC		—	—	14	14	25	—	—	—	—
CSA, File # LR90467	500VDC 600VDC	①	— —	50 —	35 20	50 35	65 50	— —	25 —	35 —	50 —
IEC-947 rated ultimate short-circuit breaking capacity	220/230VAC 380/400/415VAC	kA RMS	40 25 16 12 —	150 — — — —	65 35 30 25 14	100 65 50 40 18	170 85 65 50 20	— — — — —	65 35 30 25 14	100 65 50 40 18	170 85 65 50 20
Overcurrent trip unit/relays											
Thermal-magnetic			•	•	•	•	•	•	•	•	•
Microprocessor-based			—	—	—	—	—	—	—	—	—
Dialogue unit			—	—	—	—	—	—	—	—	—
Interchangeability			—	—	—	—	—	—	—	—	—
Version — Terminals											
Fixed — front or rear			•	•	•	•	•	•	•	•	•
Plug-in — front or rear (IEC)			•	•	•	•	•	•	•	•	•
Withdrawable — front or rear (IEC)			—	•	•	•	•	•	•	•	•
Dimensions (fixed circuit-breaker)											
2P & 3P (H x W x D)		in	4.72 x 3.07 x 2.75	6.70 x 4.13 x 4.07	6.70 x 4.13 x 4.07		6.70 x 4.13 x 4.07				
4P (H x W x D)		in	4.72 x 4.09 x 2.75	6.70 x 5.51 x 4.07	6.70 x 5.51 x 4.07		6.70 x 5.51 x 4.07				
Mechanical duration											
Operations		No.	25,000	25,000	25,000		25,000				
Frequency		ops./hour	240	240	120		120				
Weights (Fixed 3P)											
		lbs	2.42	6.75	6.75		6.75				

① For use with thermal-magnetic trip only:
500VDC, 2 poles in series
600 VDC, 3 poles in series

② 15-30A units are 65kA at 480VAC

③ 15A units are 14kA at 480VAC

General information

Improved use

ABB Isomax circuit breakers — from Model S4 to S8 and starting from 40A are provided with microprocessor based modular relays.

These are available in two versions:

- ABB PR211: with overload and short-circuit protection
- ABB PR212: with overload protection, short-circuit protection, and ground fault protection.

This version can also be fitted with a dialog unit for connection to automation systems.

These reliable and precise relays are unaffected by electromagnetic disturbances. Minimal response tolerances ensure high precision in discrimination computations.

S1, S3 and selected versions of the S5 and S6 breakers are fitted with thermal-magnetic trip releases.

Flexible and modular construction simplify panel design and construction for:

- primary distribution (switchboards)
- motor control (MCC)
- secondary distribution (panelboards)
- panel builders (OEM & users)

- Standard modular dimensions
- Standard circuit breaker depths S3-S6
- Assembly onto DIN profile up to 400 A
- Full range of accessories
- Standard front flange:
 - for DIN 45mm cut-outs on S3-S5
 - for 105mm cut-outs on S3-S7.
- Handle operators:
 - flange type
 - variable depth rotary type
 - fixed depth rotary type

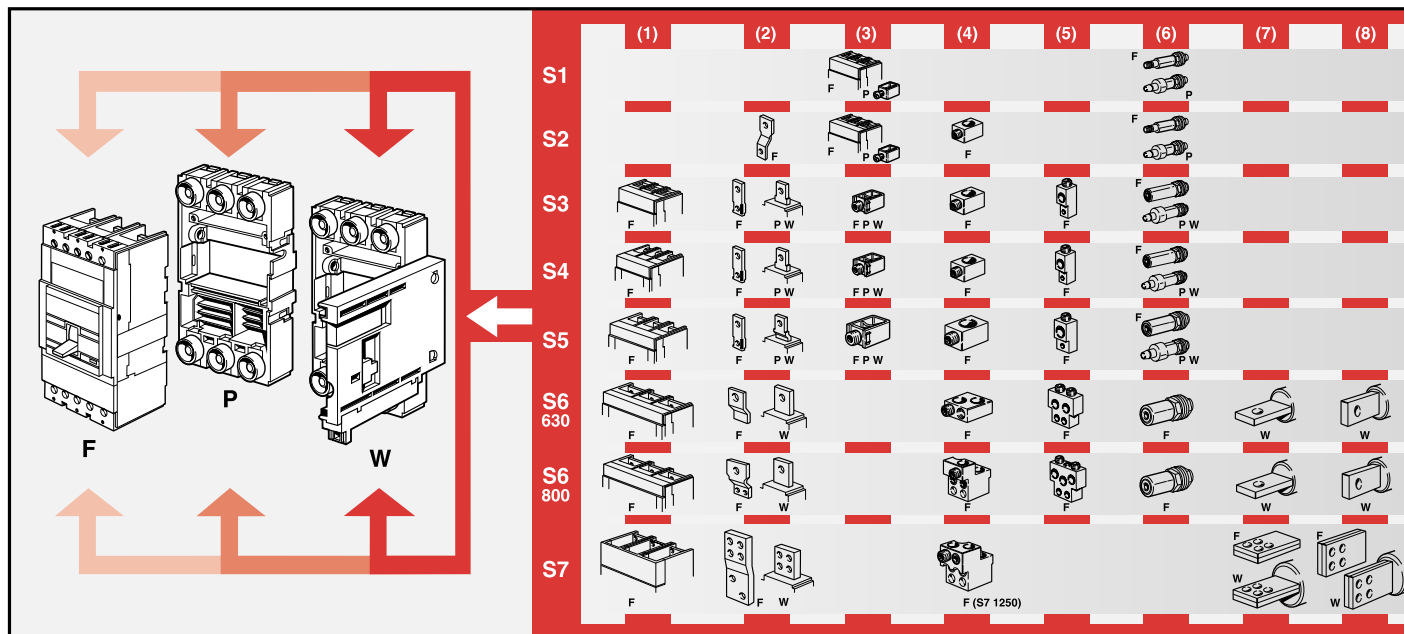


Maximum versatility

ABB Isomax circuit breakers can be fitted with a wide range of terminals for all types of connections.

Modular design also makes installation and assembly extremely simple.

The various terminal options can be fitted in different combinations in the same unit (e.g. one type at the top and another at the bottom). This makes ABB Isomax circuit breakers easy to adapt to any installation.



- | | |
|--|------------------------------|
| (1) Front | (5) CU rear cables |
| (2) Extended front | (6) Rear threaded |
| (3) CU front cable terminals (saddle type) | (7) Rear horizontal flat bar |
| (4) CU/AL front cables (standard type) | (8) Rear vertical flat bar |

General information

Accessories

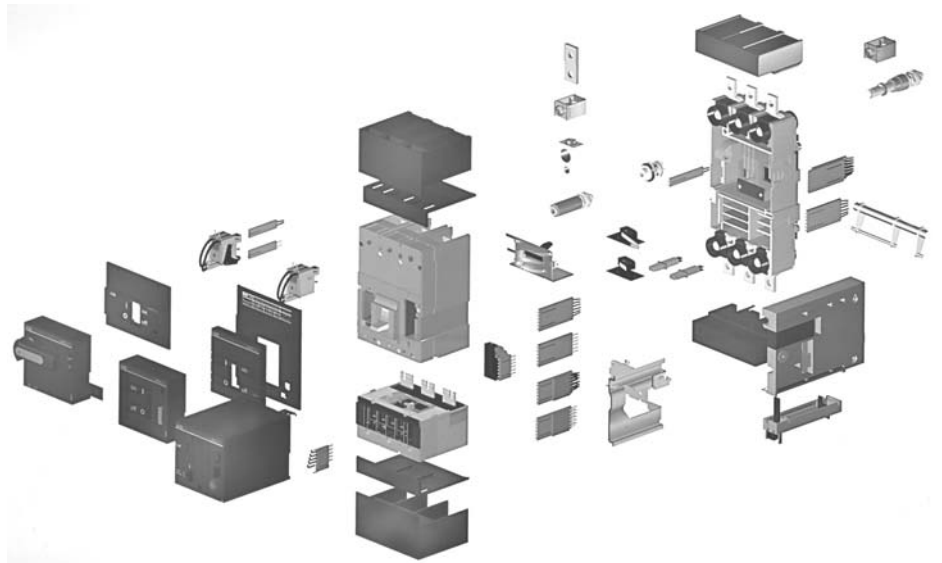
Simplified maintenance

Isomax
MCCBs

Complete range of accessories

ABB Isomax circuit breakers are complemented by a complete range of accessories to satisfy the widely differing operational and automation requirements. Accessories are standardized for groups of circuit breakers to streamline storage logistics and simplify installation.

ABB Isomax units can be customized as required under conditions of absolute safety. All accessories for S3 – S7 can be mounted with simple operations without having to remove the circuit breaker power cover and without any accessory adjustments.



Simplified maintenance

Maintenance operations are kept to a minimum. All inspection can be performed quickly and easily.

A dialog unit (optional) can be installed to store operational data for efficient maintenance scheduling.

Reliability is ensured by the high quality of all materials and by advanced manufacturing in automated assembly systems capable of ensuring consistent product quality.

Insulation distances are as required for both UL/CSA 600VAC approvals and also IEC-947 690VAC rating, which ensures safe insulation even under the severest operating conditions.

Double insulation. The cover on S3 – S7 encloses all electrical accessory cavities which are also completely separated from the power circuit.

Moreover:

- positive operation to guarantee safe and reliable signalling.
- optional draw-out with closed-door racking-out for maximum operational safety.
- high and low terminal covers are available to increase operator protection level.



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General information

Technical and design specifications

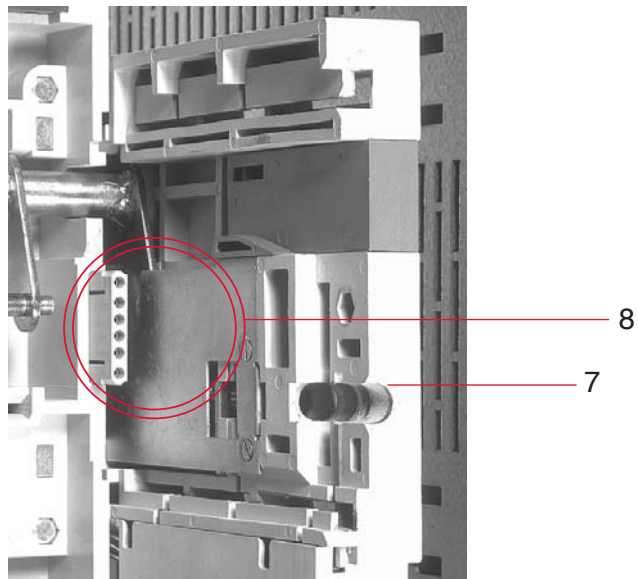
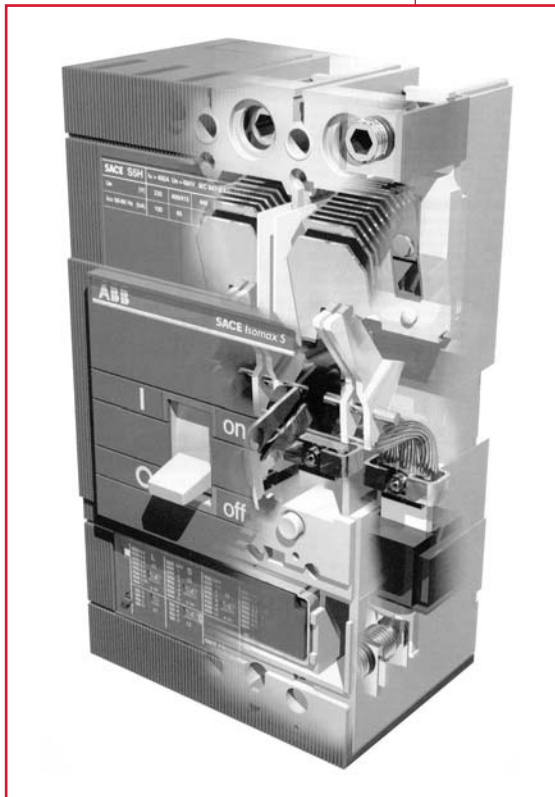
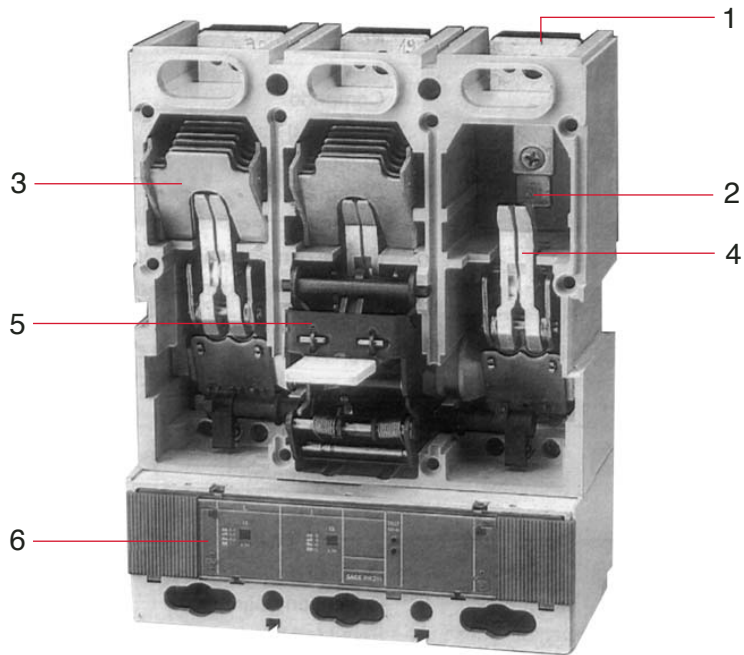
Main component parts

Versions

On request, IEC circuit breakers can be delivered in plug-in or withdrawable, two, three or four pole versions. Units are normally provided with front or rear terminals. Fixed parts are always manufactured to IP20 protection. See Accessories section for details of other optional accessories.

Key

- 1 Terminals
- 2 Fixed contacts
- 3 Arcing chamber
- 4 Moving contacts
- 5 Operating mechanism
- 6 Microprocessor based solid-state relay
- 7 Closed door isolation device
- 8 Plug-in connector for auxiliary circuits



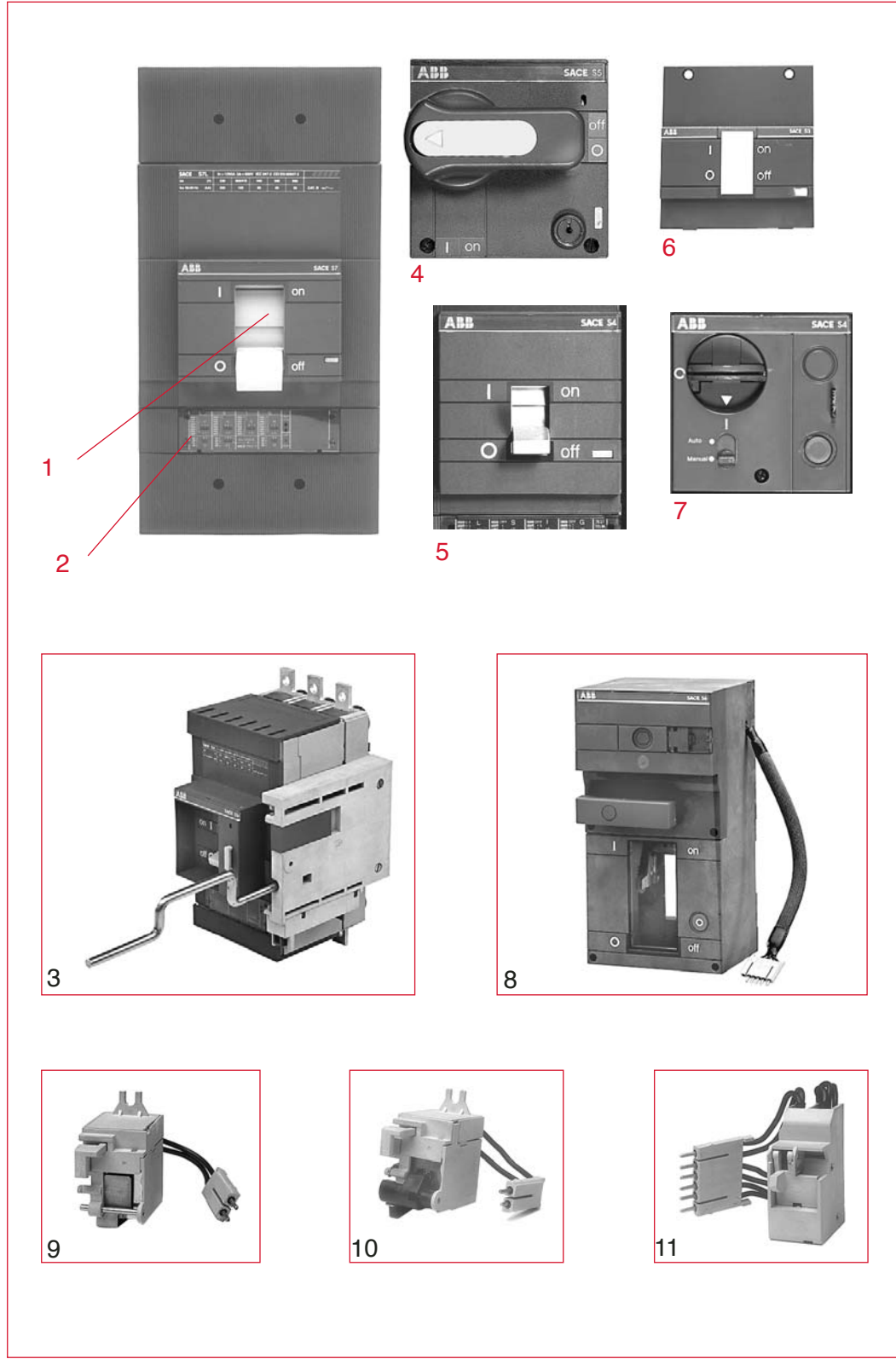
General information

Technical and design specifications

Main component parts



Operating and signalling devices



- Key**
- 1 Operating lever
 - 2 Overcurrent relay adjustments
 - 3 Closed door racking-in and racking-out device
 - 4 Rotary handle operating mechanism
 - 5 Standard front flange (105 mm/4.13" high). Available for circuit-breakers S3 – S7
 - 6 Flange (45 mm/1.77" high) for installation of circuit breakers behind standard IEC doors. Available for circuit-breakers up to S5 frame
 - 7 Direct acting motor operator S3 – S5
 - 8 Stored energy motor operator S6 – S7
 - 9 Shunt trip device
 - 10 Undervoltage release
 - 11 Auxiliary contact switch for circuit breaker position indication

General information

Technical and design specifications

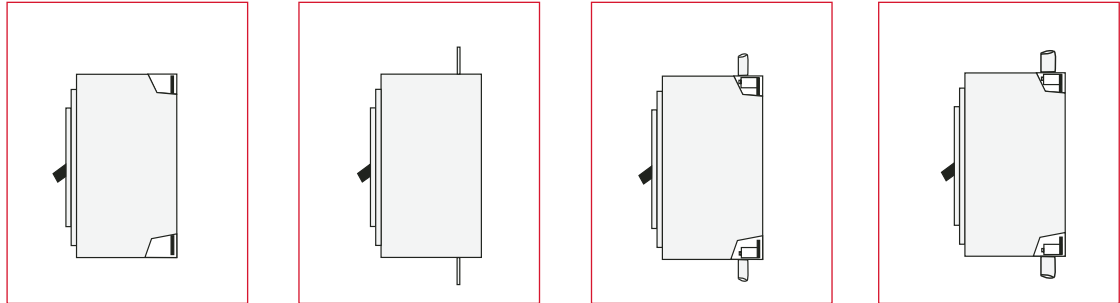
Main component parts

Combinations of terminals

All circuit breaker bus terminations are made of silver-plated copper. Terminals can be provided in different combinations (e.g. one type at the top and another type at the bottom). Various connection schemes are available making ABB Isomax circuit breakers easily adapted to any installation requirements. In particular, this exceptional versatility makes

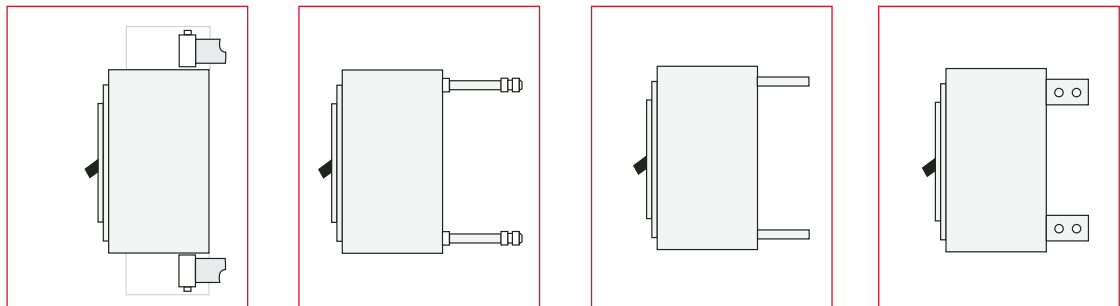
ABB Isomax units ideal for wall mounted switchboards with connections accessible from the front and for rear connection switchboards.

Connection type



Circuit-breaker	Front bar			Extended front bar			CU front cable lugs			CU/AL front cable lugs		
	F	P	W	F	P	W	F	P	W	F	P	W
S1	—	—	—	—	—	—	●	◆	—	—	—	—
S3	●	—	—	◆	◆	◆	◆	◆	◆	◆	—	—
S4	●	—	—	◆	◆	◆	◆	◆	◆	◆	—	—
S5	●	—	—	◆	◆	◆	◆	◆	◆	◆	—	—
S6	●	—	—	◆	—	◆	—	—	—	—	—	—
S7	●	—	—	◆	—	◆	—	—	—	—	—	—
S8	●	—	—	—	—	—	—	—	—	◆	—	—

Key: F = Fixed P = Plug-in W = Withdrawable ◆ = Optional terminals ● = Standard connections



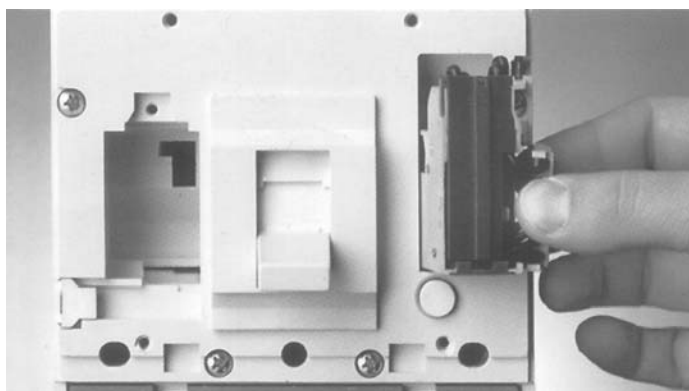
Circuit-breaker	CU rear cable lugs			Rear threaded studs			Rear horizontal flat bus			Rear vertical flat bus		
	F	P	W	F	P	W	F	P	W	F	P	W
S1	—	—	—	◆	◆	—	—	—	—	—	—	—
S3	◆	—	—	◆	◆	◆	—	—	—	—	—	—
S4	◆	—	—	◆	◆	◆	—	—	—	—	—	—
S5	◆	—	—	◆	◆	◆	—	—	—	—	—	—
S6	◆	—	—	◆	—	—	—	—	◆	—	—	◆
S7	—	—	—	—	—	—	◆	—	◆	◆	—	◆
S8	—	—	—	—	—	—	◆	—	—	◆	—	—

Key: F = Fixed P = Plug-in W = Withdrawable ◆ = Optional terminals

General information

Construction characteristics

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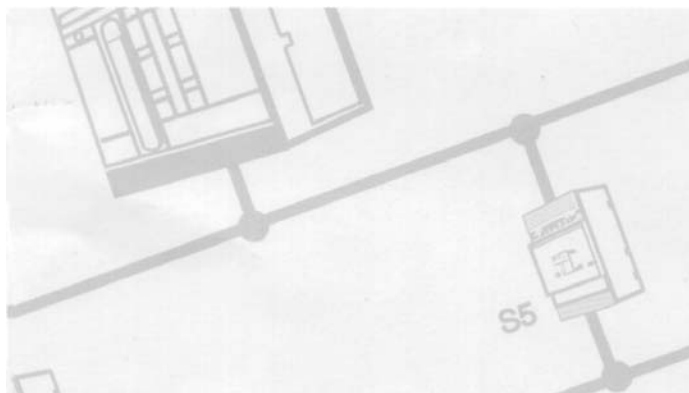


Double insulation

The double insulation technique involves the total separation of the power and auxiliary circuits, and is a characteristic of all Isomax breakers, from size S3 to S7.

The housing of each electrical accessory is completely segregated from the power circuit, thus avoiding all risk of contact with the active parts and hence improving operator safety conditions in plant management and inspection.

In addition, the insulation of the internal active parts, in terms of both the thickness of the materials and the distances, is superior to that required by the IEC Standards and complies with American usage.



Selectivity

The complete range of releases available makes it possible to coordinate protection functions using current-type, time-type, energy-type or residual-current selectivity chains.

This makes it possible to isolate only those zones affected by faults, ensuring maximum operating continuity.

Circuit-breakers in category B are available from 400 A upwards. (IEC 947-2)



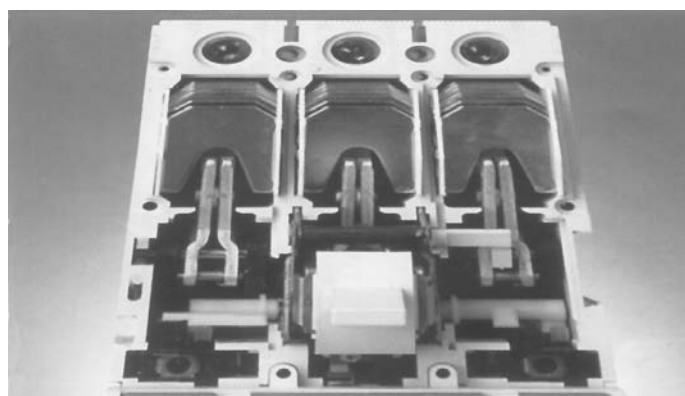
Positive operation

The operating lever always indicates the exact position of the moving contacts in the circuit-breaker, thus guaranteeing safe and reliable indication (I = Closed; O = Open; yellow line = Open due to tripping of releases).

The operating mechanism of the circuit-breaker is trip-free, independently of the pressure on the lever or the speed of operation.

Tripping of the releases automatically opens the moving contacts; to close them again, the operating mechanism has to be reset by pushing the operating lever from the intermediate position fully down to the lower limit of the open position.

In the plug-in or withdrawable circuit breakers, the mobile part can only be detached from the fixed part when the circuit-breaker is open (i.e. moving contacts separate from fixed contacts).



Inspection

A direct check can be made on the state of the internal parts and active components when the circuit-breaker is out of service.

Access can be gained to the arcing chambers and fixed and moving contacts simply by removing the cover of the circuit-breaker.

The operation, made easier by the limited number of components, reduces maintenance times and guarantees a higher level of safety.

General information

Construction characteristics



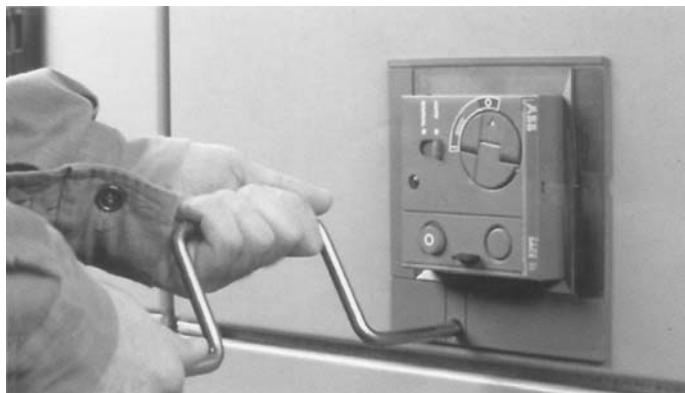
Isolation behavior

In the open position, the circuit-breaker guarantees the isolation of the circuit in accordance with IEC 947-2 specifications.

In the IEC withdrawable or plug-in versions, the power and auxiliary circuits are isolated in the racked out or removed positions, thus guaranteeing that no parts are live.

In these conditions, using suitable connectors, blank tests can be conducted, with the operations on the circuit-breaker being carried out in complete safety.

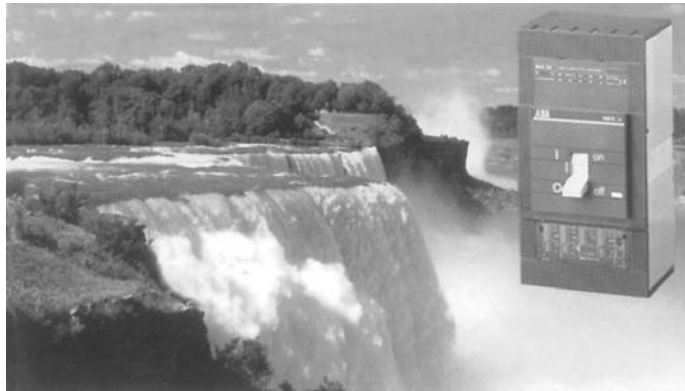
The redundant insulation distances guarantee the absence of leakage currents and dielectric strength in the event of any overvoltages across the input and output.



Racking-out with the door closed

This system, present for the first time on a series of molded-case circuit-breakers, starting from Isomax S3, allows racking-in and racking-out with the compartment door closed, thus increasing operator safety and allowing the construction of internal-arc-proof low-voltage switchboards.

Racking out can only be done with the circuit-breaker open, using the racking-out crank handle supplied with the withdrawable version of the circuit-breaker.



Electromagnetic compatibility

With the use of the PR211/P microprocessor-based overcurrent releases and the RC211 and RC212 electronic residual current releases, slow non-operation is guaranteed, even in the presence of interference caused by electronic equipment, atmospheric disturbance or discharges of an electrical nature.

Furthermore, the appliances do not generate interference with other electronic equipment in the vicinity.

This is in accordance with IEC 947-2 Addendum F, IEC 1000-4, EN 61000-4, EN 50081-2, European Directive No. 49/12-12-1992 specifications on electromagnetic compatibility EMC.

Tropicalization

The Isomax series of circuit-breakers and accessories comply with the strictest regulations on use in hot-damp saline climates (in conformity with climatographic chart No. 8 of the IEC 721-2-1 specifications), thanks to:

- insulating cases made of fiberglass-reinforced synthetic resins
- corrosion-resistant treatment on all main metal parts (environment C UNI 3564-65)
- Fe/Zn 12 galvanizing (UNI ISO 2081), protected by a conversion layer composed mainly of chromates (UNI ISO 4520).

General information

Construction characteristics

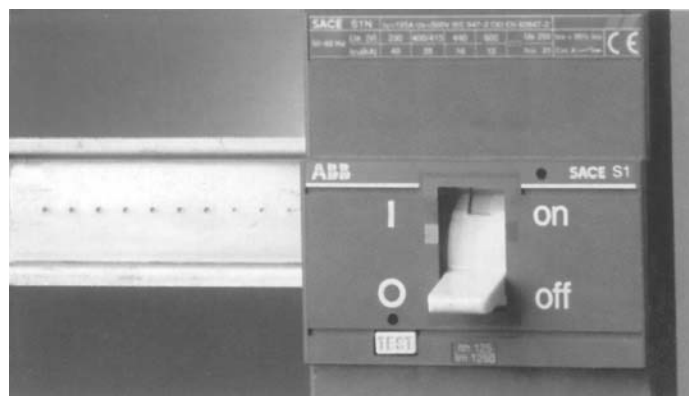
Isomax
MCCBs



Protection classes

Various measures have been incorporated in Isomax S circuit-breakers to achieve IP20 protection for the fixed, plug-in and withdrawable versions of the circuit-breaker, excluding the terminals, and IP 30 for the front parts of circuit-breakers installed in switchboards.

The fixed parts are always IP20 protection grade. IP54 protection can be achieved for circuit-breakers installed in switchboards by using door-mounted crank handle operating mechanisms and special insulating gaskets that can be ordered separately.



Mounting on DIN channel up to Isomax S5

The brackets for mounting on the standardized DIN EN 50022 channels for S1 and S2 and on DIN EN 50023 for S3, S4, S5 simplify the fitting for the circuit-breakers on standard switchboards.

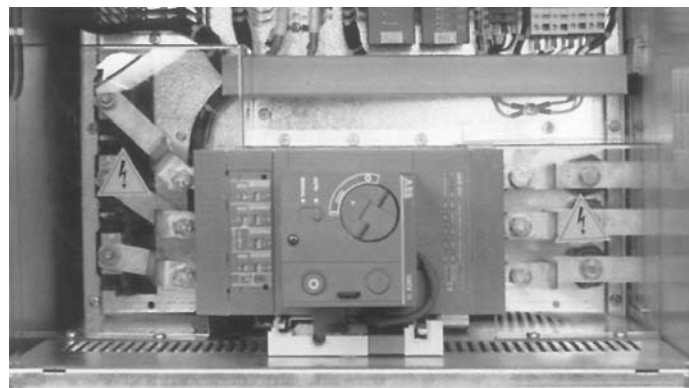
This allows standardized support structures to be installed and simplifies the phase for designing and building the switchboard structure.



Resistance to vibration

The circuit-breakers are unaffected by vibrations generated mechanically or by electromagnetic effects, in compliance with the IEC 68-2-6 standards and the strictest regulations set by the most important classification organizations:

- RINA
- DET Norske Veritas
- Lloyd's Register of Shipping
- Germanischer Lloyd
- Bureau Veritas



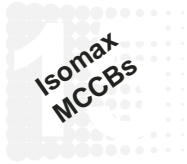
Installation positions

The circuit-breakers can be installed in any position with no variations to their rated characteristics.

In compliance with UL and IEC 947-2 standards, Isomax S circuit-breakers can be powered from either their top or bottom terminals, without affecting operation.

They can be installed in switchboards, mounted directly on the base plate or on DIN channels up to size S5.

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General information

Table of power losses

400 Hz ratings

Table of power losses

Dissipated power (W)		S1		S3		S4		S5		S6		S7		S8
Setting	I_n (A)	F	P	F	P·W	F	P·W	F	P·W	F	P·W	F	P·W	F
R15	15	7	7.3	11.8	13									
R20	20	8.6	8.9	10.8	11.9									
R25	25	7.9	8.3	12	13.2									
R30	30	8.6	8.4	16.9	18.5									
R40	40	8.6	9.5	15.1	16.6									
R50	50	10	11	16.4	18									
R60	60	12.8	13	14.4	16									
R70	70	15.8	17.4	15.8	18.8									
R80	80	13.5	15	17.9	21									
R90	90	17	19	21.9	26									
R100	100	13.8	15.5	21	25									
R125	125			18.5	26									
R150	150			40.5	52									
R175	175			35.9	40									
R200	200			36	46									
R225	225			55	67									
R300	300							52.7	79					
R400	400							66.4	96					
R600	600									83	106			
R800	800									93.2	119			
$I_n = 100$	100					5.2	8							
$I_n = 150$	150					13	19							
$I_n = 250$	250					40	55							
$I_n = 300$	300							40	57					
$I_n = 400$	400							60	90					
$I_n = 600$	600									63	104			
$I_n = 800$	800									96	125			
$I_n = 1000$	1000											102	140	
$I_n = 1200$	1200											151	203	
$I_n = 1600$	1600													41
$I_n = 2000$	2000													64
$I_n = 2500$	2500													100

15 400Hz response

Breaker frame	Breaker rating	Thermal amperes			Magnetic rating	
		Minimum	Maximum	Fixed	Minimum	Maximum
S1	15	—	—	15	—	1000
	20	—	—	19	—	1000
	25	—	—	23	—	1000
	30	—	—	28	—	1000
	40	—	—	37	—	1000
	50	—	—	46	—	1000
	60	—	—	55	—	1200
	70	—	—	65	—	1400
	80	—	—	74	—	1600
	90	—	—	81	—	1800
100	—	—	90	—	2000	
S3	15	—	—	15	—	850
	20	—	—	19	—	850
	25	—	—	23	—	850
	30	—	—	28	—	850
	35	—	—	32.4	—	850
	40	—	—	37	—	850
	50	—	—	46	—	850
	60	—	—	55.5	—	1020
	70	—	—	64.8	—	1190
	80	—	—	74	—	1360
	90	—	—	81	—	1530
	100	—	—	90	—	1700
	125	—	—	112	—	1360
	150	—	—	135	—	1605
	175	—	—	157.5	—	1640
200	—	—	180	—	1875	
225	—	—	202.5	—	2138	
250	—	—	225	—	2400	

400Hz response

Breaker frame	Breaker rating	Thermal magnetic releases ①		
		Thermal Amperes Minimum	Maximum	Magnetic rating Set @ 5Im only
S5N	300	0.7	1.0	2250
	400	189	270	
		252	360	
S6N	600	378	540	4500
	800	504	720	

① Use thermal-magnetic only for 400 Hz applications.