

TECHNICAL CATALOGUE

SACE Emax 2

Low voltage air circuit-breakers



SACE Emax 2

Consultation guide



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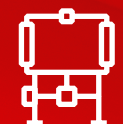
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Overview of the SACE Emax 2 family

SACE Emax 2, a further leap forward

The world of the electrical power distribution changes fast and major new trends such as energy efficiency, connectivity and smart grids are now crowding onto the stage. These trends lead to new customer and application demands. To meet these demands, ABB has now further improved SACE Emax 2. SACE Emax 2 air circuit breaker is now a multifunctional platform able to manage the next generation of electrical plants such as microgrids, evolving into a true Power Manager.

SACE Emax 2 is the first air circuit breaker that matches all the new grid requirements. It enables

a direct communication to the new energy management cloud-computing platform ABB Ability™ Energy and Asset Manager.

If the smart and plug & play architecture makes SACE Emax 2 easy to use, the cutting-edge connectivity capabilities create a circuit breaker able to evolve during the lifecycle. Thanks to the ABB Ability Marketplace™ offering and the full portfolio of commissioning tools, it is always possible to enhance the device, even when installed.

SACE Emax 2 sets a new circuit breaker benchmark for the needs of today and tomorrow, leveraging also unmatched electrical performances.



Distinctive features

SACE Emax 2 evolution from circuit breaker to Power Manager continues, embedding more and more functionalities to become the all-in-one solution to manage "low-voltage distribution systems".

Performance

The SACE Emax 2 range is made up of 4 sizes: E1.2, E2.2, E4.2 and E6.2 up to 6300A, which enable switchgear of compact dimensions and high ratings to be built with busbars of reduced length and cross-section.

The protection trip units, auxiliary connections and main accessories are the same throughout the range to simplify design and installation. Furthermore, the sizes from E2.2 to E6.2 have the same height and depth.

The rating levels are updated and standardized throughout the sizes to meet the demands and needs of today's installations, from 42kA to 150kA, and to standardize switchgear projects. High short-time currents, together with the efficiency of the protection functions, guarantee complete selectivity in all situations.

Accurate design and choice of materials enable optimization of the overall dimensions of the circuit breaker. In this way switchgear of compact dimensions can be built and outstanding savings at the same performance can be obtained.

The SACE Emax 2 range is extended also to the UL market, up to 5000A. Furthermore it can be ordered with a triple marking label, IEC, UL and CCC.

SACE Emax 2 air circuit breakers are certified for Class 1 active energy measurement in compliance with the IEC61557-12 standard. This permits to satisfy highly demanding requirements of energy efficiency and to perfectly fit into SCADA systems thanks to a current detection proximal to 0. Achieving maximum efficiency of an electrical installation requires intelligent management of power supplies and energy use. For this reason, the new technologies used in SACE Emax 2 circuit breakers allow the productivity and reliability of installations to be optimized, and at the same time, power consumption to be reduced while fully respecting the environment.

New advanced functionalities, together with Protection trip units and Communication and system devices contribute to make SACE Emax 2 the circuit breaker that maximizes efficiency in all low-voltage electrical installation.

Distinctive features

Control

SACE Emax 2 circuit breaker is the first single device ready to manage all the dynamics of a low-voltage electrical installation.

Managing loads in any condition is now possible thanks to Advanced Functionalities such as:

- Load shedding: fast load shedding to guarantee continuity for critical loads during black-outs. Typical scenario is when LV distribution is disconnected from the grid (MV).
- Power controller: patented algorithm to reduce the peak of power consumed, allowing savings on electricity bills. Managing different power sources and connecting them to main grid is also crucial, so that service continuity is maximized.
- Embedded ATS functions: an automatic transfer switch system used in all application where continuity is essential and where there are multi source supplies.
- Synchrocheck logics: Synchronization of voltage and frequency to allow plant reconnection to the Utility. SACE Emax 2 is able to act as a controller of Main grid condition, disconnecting a plant when necessary and also to adapt protection to on-grid or off-grid conditions.
- Adaptive protection: Network changes recognition and automatic set of thresholds to guarantee protection and coordination in on-grid and off-grid conditions.

Connectivity

SACE Emax 2 series circuit breakers can be integrated perfectly into all automation and energy management systems to improve productivity and energy consumption and to carry out remote service.

All circuit breakers can be equipped with communication units for use with Modbus, Profibus, and DeviceNet™ protocols as well as the modern Modbus TCP, Profinet, EtherNet/IP™ and Open ADR. The cartridge-type modules can be easily installed directly on the terminal box, even at a later date. Furthermore, the integrated IEC61850 communication module enables connection to automation systems widely used in medium voltage power distribution to create intelligent networks (Smart Grids).

All circuit breaker settings and functions are also accessible via Bluetooth, using EPiC mobile app. This remote connection allows a safer interaction with the device mitigating the risk of arc flash accidents.

Furthermore with an easy connection thanks to Ekip Com Hub module, SACE Emax 2 can be integrated in ABB Ability™ Energy and Asset Manager, exploiting all the capabilities of a cloud computing platform such as predictive maintenance, analysis and report download.

The power and auxiliary connections are optimized to simplify connection to the switchgear. The power terminals, which can be oriented horizontally or vertically, have been designed for the most common busbars, while the push-in connections of the auxiliaries ensure immediate and safe wiring.



Distinctive features

Ease of use

The entire range is available in fixed and withdrawable versions, with double insulation between the front of the switchgear and the live parts to ensure operation in complete safety. The circuit breakers can be powered indifferently from above or below.

All essential information is available in the central area of the front shield and enables immediate identification of the status of the circuit breaker: open, closed, ready to close, charged and discharged springs.

Maintenance is simple and safe. Thanks to the new front shield design, the main accessories can be installed without completely removing it.

The withdrawable circuit breaker is inserted and removed via dedicated guide rails that simplify movement. The correct movement from racked-in, test isolated, to racked-out position is guaranteed by a lock in each position.

As a further guarantee of safety, the shutters of the fixed part can be locked from the front when the circuit breaker is removed.

The shutters of the upper terminals are independent of those of the lower terminals to facilitate checking and maintenance operations.

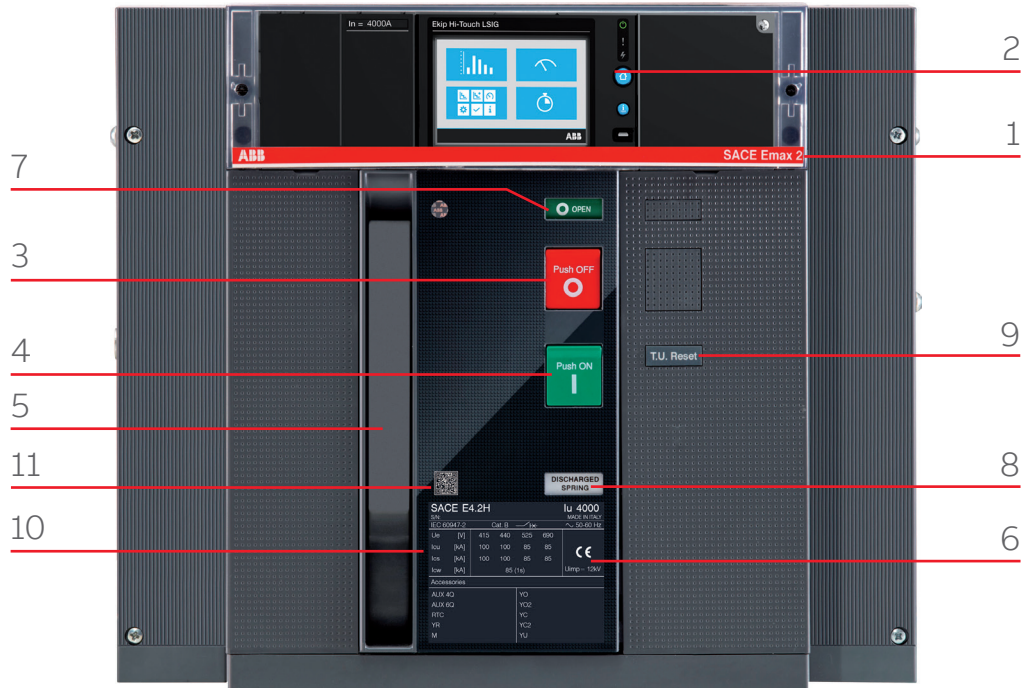
The Ekip Touch protection trip units are equipped with a large colour touch-screen display which enables safe and intuitive operation. Furthermore the Ekip trip units can be accessed by means of smartphone, tablet or portable PC, thanks to enhanced connectivity capabilities and a full portfolio of commissioning tools. The increased computing power allows to update the circuit breaker maintaining it closed and in service during the operation.

SACE Emax 2 is now able to evolve during the life-cycle thanks to dedicated software packages available on the ABB Ability Marketplace™. Upgrade and customize the circuit breaker has never been so easy. Thanks to the customization simplicity, communication modules installation ease and clear user interface, SACE Emax 2 is making the complex system ready for a new digital experience.



Key

- 1 Trademark and size of circuit-breaker
- 2 SACE Ekip protection trip unit
- 3 Pushbutton for manual opening
- 4 Pushbutton for manual closing
- 5 Lever to manually charge closing springs
- 6 Electrical rating plate
- 7 Mechanical device to signal circuit breaker open "O" and closed "I"
- 8 Signal for springs charged or discharged
- 9 Mechanical signalling of overcurrent release tripped
- 10 Size and serial number
- 11 QR code



SACE Emax 2 is now equipped with a laser etched QR code located on the front of the circuit breaker allowing easy access to product data via smartphone.

By scanning the QR code directly from your smartphone the user will have access to:

1. Product datasheet including full list of factory installed accessories and relevant documentation
2. ABB Contact information.
3. Link to download ABB EPiC mobile app for monitoring and commissioning.

In addition, ABB's EPiC mobile app has been enhanced with the ability to scan the QR code in order to provide a consistent user experience across the platform.

Product conformity

SACE Emax 2 circuit breakers and their accessories conform to IEC 60947, EN 60947 international Standard

Approvals and certifications

SACE Emax 2 circuit breakers and their accessories conform to the international IEC 60947, EN 60947 (harmonized in 30 CENELEC countries), CEI EN 60947 and IEC 61000 Standards and comply with the following EC directives:

- “Low-Voltage Directives” (LVD) no. 2014/35/EU
- “Electromagnetic Compatibility Directive” (EMC) no. 2014/30/EU.

The ABB air circuit breakers include a range that has been certified according to American UL 1066 Standards; it is also certified by the Russian certification body GOST (Russia Certificate of Conformity), has achieved China CCC Certification (China Compulsory Certification) and the UKCA marking (UK Conformity Assessment). Certification of conformity with the above-men-

tioned product Standards is carried out in compliance with the European EN 45011 Standard by the Italian certification body ACAE (Association for the Certification of Electrical Equipment), which is recognized by the European organization LOVAG (Low-Voltage Agreement Group), and by the Swedish Intertek SEMKO certification organization Intertek Semko which is recognized by the international organization IECCE.

Product Material Compliance

The Emax 2 family complies with the following international regulations:

- RoHS II, Directive 2011/65/EU and Amendment 2015/863 - Restriction of Hazardous Substances;
- REACH, 2006/1907/EC, Registration, Evaluation, Authorization and Restriction of Chemicals;
- WEEE 2012/19/EU -Waste Electrical & Electronic Equipment;
- Conflict Minerals - Dodd-Frank Consumer Protection Act. Section 1502.

The main versions of the devices are about to be approved by the following shipping registers.



Registro Italiano Navale (RINA):
Italian



Det Norske Veritas (DNV):
Norway



Lloyd's Register of Shipping (LR):
English



American Bureau Shipping (ABS):
American



Nippon Kaiji Kyokai (NKK):
Japan



Germanischer Lloyd (GL):
Deutsch



Low-Voltage Agreement Group



Bureau Veritas (BV):
French



UK Conformity Assessed:
UK

For the types of certified circuit breakers, certified ratings and corresponding validity, please contact ABB SACE.



Quality and Sustainability: company efficiency and integrated management systems. Quality, Sustainability and Customer Satisfaction have always been ABB SACE's major commitment.

The involvement of all company departments and organization of processes have led the company to develop, implement and certify management systems in compliance with international Standards:

- ISO 9001 for quality management
- IRIS for the quality of supplies in the railway sector (International Railway Industry Standards)
- ISO 14001 for environmental management
- OHSAS 18001 for the management of the health and safety of employees in the workplace
- SA 8000 for the management of social responsibility.

The ABB SACE testing laboratory, accredited by ACCREDIA in compliance with ISO/IEC 17025 Standard, provides both ABB and external customers with a qualified service for performing certification tests on devices and electric equipment of low and medium voltage in accordance with the relevant product Standards.

Thanks to the implementation of systems and their integration (Integrated Management System), ABB SACE, with a view to continuous improvement, has implemented processes with a focus on:

- quality, preventing defects and faults along the entire supply chain
- environment, reviewing production processes in terms of ecology and waste reduction, rationalizing the consumption of raw materials and energy, preventing pollution, containing noise emissions and reducing the quantity of rejects in the production processes
- health and safety of employees, offering a healthy and safe workplace in all of the various stages of work with a "zero accident objective"
- social responsibility, guaranteeing the respect of human rights and the absence of any discrimination throughout the supply chain, and offering a favourable and transparent working atmosphere.

A further commitment aimed at safeguarding the environment has been achieved by assessing products' life cycles (LCA, Life Cycle Assessment): this includes the assessment and improvement of the environmental performance of products from the engineering stage throughout their entire life cycle.

The materials, processes and packaging used are chosen with a view to optimising the actual environmental impact of each product, including its energy efficiency and recyclability.



ABB EcoSolutions™

Leading the way to the circular economy

To help preserve the Earth's resources for future generations, ABB takes a company-wide approach to circularity. We aim to innovate towards new circular business models by cutting waste, increasing recyclability and reusability, and making our products more durable. We work closely with customers and suppliers to embed circularity across the value chain.

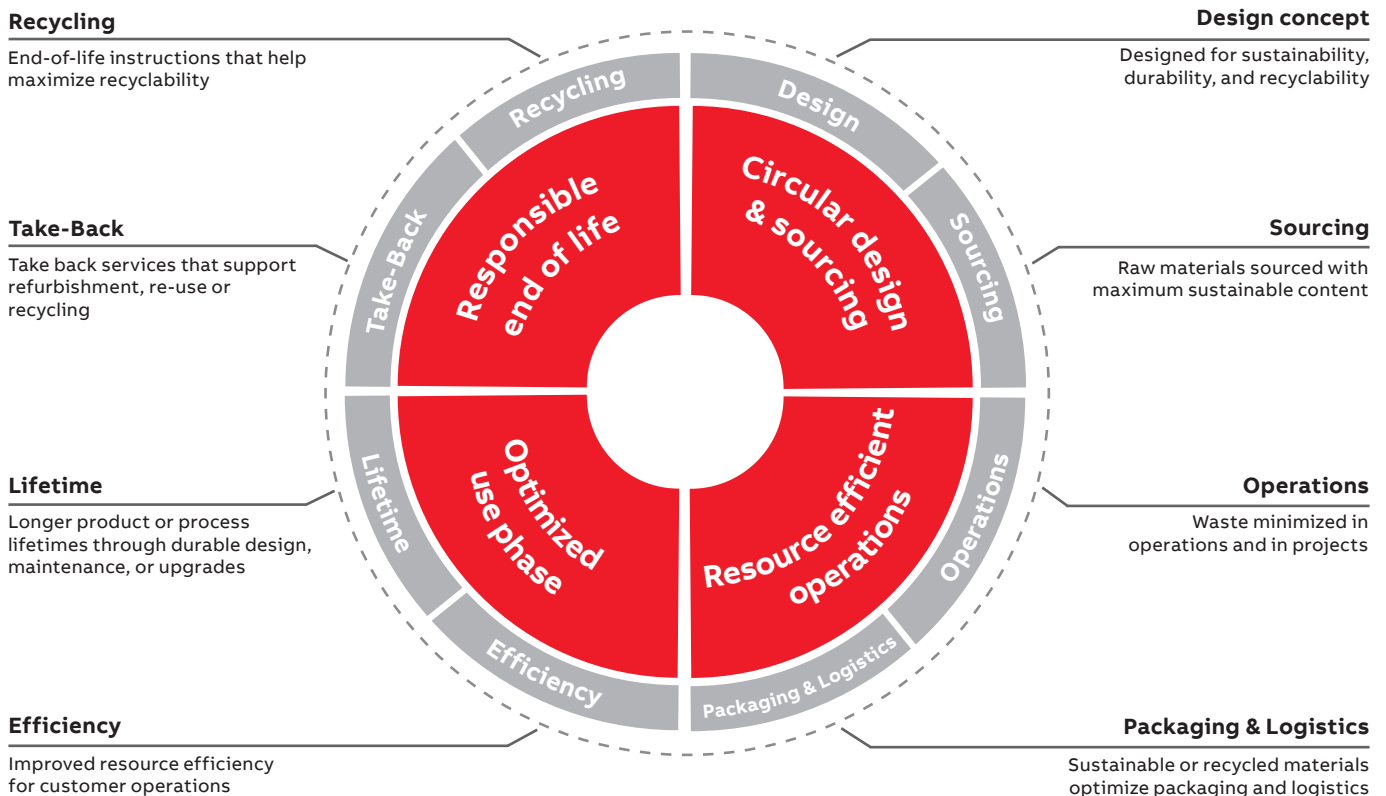
ABB's EcoSolutions™ label provides full transparency on a product's circularity value and environmental impact. ABB products with the EcoSolutions label carry an independently verified environmental product declaration (EPD) (ISO 14025) – and comply with a set of key performance indicators defined in ABB's circularity framework.

ABB EcoSolutions: transparency for customers

The ABB EcoSolutions™ label is an assurance that the product is:

- designed to last and manufactured with the maximum amount of sustainably sourced raw materials;
- made with processes that are designed to avoid waste and maximize the use of sustainable packaging materials;
- designed to increase resource and process efficiency while in use, be upgradable and optimize the lifetime of equipment and facilities;
- supported by take-back services leading to refurbishment, re-use or recycling of products and components, and is accompanied by instructions for responsible end-of-life treatment.

EcoSolutions products are evaluated against a clear set of 8 key performance indicators (KPIs) based on these four stages of the product life cycle.



* Contact ABB for information about products provided with ABB EcoSolutions™ in each production plant.



ABB
Eco
Solutions™



Look for the ABB EcoSolutions™ logo and QR code on packaging to access transparent sustainability information about the product. To receive information for a specific product, please contact ABB.

ABB Low Voltage Product Service

ABB's technical assistance service offers solutions aimed at supporting the customer in all stages of the lifespan of the circuit breaker in service and covering the entire chain of value; ABB is present from the moment of selection to the end of the life of the product, thereby guaranteeing the investments of its customers.



Retrofit kit selector

ABB supplies annual updates regarding the evolution of the circuit breaker ranges (Life Cycle Management) and for each product it provides details of associated services and the level of support available, so that customers can choose the products and spare parts best suited to their needs. ABB's organisation offers services that include installation and commissioning, technical training on the use and maintenance of products, the supply of original spare parts, corrective and preventive maintenance, equipment diagnostics, modernization of systems with upgrades and retrofitting kits, consultancy services and personalized maintenance and service contracts. All this is supported by one of the most extensive global sales and service networks.

Retrofitting kit

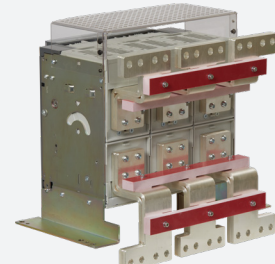
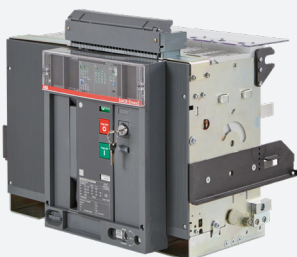
Through continuous research targeted to customer needs, ABB SACE Modernization Services has developed innovative retrofit kits in order to simplify and speed up the installation of a new circuit breaker, updating customer's low voltage systems with the latest technology available and very limited downtimes.

Whenever a device is no longer available on the market and maintenance is no longer efficient, ABB SACE Modernization Services' retrofit kits are the solution to substitute an obsolete circuit breaker.

Retrofits are specifically designed to preserve the existing frameworks and minimize installation time. ABB has developed different kit versions to cover all possible customer scenarios:

- Direct Replacement (DR)
- Cradle in Cradle (CiC)
- Hard Bus Retrofill (HBRF)

ABB SACE Modernization retrofits are available for ABB, GE and also competitors circuit breakers.



The ranges

- 2/2 SACE Emax 2 automatic circuit breakers**
- 2/4 SACE Emax 2 switch disconnectors**
- 2/6 SACE Emax 2/E9 and /E10**
Range IEC circuit breakers at 800-900V and 1000V
- 2/7 SACE Emax 2/E12**
Range IEC circuit breakers at 1000-1150-1200V up to 1380V
- 2/8 SACE Emax 2/E9 and /E10**
Range IEC switch disconnectors at 900V and 1000V
- 2/9 SACE Emax 2/E12**
Range IEC switch disconnectors at 1200V up to 1380V
- 2/10 SACE Emax 2 derived versions**
- 2/12 SACE Emax 2 MS/DC-E**
Range IEC Air switch disconnectors at 1500 V DC

SACE Emax 2 automatic circuit breakers

Common data		
Rated service voltage Ue	[V]	690
Rated insulation voltage Ui	[V]	1000
Rated impulse withstand voltage Uimp	[kV]	12
Frequency	[Hz]	50 - 60
Number of poles		3- 4
Version		Fixed - Withdrawable
Suitable for isolation according to		IEC 60947-2



SACE Emax 2			E1.2		
Performance levels			B	C	N
Rated uninterrupted current Iu @ 40°C		[A]	630	630	250
		[A]	800	800	630
		[A]	1000	1000	800
		[A]	1250	1250	1000
		[A]	1600	1600	1250
		[A]			1600
		[A]			
Neutral pole current-carrying capacity for 4-pole CBs		[%Iu]	100	100	100
Rated ultimate short-circuit breaking capacity Icu	400-415 V	[kA]	42	50	66
	440 V	[kA]	42	50	66
	500-525 V	[kA]	42	42	50
	690 V	[kA]	42	42	50
Rated service short-circuit breaking capacity Ics		[%Icu]	100	100	100 ¹⁾
Rated short-time withstand current Icw	(1s)	[kA]	42	42	50
	(3s)	[kA]	24	24	30
Rated short-circuit making capacity (peak value) Icm	400-415 V	[kA]	88	105	145
	440 V	[kA]	88	105	145
	500-525 V	[kA]	88	88	105
	690 V	[kA]	88	88	105
Utilization category (according to IEC 60947-2)			B	B	B
Breaking ⁴⁾	Maximum breaking time for I < Icw	[ms]	40	40	40
	Maximum breaking time for I > Icw	[ms]	25	25	25
Dimensions	H - Fixed/Withdrawable	[mm]	296/363.5	296/363.5	296/363.5
	D - Fixed/Withdrawable	[mm]	183/271	183/271	183/271
	W - Fixed 3p/4p/4p FS	[mm]	210/280		
	W - Withdrawable 3p/4p/4p FS	[mm]	278/348		
Weights (CB with trip unit and current sensor)	Fixed 3p/4p/4p FS	kg	14/16		
	Withdrawable 3p/4p/4p FS including fixed part	kg	38/43		

1) Ics : 50kA for 400V...440V voltage; 2) Ics: 125kA for 400V...440V voltage; 3) E4.2H 3200A: 66 Icw (3s); 4) Total clearing time is the sum of breaking time and trip time

SACE Emax 2			E1.2		
Mechanical life with regular ordinary maintenance prescribed by the manufacturer		[Iu]	≤ 1000	1250	1600
		[No. cycles x 1000]	20	20	20
	Frequency	[Oper./Hour]	60	60	60
Electrical life with regular ordinary maintenance prescribed by the manufacturer	440 V	[No. cycles x 1000]	8	8	8
	690 V	[No. cycles x 1000]	8	6,5	6,5
	Frequency	[Oper./Hour]	30	30	30



E2.2				E4.2				E6.2		
B	N	S	H	N	S	H	V	H	V	X
1600	800	250	800	3200	3200	3200	2000	4000	4000	4000
2000	1000	800	1000	4000	4000	4000	2500	5000	5000	5000
	1250	1000	1250				3200	6300	6300	6300
	1600	1250	1600				4000			
	2000	1600	2000							
	2500	2000	2500							
		2500								
100	100	100	100	100	100	100	100	50-100	50-100	50-100
42	66	85	100	66	85	100	150	100	150	150
42	66	85	100	66	85	100	150	100	150	150
42	66	66	85	66	66	85	100	100	130	130
42	66	66	85	66	66	85	100	100	100	100
100	100	100	100	100	100	100	100 ²⁾	100	100	100
42	66	66	85	66	66	85	100	100	100	120
42	50	50	66	50	66	75 ³⁾	75	100	100	100
88	145	187	220	145	187	220	330	220	330	330
88	145	187	220	145	187	220	330	220	330	330
88	145	145	187	145	145	187	220	220	286	286
88	145	145	187	145	145	187	220	220	220	220
B	B	B	B	B	B	B	B	B	B	B
40	40	40	40	40	40	40	40	40	40	40
25	25	25	25	25	25	25	25	25	25	25
371/425	371/425	371/425	371/425	371/425	371/425	371/425	371/425	371/425	371/425	371/425
270/383	270/383	270/383	270/383	270/383	270/383	270/383	270/383	270/383	270/383	270/383
276/366				384/510				762/888/1014		
317/407				425/551				803/929/1069		
41/53				56/70				109/125/140		
84/99				110/136				207/234/260		

E2.2				E4.2				E6.2		
< 1600	1600	2000	2500	< 2500	2500	3200	4000	4000	5000	6300
25	25	25	20	20	20	20	15	12	12	12
60	60	60	60	60	60	60	60	60	60	60
15	12	10	8	10	8	7	5	4	3	2
15	10	8	7	10	8	7	4	4	2	2
30	30	30	30	20	20	20	20	10	10	10

SACE Emax 2 switch disconnectors

Switch disconnectors, identified with the abbreviation “/MS”, are devices that satisfy the isolating specifications provided by the IEC 60947-3 Standard. The switch disconnectors are derived from the corresponding automatic circuit breakers, and they have the same dimensions and accessory options.

This version differs from the automatic circuit-breakers only because of the absence of protection trip units.

The device, when in the open position, guarantees an isolating distance between the main contacts of the circuit breaker that is sufficient to ensure that the installation downstream is not live.

Furthermore the switch disconnectors, if used with an external protection relay with maximum delay of 500ms, enable a breaking capacity at a maximum rated operating voltage (Ue) equal to the value of rated short-time withstand current (Icw) for one second.

Common data		
Rated service voltage Ue	[V]	690
Rated insulation voltage Ui	[V]	1000
Rated impulse withstand voltage Uimp	[kV]	12
Frequency	[Hz]	50 - 60
Number of poles		3- 4
Version		Fixed - Withdrawable
Suitable for isolation according to		IEC 60947-3



SACE Emax 2			E1.2	
Performance levels			B/MS	N/MS
Rated uninterrupted current Iu @ 40°C		[A]	630	250
		[A]	800	630
		[A]	1000	800
		[A]	1250	1000
		[A]	1600	1250
		[A]		1600
Neutral pole current-carrying capacity for 4-pole CBs		[%Iu]	100	100
Rated short-time withstand current Icw	(1s)	[kA]	42	50
	(3s)	[kA]	24	30
Rated short-circuit making capacity (peak value) Icm	400-415 V	[kA]	88	105
	440 V	[kA]	88	105
	500-525 V	[kA]	88	105
	690 V	[kA]	88	105
Utilization category (according to IEC 60947-3)			AC-23A	AC-23A
Dimensions	H - Fixed / Withdrawable	[mm]	296 / 363.5	296 / 363.5
	D - Fixed / Withdrawable	[mm]	183 / 271	183 / 271
	W - Fixed 3p/4p/4p FS	[mm]	210 / 280	
	W - Withdrawable 3p/4p/4p FS	[mm]	278 / 348	

1) E4.2H/MS 3200A: 66KA Icw (3s)

SACE Emax 2			E1.2		
Mechanical life with regular ordinary maintenance prescribed by the manufacturer		[Iu]	< 1000	1000	1600
		[No. cycles x 1000]	20	20	20
	Frequency	[Oper./Hour]	60	60	60
Electrical life with regular ordinary maintenance prescribed by the manufacturer	440 V	[No. cycles x 1000]	8	8	8
	690 V	[No. cycles x 1000]	8	6.5	6.5
	Frequency	[Oper./Hour]	30	30	30



E2.2			E4.2			E6.2	
B/MS	N/MS	H/MS	N/MS	H/MS	V/MS	H/MS	X/MS
1600	800	800	3200	3200	2000	4000	4000
2000	1000	1000	4000	4000	2500	5000	5000
	1250	1250			3200	6300	6300
	1600	1600			4000		
	2000	2000					
	2500	2500					
100	100	100	100	100	100	50-100	50-100
42	66	85	66	85	100	100	120
42	50	66	50	75 ¹⁾	75	100	100
88	145	187	145	187	220	220	264
88	145	187	145	187	220	220	264
88	145	187	145	187	220	220	264
88	145	187	145	187	220	220	264
AC-23A	AC-23A	AC-23A	AC-23A	AC-23A	AC-23A	AC-23A	AC-23A
371 / 425	371 / 425	371 / 425	371 / 425	371 / 425	371 / 425	371 / 425	371 / 425
270 / 383	270 / 383	270 / 383	270 / 383	270 / 383	270 / 383	270 / 383	270 / 383
276 / 366			384 / 510			762 / 888 / 1014	
317 / 407			425 / 551			803 / 929 / 1069	

E2.2				E4.2				E6.2		
< 1600	1600	2000	2500	< 2500	2500	3200	4000	4000	5000	6300
25	25	25	20	20	20	20	15	12	12	12
60	60	60	60	60	60	60	60	60	60	60
15	12	10	8	10	8	7	5	4	3	2
15	10	8	7	10	8	7	4	4	2	2
30	30	30	30	20	20	20	20	10	10	10

SACE Emax 2/E9 and /E10

Range IEC circuit breakers at 800-900V and 1000V

Common data		
Rated service voltage Ue	[V]	800-900 (/E9), 1000 (/E10)
Rated insulation voltage Ui	[V]	1000
Rated impulse withstand voltage Uimp	[kV]	12*
Frequency	[Hz]	50 - 60
Version		Fixed - Withdrawable
Suitable for isolation according to		IEC 60947-2

(*) 15kV for E4.2/E10



SACE Emax 2/E		E1.2	E2.2	E4.2		E6.2			
Performance levels		N/E9	S/E9	H/E9	H/E10	S/E9	H/E9	S/E10	H/E9 X/E9
Rated uninterrupted current Iu @ 40°C	[A]	1250	1250	1250	2500	3200	3200	3200	5000 5000
	[A]		2000	2000		4000	4000	4000	6300 6300
	[A]		2500	2500					
Neutral pole current-carrying capacity for 4-pole CBs	[%Iu]	100	100	100		100	100		50 50
Rated service voltage Ue	[V]	800	900	900	1000	900	900	1000	900 900
Rated ultimate short-circuit breaking capacity Icu	800V [kA]	35	50	65		65	90	50	90 100
	900V [kA]		50	65		65	75		75 90
	1000V [kA]				50			50	
Rated service short-circuit breaking capacity Ics	[%Icu]	100	100	100	100	100	100	100	100 100
Rated short-time withstand current Icw	(1s) [kA]	35	50	65	50	65	75	50	75 90
	(3s) [kA]	30	50	65	50	65	75 ^(*)	50	75 90
Rated short-circuit making capacity (peak value) Icm	800V [kA]	73.5	105	143		143	200	105	200 220
	900V [kA]		105	143		143	165		165 198
	1000V [kA]				105			105	
Utilization category (according to IEC 60947-2)	[V]	B	B	B	B	B	B	B	B B
Suitable for IT network (IEC 60947-2 Annex H)	[V]		900	900				800	

(*) E4.2H/MS 3200A: 66kA Icw (3s)

SACE Emax 2/E		E1.2	E2.2	E4.2	E6.2	
[Iu]		1250	≤2500	≤3200	4000	6300
Mechanical life*	[No. cycles x 1000]	20	25	20	15	12
	Frequency [Oper./Hour]	60	60	60	60	60
Electrical life	800 V [No. cycles x 1000]	0.5		1.6	1	1
	900 V [No. cycles x 1000]		2	1	1	1
	1000 V [No. cycles x 1000]		0.5	1	1	
	Frequency [Oper./Hour]	30	30	10	10	10

(*) with regular maintenance prescribed by the manufacturer.



For further detail, consult
the Emax 2/E catalogue
for ACB >690Vac

SACE Emax 2/E12

Range IEC circuit breakers at 1000-1150-1200V up to 1380V



For further detail, consult the Emax 2/E catalogue for ACB >690Vac

The SACE Emax2/E12 automatic circuit breakers have been certified according to IEC 60947-2. Three levels of performances are offered: "S" with essential performances, "H" with advanced breaking capacities (85kA@1000V, 65kA@1200V), and "V" with extended voltage range up to 1380V.

Devices are available in fixed and withdrawable versions, and can be fitted with a vast assortment of electrical and mechanical accessories already available for the standard SACE Emax 2 range.



Common data

Rated service voltage Ue	[V]	1200
Rated insulation voltage Ui	[V]	1500
Rated impulse withstand voltage Uimp	[kV]	15
Frequency	[Hz]	50-60
Number of poles		3
Version		Fixed-Withdrawable
Suitable for isolation according to		IEC 60947-2

SACE Emax 2/E12

E4.2

Performance levels			S/E12	H/E12	V/E12
Rated uninterrupted current Iu @ 40°C		[A]	2500	2500	2500
		[A]	3200	3200	3200
		[A]	4000	4000	4000
Rated ultimate short-circuit breaking capacity Icu	1000V	[kA]	65	85	85
	1150V	[kA]	50	65	65
	1200V	[kA]	50	65	65
Rated service short-circuit breaking capacity Ics	1000V	[kA]	65	85	85
	1150V	[kA]	50	50	50
	1200V	[kA]	50	50	50
Rated short-time withstand current Icw	(1s) 1000V	[kA]	65	85	85
	(3s) 1000V	[kA]	65	75	75
	(1s) 1200V	[kA]	50	65	65
	(3s) 1200V	[kA]	50	65	65
Rated short-circuit making capacity (peak value) Icm	1000V	[kA]	143	187	187
	1150V	[kA]	105	143	143
	1200V	[kA]	105	143	143
Utilization category (according to IEC 60947-2)			B	B	B

Extended performances

Maximum operating voltage	[V]	V/E12
Breaking capacity*	1380V [kA]	65

(*) Defined as one single opening operation under short circuit condition.

SACE Emax 2/E12

E4.2

Mechanical life*		[Iu]	≤3200	4000
Electrical life		[No. cycles x 1000]	20	15
	Frequency	[Oper./Hour]	60	60
	1000V	[No. cycles x 1000]	1	1
	1150V	[No. cycles x 1000]	1	1
	1200V	[No. cycles x 1000]	1	1
	Frequency	[Oper./Hour]	10	10

(*) with regular maintenance prescribed by the manufacturer.

SACE Emax 2/E9 and /E10

Range IEC switch disconnectors at 900V and 1000V

Common data		
Rated service voltage Ue	[V]	900 (/E9), 1000(/E10)
Rated insulation voltage Ui	[V]	1000
Rated impulse withstand voltage Uimp	[kV]	12
Frequency	[Hz]	50-60
Number of poles		3
Version		F-W (/E9), F (/E10)
Suitable for isolation according to		IEC 60947-3



SACE Emax 2/E MS		E2.2	E4.2
Performance levels		H/E10 MS	H/E9 MS
Rated uninterrupted current Iu @ 40°C	[A]	2500	2500
	[A]		3200
	[A]		4000
Rated service voltage Ue	[V]	1000	900
Rated short-time withstand current Icw	(1s) [kA]	50	75
	(3s) [kA]	50	75*
Rated short-circuit making capacity (peak value) Icm	900V [kA]		165
	1000V [kA]	105	
Utilization category (according to IEC 60947-3)		AC-23A	AC-23A

(*) 66kA Icw(3s) up to 3200A.

SACE Emax 2/E MS		E2.2	E4.2	
	[Iu]	2500	≤3200	4000
Mechanical life*	[No. cycles x 1000]	20	20	15
	Frequency [Oper./Hour]	60	60	60
Electrical life	900 V [No. cycles x 1000]	2	1	1
	1000 V [No. cycles x 1000]	0.5		
	Frequency [Oper./Hour]	30	10	10

(*) with regular maintenance prescribed by the manufacturer.

For Variable Frequency versions, see document [1SDC200097B0201](#)



For further detail, consult
the Emax 2/E catalogue
for ACB >690Vac

SACE Emax 2/E12

Range IEC switch disconnectors at 1200V up to 1380V



For further detail, consult the Emax 2/E catalogue for ACB >690Vac

Switch disconnectors at 1200V are identified with the abbreviation /E12 MS and have been certified according to IEC 60947-3. The switch disconnectors are derived from the corresponding automatic circuit breakers, and they have the same dimensions and accessory options, without protection trip units.

The device, when in the open position, guarantees an isolating distance between the main contacts of the circuit breaker that is sufficient to ensure that the installation downstream is not live.

Common data		
Rated service voltage Ue	[V]	1200
Rated insulation voltage Ui	[V]	1500
Rated impulse withstand voltage Uimp	[kV]	15
Frequency	[Hz]	50-60
Number of poles		3
Version		Fixed-Withdrawable
Suitable for isolation according to		IEC 60947-3



SACE Emax 2/E12			E4.2
Performance levels			H/E12 MS
Rated uninterrupted current Iu @ 40°C		[A]	2500
		[A]	3200
		[A]	4000
Rated short-time withstand current Icw	(1s)	[kA]	85
	(3s)	[kA]	75
Rated short-circuit making capacity (peak value) Icm	1000V	[kA]	187
	1200V	[kA]	143
Utilization category (according to IEC 60947-3)			AC-23A
Extended performances			
Maximum operating voltage		[V]	1380

SACE Emax 2/12			E4.2	
		[Iu]	≤3200	4000
Mechanical life*		[No. cycles x 1000]	20	15
	Frequency	[Oper./Hour]	60	60
Electrical life	1000V	[No. cycles x 1000]	1	1
	1150V	[No. cycles x 1000]	1	1
	1200V	[No. cycles x 1000]	1	1
	Frequency	[Oper./Hour]	10	10

(*) with regular maintenance prescribed by the manufacturer.

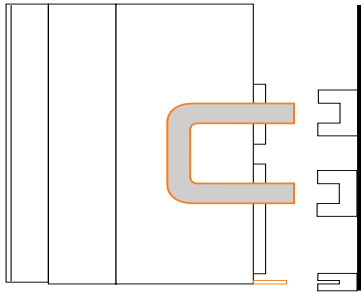
For Variable Frequency versions, see document [1SDC200097B0201](#)



SACE Emax 2 derived versions

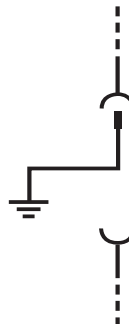
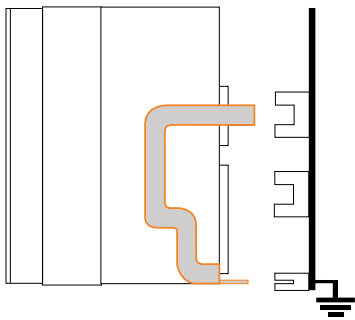
Safety is an indispensable requirement that must always be guaranteed in electrical installations. In this regard, ABB SACE offers devices developed to further increase safety standards during inspection and maintenance activities on electrical installations. In particular, in a withdrawable version, ABB SACE Emax 2 offers:

— The earthing circuit is dimensioned for a short-time current equal to 60% of the maximum I_{cw} of the circuit breaker from which it is derived (IEC 60439-1)

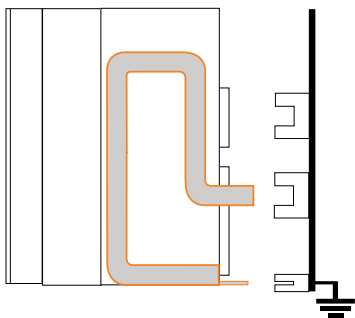


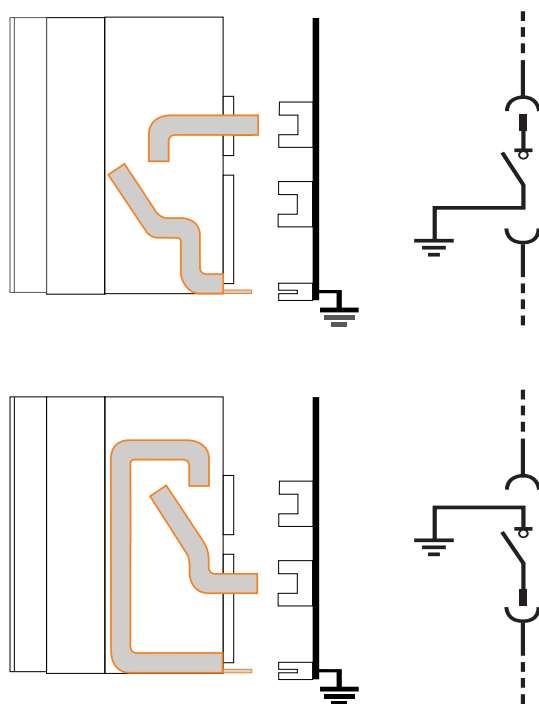
- **Sectionalizing truck CS:** in normal operating conditions of the electrical circuit, this device is inserted in the part. It short-circuits the upper and lower terminals of the power circuit. When maintenance activities need to be carried out, the sectionalizing truck is removed and the part of the system involved is isolated. The device can be accessorized with a keylock and padlocks for locking in the withdrawn position.

— The standard fixed parts can not accept MT/MTP device. In order to allow the utilization of MT/MTP mobile parts is mandatory to install the grounding clamps on fixed parts. Accessorizing only in the factory.



- **Earthing truck MT:** this device enables all phases of the electrical circuit on which maintenance needs to be performed to be earthed ¹⁾. The earthing truck is available in two versions: for earth connection from the upper or lower terminals.





- **Earthing switch with making capacity MTP:** similar to the MT device, this differs due to the presence of a mechanical stored energy control which allows the circuit to be opened and closed. Two versions of this earthing switch are also available: for earth connection from the upper or lower terminals. It can also be accessorized
 - with a keylock or padlocks for locking in the open position.

Common data

Rated service voltage U_e	[V]	690
Rated insulation voltage U_i	[V]	1000
Rated impulse withstand voltage U_{imp}	[kV]	12
Frequency	[Hz]	50 - 60
Number of poles		3 - 4
Version		Withdrawable

SACE Emax 2	E2.2			E4.2			E6.2		
Performance levels	CS	MT	MTP	CS	MT	MTP	CS	MT	MTP
Rated uninterrupted current I_u @ 40°C	2500	2500	2500	4000	4000	4000	6300	6300	6300
Neutral pole current-carrying capacity for 4-pole CBs	100	100	100	100	100	100	50-100	50-100	50-100
Rated short-time withstand current I_{cw} (1s) [kA]	-	30	30	-	50	50	-	50	50

SACE Emax 2 MS/DC-E

Range IEC Air switch disconnectors at 1500 V DC

The SACE Emax 2 MS/DC-E IEC range has been developed for installations up to 1500V DC and 4000 A, with short-time withstand current up to 100 kA.

The SACE Emax 2 MS/DC-E is compliant with DC-PV2, the most demanding Utilization Category according to IEC 60947-3 Annex D, since it requires the ability to connect and disconnect PV circuits where significant overcurrents may occur and where current flow can be in either direction; these are common characteristics of centralized PV systems.

Because of dedicated shorting busbar (jumper) kits, all four poles can be connected in series to isolate a single polarity source, or alternatively for a dual polarity source 2 poles can be configured in series for the positive supply and the other 2 poles in series for the negative supply.

SACE Emax 2 MS/DC-E can be fitted with a vast assortment of electrical and mechanical accessories already available for the standard SACE Emax 2 range. The IEC version has also achieved China CCC certification.

Common data		
Rated service voltage Ue	[V]	1500
Rated insulation voltage Ui	[V]	1500
Rated impulse withstand voltage Uimp	[kV]	12
Number of poles		4
Version		Fixed - Withdrawable
Suitable for isolation according to		IEC 60947-3
Utilization category		DC22A, DC-PV2 (Annex D)



SACE Emax2 MS/DC-E for IEC			E4.2		
Performance levels			S	H	V
Rated uninterrupted current I _u @ 40°C		[A]	1600	1600	1600
		[A]	2000	2000	2000
		[A]	2500	2500	2500
		[A]	3200	3200	3200
		[A]	4000	4000	4000
Rated short-time withstand current I _{cw}	(1s)	[kA]	65	85	100
Rated short-circuit making capacity (peak value) I _{cm}	1500 V	[kA]	65	85	100
Dimensions	H - Fixed	[mm]	371		
	D - Fixed		270		
	W - Fixed 4p		510		
	H – Draw out	[mm]	425		
	D – Draw out	[mm]	393		
	W – Draw out 4p	[mm]	551		



For further detail, please consult the SACE Emax 2 MS/DC-E technical catalogue



Discover more by visiting the SACE Emax 2 MS/DC-E dedicated webpage



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