

TECHNICAL CATALOGUE

SACE Emax 2 MS/DC-E

Air Switch-disconnectors at 1500V DC



The SACE Emax 2 MS/DC-E range of air switch-disconnectors offers an increasingly comprehensive, leading-edge solution that anticipates the market trends.

SACE Emax 2 MS/DC-E

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Introduction

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Keeping ahead of the DC application trends

The SACE Emax 2 MS/DC-E air switch-disconnectors further expand SACE's broad offering of low voltage devices providing a solution to all our customer's applications. Meeting both IEC and UL standards, this new range was designed with internationalization in mind. It offers to design engineers, panel builders and OEM manufacturers the chance to rely on a single provider and meet the specific requirements of a wide range of DC applications installed in any part of the world. A range that keeps pace with the times.

String inverter configurations and higher operating voltages are the current trend in photovoltaic systems. System designers and their customers want to enhance energy efficiency and limit the rated currents thereby reducing switchgear size, installation time, and associated costs.



Quality, innovation and the ability to keep up with technological developments while satisfying the every changing needs of our customers: these, in short, are the key strengths of the SACE Emax 2 MS/DC-E range of switch disconnectors.

By 2021, according to ABB estimates, over 93% of PV systems above one megawatt will function with 1500V DC rated voltage, even more so in areas where UL regulations are applicable. This will increase the power density and significantly reduce the number of combiners, inverters and conductors required compared to 1000V DC systems.

Value proposition

Innovations technologies to be a step ahead



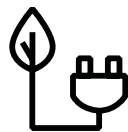
Global availability

Ensuring performances at 1500V DC under IEC and UL standards, SACE Emax 2 MS/DC-E range provide a unique solution for any projects around the world. Any version up to 3200A can also be ordered with IEC & UL & CCC approvals. This means that engineers, panel builders, inverter manufacturers and OEMs can find the right solution for any plant installed anywhere in the world.



Flexible installation

The SACE Emax 2 MS/DC-E range of air switch-disconnectors guarantee great flexibility for any installation. It is possible to insulate one polarity or both, and manage current flow in both directions. In addition, it is available in fixed and drawable version, and terminals can be setup vertically or horizontally.

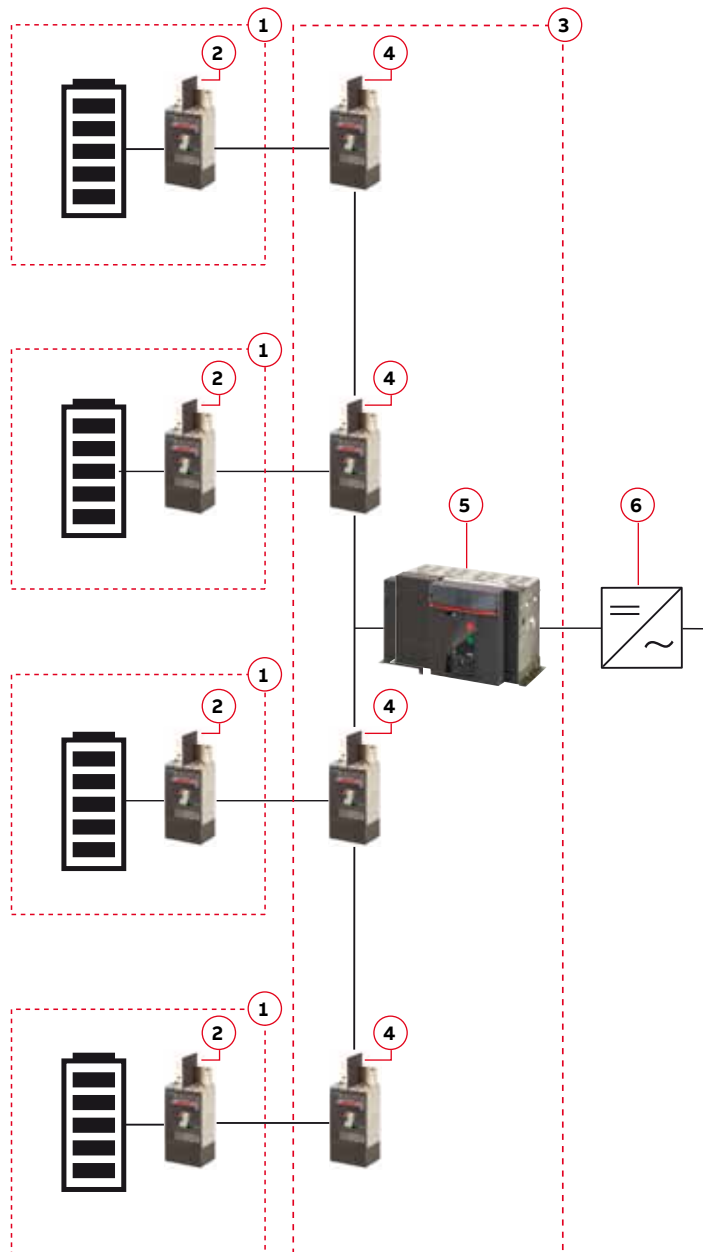


Energy efficiency

The SACE Emax 2 MS/DC-E range is here to support the energy efficiency trend in Energy Storage and Photovoltaic systems. Achieving 1500V DC helps to cut power losses and make our planet a better place.

Application examples

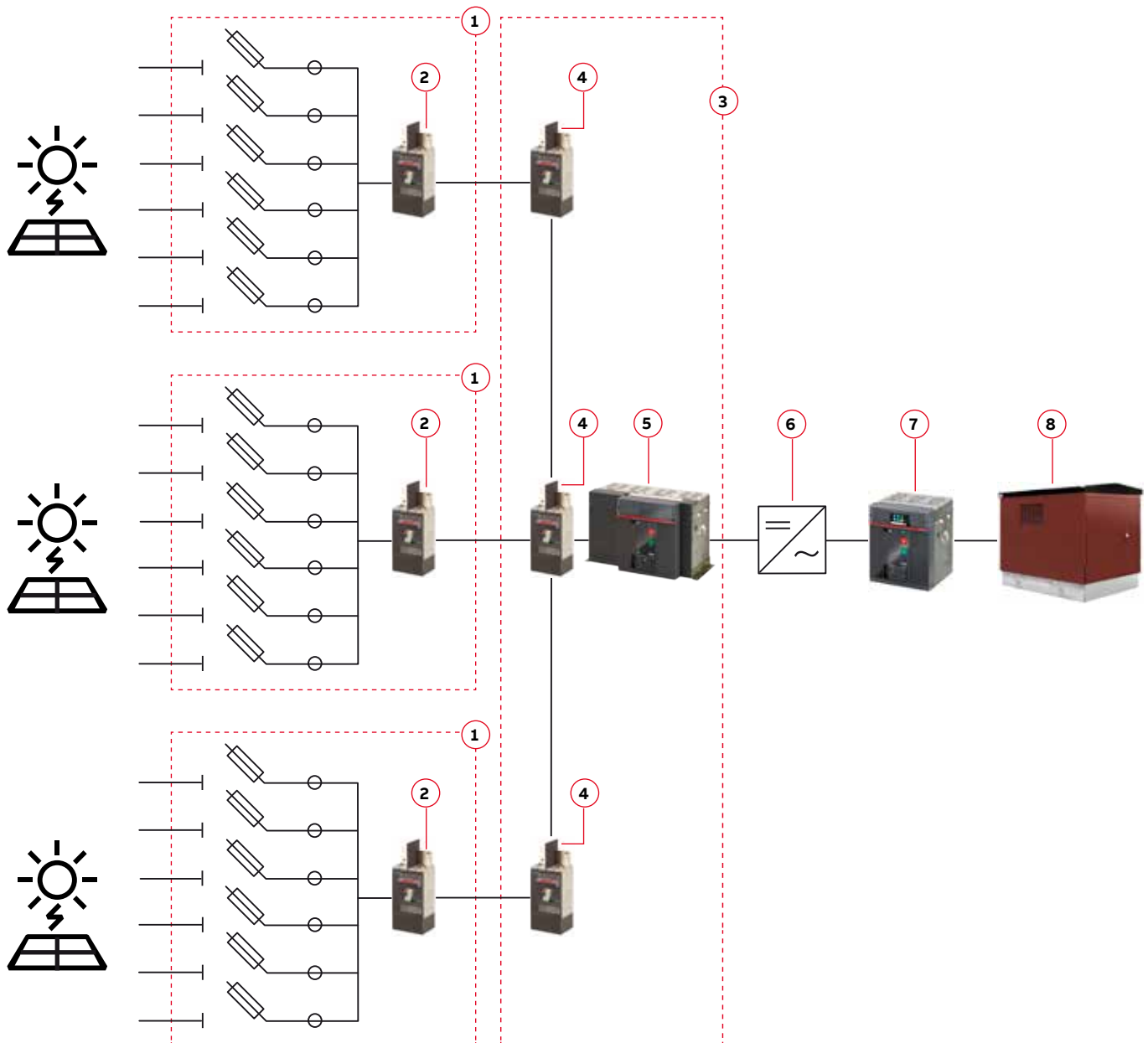
Energy Storage System plant



1. Battery module
2. Molded Case Switch-Disconnecter Tmax PV
3. ESS combiner
4. Molded Case Circuit-Breakers Tmax PV
5. Air Switch-Disconnecter Emax 2 MS/DC-E
6. Inverter

Application examples

Photovoltaic plant



1. String Combiner
2. Molded Case Switch-Disconnecter Tmax PV
3. Recombiner
4. Molded Case Circuit-Breakers Tmax PV
5. Air Switch-Disconnecter Emax 2 MS/DC-E
6. Central inverter
7. Air Circuit-Breaker Emax 2
8. MV/LV Transformer - Compact Secondary Substation



Range

- 2/2** IEC range
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Flexibility guaranteed for IEC compliant requirements

In accordance with IEC60947-3 Annex D specifications, the SACE Emax 2 MS/DC-E air switch-disconnectors offer a broad range of extended ratings for today's increasingly demanding DC applications.

Connection jumpers are available factory mounted or field mountable for enhanced safety and installation flexibility.

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.



IEC Range

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		

Dedicated solutions compliant with UL Standards

The SACE Emax 2 MS/DC-E UL range includes a full assortment of air switch-disconnectors compliant with UL489B and UL489F standards. Multiple versions that form a complete portfolio of shared accessories, including factory mounted connection jumpers that are mandatory for SACE Emax 2 MS/DC-E UL. Jumpers ensure ease of installation, safety, and are fully compliant with UL regulations.

The SACE Emax 2 MS/DC-E range of switch-disconnectors covers 1500V DC installations in compliance with UL489B (for use with Photovoltaic systems) and UL489F (for use with Battery Power Supplies), with rated short-time current up to 100kA.

Sharing the same dimension as the standard Emax 2, these compact switch-disconnectors allow UL switchgear and inverters manufacturers to optimize their footprint.

Thanks to the factory-fitted 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.

All products can be equipped with the most common UL listed mechanical and electrical accessories already available for the SACE Emax 2 air circuit-breaker range.



UL Range

Common data

Rated maximum voltage	[V]	1500
Rated voltage	[V]	1500
Number of poles		4
Version		Fixed - Withdrawable
UL file		E348799, E501222



SACE Emax2 MS/DC-E for UL

E4.2

Performance levels			S-A	H-A	V-A
Rated current	UL489B, UL489F	[A]	1600	1600	1600
	UL489B, UL489F	[A]	2000	2000	2000
	UL489B, UL489F	[A]	2500	2500	2500
	UL489B	[A]	3200	3200	3200
Rated short-time current	(1s)	[kA]	65	85	100
Dimensions	H - Fixed	[in / mm]	14.61/371		
	D - Fixed	[in / mm]	10.63/270		
	W - Fixed (4p)	[in / mm]	20.08/510		
	H - Draw out	[in / mm]	16.73/425		
	D - Draw out	[in / mm]	15.47/393		
	W - Draw out (4p)	[in / mm]	21.69/551		

Global multi-standard version IEC, UL and CCC compliant

The SACE Emax 2 DC range includes a global multi-standard version compliant with IEC 60947-3, UL 489B, UL489F and with CCC approval.

The SACE Emax 2 MS/DC-E range of switch-disconnectors in multi-standard version covers 1500V DC installations with the following rated currents:

- 1600, 2000 and 2500 A: IEC 60947-3, UL 489B, UL489F and GB/T 14048.3 (CCC approval).
- 3200 A: IEC 60947-3, UL 489B, and GB/T 14048.3 (CCC approval).

Thanks to the factory-fitted shorting busbar (jumper) kits, all four poles can be connected in series to isolate a single polarity or alternatively for a dual polarity source.

All products can be equipped with the most common UL listed mechanical and electrical accessories already available for the SACE Emax 2 air circuit-breaker range.

For technical data, please refer to the UL versions of SACE Emax 2 MS/DC-E range.



Accessories

SACE Emax 2 MS/DC-E switch-disconnectors offer a wide range of accessories already available for SACE Emax 2 air circuit-breaker, developed to satisfy the application and installation requirements of every customer.

	E4.2
Signalling	
Standard open/closed auxiliary contacts - AUX 4Q	○ / ∞
Open/closed auxiliary contacts - AUX 6Q	○ / ∞
Open/closed auxiliary contacts - AUX 15Q	○ / △
Auxiliary position contacts - AUP	△
Ready to close signalling contact - RTC	○ / ∞
Contact signalling loaded springs – S33 M/2 (supplied with Motor)	○ / ∞
Control	
Opening and closing release - YO/YC	○ / ∞
Second opening and closing release - YO2/YC2	○ / ∞
Undervoltage release - YU	○ / ∞
Electronic time-delay device for undervoltage release - UVD	○ / ∞
Motor - M	○ / ∞
Remote reset - YR	-
Opening and closing release test unit - YO/YC Test Unit	○ / △
Safety	
Key lock and padlock in open position - KLC and PLC	○ / ∞
Key lock and padlock in racked-in / test / racked-out position - KLP and PLP	∞
Shutter lock - SL	▲
Lock for racking-out mechanism with circuit-breaker in closed position	●●
Lock for racking in / racking out the mobile part when the door is open - DLR	△
Lock to prevent door opening when circuit-breaker is in racked-in / test position - DLP	△
Lock to prevent door opening when circuit-breaker is in closed position - DLC	○ / ∞
Anti-insertion lock	● / ●●
Mechanical operation counter - MOC	○ / ∞
Protection devices	
Protection device for opening and closing pushbuttons - PBC	○ / ∞
IP30 Protection	● / ▲
IP54 Protection	○ / △
Terminal covers - HTC / LTC	-
Connections	
Orientable rear terminal - HR/VR*	● / ▲
Interlocks and switching devices	
Mechanical interlock - MI	○ / ∞ / △
Fail Safe	
	●

- Standard accessory for fixed circuit-breaker
- Accessory on request for fixed circuit-breaker
- Standard accessory for mobile part

- ∞ Accessory on request for mobile part
- ▲ Standard accessory for fixed part
- △ Accessory on request for fixed part

* UL 2500/3200A vertical only

Accessories

Signalling

Open / closed auxiliary contacts - AUX (Fig. 01A/B/C)

SACE Emax 2 MS/DC-E can be equipped with auxiliary contacts that signal the open or closed status of the circuit-breaker. The switching contacts are available in the following configurations:



Fig. 01-A



Fig. 01-B



Fig. 01-C

Open / closed auxiliary contacts (AUX 4Q)		E2.2 ... E6.2
4 auxiliary contacts	standard	●
	digital signals	●
	mixed	●
Open / closed supplementary auxiliary contacts (AUX 6Q)		
6 auxiliary contacts	standard	●
	digital signals	●
	mixed	●
Open / closed external supplementary auxiliary contacts (AUX 15Q)		
15 auxiliary contacts	standard	●
	digital signals	●
Maximum number of open / closed auxiliary contacts that can be installed		25

	Standard contact	Contact for digital signals
Type	changeover contacts	changeover contacts
Minimum load	100mA @ 24V	1mA @ 5V
Breaking capacity		
DC	24V	-
	125V	0.3A @ 0ms
	250V	0.15A @ 0ms
AC	250V	5A @ cosφ 1
		5A @ cosφ 0.7
		5A @ cosφ 0.3
	400V	3A @ cosφ 1
		2A @ cosφ 0.7
		1A @ cosφ 0.3

Electrical diagram reference: figures 1, 81, 91

Aux 6Q is an alternative to the Ekip Signalling 4K module. AUX 15Q is an alternative to the mechanical interlock (MI), the DLC for E1.2 lock or the DLP lock if mounted on the right side.

Ready to close signalling contact - RTC (Fig. 02)

The ready to close signalling contact – RTC – indicates that the circuit-breaker is ready to receive the closing command. The circuit-breaker is ready to close when the following conditions have been met:

- circuit-breaker open
- springs loaded
- no opening command or locks on the opening command
- circuit-breaker reset following tripping of Ekip protection trip unit



Fig. 02

	Standard contact	Contact for digital signals
Type	Switching	
Minimum load	100mA @ 24V	1mA @ 5V
Breaking capacity		
DC	24V	-
	250V	0.5A @ 0ms / 0.2A 10ms
AC	250V	3A @ cosφ 0.7

Electrical diagram reference: figure 71

Control

Opening and closing release- YO/YC (Fig. 03)

The opening and closing releases enable the circuit-breaker to be controlled remotely. Opening is always possible, while closing is available only when the closing springs of the operating mechanism are loaded and the circuit-breakers is ready to close.

The releases operate by means of minimum impulse current duration time of 100 ms. Furthermore, they can operate in permanent service. In this case, if opening command is given by means of the opening release, the circuit-breaker can be closed by de-energizing the opening release and, after a time of at least 30 ms, by controlling the closing.



Fig. 03

Electrical diagram reference: figures 75, 77

Second opening and closing release - YO2/YC2

For certain installations the redundancy of mechanisms and circuit-breaker operating circuits is often requested. To answer these needs, the SACE Emax 2 MS/DC-E circuit-breakers can be equipped with double opening release and double closing release. The technical characteristics of the second opening release remain the same as those of the first opening and closing release.

A double closing release can be used; a second open release in an alternative to undervoltage release.

Electrical diagram reference: figures 72, 79

General characteristics		
Power supply (Un)	AC	DC
24V	●	●
30V	●	●
48V	●	●
60V	●	●
110V...120V	●	●
120V...127V	●	●
220V...240V	●	●
240V...250V	●	●
380V...400V	●	-
415V...440V	●	-
480V...500V	●	-
Operating limits (IEC60947-2 standards)	YO/YO2: 70%...110% Un YC/YC2: 85%...110% Un	
Inrush power (Ps)	300VA	300W
Continuous power (Pc)	3.5VA	3.5W
Opening time (YO/YO2)		
E2.2 ... E6.2	35 ms	
Closing time (YC/YC2)		
E2.2 ... E6.2	70 ms	

Accessories

Opening and closing release test unit - YO/YC Test Unit

The opening and closing releases test unit helps ensure that the various version of releases are running smoothly, to guarantee a high level of reliability in controlling circuit-breaker opening. The test unit ensures the continuity of the opening and closing releases with a rated operating voltage between 24V and 250V (AC and DC), as well as verifies the functions of the opening and closing coil electronic circuit. Continuity is checked cyclically with an interval of 20s between tests. The unit has optic signals via LEDs on the front, which provide the following information:

POWER ON: power supply present

TESTING: testing in progress

TEST FAILED: signal following a failed test or lack of auxiliary power supply

ALARM: signal given following three failed tests.

Two relays with one change-over area also available on board the unit, to allow remote signalling of the following events:

Failure of a test: resetting takes place automatically when the alarm stops

Failure of three tests: resetting occurs only by pressing the manual RESET on the unit.

Characteristics of device	
Auxiliary power supply	24V...250V AC/DC
Specification of the signalling relays	
Maximum interrupted current	6A
Maximum interrupted voltage	250V AC

Undervoltage release – YU (Fig. 04)

The undervoltage release opens the circuit-breaker when there is a significant voltage drop or power failure. It can be used for safe remote tripping, for blocking closing or to control the voltage in the primary and secondary circuits. The power supply for the release is therefore obtained on the supply side of the circuit-breaker or from an independent source.

Circuit-breaker closing is permitted only when the release is powered. The undervoltage release is an alternative to as second shunt trip or the anti-racking out device.

The circuit-breaker is opened with trip unit power supply voltages of 35-70% U_n .

The circuit-breaker can be closed with a trip unit power supply voltage of 85-110% U_n .



Fig. 04

General characteristics		
Power supply (U_n)	AC	DC
24V	●	●
30V	●	●
48V	●	●
60V	●	●
110V...120V	●	●
120V...127V	●	●
220V...240V	●	●
240V...250V	●	-
380V...400V	●	-
415V...440V	●	-
480V...500V	●	-
Inrush power (P_s)	300VA	300W
Continuous power (P_c)	3.5VA	3.5W
Opening time (YU)		
E2.2 ... E6.2	50 ms	

Electrical diagram reference: figure 73



Fig. 05

Time-delay device for undervoltage release (UVD) (Fig. 05)

The undervoltage release can be combined with an electronic time-delay device for the circuit-breaker, allowing for delayed external tripping with adjustable preset times. Use of the delayed undervoltage trip unit is recommended to prevent tripping when the power supply network for the trip unit is subject to brief voltage drops or power supply failures. Circuit-breaker closing is inhibited when it is not powered. The time-delay device must be used with an undervoltage release with the same voltage.

General characteristics

Power supply (UVD)	AC	DC
24-30V	-	●
48V	●	●
60V	●	●
110-127V	●	●
220-250V	●	●
Adjustable opening time (YU + D):	0.5-1-1.5-2-3 s	

Motor – M (Fig. 06A/B)

The motor automatically loads the closing springs of the circuit-breaker. The device, which can be installed from the front, automatically reloads the springs of the operating device when they are unloaded and power is present. In the event no power is present, the springs can be manually loaded by a dedicated lever on the operating device. The motor is always supplied with the limit switch contact S33 M/2 which signals the status of the springs.



Fig. 06A



Fig. 06B

General characteristics

Power supply (Un)	AC	DC
24V-30V	●	●
48V-60V	●	●
100V...130V	●	●
220V...250V	●	●
380V...415V	●	-
440V...480V (E2.2 ... E6.2)	●	-
Operating limits (IEC60947-2 standards)	85%...110% Un	
Inrush power (Ps)	500VA E2.2 ... E6.2	500W E2.2 ... E6.2
Inrush time	200ms	
Continuous power (Pc)	150VA E2.2 ... E6.2	150W E2.2 ... E6.2
Charging time E2.2 ... E6.2	7 sec	

Electrical diagram reference: figure 13

Accessories

Safety

Key lock in open position - KLC (Fig. 7)

Due to these safety devices, the SACE Emax 2 MS/DC-E circuit-breaker can be locked in the open position. The lock can also be used during maintenance activities when the shield of the accessories area is removed. The device is available with lock with different keys – KLC-D (for only one circuit-breaker) or with the same keys – KLC-S (for several circuit-breakers). Four different key numbers are available for the KLC-S.

SACE Emax 2 also allows alternative key lock to be installed. The following key lock set-ups are also available:

- Ronis
- Profalux
- Kirk
- Castell

In this case, the key locks must be supplied by the customer.

Padlocks - PLC (Fig. 8)

These padlock options allow the circuit-breaker to be kept open by acting directly on the mechanical operating device (opening pushbutton). Three different padlock versions are available:

- Locking device with plastic structure for up to a maximum of three padlocks of 4 mm
- Locking device with metal structure for up to a maximum of two padlocks of 8 mm
- Locking device with metal structure for one padlock of 7 mm or for padlock holders

The padlocks must be supplied by the customer. This device is an alternative to the PBC.

Key lock in racked-in / test / racked-out position - KLP (Fig. 9)

This device enables the mobile part to be locked in one of the three positions: racked-in, test and racked-out.

This device can be supplied with locks with different keys – KLP-D or with the same keys – KLP-S. A second key lock option can be added for a maximum of two key locks per breaker.

Locking in the racked-in, test and racked-out positions can be achieved by using other key locks – KLP-A. Adapters are offered for acceptance of Ronis, Profalux, Kirk and Castell locks, which are to be provided by the customer. With the exception of the Castell version, every circuit-breaker can accept up to two key locks. Moreover, it is possible to allow locking only when in the racked-out position with a supplementary accessory.

Padlock in racked-in / test / racked-out position - PLP (Fig. 10)

This device can hold up to three padlocks of 8 mm in diameter. The structure housing the padlocks can also be used in combination with the 2 lock KLP keylock option. Furthermore, it enables the lock of the moving part in the racked-out position only by means of the supplementary lock in racked-out position.

Shutter lock – SL

When the mobile part is in the test position, the shutters of the fixed part close, maintaining the insulation distance and physically segregating the live parts of the of the cradle from the internal breaker compartment of the cradle. Using two dedicated mechanisms, the upper and lower shutters can be locked independently of one another.



Fig. 7



Fig. 8



Fig. 9



Fig. 10

Protection devices

Lock for racking-out mechanism with circuit-breaker in closed position (Fig. 11)

All SACE Emax 2 withdrawable circuit-breakers are always supplied with a lock that prevents the mobile part from being racked in and racked out when the circuit-breaker is in the closed position. To rack in the mobile part, the circuit-breaker must be in the open position.



Fig. 11

Lock for racking in / racking out the mobile part when the door is open - DLR

This accessory, which is mounted on the fixed part, prevents the mobile part from being racked in or out when the switchgear door is open.



Fig. 12

Lock to prevent door opening when the circuit-breaker is in racked-in / test position - DLP (Fig. 12)

This safety device prevents the switchgear door from being opened when the mobile part of the withdrawable version of the circuit-breaker is in the racked-in or test position.

The circuit-breaker can only be racked in when the door is open, which is then closed. This accessory can be installed on either the right-hand or left-hand side of the fixed part. It is available for circuit-breakers E2.2, E4.2 and E6.2. If mounted on the right side, it is an alternative to the mechanical interlock, the AUX 15Q or the DLC.



Fig. 13

Lock to prevent door opening when the circuit-breaker is in the closed position - DLC (Fig. 13)

This prevents the compartment door from being opened when the circuit-breaker is in the closed position (and with the circuit-breaker racked in for withdrawable circuit-breakers).

It also blocks the circuit breaker from closing when the compartment door is open. DLC direct door for E2.2... E6.2 is compatible with all mechanical interlocks and the AUX 15Q DLC. DLC cable door for E2.2... E6.2 is compatible with mechanical interlock type A and the AUX 15Q.



Fig. 14

Anti-insertion lock

The withdrawable circuit-breakers are equipped with special locks that allow the mobile part to be inserted only into the corresponding fixed part.



Fig. 15

Mechanical operation counter - MOC (Fig. 14)

The number of mechanical operations is often one of the elements that determines the frequency of ordinary maintenance operations on circuit-breakers. With this mechanical operation counter, which is always visible on the front of the circuit-breaker, the user knows how many mechanical operations the device has performed.



Fig. 16

Protection device for opening and closing pushbuttons - PBC (Fig. 15)

This accessory is applied to the safety cover of the circuit-breaker and is available in two versions:

- Pushbutton protection device, which blocks operations on both the opening and closing pushbuttons unless the special key is used.
- Padlockable pushbutton protection device, which makes it possible to block either or both pushbuttons and lock the covers in place. It does not trip the breaker as a standard "Padlock device" would.
- PBC is an alternative to PLC padlocks.

IP30 Protection (Fig. 16)

Supplied with every circuit-breaker, the cover frame is installed on the door of the switchgear to achieve IP30 degree of protection on the front part of the circuit-breaker.



Fig. 17

IP54 Protection (Fig. 17)

This transparent cover completely protects the front of the circuit-breaker, enabling an IP54 degree of protection to be achieved. This accessory is provided with double key lock (same or different keys).



Fig. 17

Installation

- 3/2** **Breaker**
- 3/2** Versions and connections
- 3/2** Degree of protection
- 3/2** Power losses

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- 3/3** Temperature derating
- 3/3** Temperature
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Breaker

Versions and connections

The SACE Emax 2 MS/DC-E switch-disconnector is based on 4 poles version of Emax 2 frame E4.2 and it is available in fixed or withdrawable versions.

All SACE Emax 2 MS/DC-E is used with all poles connected in series, for this reason specific connection busbars (also called “jumpers”) are mounted on breaker terminals.

It is possible to select the interruption of one polarity of DC network or both, and the breaker side of power supply and load can be from the lower or upper terminals.

In most cases it is possible to select between vertical and horizontal terminals:

Iu	IEC		UL	
	VR	HR	VR	HR
1600	●	●	●	●
2000	●	●	●	●
2500	●	●	●	-
3200	●	●	●	-
4000	●	●	-	-

Degree of protection

SACE Emax 2 circuit breakers guarantee the following degrees of protection:

- IP20 for circuit breakers in fixed or drawout versions, excluding the terminals.
- IP30 for the front parts of the circuit breaker when installed in switchgear with the IP30 flange mounted on the door.
- IP54 for circuit breakers equipped with optional IP54 transparent flange fixed on the door on the front of the switchgear.

Power losses

The values given in the table refer to total power for four pole circuit breakers with a current flow equal to rated uninterrupted current.

	[W]/[A]	1600	2000	2500	3200	4000
Fixed	W	130	200	320	500	620
Drawout	W	230	360	560	800	1200

Altitude

SACE Emax 2 air circuit breakers guarantee rated performance up to 2000 meters above sea level.

Beyond this altitude, the performance of the circuit breakers is subject to derating, which can be measured by means of the variation in maximum rated service voltage and rated uninterrupted current.

Altitude	[m]	2000	3000	4000	5000
	[ft]	6600	9900	13200	16500
Rated service voltage - Ue	[V]	1500	1320	1170	1022
Rated current	[%In]	100	98	93	90

Installation environment

Temperature derating

Under certain installation conditions, circuit breakers can operate at higher temperatures than the reference temperature of 40 °C. In this case the current-carrying capacity of the circuit-breaker may be lower than the rated current-carrying capacity at the reference temperature: therefore the derating coefficients shown in the table must be applied. Percentage values refer to withdrawable and fixed circuit breaker. If not specified, all data refer to a copper.

Emax 2 E4.2 IEC	Temperature [°C/°F]							
	Iu	<40/104	45/113	50/122	55/131	60/140	65/149	70/158
1600		100%	100%	100%	100%	100%	100%	100%
2000		100%	100%	100%	100%	100%	100%	100%
2500		100%	100%	100%	100%	95%	90%	85%
3200		100%	100%	100%	100%	100%	100%	100%
4000		100%	100%	100%	100%	95%	90%	85%

Emax 2 E4.2 UL	Temperature [°C/°F]							
	Iu	<40/104	45/113	50/122	55/131	60/140	65/149	70/158
1600		100%	100%	100%	100%	100%	100%	100%
2000		100%	100%	100%	100%	95%	90%	85%
2500		100%	100%	100%	100%	100%	100%	100%
3200		100%	100%	100%	100%	95%	90%	85%

The installation requirements prescribed by the international Standards are listed below.

Temperature

SACE Emax 2 circuit breakers can operate in the following environmental conditions:

	Temperature	
	Operating	Storage
Emax 2 switch-disconnector	-25°C...+70°C -13°F...+158°F	-40°C...+70°C -40°F...+158°F

Environmental conditions

The devices can be installed in industrial environments with pollution level 3, IEC60947.

SACE Emax 2 circuit breakers also comply with:

- IEC60721-3-6 class 6C3
- IEC60721-3-3 class 3C2

Electromagnetic compatibility

The use of specific devices in industrial installations may cause electromagnetic interference in the electrical system. SACE Emax 2 MS/DC-E switch-disconnectors have been developed and tested for electromagnetic compatibility in accordance with 60947-3.

Installation in switchgear

Position

All SACE Emax 2 circuit breakers can be floor mounted in a vertical position inside the switchgear compartment.

Insulation distances and connection

The circuit breakers can be connected to the main power system using the most common configurations and dimensions of copper bars.

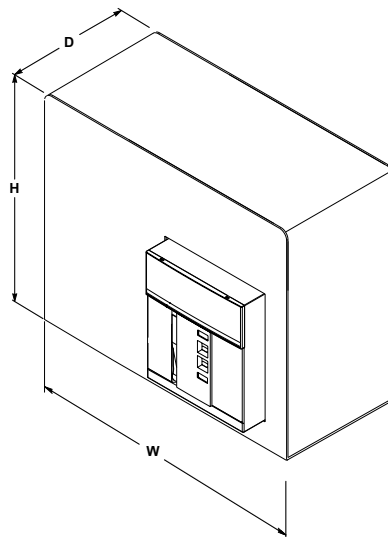
Installation of live parts must ensure minimum insulation distances between the phases.

• Insulation distance of installation cubicle:

E4.2	Fixed			Drawout		
	Width	Heigh	Depth	Width	Heigh	Depth
[mm]	800 ⁽¹⁾	600 ⁽²⁾	221	800 ⁽¹⁾	440	355
[inch]	31.50 ⁽¹⁾	23.62 ⁽²⁾	8.7	31.50 ⁽¹⁾	17.32	13.97

(1) Cubicle width can be reduced to 600 mm (23.62 inch) when lateral walls are insulated.

(2) Cubicle height for Fixed version can be reduced to 500 mm (19.69 inch) when roof panel is insulated.



• Separator plates

The rear part of the circuit breaker has been designed with specific slots in which insulating walls are placed to facilitate segregation between polarities.

Fixed versions also have additional phase separator for top side of breaker.

All those insulations are mandatory for following configurations of Emax 2 MS/DC-E:

2 poles in series for each polarity (network configurations A and B, page 5/3).

• Tightening torques

Connections	E4.2
Busbars to terminals	70 Nm / 619.55 lb-in
Jumpers to terminals	70 Nm / 619.55 lb-in
Terminals to breaker	20 Nm / 177.01 lb-in

Busbar types

The circuit breakers, via the terminals, can be connected to the main distribution system by busbars of different types: copper, silver-plated copper and tinned aluminum when the main distribution system is made of aluminum.

Bars recommendation

IEC version:

Iu	Qty	Vertical	Horizontal
		Size (mm)	Size (mm)
1600	2	100 x 5	100 x 5
2000	2	100 x 8	100 x 8
2500	2	100 x 10	100 x 10
3200	3	100 x 10	100 x 10
4000	4	100 x 10	100 x 10

UL version:

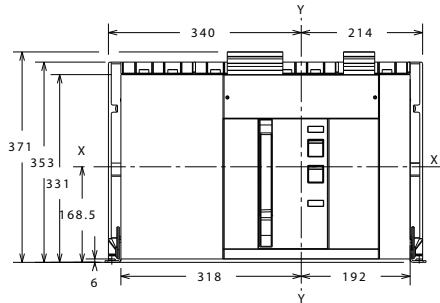
Iu	Qty	Vertical	Horizontal
		Size (in)	Size (in)
1600	2	1/4 x 3	1/4 x 3
2000	4	1/4 x 2	1/4 x 2.5
2500	3	1/4 x 4	-
3200	4	1/4 x 4	-
	5	1/4 x 3	

The tables should be used solely as a general guideline for selecting products. Due to the extensive variety of switchgear construction shapes and conditions that can affect the behavior of the apparatus, the solution used must always be verified.

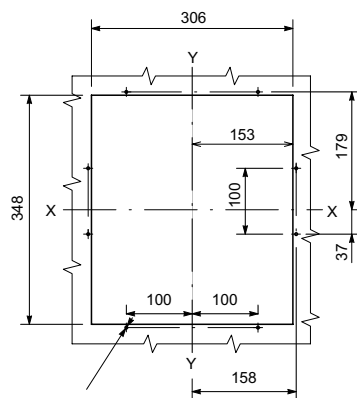
Dimensions and wiring

- 4/2** IEC Fixed execution
- 4/6** IEC Withdrawable execution
- 4/10** UL Fixed execution
- 4/14** UL Withdrawable execution
- 4/18** Terminal box
- 4/19** Electrical accessories

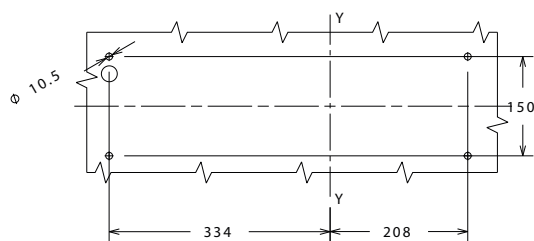
IEC Fixed execution



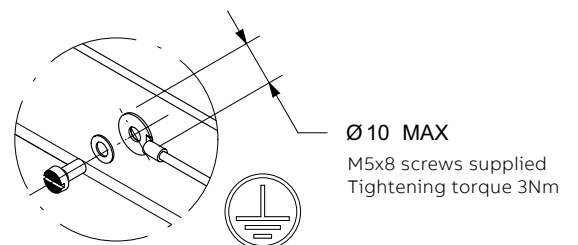
Compartment door drilling



Floor fixing

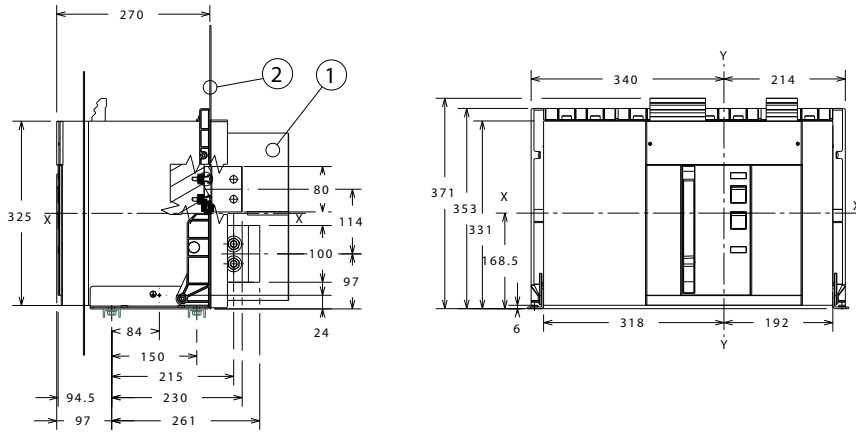


Earthing device

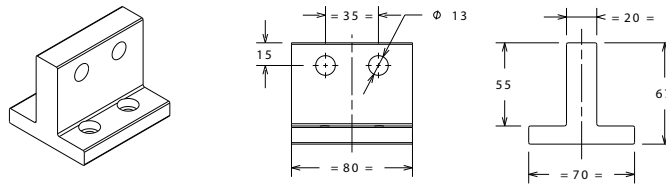


Orientable rear terminals - HR/VR

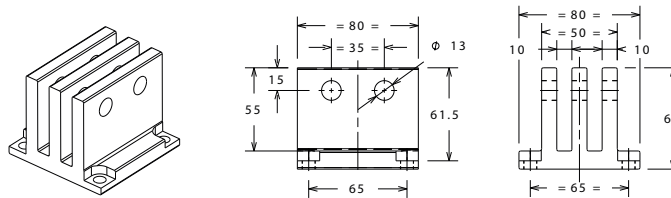
- Key
1 Phase separator
2 Insulated sheet



E4.2 1600-2000-2500A Terminals



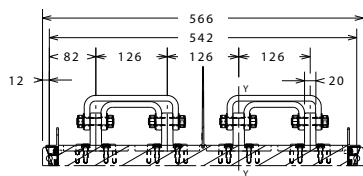
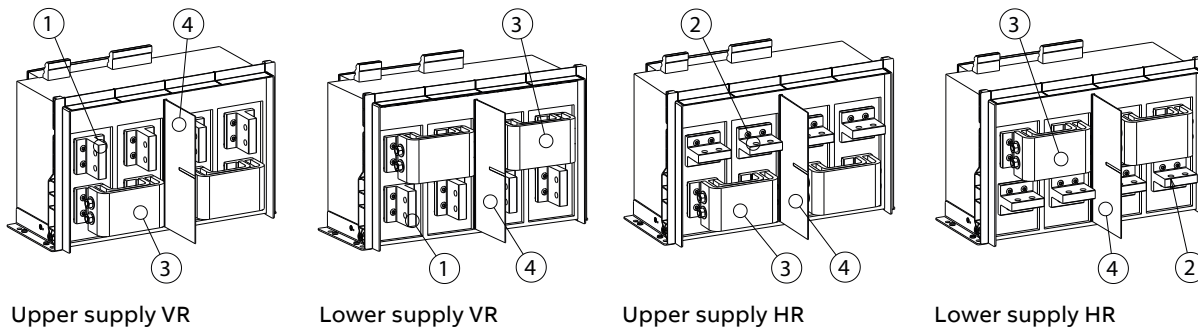
E4.2 3200-4000A Terminals



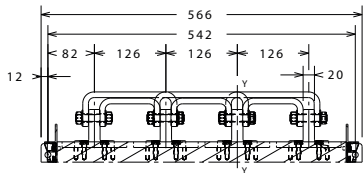
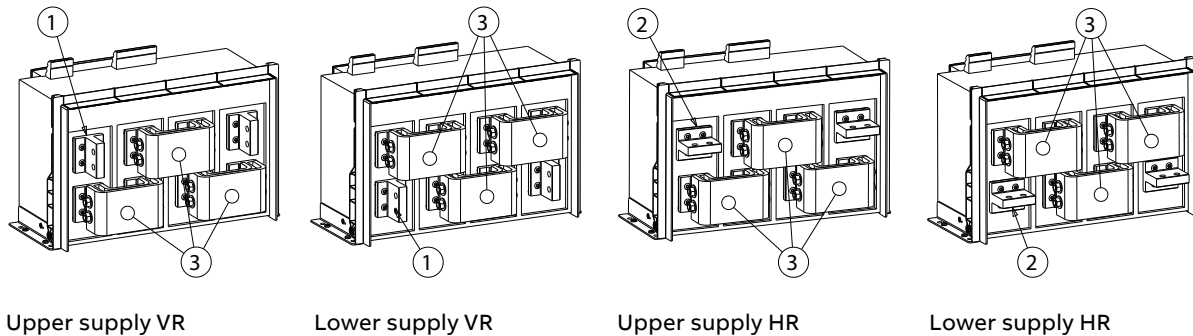
IEC Fixed execution

E4.2 1600-2000-2500A

Configurations A & B



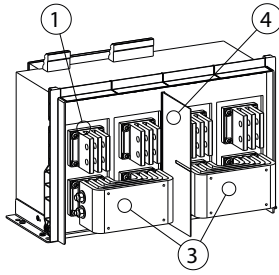
Configurations C & D



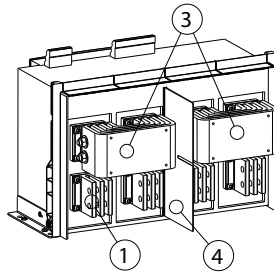
- Key
- 1 Vertical terminal
1600-2000-2500A
 - 2 Horizontal terminal
1600-2000-2500A
 - 3 Jumper 2C
 - 4 Phase separator

E4.2 3200-4000A

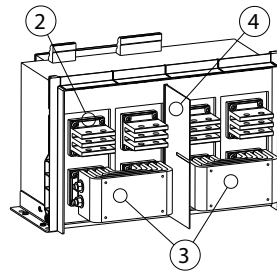
Configurations A & B



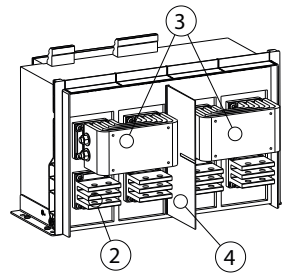
Upper supply VR



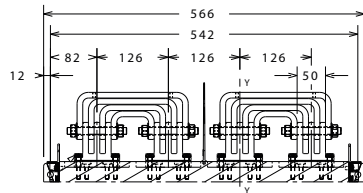
Lower supply VR



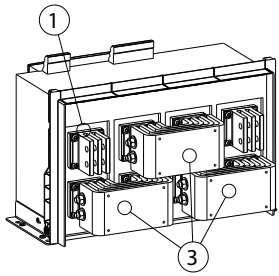
Upper supply HR



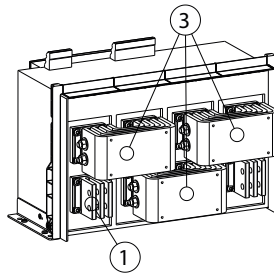
Lower supply HR



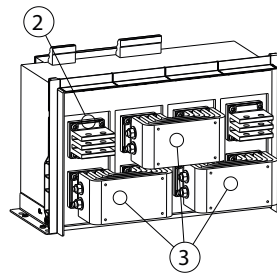
Configurations C & D



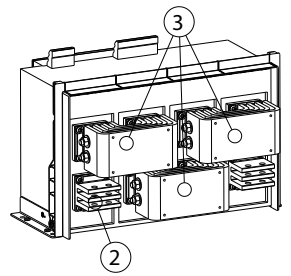
Upper supply VR



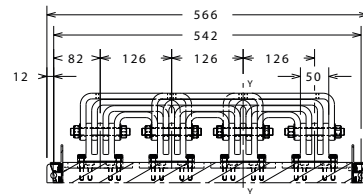
Lower supply VR



Upper supply HR

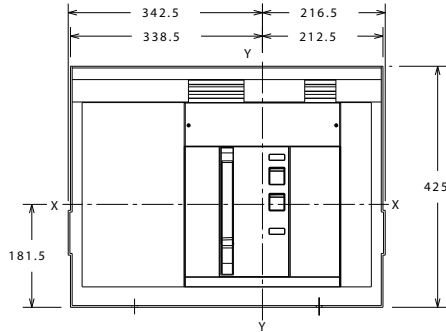


Lower supply HR

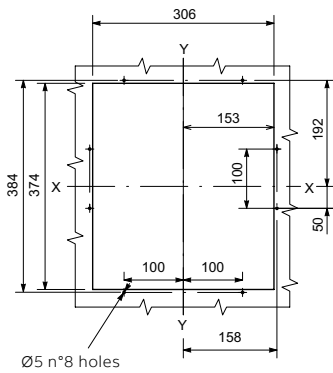


- Key
—
Key
- 1 Vertical terminal
3200-4000A
 - 2 Horizontal terminal
3200-4000A
 - 3 Jumper 4C
 - 4 Phase separator

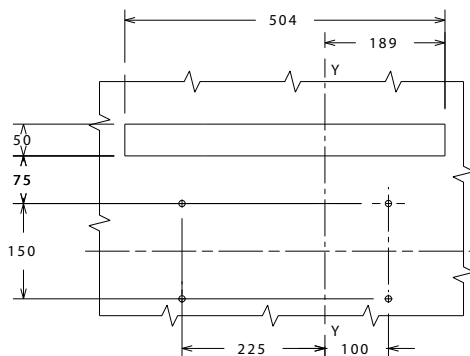
IEC Withdrawable execution



Compartment door drilling

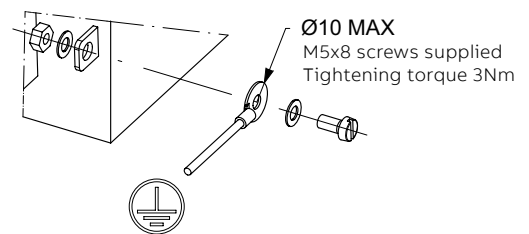


Floor fixing



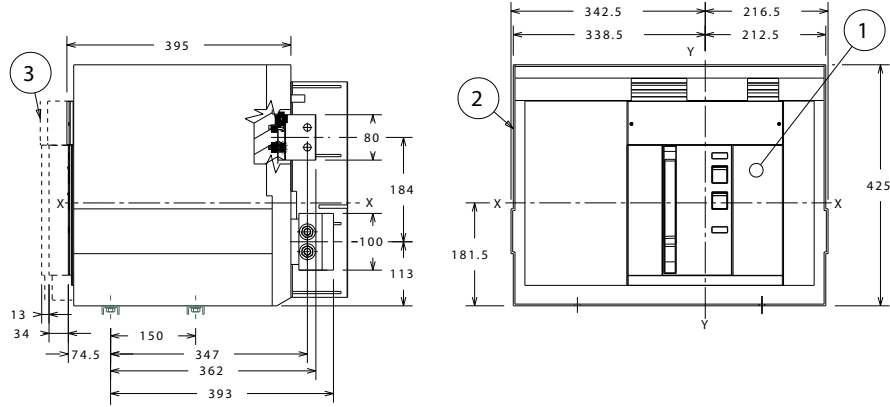
— Key
1 Ventilation drilling on the switchgear

Earthing device

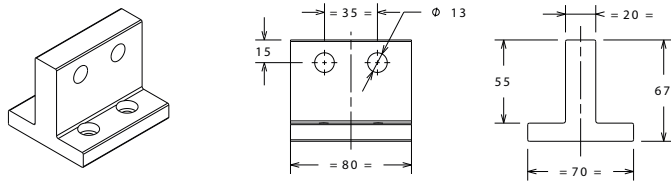


Orientable rear terminals - HR/VR

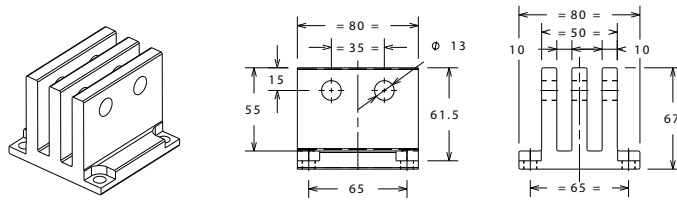
- **Key**
 1 Moving part
 2 Fixed part
 3 Connected, test, disconnected distances



E4.2 1600-2000-2500A Terminals



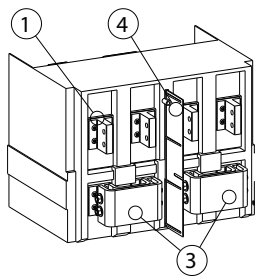
E4.2 3200-4000A Terminals



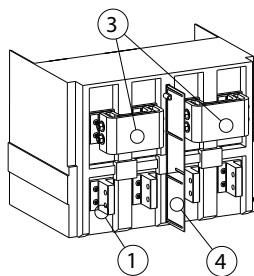
IEC Withdrawable execution

E4.2 1600-2000-2500A

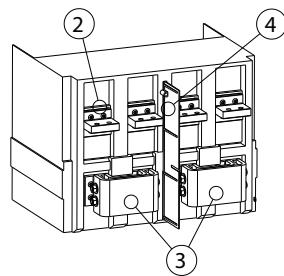
Configurations A & B



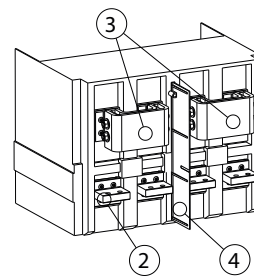
Upper supply VR



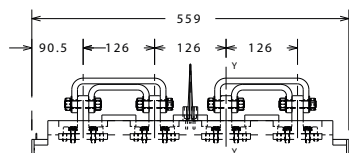
Lower supply VR



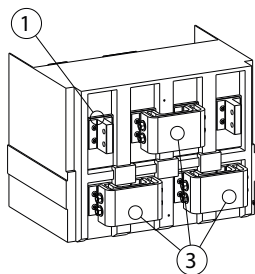
Upper supply HR



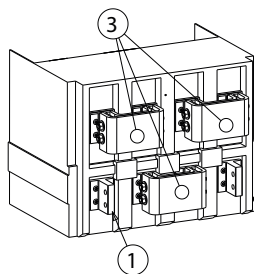
Lower supply HR



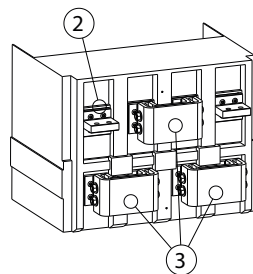
Configurations C & D



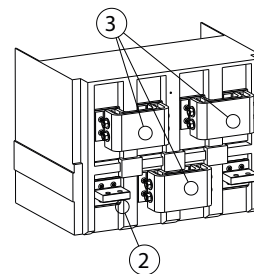
Upper supply VR



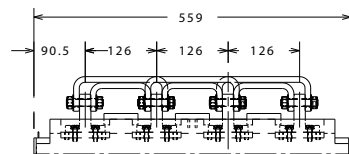
Lower supply VR



Upper supply HR



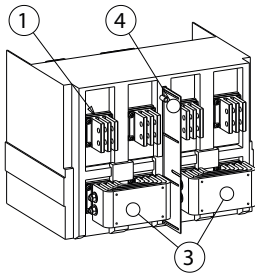
Lower supply HR



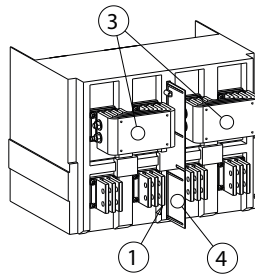
- Key
- 1 Vertical terminal
1600-2000-2500A
 - 2 Horizontal terminal
1600-2000-2500A
 - 3 Jumper 2C
 - 4 Phase separator

E4.2 3200-4000A

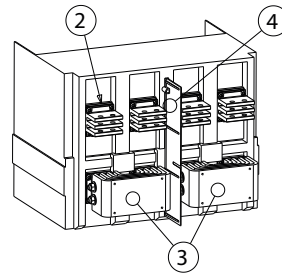
Configurations A & B



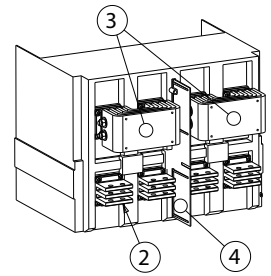
Upper supply VR



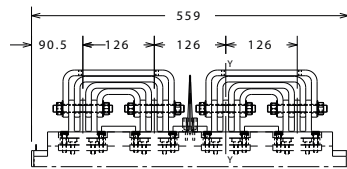
Lower supply VR



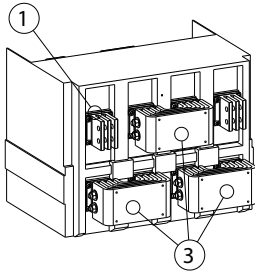
Upper supply HR



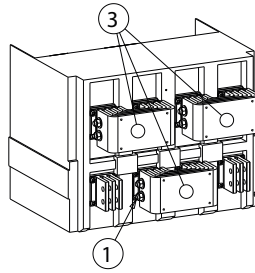
Lower supply HR



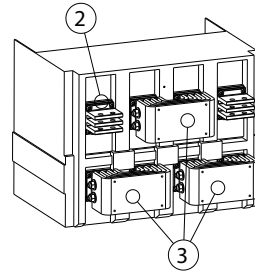
Configurations C & D



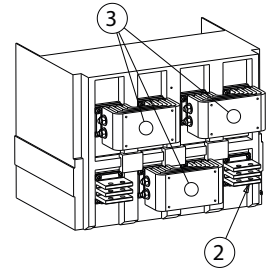
Upper supply VR



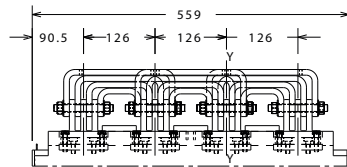
Lower supply VR



Upper supply HR

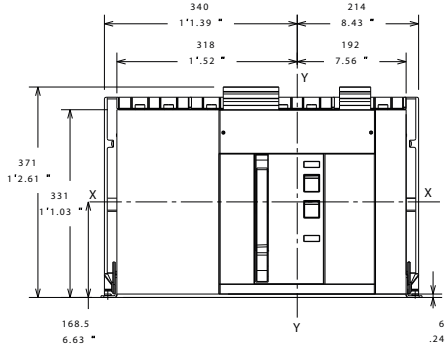


Lower supply HR

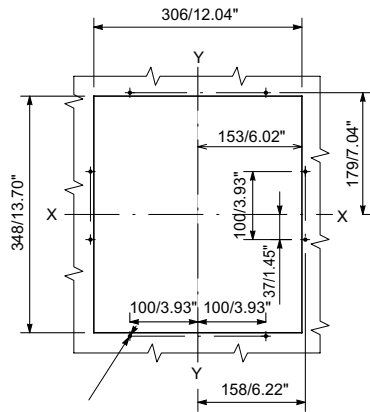


- Key
—
Key
- 1 Vertical terminal
3200-4000A
 - 2 Horizontal terminal
3200-4000A
 - 3 Jumper 4C
 - 4 Phase separator

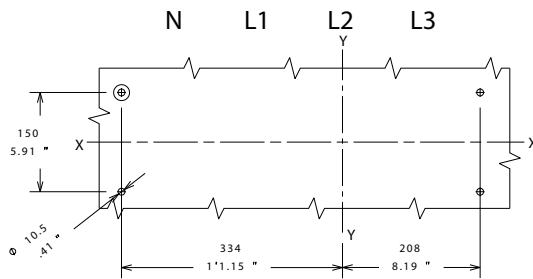
UL Fixed execution



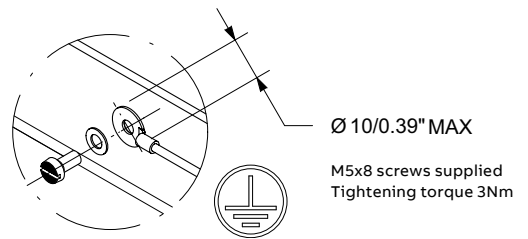
Compartment door drilling



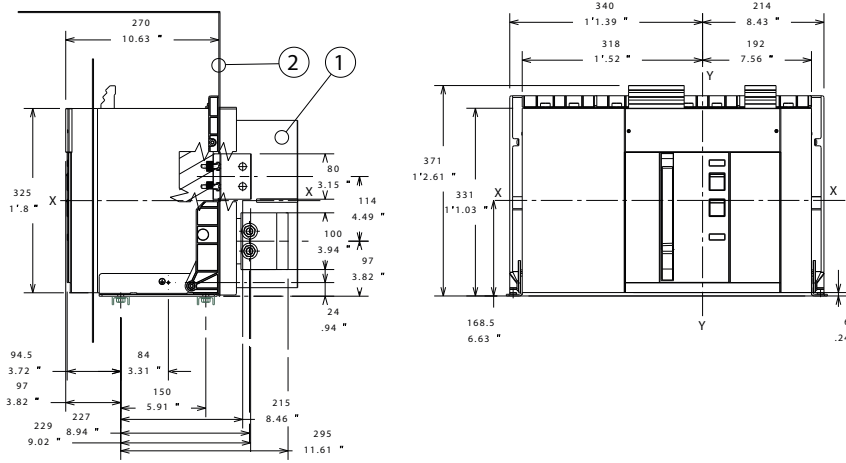
Floor fixing



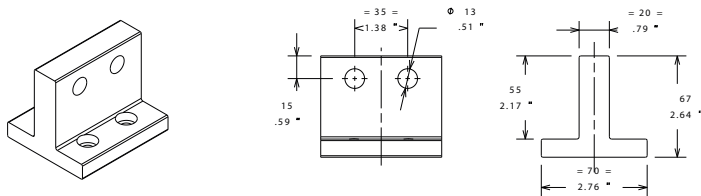
Earthing device



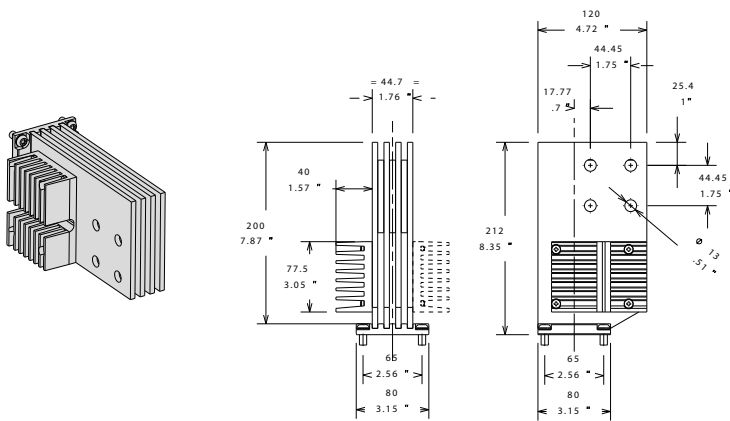
- Key
 1 Phase separator
 2 Insulation sheet



E4.2 1600-2000A Terminals



E4.2 2500-3200A Terminals

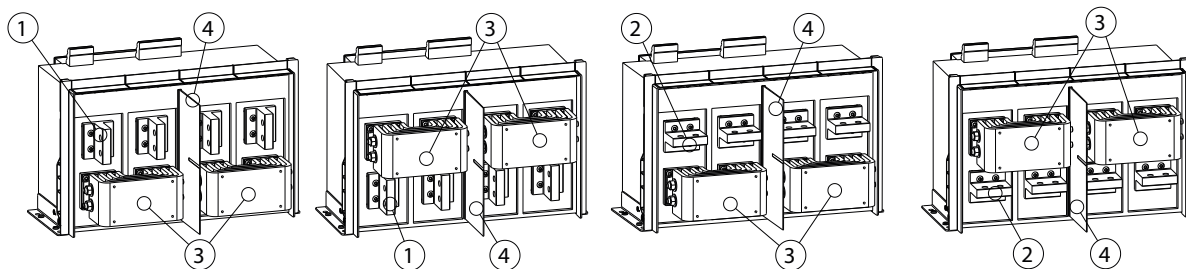


UL Fixed execution

Orientable rear terminals - HR/VR

E4.2 1600-2000A

Configurations A & B

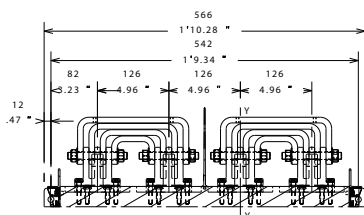


Upper supply VR

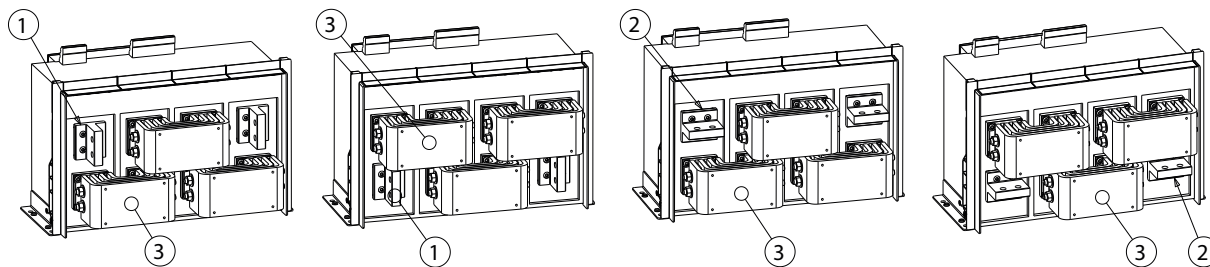
Lower supply VR

Upper supply HR

Lower supply HR



Configurations C & D

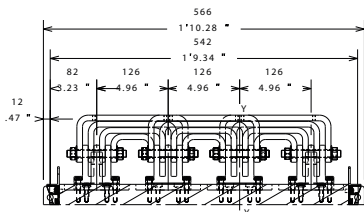


Upper supply VR

Lower supply VR

Upper supply HR

Lower supply HR

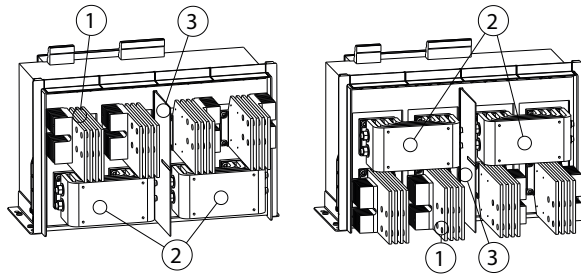


- Key
- 1 Vertical terminal 1600-2000A
 - 2 Horizontal terminal 1600-2000A
 - 3 Jumper 4C
 - 4 Phase separator

Vertical rear terminals - VR

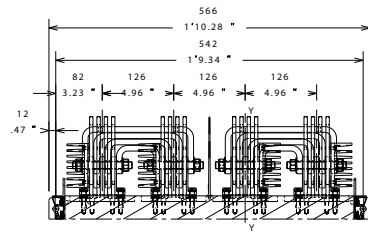
E4.2 2500-3200A

Configurations A & B

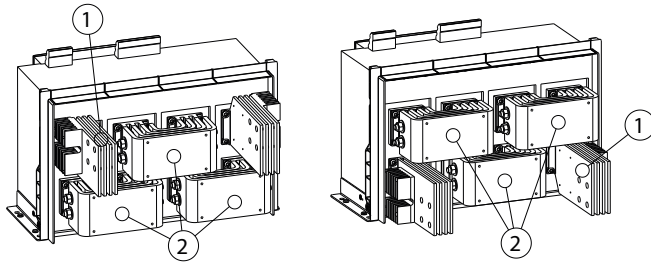


Upper supply

Lower supply

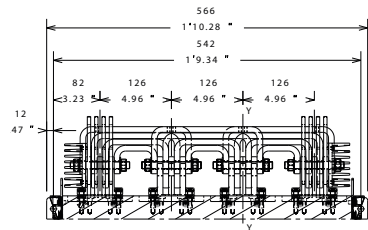


Configurations C & D



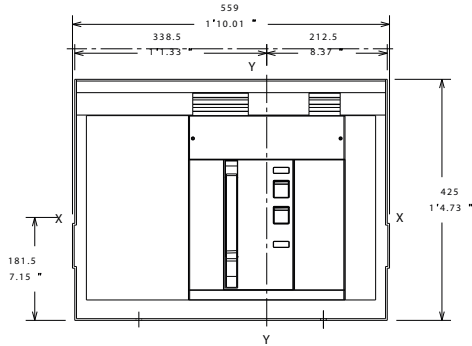
Upper supply

Lower supply

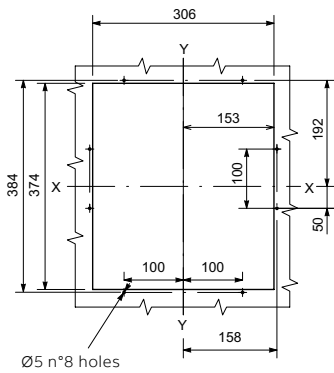


- Key
- 1 Vertical terminal 2500-3200A
 - 2 Jumper 4C
 - 3 Phase separator

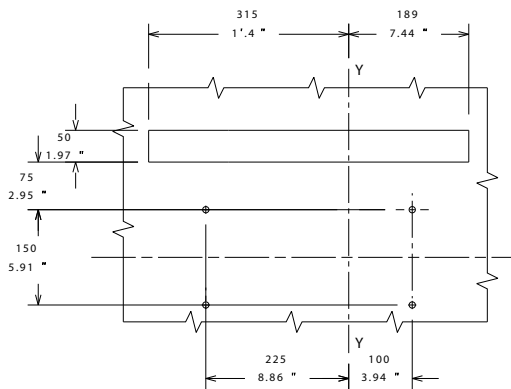
UL Withdrawable execution



Compartment door drilling

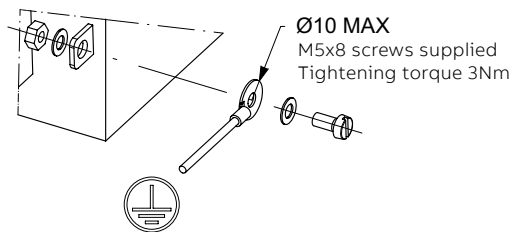


Floor fixing

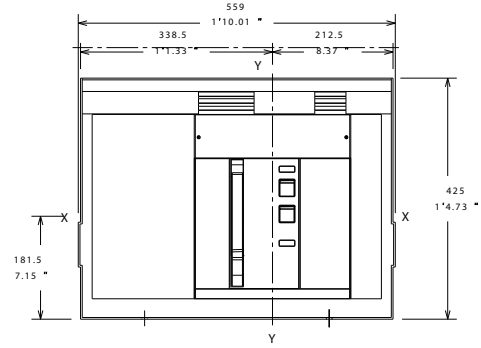
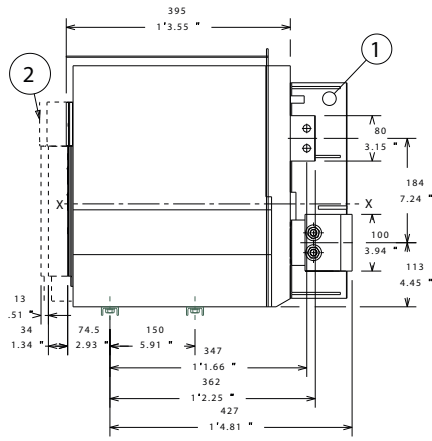


— Key
1 Ventilation drilling on the switchgear

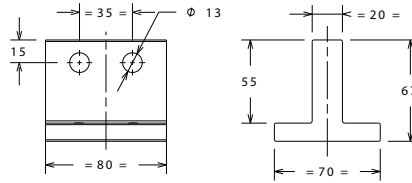
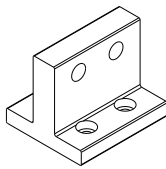
Earthing device



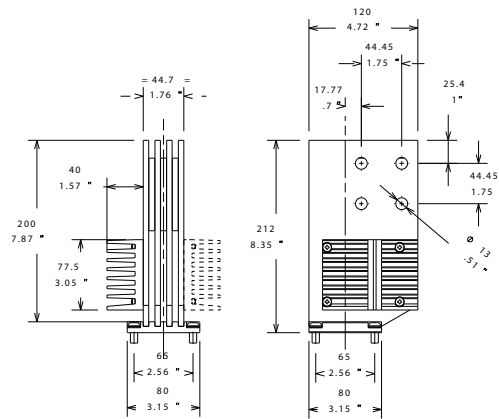
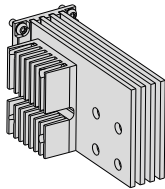
- Key
 1 Phase separator
 2 Connected, test, disconnected distances



E4.2 1600-2000A Terminals



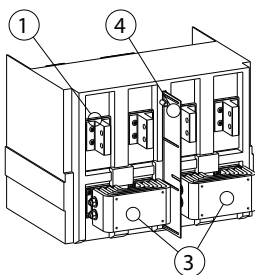
E4.2 2500-3200A Terminals



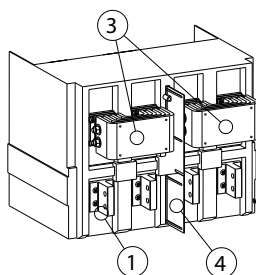
UL Withdrawable execution

Orientable rear terminals - HR/VR
E4.2 1600-2000A

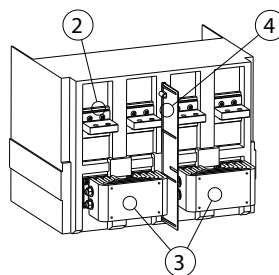
Configurations A & B



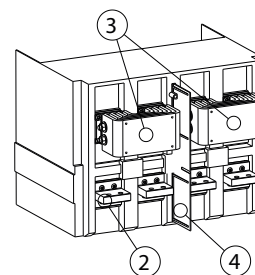
Upper supply VR



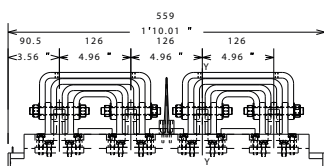
Lower supply VR



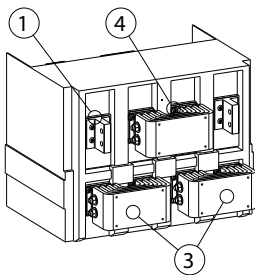
Upper supply HR



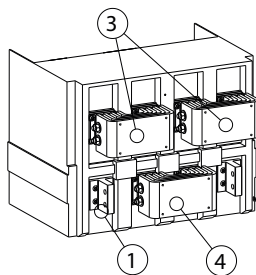
Lower supply HR



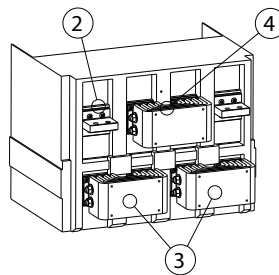
Configurations C & D



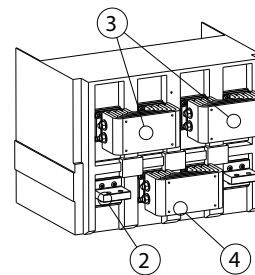
Upper supply VR



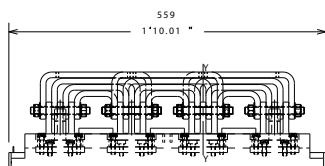
Lower supply VR



Upper supply HR



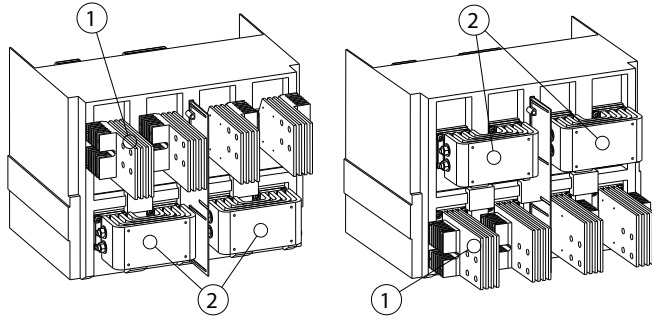
Lower supply HR



- Key
- 1 Vertical terminal 1600-2000A
 - 2 Horizontal terminal 1600-2000A
 - 3 Jumper 4C
 - 4 Phase separator

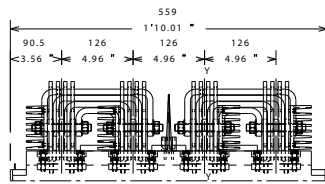
Vertical rear terminals - VR
E4.2 2500-3200A

Configurations A & B

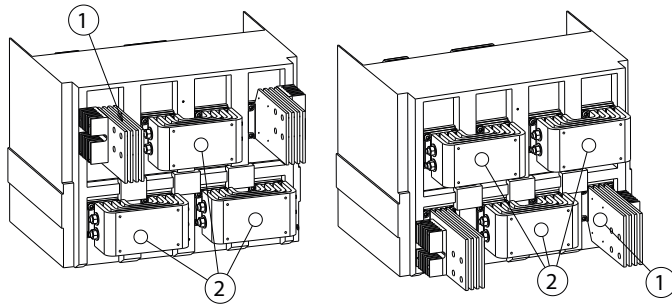


Upper supply

Lower supply

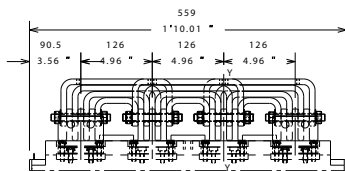


Configurations C & D



Upper supply

Lower supply



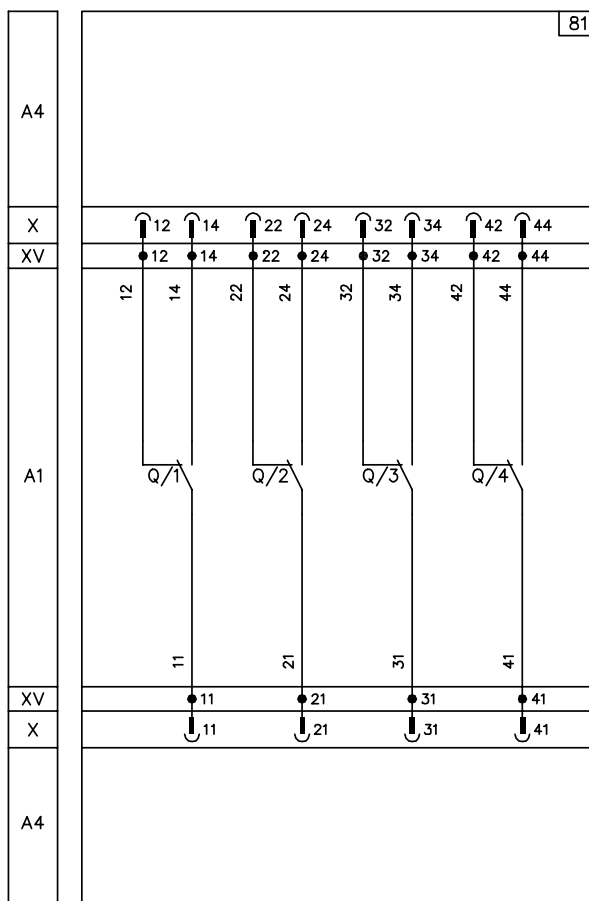
- Key
1 Vertical terminal
2500-3200A
2 Jumper 4C

Terminal box E4.2



11	21	31	41
12	22	32	42
14	24	34	44
Q1	Q2	Q3	Q4

81) Open/closed auxiliary contacts of circuit-breaker - AUX 4Q (4 Form C)



*B)

Electrical accessories

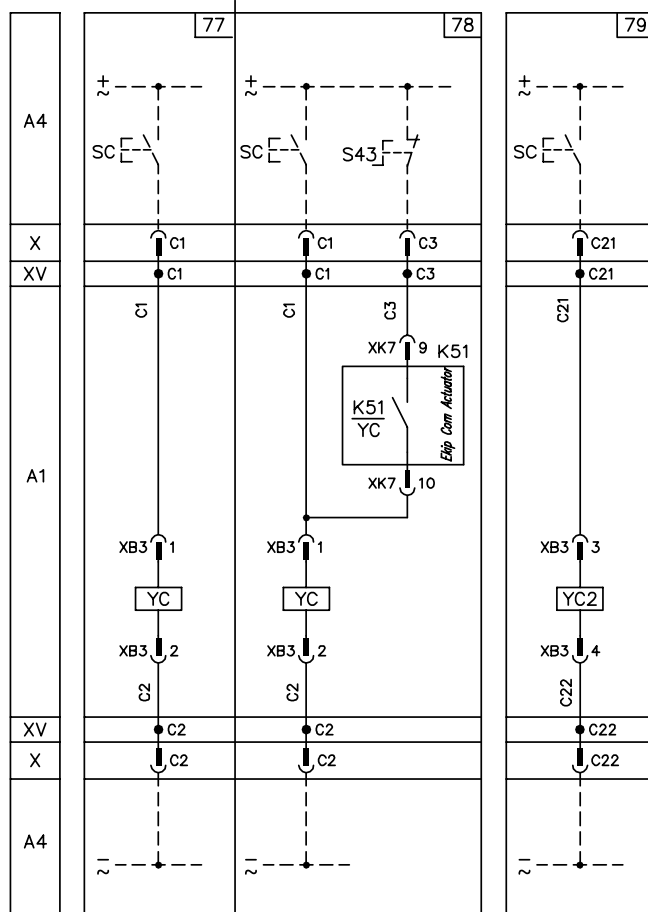
51	61	71	81	91	01	95	35	R1	V3	Vn	Ge+	Szi	Ne-	45	D1	C1	C11	C21	11	21	31	41					
52	62	72	82	92	02	96	36	U1	R2	V2	Rct	Ge-	Szo	Ne	46		C3	C13		12	22	32	42				
54	64	74	84	94	04	98	38	U2		V1	Gzo	Szc	Gzi	Rca	48	D2	C2	C12	C22	14	24	34	44				
Q5...Q10 Ekip Signalling 4K						S51	S33	M	YR	Trip Unit I/O				W3 K1		W4 K2		Module		Module		Module		Module			
										RTC		YU YO2		YC		YO		YC2		Q1		Q2		Q3		Q4	

45	D1	C1	C11	C21
46		C3	C13	
48	D2	C2	C12	C22
RTC	YU YO2	YC	YO	YC2

- 77) First closing coil - YC
- 78) First closing coil with control from protection trip unit - YC, Ekip Com Actuator
- 79) Second closing coil - YC2

77- 78 as an alternative to each other

79 valid only for E2.2 - E4.2 - E6.2



*M)

Electrical accessories

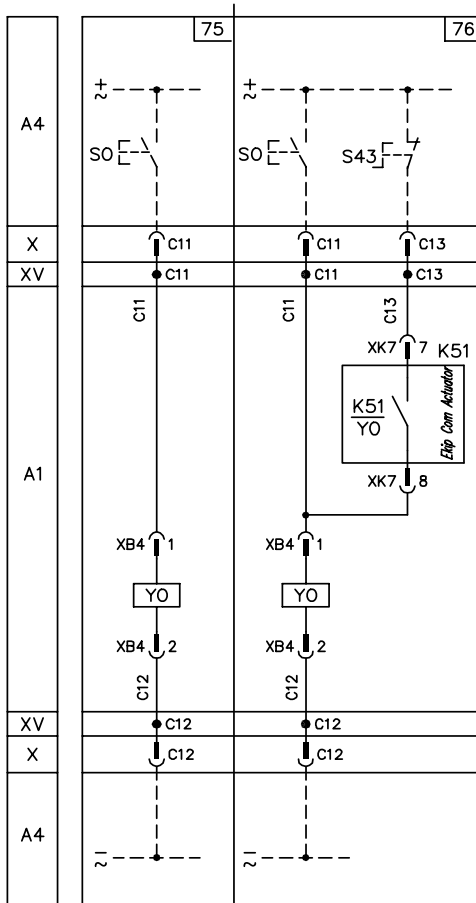
51	61	71	81	91	01	95	35	R1	V3	Vn	Ge+	Szi	Ne-	45	D1	C1	C11	C21	11	21	31	41			
52	62	72	82	92	02	96	36	U1	R2	V2	Rct	Ge-	Szo	Ne	46		C3	C13		12	22	32	42		
54	64	74	84	94	04	98	38	U2		V1	Gzo	Szc	Gzi	Rca	48	D2	C2	C12	C22	14	24	34	44		
Q5...Q10 EKIP Signalling 4K						S51	S33	M	YR	Trip Unit I/O				W3 K1		W4 K2		Module		Module		Module		RTC	
										YU		YC		YO		YC2		Q1		Q2		Q3		Q4	

45	D1	C1	C11	C21
46		C3	C13	
48	D2	C2	C12	C22
RTC	YU	YC	YO	YC2

75) First opening coil - YO

76) First opening coil with control from protection trip unit - YO, Ekip Com Actuator

75-76 as an alternative to each other

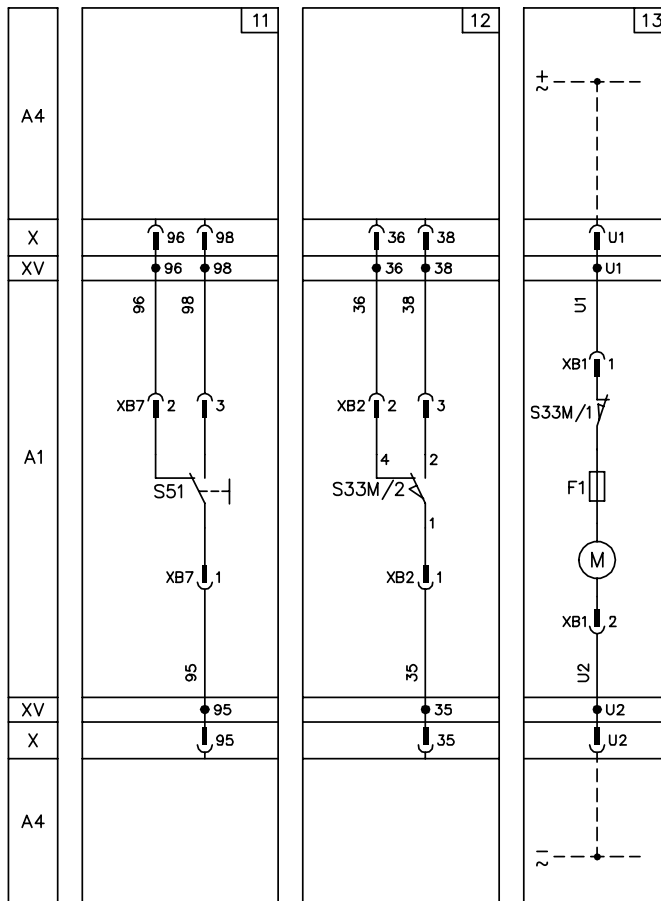


*M)

51	61	71	81	91	01	95	35	R1	V3	Vn	Ge+	Szi	Ne-	45	D1	C1	C11	C21	11	21	31	41					
52	62	72	82	92	02	96	36	U1	R2	V2	Rct	Ge-	Szo	Ne	46	C3	C13		12	22	32	42					
54	64	74	84	94	04	98	38	U2		V1	Gzo	Szc	Gzi	Rca	48	D2	C2	C12	C22	14	24	34	44				
Q5...Q10					EKIP Signalling 4K					S51	S33	M	YR	RTC					YU	YO2	YC	YO	YC2	Q1	Q2	Q3	Q4

95	35		R1
96	36	U1	R2
98	38	U2	
S51	S33	M	YR

- 11) Trip signalling contact - S51
- 12) Contact for signalling position of loaded springs - S33 M/2
- 13) Motor for loading closing springs - M



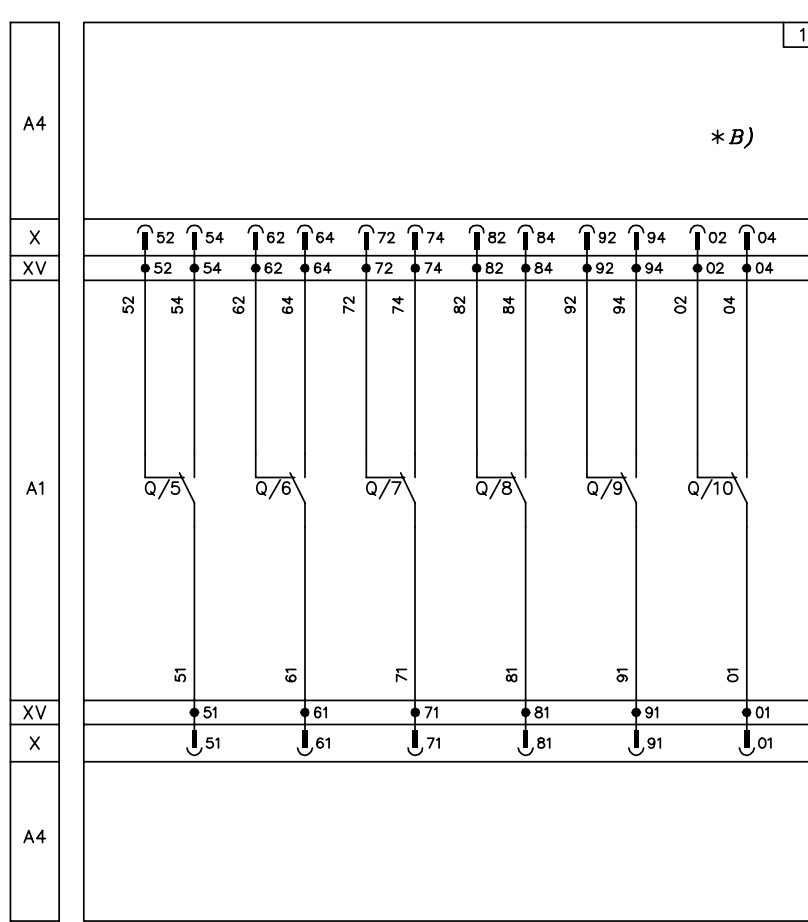
*D)

Electrical accessories

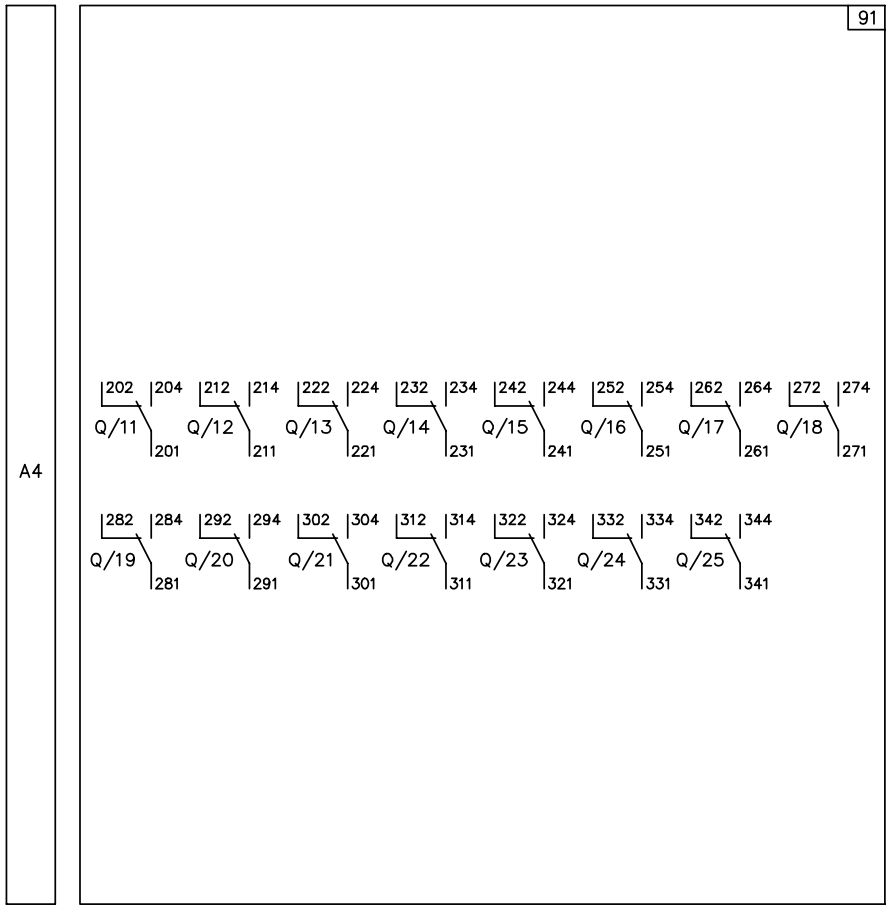
51	61	71	81	91	01	95	35	R1	V3	Vn	Ge+	Szi	Ne-						45	D1	C1	C11	C21	11	21	31	41	
52	62	72	82	92	02	96	36	U1	R2	V2	Rct	Ge-	Szo	Ne	W3	K1				46		C3	C13		12	22	32	42
54	64	74	84	94	04	98	38	U2		V1	Gzo	Szc	Gzi	Rca	W4	K2				48	D2	C2	C12	C22	14	24	34	44
Q5..Q10 EKIP Signalling 4K						S51	S33	M	YR	Trip Unit I/O				EKIP Supply		Module	Module	Module	RTC	YU	YO2	YC	YO	YC2	Q1	Q2	Q3	Q4

51	61	71	81	91	01
52	62	72	82	92	02
54	64	74	84	94	04
Q5..Q10 EKIP Signalling 4K					

1) Supplementary open/closed auxiliary contacts of the circuit-breaker - AUX 6Q (6 Form C)



91) Supplementary open/closed auxiliary contacts outside the circuit-breaker - AUX 15Q (15 Form C)



Ordering codes

5/2	General information
5/3	Network configurations
5/4	Instructions for ordering
5/4	Configuration steps
5/5	Ordering examples
5/6	IEC Switch-disconnectors
5/6	Fixed version
5/7	Withdrawable version
5/7	Fixed parts
5/8	Connections setup
5/9	Horizontal terminals
5/10	UL Switch-disconnectors
5/10	Fixed version
5/11	Withdrawable version
5/11	Fixed parts
5/12	Connections setup
5/13	Horizontal terminals
5/13	Global multi-standard version
5/14	Standard supply
5/15	Instructions for ordering
5/15	SACE Emax 2 configured circuit breaker / switch disconnector order code breakdown
5/18	SACE Emax 2 cradle (fixed part) order code breakdown
5/19	Accessories
5/19	Electrical accessories
5/22	Mechanical accessories
5/25	Mechanical interlock
5/26	Spare parts

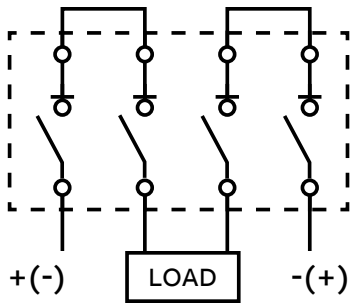
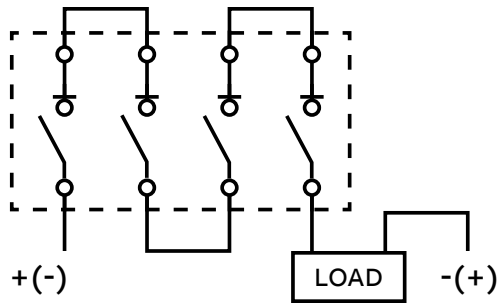
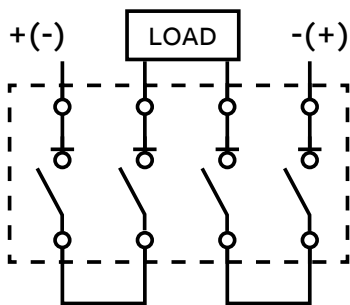
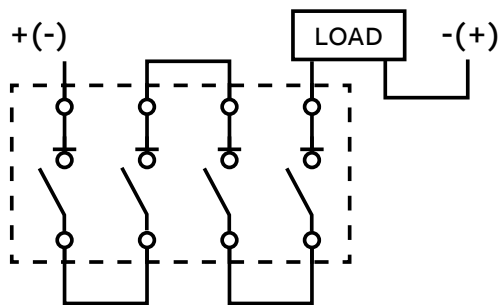
General information

Versions and terminals

F	Fixed circuit-breaker
W	Withdrawable circuit-breaker
MP	Mobile part of withdrawable circuit-breaker
FP	Fixed part of withdrawable circuit-breaker
HR	Horizontal rear terminals
VR	Vertical rear terminals
HR VR	Rear orientable terminals
MS	Switch-disconnector
MS/DC-E	Switch-disconnector for 1500V DC
I _u	Rated uninterrupted current
I _{cu}	Rated ultimate short-circuit breaking capacity
I _{cw}	Rated short-time withstand current

Network configurations

SACE Emax 2 MS/DC-E switch-disconnector can be installed in one of the following four configurations:

Configuration	Insulated network	Grounded polarity
Supply/load on lower side	Configuration A	Configuration C
		
Supply/load on upper side	Configuration B	Configuration D
		

Configuration A: insulated network (interrupting both polarities), supply/load connected to lower terminals.

Configuration B: insulated network (interrupting both polarities), supply/load connected to upper terminals.

Configuration C: grounded polarity (interrupting one polarity), supply/load connected to lower terminals.

Configuration D: grounded polarity (interrupting one polarity), supply/load connected to upper terminals.

Note: Supply terminals and load terminals are interchangeable.

Instructions for ordering

Configuration steps

SACE Emax 2 MS/DC-E switch-disconnector must be selected according to:

- Standard: IEC or UL;
- Execution: Fixed or Withdrawable;
- Rated current (Iu);
- Short-time withstand current (Icw);
- Type of network: grounded polarity or insulated network;
- Power supply and load connection: from upper or lower terminals
- Terminals orientation (HR/VR): vertical (standard) or horizontal*

* UL 2500/3200A ratings are available only with vertical rear terminals

To build the needed configuration, please follow those ordering steps:

Ordering steps	Ordering codes pages	
	IEC	UL
1. Select code for switch-disconnector One code for fixed execution, or two codes for drawables (mobile part + fixed part)	5/6	5/10
2. Select code for connections setup One code to define network configuration and supply/load side for terminals	5/8	5/12
3. Add extracode for horizontal terminals HR (optional)	5/9	5/13
4. Add codes for accessories (optional)	5/15	5/15

Note: IEC versions have also CCC approval.

For Global multi-standard version IEC+UL+CCC, please follow ordering steps for UL version and add extracode listed on page 5/13.

Instructions for ordering

Ordering examples

Example no. 1

Emax 2 DC switch, IEC, rated 2000A, I_{cw}=100kA, fixed, with vertical rear terminals (VR), for insulated network, connected by lower terminals

Code	Description	Comment
1SDA115417R1	E4.2V MS/DC-E 2000A 1500V 4p F VR	VR is the default setup for any Emax 2 DC switch
1SDA115478R1	KitJumpE4.2 1600-2500IEC -A- 2psLS INST	Terminals configuration A, for IEC up to 2500A

Example no. 2

Emax 2 DC switch, IEC, rated 3200A, I_{cw}=65kA, drawable, with horizontal rear terminals (HR), for grounded polarity, connected by upper terminals

Code	Description	Comment
1SDA115404R1	E4.2S MS/DC-E 3200A 1500V 4p W MP	Moving part
1SDA115427R1	E4.2 MS/DC-E 4000A 1500V 4p FP VR	Fixed part for IEC 3200-4000A
1SDA115475R1	KitJumpE4.2 3200-4000IEC -D- 4psUS INST	Terminals configuration D, for IEC 3200-4000A
1SDA115470R1	HR E4.2DC 3200-4000A IEC -CD- extra	Extracode for HR, configurat. C or D, IEC 3200-4000A

Example no. 3

UL Emax 2 DC switch, rated 2500A, I_{cw}=85kA, drawable, with vertical rear terminals (VR), for insulated network, connected by upper terminals

Code	Description	Comment
1SDA115445R1	E4.2H-A MS/DC-E 2500A 1500V 4p W MP	Moving part
1SDA115459R1	E4.2-A MS/DC-E 3200A 1500V 4p FP VR	Fixed part for UL 2500-3200A, VR only
1SDA115485R1	KitJumpE4.2 2500 UL -B- 2psUS INST	Terminals configuration B, for UL 2500A

Example no. 4

Same as example no. 1, but multi-standard IEC+UL+CCC

Code	Description	Comment
1SDA115449R1	E4.2V-A MS/DC-E 2000A 1500V 4p F VR	Multi-standard is based on UL versions
1SDA115490R1	KitJumpE4.2 1600-2000 UL -A- 2psLS INST	Terminals configuration A, for UL up to 2000A
1SDA115460R1	CERT. UL/IEC/CCC E4.2MS/DC-E 1600-2500A	Extracode for multi-standard, up to 2500A

IEC Switch-disconnectors



Fixed version

SACE Emax E4.2S-H-V MS/DC-E • Without terminals (*)

Size	Iu	Icw (1s)	Type	Global PN ⁽¹⁾	US / CA PN
E4.2S MS/DC-E	1600A	65	E4.2S MS/DC-E 1600 VR	1SDA115396R1	Configured part
	2000A		E4.2S MS/DC-E 2000 VR	1SDA115397R1	Configured part
	2500A		E4.2S MS/DC-E 2500 VR	1SDA115398R1	Configured part
	3200A		E4.2S MS/DC-E 3200 VR	1SDA115399R1	Configured part
	4000A		E4.2S MS/DC-E 4000 VR	1SDA115400R1	Configured part
E4.2H MS/DC-E	1600A	85	E4.2H MS/DC-E 1600 VR	1SDA115406R1	Configured part
	2000A		E4.2H MS/DC-E 2000 VR	1SDA115407R1	Configured part
	2500A		E4.2H MS/DC-E 2500 VR	1SDA115408R1	Configured part
	3200A		E4.2H MS/DC-E 3200 VR	1SDA115409R1	Configured part
	4000A		E4.2H MS/DC-E 4000 VR	1SDA115410R1	Configured part
E4.2V MS/DC-E	1600A	100	E4.2V MS/DC-E 1600 VR	1SDA115416R1	Configured part
	2000A		E4.2V MS/DC-E 2000 VR	1SDA115417R1	Configured part
	2500A		E4.2V MS/DC-E 2500 VR	1SDA115418R1	Configured part
	3200A		E4.2V MS/DC-E 3200 VR	1SDA115419R1	Configured part
	4000A		E4.2V MS/DC-E 4000 VR	1SDA115420R1	Configured part

* Add code for connections setup (page 5/8).

(1) Configured part

IEC Switch-disconnectors



Withdrawable version

SACE Emax E4.2S-H-V MS/DC-E • Mobile part of switch disconnector (MP)

Size	Iu	Icw (1s)	Type	Global PN	US / CA PN
E4.2S MS/DC-E	1600A	65	E4.2S MS/DC-E 1600	1SDA115401R1	PCSS00A000000000000XX
	2000A		E4.2S MS/DC-E 2000	1SDA115402R1	PCST00A000000000000XX
	2500A		E4.2S MS/DC-E 2500	1SDA115403R1	PCSU00A000000000000XX
	3200A		E4.2S MS/DC-E 3200	1SDA115404R1	PCSV00A000000000000XX
	4000A		E4.2S MS/DC-E 4000	1SDA115405R1	PCSW00A000000000000XX
E4.2H MS/DC-E	1600A	85	E4.2H MS/DC-E 1600	1SDA115411R1	PCHS00A000000000000XX
	2000A		E4.2H MS/DC-E 2000	1SDA115412R1	PCHT00A000000000000XX
	2500A		E4.2H MS/DC-E 2500	1SDA115413R1	PCHU00A000000000000XX
	3200A		E4.2H MS/DC-E 3200	1SDA115414R1	PCHV00A000000000000XX
	4000A		E4.2H MS/DC-E 4000	1SDA115415R1	PCHW00A000000000000XX
E4.2V MS/DC-E	1600A	100	E4.2V MS/DC-E 1600	1SDA115421R1	PCVS00A000000000000XX
	2000A		E4.2V MS/DC-E 2000	1SDA115422R1	PCVT00A000000000000XX
	2500A		E4.2V MS/DC-E 2500	1SDA115423R1	PCVU00A000000000000XX
	3200A		E4.2V MS/DC-E 3200	1SDA115424R1	PCVV00A000000000000XX
	4000A		E4.2V MS/DC-E 4000	1SDA115425R1	PCVW00A000000000000XX



Fixed parts

Without terminals (*)

Size	Performance	Iu range	Type	Global PN ⁽¹⁾	US / CA PN
E4.2	S, H, V	1600-2500A	E4.2 MS/DC-E WFP Iu=2500 VR	1SDA115426R1	Configured part
E4.2	S, H, V	3200-4000A	E4.2 MS/DC-E WFP Iu=4000 VR	1SDA115427R1	Configured part

* Add code for connections setup (page 5/8).
 (1) Configured part

IEC Switch-disconnectors

Connections setup

Kit for terminals and jumper busbars - installed on fixed breaker (F) or fixed part of withdrawable breaker (FP)

Network configuration			1600-2000-2500 A		3200-4000 A			
ID	Description	Scheme	Figure	Global PN ⁽²⁾	US / CA PN	Figure	Global PN ⁽²⁾	US / CA PN
A	insulated network, lower terminals	<p>Configuration A</p>		1SDA115478R1	Factory Installed code only		1SDA115474R1	Factory Installed code only
B	insulated network, upper terminals	<p>Configuration B</p>		1SDA115477R1	Factory Installed code only		1SDA115473R1	Factory Installed code only
C	grounded polarity, lower terminals.	<p>Configuration C</p>		1SDA115480R1	Factory Installed code only		1SDA115476R1	Factory Installed code only
D	grounded polarity, upper terminals.	<p>Configuration D</p>		1SDA115479R1	Factory Installed code only		1SDA115475R1	Factory Installed code only

Note: for network configurations A and B, separator plate is provided.

(2) Factory Installed code only

IEC Switch-disconnectors

Horizontal terminals

IEC breakers are provided with adjustable rear terminals, mounted in vertical configuration (VR). It is possible to order breakers with rear terminals as factory mounted in horizontal configuration (HR), adding one of the following extracodes:

Extracode for horizontal rear terminals (HR)

Size	Iu range	Network Configuration	Global PN	US / CA PN	
E4.2	1600-2500A	A	1SDA115467R1		
		B			
		C	1SDA115468R1		
		D			
	3200-4000A	A	1SDA115469R1 ⁽²⁾		Factory Installed code only
		B			
		C	1SDA115470R1 ⁽²⁾		Factory Installed code only
		D			

(2) Factory Installed code only

UL Switch-disconnectors



Fixed version

SACE Emax E4.2S-A, H-A, V-A MS/DC-E • Without terminals (*)

Size	Iu	Icw (1s)	Type	Global PN ⁽¹⁾	US / CA PN
E4.2S-A MS/DC-E	1600A	65	E4.2S-A MS/DC-E 1600 VR	1SDA115428R1	Configured part
	2000A		E4.2S-A MS/DC-E 2000 VR	1SDA115429R1	Configured part
	2500A		E4.2S-A MS/DC-E 2500 VR	1SDA115430R1	Configured part
	3200A		E4.2S-A MS/DC-E 3200 VR	1SDA115431R1	Configured part
E4.2H-A MS/DC-E	1600A	85	E4.2H-A MS/DC-E 1600 VR	1SDA115438R1	Configured part
	2000A		E4.2H-A MS/DC-E 2000 VR	1SDA115439R1	Configured part
	2500A		E4.2H-A MS/DC-E 2500 VR	1SDA115440R1	Configured part
	3200A		E4.2H-A MS/DC-E 3200 VR	1SDA115441R1	Configured part
E4.2V-A MS/DC-E	1600A	100	E4.2V-A MS/DC-E 1600 VR	1SDA115448R1	Configured part
	2000A		E4.2V-A MS/DC-E 2000 VR	1SDA115449R1	Configured part
	2500A		E4.2V-A MS/DC-E 2500 VR	1SDA115450R1	Configured part
	3200A		E4.2V-A MS/DC-E 3200 VR	1SDA115451R1	Configured part

* Add code for connections setup (page 5/12).

(1) Configured part

UL Switch-disconnectors



Withdrawable version

SACE Emax E4.2S-A, H-A, V-A MS/DC-E • Mobile part of switch disconnector (MP)

Size	Iu	Icw (1s)	Type	Global PN	US / CA PN
E4.2S-A MS/DC-E	1600A	65	E4.2S-A MS/DC-E 1600	1SDA115433R1	PCSE00A000000000000XX
	2000A		E4.2S-A MS/DC-E 2000	1SDA115434R1	PCSF00A000000000000XX
	2500A		E4.2S-A MS/DC-E 2500	1SDA115435R1	PCSG00A000000000000XX
	3200A		E4.2S-A MS/DC-E 3200	1SDA115436R1	PCSH00A000000000000XX
E4.2H-A MS/DC-E	1600A	85	E4.2H-A MS/DC-E 1600	1SDA115443R1	PCHE00A000000000000XX
	2000A		E4.2H-A MS/DC-E 2000	1SDA115444R1	PCHF00A000000000000XX
	2500A		E4.2H-A MS/DC-E 2500	1SDA115445R1	PCHG00A000000000000XX
	3200A		E4.2H-A MS/DC-E 3200	1SDA115446R1	PCHH00A000000000000XX
E4.2V-A MS/DC-E	1600A	100	E4.2V-A MS/DC-E 1600	1SDA115453R1	PCVE00A000000000000XX
	2000A		E4.2V-A MS/DC-E 2000	1SDA115454R1	PCVF00A000000000000XX
	2500A		E4.2V-A MS/DC-E 2500	1SDA115455R1	PCVG00A000000000000XX
	3200A		E4.2V-A MS/DC-E 3200	1SDA115456R1	PCVH00A000000000000XX



Fixed parts

Without terminals (*)

Size	Performance	Iu range	Type	Global PN ⁽¹⁾	US / CA PN
E4.2	S-A, H-A, V-A	1600-2000A	E4.2-A MS/DC-E W FP Iu=2000 VR	1SDA115458R1	Configured part
E4.2	S-A, H-A, V-A	2500-3200A	E4.2-A MS/DC-E W FP Iu=3200 VR	1SDA115459R1	Configured part

* Add code for connections setup (page 5/12).

(1) Configured part

UL Switch-disconnectors

Connections setup

Kit for terminals and jumper busbars - installed on fixed breaker (F) or fixed part of withdrawable breaker (FP)

Network configuration			1600-2000A		2500A		3200A			
ID	Description	Scheme	Figure	Global PN ⁽²⁾	US / CA PN	Figure	Global PN ⁽²⁾	US / CA PN	Global PN ⁽²⁾	US / CA PN
A	insulated network, lower terminals	<p>Configuration A</p>		1SDA115490R1	Factory Installed code only		1SDA115486R1	Factory Installed code only	1SDA115482R1	Factory Installed code only
B	insulated network, upper terminals	<p>Configuration B</p>		1SDA115489R1	Factory Installed code only		1SDA115485R1	Factory Installed code only	1SDA115481R1	Factory Installed code only
C	grounded polarity, lower terminals.	<p>Configuration C</p>		1SDA115492R1	Factory Installed code only		1SDA115488R1	Factory Installed code only	1SDA115484R1	Factory Installed code only
D	grounded polarity, upper terminals.	<p>Configuration D</p>		1SDA115491R1	Factory Installed code only		1SDA115487R1	Factory Installed code only	1SDA115483R1	Factory Installed code only

Note: for network configurations A and B, separator plate is provided.
 (2) Factory Installed code only

UL Switch-disconnectors

Horizontal terminals

UL Breakers are provided with rear terminals mounted in vertical configuration (VR).

For UL ratings 2500A and 3200A, VR is the only available configuration and cannot be modify into horizontal (HR).

For UL ratings 1600A and 2000A, it is possible to order breaker with rear terminals factory mounted in horizontal configuration (HR), adding one of the following extracodes:

Extracode for horizontal rear terminals (HR)

Size	Iu range	Network Configuration	Global PN ⁽²⁾	US / CA PN
E4.2	1600-2000A	A	1SDA115467R1	Factory Installed code only
		B		
		C	1SDA115468R1	Factory Installed code only
		D		

(2) Factory Installed code only

Global multi-standard version IEC, UL and CCC

For Global multi-standard version IEC 60947-3, UL489, and CCC, follow ordering steps for UL versions and add following extracode:

Size	Iu range	Description	Global PN ⁽²⁾	US / CA PN
E4.2	1600-2500A	CERT. UL/IEC/CCC E4.2MS/DC-E 1600-2500A	1SDA115460R1	Factory Installed code only
	3200A	CERT. UL/IEC/CCC E4.2MS/DC-E 3200A	1SDA117162R1	Factory Installed code only

(2) Factory Installed code only

Standard supply

The fixed versions of SACE Emax 2 DC switch-disconnectors are always supplied as standard with the following accessories:

- IP30 protection for switchgear door
- lifting plates
- adjustable rear terminals*, mounted in VR configuration
- separator plate for network configurations A and B.

The withdrawable versions of switch-disconnectors are always supplied as standard with the following accessories:

- closed circuit-breaker racked-out mechanism lock
- lifting plates
- lever for racking in and racking out
- anti-insertion lock.

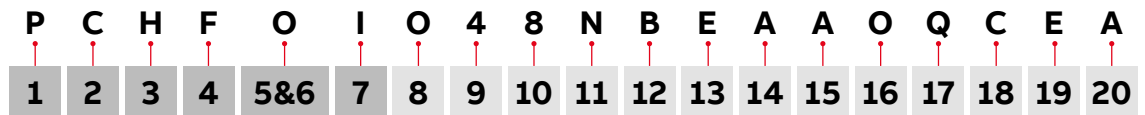
The fixed part of with drawable versions features:

- IP30 protection for switchgear door
- anti-insertion lock
- standard shutter lock – SL
- adjustable rear terminals*, mounted in VR configuration
- separator plate for network configurations A and B.

* UL 2500/3200A ratings are available only with non-adjustable vertical rear terminals

Instructions for ordering

SACE Emax 2 configured circuit breaker / switch disconnecter order code breakdown



1 - Emax 2 Prefix

P	DC (1500VDC)
---	--------------

3 - Short-time withstand (1s)/ Version

	S	V	H
UL kA @ 1500VDC	65	85	100
IEC kA @ 1500VDC	65	85	100

5 & 6 - Rating Plug [A]

Switch	00
--------	----

2 - Frame

E4.2

4p	C
----	---

4 - Frame Rating [A]

	E	F	G	H	
UL	1600	2000	2500	3200	
	S	T	U	V	W
IEC	1600	2000	2500	3200	4000

7 - Fixed/Drawout and Terminal connections

	DC Insulated Network (2+2ps) Upper	DC Insulated Network (2+2ps) Lower	DC Grounded Polarity (4ps) Upper	DC Grounded Polarity (4ps) Lower
Drawout (less cradle)	A			
Fixed (std. terminals)	I	Z	9	1

8 - Ekip Trip Unit

Switch Disconnecter	0
---------------------	---

9 - Auxiliary Power Supply (Ekip Supply) and Measuring

None	0
------	---

10 - Communication Modules

None	0
------	---

11 - Redundant Communications and Additional Ekip Modules

None	0
------	---

12 - Auxiliary Contacts (AUX) and Additional Signaling (4K)

None	0			
	-	4 AUX (4Q) 400V	4 AUX (4Q) 24V	4 AUX (2Q+2Q) 24 & 400V
	-	A	B	C
6 AUX (6Q) 400V ⁽¹⁾	D	E	F	G
6 AUX (6Q) 24V ⁽¹⁾	H	J	K	L
6 AUX (3Q+3Q) 400 & 24V ⁽¹⁾	M	N	P	Q

13 - Remote Reset (YR), 2nd Bell Alarm (S51/2), Ready to Close Contacts (RTC), and Disabling Bluetooth + Sealable Cover

None	0
RTC 24VDC	D
RTC 250V AC/DC	H

05

Instructions for ordering

SACE Emax 2 configured circuit breaker / switch disconnect order code breakdown

14 - Closing Coil (YC) and Redundant Closing Coil (YC2)

None	0											
	24V AC/DC	30V AC/DC	48V AC/DC	60V AC/DC	110-120V AC/DC	120-127V AC/DC	220-240V AC/DC	240-250V AC/DC	380-400V AC	415-440V AC	480-500V AC	
YC	A	B	C	D	E	F	G	H	K	L	M	
YC + YC2	N	P	Q	R	S	T	U	V	X	Y	Z	

Note: YC2 will have the same control voltage as YC1

15 - Opening Coil (YO)

None	0											
	24V AC/DC	30V AC/DC	48V AC/DC	60V AC/DC	110-120V AC/DC	120-127V AC/DC	220-240V AC/DC	240-250V AC/DC	380-400V AC	415-440V AC	480-500V AC	
YO	A	B	C	D	E	F	G	H	K	L	M	

16 - Undervoltage Release (UVR) or Redundant Opening Coil (YO2)

None	0											
	24V AC/DC	30V AC/DC	48V AC/DC	60V AC/DC	110-120V AC/DC	120-127V AC/DC	220-240V AC/DC	240-250V AC/DC	380-400V AC	415-440V AC	480-500V AC	
UVR	A	B	C	D	E	F	G	H	K	L	M	
YO2 Only	N	P	Q	R	S	T	U	V	X	Y	Z	

17 - Spring Charging Motor (M) and Ekip Com Actuator

None	0						
		24-30V AC/DC	48-60V AC/DC	100-130V AC/DC	220-250V AC/DC	380-415V AC	440-480V AC ⁽¹⁾
M with standard aux. for status indication of springs		2	3	4	5	7	8
M with 24VDC aux. contacts for status indication of springs		A	B	C	D	F	G

18 - Push Button Locking Options

None	0							
		Push Button Covers (PBC)				Padlock in Open Position (PLC)		
		PBC Special Key	PBC Padlock (4mm)	PBC Padlock (7mm)	PBC Padlock (8mm)	PLC - 4mm	PLC - 7mm	PLC - 8mm
		2	3	4	5	6	7	8
Key Lock in Open Position - Different Keys (KLC-D)	A	D	E	F	G	H	J	K
Key Lock in Open Position - Same Keys (KLC-S) ⁽¹⁾	B	L	M	N	P	Q	R	S
Key Lock in Open Position - Kirk Key provisions (KLC-A)	C	T	I	V	W	X	Y	Z

(1) Standard key for Same Key option is #20005. Locks for #20006 - 20009 are available for order as loose accessories.

Note: Key lock options for Castell and Ronis/Profalux are available for order as loose accessories.

19 - Racking Lock Options (1st lock) and Factory Test Report

None	X	Keylock in racked in/ out - Same Keys (KLP-S) ⁽¹⁾	Keylock in racked in/ out - Different Keys (KLP-D) ⁽¹⁾	Keylock in racked in/out - Kirk/Ronis/Profulaux provisions (KLP-A) ⁽¹⁾	Keylock in racked in/ out - Castell provisions (KLP-A) ⁽²⁾
	-	A	B	C	D
Padlock in racked in/out position (PLP)	E	F	G	H	J

(1) Standard key for Same Key option is #20005. Locks for #20006 - 20009 are available for order as loose accessories.

(2) Two Castell adapter cannot be used at once, but can be used in either position with another style of lock.

Note: Racking locks are for E2.2 - E6.2. For E1.2 they are configured within the cradle.

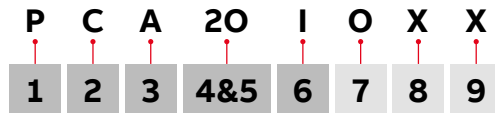
20 - 2nd Racking Lock Options, Mechanical Operations Counter (MOC) and Extended Warranty'+A+A108:AG127

None	X	Keylock in racked in/ out - Same Keys (KLP-S) ⁽¹⁾	Keylock in racked in/ out - Different Keys (KLP-D) ⁽¹⁾	Keylock in racked in/ out - Kirk/Ronis/ Profulaux provisions (KLP-A) ⁽¹⁾	Keylock in racked in/ out - Castell provisions (KLP-A) ⁽²⁾
		B	C	D	E
Mechanical Operations Counter (MOC)	A	F	G	H	J
2 Year Extended Warranty	2	N	R	U	Y
4 Year Extended Warranty	4	P	S	V	Z
5 Year Extended Warranty	5	Q	T	W	6
Additional Combinations					
MOC + 2 Year Extended Warranty	K	7	-	-	-
MOC + 4 Year Extended Warranty	L	8	-	-	-
MOC + 5 Year Extended Warranty	M	9	-	-	-

Note: for additional combinations please contact your local ABB sales person

Instructions for ordering

SACE Emax 2 cradle (fixed part) order code breakdown



1 - Emax 2 Prefix

P	1500VDC
---	---------

3 - Standard

UL	A
IEC	C

6 - Terminal Connections

DC Insulated Network (2+2ps) Upper	I
DC Insulated Network (2+2ps) Lower	Z
DC Grounded Polarity (4ps) Upper	9
DC Grounded Polarity (4ps) Lower	1

7 - Auxiliary Cradle Position Contacts (AUP)

None	0				
	6 AUP (400VAC)	6 AUP (24VDC)	5 AUP (400VAC)	5 AUP (24VDC)	-
E2.2 - E6.2 Left position	-	-	C	D	-
E2.2 - E6.2 Right position	-	-	E	F	-
E2.2 - E6.2 Left & Right positions	-	-	G	H	J ⁽¹⁾

(1) Includes one 400V set (left) and one 24VDC set (right)

8 - Racking Lock Options (1st lock)

None	X				
	Keylock in racked in/out - Same Keys (KLP-S) ⁽¹⁾	Keylock in racked in/out - Different Keys (KLP-D) ⁽¹⁾	Keylock in racked in/out - Kirk/Ronis/Profulaux provisions (KLP-A) ⁽¹⁾	Keylock in racked in/out - Castell provisions (KLP-A) ⁽²⁾	
	A	B	C	D	
Padlock in racked in/out position (PLP)	E	F	G	H	J
Racked out Position Lock (Supplementary)	K (3)	L	M	N	P
PLP + Racked out Position Lock	Q	R	S	T	U

(1) Standard key for Same Key option is #20005. Locks for #20006 - 20009 are available for order as loose accessories.

(2) Two Castell adapter cannot be used at once, but can be used in either position with another style of lock

(3) Available for E2.2-E6.2 and only if a racking lock option has been selected on the circuit breaker side

Note: Racking locks are for E1.2. For E2.2 - E6.2 they are configured within the circuit breaker

9 - 2nd Racking Lock Options

None	X				
	Keylock in racked in/out - Same Keys (KLP-S) ⁽¹⁾	Keylock in racked in/out - Different Keys (KLP-D) ⁽¹⁾	Keylock in racked in/out - Kirk/Ronis/Profulaux provisions (KLP-A) ⁽¹⁾	Keylock in racked in/out - Castell provisions (KLP-A) ⁽²⁾	
	B	C	D	E	

(1) Standard key for Same Key option is #20005. Locks for #20006 - 20009 are available for order as loose accessories.

(2) Two Castell adapter cannot be used at once, but can be used in either position with another style of lock

Note: Racking locks are for E1.2. For E2.2 - E6.2 they are configured within the circuit breaker

2 - Frame

E4.2

4p	C
----	---

4 & 5 - Amp Ratings by Frame

UL	1600 - 2000A	2500A	3200A
	20	25	32
IEC	1600-2500A	3200-4000A	
	25	40	

Accessories

Electrical accessories



First and second shunt coil - YO

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YO E1.2..E6.2 24 Vac/dc	1SDA073668R1	ZEASA
E1.2..E6.2	YO E1.2..E6.2 30 Vac/dc	1SDA073669R1	ZEASB
E1.2..E6.2	YO E1.2..E6.2 48 Vac/dc	1SDA073670R1	ZEASC
E1.2..E6.2	YO E1.2..E6.2 60 Vac/dc	1SDA073671R1	ZEASD
E1.2..E6.2	YO E1.2..E6.2 110-120 Vac/dc	1SDA073672R1	ZEASE
E1.2..E6.2	YO E1.2..E6.2 120-127 Vac/dc	1SDA073673R1	ZEASF
E1.2..E6.2	YO E1.2..E6.2 220-240 Vac/dc	1SDA073674R1	ZEASG
E1.2..E6.2	YO E1.2..E6.2 240-250 Vac/dc	1SDA073675R1	ZEASH
E1.2..E6.2	YO E1.2..E6.2 380-400 Vac	1SDA073677R1	ZEASK
E1.2..E6.2	YO E1.2..E6.2 415-440 Vac	1SDA073678R1	ZEASL
E1.2..E6.2	YO E1.2..E6.2 480-500 Vac	1SDA073679R1	ZEASM

Second shunt coils are an alternative to a UVR or anti-racking out device (fail safe)

First and second closing coil - YC

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YC E1.2..E6.2 24 Vac/dc	1SDA073681R1	ZEACA
E1.2..E6.2	YC E1.2..E6.2 30 Vac/dc	1SDA073682R1	ZEACB
E1.2..E6.2	YC E1.2..E6.2 48 Vac/dc	1SDA073683R1	ZEACC
E1.2..E6.2	YC E1.2..E6.2 60 Vac/dc	1SDA073684R1	ZEACD
E1.2..E6.2	YC E1.2..E6.2 110-120 Vac/dc	1SDA073685R1	ZEACE
E1.2..E6.2	YC E1.2..E6.2 120-127 Vac/dc	1SDA073686R1	ZEACF
E1.2..E6.2	YC E1.2..E6.2 220-240 Vac/dc	1SDA073687R1	ZEACG
E1.2..E6.2	YC E1.2..E6.2 240-250 Vac/dc	1SDA073688R1	ZEACH
E1.2..E6.2	YC E1.2..E6.2 380-400 Vac	1SDA073690R1	ZEACK
E1.2..E6.2	YC E1.2..E6.2 415-440 Vac	1SDA073691R1	ZEACL
E1.2..E6.2	YC E1.2..E6.2 480-500 Vac	1SDA073692R1	ZEACM

Shunt coil and closing coil test unit - YO/YC Test Unit (IEC only)

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YO/YC test unit E1.2...E6.2	1SDA082751R1	ZEAYOYCT

Accessories

Electrical accessories

Undervoltage coil - YU

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YU E1.2..E6.2 24 Vac/dc	1SDA073694R1	ZEAUA
E1.2..E6.2	YU E1.2..E6.2 30 Vac/dc	1SDA073695R1	ZEAUB
E1.2..E6.2	YU E1.2..E6.2 48 Vac/dc	1SDA073696R1	ZEAUC
E1.2..E6.2	YU E1.2..E6.2 60 Vac/dc	1SDA073697R1	ZEAUD
E1.2..E6.2	YU E1.2..E6.2 110-120 Vac/dc	1SDA073698R1	ZEAUE
E1.2..E6.2	YU E1.2..E6.2 120-127 Vac/dc	1SDA073699R1	ZEAUF
E1.2..E6.2	YU E1.2..E6.2 220-240 Vac/dc	1SDA073700R1	ZEAUG
E1.2..E6.2	YU E1.2..E6.2 240-250 Vac/dc	1SDA073701R1	ZEAUH
E1.2..E6.2	YU E1.2..E6.2 380-400 Vac	1SDA073703R1	ZEAUK
E1.2..E6.2	YU E1.2..E6.2 415-440 Vac	1SDA073704R1	ZEAUL
E1.2..E6.2	YU E1.2..E6.2 440-500 Vac	1SDA073705R1	ZEAUM

The undervoltage coil is an alternative to a second shunt coil or anti-racking out device (fail safe)

Electronic time-delay device for undervoltage coil - UVD

Size	Type	Global PN	US / CA PN
E1.2..E6.2	24-30 Vdc	1SDA038316R1	ZEATL9
E1.2..E6.2	48 Vac/dc	1SDA038317R1	ZEATL8
E1.2..E6.2	60 Vac/dc	1SDA038318R1	ZEATL7
E1.2..E6.2	110...127 Vac/dc	1SDA038319R1	ZEATL5
E1.2..E6.2	220...250 Vac/dc	1SDA038320R1	ZEATL3

The electronic time-delay device must be used with an undervoltage coil with the same voltage

Motor - M

Size	Type	Global PN	US / CA PN
E2.2..E6.2	M E2.2...E6.2 24-30 Vac/dc + MC 400V	1SDA073722R1	ZEBM2
E2.2..E6.2	M E2.2...E6.2 48-60 Vac/dc + MC 400V	1SDA073723R1	ZEBM3
E2.2..E6.2	M E2.2...E6.2 100-130 Vac/dc + MC 400V	1SDA073724R1	ZEBM4
E2.2..E6.2	M E2.2...E6.2 220-250 Vac/dc + MC 400V	1SDA073725R1	ZEBM5
E2.2..E6.2	M E2.2...E6.2 380-415 Vac + MC 400V	1SDA073727R1	ZEBM7
E2.2..E6.2	M E2.2...E6.2 24-30 Vac/dc + MC 24V	1SDA073729R1	ZEBMA
E2.2..E6.2	M E2.2...E6.2 48-60 Vac/dc + MC 24V	1SDA073730R1	ZEBMB
E2.2..E6.2	M E2.2...E6.2 100-130 Vac/dc + MC 24V	1SDA073731R1	ZEBMC
E2.2..E6.2	M E2.2...E6.2 220-250 Vac/dc + MC 24V	1SDA073732R1	ZEBMD
E2.2..E6.2	M E2.2...E6.2 380-415 Vac + MC 24V	1SDA073734R1	ZEBMF





Open closed auxiliary contacts - AUX

Size	Type	Global PN	US / CA PN
E2.2...E6.2	AUX 4Q (4 Form C) 400V E2.2...E6.2	1SDA073753R1	ZEBAUX4
E2.2...E6.2	AUX 4Q (4 Form C) 24V E2.2...E6.2	1SDA073754R1	ZEBAUX4D
E2.2...E6.2	AUX 2Q (2 Form C) 400V + 2Q (2 Form C) 24V E2.2...E6.2	1SDA073755R1	ZEBAUX2-2D
E2.2...E6.2	AUX 6Q 400V E2.2...E6.2 ¹⁾	1SDA073756R1	ZEBAUX6
E2.2...E6.2	AUX 6Q 24V E2.2...E6.2 ¹⁾	1SDA073757R1	ZEBAUX6D
E2.2...E6.2	AUX 3Q (3 Form C) 400V + 3Q (3 Form C) 24V E2.2...E6.2 ¹⁾	1SDA075973R1	ZEBAUX3-3D
E2.2...E6.2	AUX 15Q (15 Form C) 400V (for fixed/drawout with signalling in racked in) E2.2...E6.2 ^{2) (*)}	1SDA073760R1	ZEBAUX15
E2.2...E6.2	AUX 15Q (15 Form C) 24V (for fixed/drawout with signalling in racked in) E2.2...E6.2 ^{2) (*)}	1SDA073761R1	ZEBAUX15D
E2.2...E6.2	AUX 15Q (15 Form C) 400V (for fixed/drawout with signalling in racked in/test isolated) E2.2...E6.2 ^{2) (*)}	1SDA073846R1	ZEBAUX15RT
E2.2...E6.2	AUX 15Q (15 Form C) 24V (for fixed/drawout with signalling in racked in/test isolated) E2.2...E6.2 ^{2) (*)}	1SDA073847R1	ZEBAUX15DRT

1) AUX 6Q (6 Form C) is an alternative to the Ekip Signalling 4k module

2) Aux 15 Q (15 Form C) is an alternative to the Mechanical interlock (MI), the lock to prevent door opening when the circuit breaker is in the closed position (DLC) or the lock to prevent door opening when the circuit breaker is in the racked in or test position (DCP) when mounted on the right side.

* Not compatible with mechanical locks on compartment doors or mechanical interlocks

Auxiliary position contacts - AUP

Size	Type	Global PN	US / CA PN
E2.2...E6.2	AUP 5 contacts 400V E2.2...E6.2 - left set	1SDA080373R1	ZEBAUP-L
E2.2...E6.2	AUP 5 contacts 24V E2.2...E6.2 - left set	1SDA080374R1	ZEBAUPD-L
E2.2...E6.2	AUP 5 suppl. contacts 400V E2.2...E6.2 - right set	1SDA080375R1	ZEBAUP-R
E2.2...E6.2	AUP 5 suppl. contacts 24V E2.2...E6.2 - right set	1SDA080376R1	ZEBAUPD-R

Ready to close signalling contact - RTC

Size	Type	Global PN	US / CA PN
E2.2...E6.2	RTC 250V E2.2...E6.2	1SDA073773R1	ZEBRTC
E2.2...E6.2	RTC 24V E2.2...E6.2	1SDA073774R1	ZEBRTCD
E2.2...E6.2	RTC Ekip 24V E2.2...E6.2	1SDA073775R1	ZEBRTCDE

Terminal blocks for auxiliary connection

Size	Type	Global PN	US / CA PN
E1.2...E6.2	Terminal blocks 10 pcs	1SDA073906R1	ZEATB10

Accessories

Mechanical accessories



Mechanical operation counter - MOC

Size	Type	Global PN	US / CA PN
E2.2...E6.2	MOC mechanical operation counter	1SDA073781R1	ZEBMOC

* Only available with motor



Key lock in open position - KLC

Size	Type	Global PN	US / CA PN
E2.2...E6.2	KLC-D Key lock open E2.2...E6.2	1SDA073791R1	ZEBKLCD
E2.2...E6.2	KLC-S Key lock open N.20005 E2.2..E6.2	1SDA073792R1	ZEBKLCS5
E2.2...E6.2	KLC-S Key lock open N.20006 E2.2..E6.2	1SDA073793R1	ZEBKLCS6
E2.2...E6.2	KLC-S Key lock open N.20007 E2.2..E6.2	1SDA073794R1	ZEBKLCS7
E2.2...E6.2	KLC-S Key lock open N.20008 E2.2..E6.2	1SDA073795R1	ZEBKLCS8
E2.2...E6.2	KLC-S Key lock open N.20009 E2.2..E6.2	1SDA073796R1	ZEBKLCS9
E2.2...E6.2	KLC-A Key lock open Castell E2.2...E6.2 ^{1) 2)}	1SDA073797R1	ZEBKLAC
E2.2...E6.2	KLC-A Key lock open Kirk E2.2..E6.2 ¹⁾	1SDA073798R1	ZEBKLAK
E2.2...E6.2	KLC-A Key lock open Ronis Profalux E2.2..E6.2 ¹⁾	1SDA073799R1	ZEBKLAR

1) Arrangement only; 2) Only mounted. For loose supply contact ABB SACE.



Padlocks in open position - PLC

Size	Type	Global PN	US / CA PN
E2.2...E6.2	PLC E2.2..E6.2 Padlock open D=4mm/0.15"	1SDA073803R1	ZEBPLC4
E2.2...E6.2	PLC E2.2..E6.2 Padlock open D=7mm/0.27"	1SDA073804R1	ZEBPLC7
E2.2...E6.2	PLC E2.2..E6.2 Padlock open D=8mm/0.31"	1SDA073805R1	ZEBPLC8

The PLC is an alternative to the protection device for opening and closing pushbuttons (PBC)



Key lock in racked in / test / racked out position - KLP

Size	Type	Global PN	US / CA PN
E2.2...E6.2	KLP-D Key lock racked in/out E2.2...E6.2 1st key	1SDA073806R1	ZEBKLPD
E2.2...E6.2	KLP-S Key lock racked in/out N.20005 E2.2...E6.2 1st key	1SDA073807R1	ZEBKLPS5
E2.2...E6.2	KLP-S Key lock racked in/out N.20006 E2.2...E6.2 1st key	1SDA073808R1	ZEBKLPS6
E2.2...E6.2	KLP-S Key lock racked in/out N.20007 E2.2...E6.2 1st key	1SDA073809R1	ZEBKLPS7
E2.2...E6.2	KLP-S Key lock racked in/out N.20008 E2.2...E6.2 1st key	1SDA073810R1	ZEBKLPS8
E2.2...E6.2	KLP-S Key lock racked in/out N.20009 E2.2...E6.2 1st key	1SDA073811R1	ZEBKLPS9
E2.2...E6.2	KLP-D Key lock racked in/out E2.2...E6.2 2nd key	1SDA073812R1	ZEBKLPD-2
E2.2...E6.2	KLP-S Key lock racked in/out N.20005 E2.2...E6.2 2nd key	1SDA073813R1	ZEBKLPS5-2
E2.2...E6.2	KLP-S Key lock racked in/out N.20006 E2.2...E6.2 2nd key	1SDA073814R1	ZEBKLPS6-2
E2.2...E6.2	KLP-S Key lock racked in/out N.20007 E2.2...E6.2 2nd key	1SDA073815R1	ZEBKLPS7-2
E2.2...E6.2	KLP-S Key lock racked in/out N.20008 E2.2...E6.2 2nd key	1SDA073816R1	ZEBKLPS8-2
E2.2...E6.2	KLP-S Key lock racked in/out N.20009 E2.2...E6.2 2nd key	1SDA073817R1	ZEBKLPS9-2
E2.2...E6.2	KLP-A Key lock racked in/out RonProfKirk E2.2...E6.2 1st key ²⁾	1SDA073818R1	ZEBKLPR
E2.2...E6.2	KLP-A Key lock racked in/out RonProfKirk E2.2...E6.2 2nd key ²⁾	1SDA073819R1	ZEBKLPR-2
E2.2...E6.2	KLP-A Key lock racked in/out Castell E2.2...E6.2 1st key ^{1) 2)}	1SDA073820R1	ZEBKLPC
E2.2...E6.2	KLP-A Key lock racked in/out Castell E2.2...E6.2 2nd key ^{1) 2)}	1SDA073821R1	ZEBKLPC-2

To have 2 keys, one each of a 1st key and 2nd key option must be ordered. When the Padlock in racked in/test/racked out (PLP) is also present, the 2nd key option must be ordered.

1) Two Castell key options can not be used together; 2) Arrangement only



Supplementary lock in racked out position accessory

Size	Type	Global PN	US / CA PN
E2.2...E6.2	Suppl. lock in racked out E2.2...E6.2	1SDA073839R1	ZEBSUP

Padlock in racked in / test / racked out position - PLP

Size	Type	Global PN	US / CA PN
E2.2...E6.2	PLP Padlock racked in/out E2.2...E6.2	1SDA073841R1	ZEBPLP

Can also be used with the key lock in racked in/test/racked out device when the 2nd key option is ordered.

Anti-racking out device (fail safe) - FS

Size	Type	Global PN	US / CA PN
E2.2...E6.2	Fail Safe E2.2...E6.2	1SDA079899R1	ZEBFS

Standard for CBs UL, not compatible with YU

Lock for racking in / racking out the mobile part when the door is open - DLR

Size	Type	Global PN	US / CA PN
E1.2...E6.2	DLR E2.2...E6.2 ^(*)	1SDA073845R1	ZEBDLR

(*) Only as loose part

Lock to prevent door opening when the circuit breaker is in racked in / test position - DLP

Size	Type	Global PN	US / CA PN
E2.2...E6.2	DLP E2.2...E6.2 ^(*)	1SDA073849R1	ZEBDLP

If mounted on the right side, the DLP is an alternative to the mechanical interlock, AUX 15Q (15 Form C) or Lock to prevent door opening when the circuit breaker is in a closed position (DLC); (*) Only as loose part



Accessories

Mechanical accessories

Lock to prevent door opening when the circuit breaker is in a closed position - DLC

Size	Type	Global PN	US / CA PN
E2.2...E6.2	DLC Interlock cable door E2.2...E6.2 ^(*)	1SDA073852R1	ZEBDLCCD
E2.2...E6.2	DLC Interlock direct door E2.2...E6.2 ^(*)	1SDA073853R1	ZEBDLCCD

If mounted on the right side, the DLP is an alternative to the mechanical interlock, AUX 15Q (15 Form C) or Lock to prevent door opening when the circuit breaker is in a closed position (DLC); * To be ordered with lever for interlock [group 2] and support for interlock [1SDA073895R1]

Protection device for opening and closing pushbuttons - PBC

Size	Type	Global PN	US / CA PN
E2.2...E6.2	PBC Op/Cl BP protection sp. key E2.2...E6.2	1SDA073858R1	ZEBPBC
E2.2...E6.2	PBC Op/Cl BP protection PL D=4mm/0.15" E2.2...E6.2	1SDA073859R1	ZEBPBC4
E2.2...E6.2	PBC Op/Cl BP protection PL D=7mm/0.27" E2.2...E6.2	1SDA073860R1	ZEBPBC7
E2.2...E6.2	PBC Op/Cl BP protection PL D=8mm/0.31" E2.2...E6.2	1SDA073861R1	ZEBPBC8

* The PBC is an alternative to the Padlock in open position (PLC)

Circuit breaker flange / door escutcheon

Size	Type	Global PN	US / CA PN
E2.2...E6.2	IP30 flange E2.2...E6.2 Fixed	1SDA073864R1	ZEBFLG30F
E2.2...E6.2	IP30 flange E2.2...E6.2 Drawout	1SDA073865R1	ZEBFLG30D
E2.2...E6.2	IP54 flange, different keys E2.2...E6.2 ^(*)	1SDA073867R1	ZEBFLG54DK
E2.2...E6.2	IP54 flange, key N.20005 E2.2...E6.2 ^(*)	1SDA073869R1	ZEBFLG54SK
E2.2...E6.2	Sealable trip unit cover E2.2...E6.2	1SDA073870R1	ZEBSTUC

* Only as loose part

Separators - PB

Size	Type	Global PN	US / CA PN
E2.2...E6.2	PB 2pcs E2.2...E6.2 Fixed	1SDA076166R1	ZEBPBF
E2.2...E6.2	PB 2pcs E2.2...E6.2 Drawout	1SDA076168R1	ZEBPBW

Remote Racking Device - RRD

Size	Type	Global PN	US / CA PN
E2.2...E6.2	RRD Emax 2 E2.2...E6.2 110Vac/dc	1SDA085528R1	ZEBRRD
E2.2...E6.2	RRD Emax 2 E2.2...E6.2 220Vac/dc	1SDA085529R1	ZEBRRD2
E2.2...E6.2	Kit for fixing RRD on E2.2...E6.2 ^(*)	1SDA085530R1	ZEARRDCB

** One kit per breaker needed



Cables for mechanical interlock [Group 1]

Size	Type	Global PN	US / CA PN
E1.2..E6.2	Type A horizontal	1SDA073881R1	ZEACBLAHR
E2.2..E6.2	Type B,C,D horizontal	1SDA073882R1	ZEACBLBHR
E1.2..E6.2	Type A vertical	1SDA073885R1	ZEACBLAVR
E2.2..E6.2	Type B,C,D vertical	1SDA073886R1	ZEACBLBVR

On type of cable must be ordered for each interlock. The cable must be ordered with the fixed circuit breaker or the cradle of a drawout circuit breaker.

Lever for mechanical interlock of fixed circuit breaker or cradle [Group 2]

Size	Type	3 Poles		4 Poles	
		Global PN	US / CA PN	Global PN	US / CA PN
E4.2	Lever for mechanical interlock	1SDA073890R1	ZE4LEV	1SDA073890R1	ZE4LEV

The lever for the mechanical interlock is not required for E1.2

Support for mechanical interlock of fixed circuit breaker [Group 3]

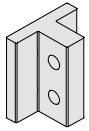
Size	Type	Global PN	US / CA PN
E2.2...E6.2	Type A / B / D	1SDA073895R1	ZEBSPB
E2.2...E6.2	Type C	1SDA073897R1	ZEBSPC

Support for mechanical interlock of fixed part [Group 4]

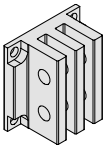
Size	Type	Global PN	US / CA PN
E2.2...E6.2	Type A / B / D	1SDA073895R1	ZEBSPB
E2.2...E6.2	Type C	1SDA073897R1	ZEBSPC

Accessories

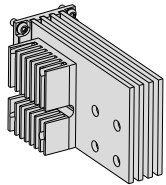
Spare parts



A



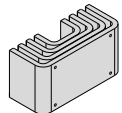
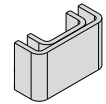
B



C

Kit for terminals

Size	IEC/UL	Iu range	Version	Figure	2 pieces		4 pieces	
					Global PN	US / CA PN	Global PN	US / CA PN
E4.2	IEC	1600-2500	F; W (FP)	A	1SDA115462R1	ZE4HRVR25DC-2	1SDA115464R1	ZE4HRVR25DC-4
E4.2	IEC	3200-4000	F; W (FP)	B	1SDA115461R1	ZE4HRVR40DCE-2	1SDA115463R1	ZE4HRVR40DCE-4
E4.2	UL	1600-2000	F; W (FP)	A	1SDA115462R1	ZE4HRVR25DC-2	1SDA115464R1	ZE4HRVR25DC-4
E4.2	UL	2500-3200	F; W (FP)	C	1SDA115465R1	ZE4VR32DC-2	1SDA115466R1	ZE4VR32DC-4



Kit for jumper busbars

Size	IEC/UL	Iu range	Version	Type	Quantity (pcs)	Global PN	US / CA PN
E4.2	IEC	1600-2500	F; W (FP)	"2C" jumper kit	1	1SDA115472R1	ZE4JP25DC-1
E4.2	IEC	3200-4000	F; W (FP)	"4C" jumper kit	1	1SDA115471R1	ZE4JP40DC-1
E4.2	UL	1600-2000	F; W (FP)				
E4.2	UL	2500-3200	F; W (FP)				

Those spare parts are specific for Emax 2 DC.

The complete ordering codes for original and guaranteed spare parts are available in the ABB SACE Low voltage Spare Parts catalogue.



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