

# Advanced retrofitting kits solutions for Novomax

Novomax → Emax 2



With few modifications to your existing switchgear, ABB retrofitting kits are a cost effective solution to upgrade your electrical system. The advanced retrofitting kits allow a very fast and reliable upgrade of the old SACE Novomax circuit breakers with the state of the art Air Circuit Breaker SACE Emax 2.

Air circuit breakers put into service many years ago might not provide the reliability and safety assurances required today. Making certain that people, equipment and processes are properly protected is a growing concern.

When maintenance is no longer sufficient owing to lack of materials or when components are out of production, retrofit kits are the best solution. ABB low voltage service offers a unique way to upgrade installed hardware and software to the next generation, by changing the worn or outdated parts while maintaining the original plant and equipment configuration. The kits are tested in the ABB SACE Division Lab, accredited by ACCREDIA and acknowledged by important international certification bodies such as ACAE / LOVAG, ANCE, ASTA, ETL SEMKO, UL, CSA and Naval Registers.

### Safety and Service continuity

- Safety improvement.
- Service continuity guaranteed.
- Ease of installation.
- Reduction of the cost of maintenance.
- Long availability of the products and its spare parts.
- Factory tested solution.
- Wide range of mechanical and electrical accessories with Emax 2.

### From Circuit-Breaker to Power Manager

SACE Emax 2 improves the efficiency of electrical plants, creating the new standard of:

- **Control:** Ekip PowerController to improve energy efficiency and saving
- **Connectivity:** integration into systems with integrated communication modules with different protocols: Modbus RS-485, Modbus TCP, Profibus, DeviceNet, EtherNet/IP, IEC61850, Bluetooth
- **Ease of use:** creation of efficiency and simplicity. Power measurement with Emax 2 advanced trip units
- **Easy to Maintain:** diagnosis and installation with Ekip Connect Software. Automatic notifications to remind maintenance activities. ABB Ability™ Energy and Asset Manager is also available with Emax 2 for Predictive Maintenance.

### SACE Novomax panorama

SACE Novomax is one of the most famous Air Circuit Breaker produced by ABB from '80s and used everywhere in the world. Available in 6 frames (G30-G2-G4-G5-G6) with different performance levels.

## Retrofitting kit offering

ABB offers a complete range of solutions to upgrade obsolete SACE Novomax circuit breakers with Emax 2:

- **Hard bus retrofit (RF):** the traditional retrofit kit for which the complete SACE Novomax circuit breaker needs to be dismantled. The kit consists of a new Emax 2 breaker equipped with special terminals to fit the existing busbars. Dedicated support is provided to allow fixing of the retrofit reusing the Novomax fixing point to minimize modification of the switchboard structure. Available for both Fixed and Withdrawable versions.
- **Cradle in Cradle (CiC):** it is an advanced retrofitting solution type; only SACE Novomax moving part of withdrawable circuit breaker need to be removed. A special version Emax 2 fixed part is supplied by ABB to be racked in the installed fixed part. Standard Emax 2 moving part is racked in/out on the Emax2 fixed part.
- **Direct replacement (DR):** it is the most advanced retrofitting solution type; only SACE Novomax moving part of withdrawable circuit breaker need to be removed. A special version of Emax 2 moving part is supplied by ABB to be racked in/out on the installed fixed part.

When shutdown time is an issue, the DR or CiC solutions are preferable. Installation time is reduced to minimum as the existing fixed part are not removed; with few adaptations on-site the new Emax2 moving part can be inserted. All retrofit solutions have been tested for mechanical and electrical operations, short circuit breaking capacity, short circuit withstand current and dielectric properties according to IEC standards.

### Recommendations for usage of DR/CiC solutions

The DR and CiC Retrofit can be inserted only if the existing fixed part is full working. it is important to verify the following conditions:

- the clamps, terminals and their protective coating undamaged, with no traces of repulsion, short-circuiting or corroded copper
- the plastic support that houses the terminals to be not cracked, broken or deformed
- the condition of the opening mechanism of the terminal shutters: check that it moves smoothly and that the levers are not broken or deformed
- the racking-in guides of the moving part to be in a good condition and not damaged. Lubricate if necessary.

The detailed check list is in the document [1SDH001279R0002](#). When fixed part is not fully working the best retrofitting solution is the Hard Bus Retrofit.

On the table below the retrofitting kit solutions available for Novomax.

	G30	G2		G3		G4		G5	G6	
Rated Current [A]	800	1250	2500	1600	3000	3200	3600	3200	6300	
	1250	1600	3000	2000		4000	4000			
	1600	2000	2500				4500	5000		
<b>Version</b>	<b>Pole</b>									
<b>FIXED</b>	<b>3P</b>	-	RF <sup>(1)</sup>	-	RF	RF	RF	-	RF <sup>(3)</sup>	-
	<b>4P</b>	-	RF <sup>(1)</sup>	-	RF	RF	RF	-	RF <sup>(3)</sup>	-
<b>WITHDRAWABLE</b>	<b>3P</b>	DR - RF	DR-RF	DR <sup>(2)</sup>	RF	RF	DR - RF	RF	CiC <sup>(3)</sup> - RF	RF
	<b>4P</b>	DR - RF	DR- RF	DR <sup>(2)</sup>	RF	RF	DR - RF	RF	CiC <sup>(3)</sup> - RF	RF

RF for G30 is with New Emax E1

(1) Available only for 2000A versions

(2) Available only for 2500A versions

(3) Available only for 3200A - 4000A versions

# Novomax vs Emax 2 advanced retrofitting kit solutions

## Correspondences between Novomax and Emax 2 Direct Replacement & Cradle in Cradle solutions.

### Automatic circuit breakers - Novomax to Emax 2

Novomax	Iu [A]	Poles	Solution	Emax 2	Emax 2 Performance Level	Iu [A]	Iu (Rating Plug) [A]	Icu 415V	Icu 440V	Icu 500V	Icu 660V	Icw (1s) 415V
<b>G2</b>	1250	3p/4p	DR	E2.2	N	1250	-	55	50	50	45	50
	1600	3p/4p	DR	E2.2	N	1600	-	55	50	50	45	50
	2000	3p/4p	DR	E2.2	N	2000	-	55	50	50	45	50
	2500	3p/4p	DR	E2.2	N	2500*	-	60	60	60	55	60
<b>G4</b>	3200	3p/4p	DR	E4.2	H	3200	-	75	75	75	65	75
	3600	3p/4p	DR	E4.2	H	4000	3600	80	75	75	65	75
<b>G5</b>	3200	3p/4p	CiC	E4.2	V	3200	-	100	100	100	75	100
	4000	3p/4p	CiC	E4.2	V	4000**	-	100	100	100	75	100

\* Derating up to 2400 A with Fixed Part with HR terminals; no derating with Fixed part with VR terminals

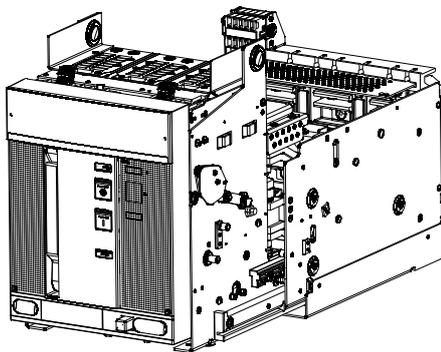
\*\* Derating up to 3600 A

### Switch disconnectors - Novomax to Emax 2

Novomax S	Iu [A]	Poles	Solution	Emax 2/MS	Emax 2 Performance Level	Iu [A]	Icw (1s) 415V
<b>G2S</b>	1250	3p/4p	DR	E2.2	N	1250	50
	1600	3p/4p	DR	E2.2	N	1600	50
	2000	3p/4p	DR	E2.2	N	2000	50
	2500	3p/4p	DR	E2.2	N	2500	60
<b>G4S</b>	3200	3p/4p	DR	E4.2	H	3200	75
	3600	3p/4p	DR	E4.2	H	4000	75
<b>G5S</b>	3200	3p/4p	CiC	E4.2	V	3200	80
	4000	3p/4p	CiC	E4.2	V	4000*	80

\* Derating to 3600 A

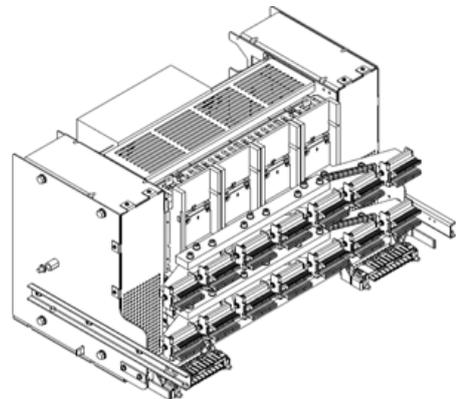
### Direct Replacement Solution with Emax 2



The DR kit consists of:

- Special Emax 2 moving part (it includes sliding contacts, mechanical signaling, anti-insertion lock, racking in/out lever for the version)
- Kit for door's adaption

### Cradle in Cradle Solution with Emax 2



The CiC kit consists of:

- Special Emax 2 fixed part (it includes sliding contacts with 4Q and dedicated wiring for 6Q)
- Emax 2 moving part (it could be ordered separately)
- Kit for door's adaption
- Racking-in lever.

## Available trip unit and comparison



	T	S1	S2	Ekip DIP	Ekip Touch	Ekip Hi-Touch
<b>Protection functions</b>				LI LSI LSIG	LI LSI LSIG	LI LSI LSIG
Inverse long-time delayed trip - L	●	●	●	●	●	●
Definite long delay (t=k) - M	-	●	●	●	●	●
Short circuit constant tripping time (t=k) - S	●	●	●	●	●	●
Instantaneous not adjustable - I	●	●	●	●	●	●
Instantaneous adjustable - F	●	●	●	●	●	●
Ground fault constant tripping time (t=k) - G	-	●	●	●	●	●
Network analyzer	-	-	-	-	-	●
Real-time monitoring and protection - Current	-	-	-	○	●	●
Real-time monitoring and protection - Voltage, Power, Energy, Frequency	-	-	-	-	○	●
Maintenance indicators and records	-	-	-	●	●	●
Communication capability	-	-	-	-	○	○

● = Available

○ = Available with additional device

The S2 series relè offers the same type of protections as S1 series plus additional features, i.e. :

- Higher ambient temperature range -25° to +75°
- Separate trip indications for each type of protection
- Test push button to check the circuit breaker trip system

The S2 series is suitable for system with higher level of control and monitoring.

## Available trip unit and comparison

SACE Novomax	SACE Emax 2	
	DR	CiC
YO (shunt opening release)	→ Emax 2 standard YO	Emax 2 standard YO
YO2 (shunt opening release)	→ Emax 2 standard YO2 (alternative YU)	Emax 2 standard YO2 (alternative YU)
YC (shunt closing release)	→ Emax 2 standard YC	Emax 2 standard YC
YU (undervoltage release)	→ Emax 2 standard YU	Emax 2 standard YU
M (motor for charging springs)	→ Emax 2 standard Spring charge motor	Emax 2 standard Spring charge motor
Q1...Q25 (O/C AUX contacts)	→ Use the ones of Novomax Fixed Part	Q10 available with Emax 2 (Q4 + Q6) and Q15 with the installation of an external accessory
AUX Spring charged (S33M)	→ Emax 2 standard S33 M/2	Emax 2 standard S33 M/2
AUX CB tripped - S51/1	→ Emax 2 standard contact (N/O) S51/1 (standard supply for automatic CBs)	Emax 2 standard contact (N/O) S51/1 (standard supply for automatic CBs)
AUX CB tripped - S51/2	→ Emax 2 special contacts (N/C) S51/2 supplied under request	Emax 2 special contacts (N/C) S51/2 supplied under request
CB tripped mechanical indication	→ Emax 2 standard - TU reset (standard supply for automatic CBs)	Emax 2 standard - TU reset (standard supply for automatic CBs)
AUX CB connected/ insulated position - S75S-S75I	→ Included in the Emax 2 sliding contacts (standard supply)	Emax 2 AUP - Necessary a re-wiring to accessorize the Novomax FP
AUX YU (YU energized)	→ Emax 2 RTC contact - check compatibility before ordering	Emax 2 RTC contact - check compatibility before ordering
Novomax Shutter padlock device	→ Novomax shutter padlock	Emax 2 Shutter lock – SL
Key lock in open position	→ Emax 2 standard - KLC	Emax 2 standard - KLC
Padlock in open position	→ Emax 2 standard - PLC	Emax 2 standard - PLC
Key lock in Racked in/out position	→ Not applicable	Emax 2 standard - KLP
Padlock in Racked in/out position	→ Not applicable	Emax 2 standard - PLP
Mechanical operation counter	→ Emax 2 standard - MOC	Emax 2 standard - MOC
IP54 door protection	→ Emax 2 standard - IP54	Emax 2 standard - IP54
Transparent protective cover for O/C pushbuttons	→ Emax 2 standard - PBC	Emax 2 standard - PBC
Mechanical interlock system with other CBs	→ Not compatible	Not compatible
Time-delay device D	→ Emax 2 UVD - Necessary a re-wiring on the cubicle	Emax 2 UVD - Necessary a re-wiring on the cubicle
SOR Test Unit	→ Emax 2 YO/YU Test Unit - Necessary a re-wiring	Emax 2 YO/YU Test Unit - Necessary a re-wiring

The following accessories are **not compatible** with these retrofit kit solutions

- Mechanical lock for compartment door;
- Mechanical interlock system with other CBs;
- All accessories of the Emax 2 fixed part (for CiC contacts for signaling of circuit breaker in racked-in are compatible).

While the following Emax 2 accessories can be installed, but **need to be externally cabled** with local adaption:

- YO/YU Test Unit;
- Current sensor for neutral conductor outside circuit-breaker;
- Remote reset YR
- Ekip Multimeter;
- Ekip View;
- Ekip Control Panel.

For the Direct Replacement, the introduction of Emax 2 **Ekip Modules** is possible using the **Ekip Cartiridge**, external accessory that can be installed on a DIN guide while the **Zone Selectivity** Gzi/Gzo - Szi/Szo feature is available using an external socket.

### Ekip Cartridge

This external device connected directly to the Ekip Touch/Ekip Hi-Touch Trip Unit allows to use most of the connectivity modules: the Ekip Supply, Ekip Com, Ekip Link, Ekip Signalling, Ekip Synchro check, Ekip AUP. The Ekip Cartridge has 4 slots (1 Ekip Supply + 3 modules).

If needed, when circuit-breakers in the withdrawable version are used, it is possible to connect the position AUP contacts to the related pins of the cartridge to avoid failure messages on the communication channel.

The cartridge can be installed on a DIN-rail everywhere in the panel and it commutes with the breaker through and external socket.



### Welcome in the era of Industry 4.0!

Upgrade an old device with Emax 2 means to introduce cutting-edge technologies inside your switch-gears.

Emax 2 All-in-one innovation integrates protection, control, connectivity and power management to ensure continuity of service, reliability and productivity of microgrid installations.

In ABB Ability™ Energy and Asset Manager, cloud-computing platform that allow to monitor, control, optimize energy consumptions is present also the PREDICT feature that supports predictive maintenance to prevent product failure optimizing maintenance strategy and reducing total costs of ownership.

