
SERVICE NOTE

Retrofit kits

Hard Bus Retrofill Novomax to Emax 2



With only few modification actions and sustainable costs, retrofitting kits are the perfect solution to improve a low voltage switchgear. ABB SACE has developed new hard bus retrofitting kits to replace and upgrade SACE Novomax Air circuit breaker with the ABB latest family of 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Service offers a unique way to upgrade installed hardware and software to the next generation, by changing the worn or outdated parts while maintaining the original plant and equipment configuration.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 product 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 EDCS 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 '70s and used everywhere in the world. Available in six frames (G30-G2-G3-G4-G5-G6) with different performance levels, the series covers uninterrupted breaking capacity I_{cu} up to 6300A and guarantees breaking capacity I_{cu} up to 100kA at 660V AC

ABB offers a complete range of solution to upgrade Novomax devices with Emax 2 retrofit solutions:

- **Hard bus retrofitfill (RF):** it is the traditional retrofit kit for which the complete Novomax circuit breakers/switch disconnectors need to be replaced. The kit consists in a new Emax 2 device equipped with special terminals to fit the existing busbars. This solution is available for both Fixed and Withdrawable versions.
- **Cradle in Cradle (CiC):** it is an advanced retrofitting solution type for which the Novomax moving part of withdrawable device need to be removed and replaced. In this case, a special version Emax 2 fixed part supplied by ABB service is ready to be racked in/out the existing fixed part and a standard Emax 2 moving part can be fitted in the Emax 2 fixed part.

- **Direct replacement (DR):** It is the most advanced retrofit solution type. In this case, only the mobile part of withdrawable devices need to be replaced with the special version of Emax 2 moving part supplied by ABB service is ready to be racked in/out the existing fixed part.

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. The Direct Replacement and Cradle in Cradle are solutions suitable when the existing part is full working while the Hard Bus Retrofitfill is the best retrofitting solution when fixed part is not fully working

Retrofitting solutions - Novomax to Emax 2

		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	
Version	Pole									
FIXED	3P	RF	RF ⁽¹⁾	-	RF	RF	RF	-	RF ⁽³⁾	-
	4P	RF	RF ⁽¹⁾	-	RF	RF	RF	-	RF ⁽³⁾	-
"WITHDRAWABLE"	3P	DR - RF	DR-RF	DR ⁽²⁾	RF	RF	DR - RF	RF	CiC ⁽³⁾ - RF	RF
"	4P	DR - RF	DR - RF	DR ⁽²⁾	RF	RF	DR - RF	RF	CiC ⁽³⁾ - RF	RF

DR - CiC for G2..G5 are under development and RF for G30 is with New Emax E1

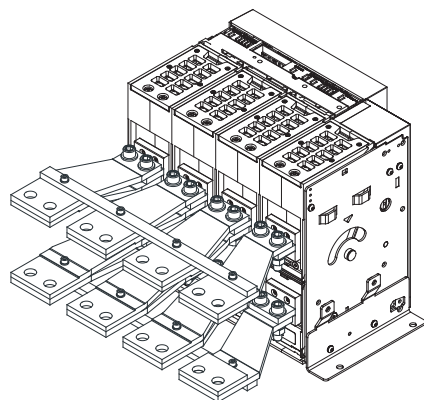
(1) Available only for 2000A versions

(2) Available only for 2500A versions

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

The Hard Bus Retrofitting kit for fixed versions consist of:

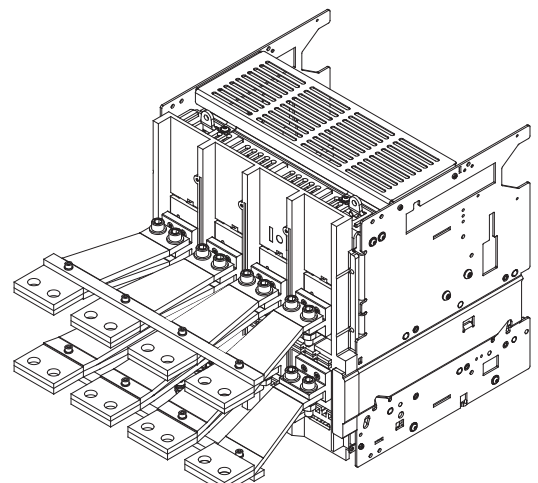
- Adapting terminals
- Side supports
- Instructional manuals
- Kit for the door's adaption
- Insulating materials.



HBRF for Novomax fixed version with HR terminals

The Hard Bus Retrofitting kit for withdrawable versions consist of:

- Adapting terminals
- Fixing plates
- Instructional manuals
- Kit for the door's adaption
- Insulating supports.



HBRF for Novomax withdrawable version with HR terminals

Correspondence tables

Fixed versions - Solutions suitable for Circuit Breakers and Switch Disconnectors

Novomax	Iu [A]	Terminals	Poles	Emax 2	Iu [A]	Rating Plug	Icu/Ics 380-415V [kA]	Icu/Ics 440V [kA]	Icu/Ics 660V [kA]	Icw (1s) 415V [kA]
G2	2000	HR	3p/4p	E2.2N	2000	-	55	50	45	50
G3	1600	HR	3p/4p	E2.2H	1600	-	75	75	65	75
G3	2000	HR	3p/4p	E2.2H	2000	-	75	75	65	75
G3	2500	HR	3p/4p	E2.2H	2500	-	75	75	65	75
G3	3000	VR	3p/4p	E4.2H	3200	3200	75	75	65	75
G4	3200	HR	3p/4p	E4.2H	3200	-	75	75	65	75
G5	3200	HR	3p/4p	E4.2V	3200	-	100	100	75	100
G5	4000	HR	3p/4p	E4.2V	4000	-	100	100	75	100

Withdrawable versions - Solutions suitable for Circuit Breakers and Switch Disconnectors

Novomax	Iu [A]	Terminals	Poles	Emax 2	Iu [A]	Rating Plug	Icu/Ics 380-415V [kA]	Icu/Ics 440V [kA]	Icu/Ics 660V [kA]	Icw (1s) 415V [kA]
G2	1250	HR	3p/4p	E2.2N	1250	-	55	50	45	50
G2	1600	HR	3p/4p	E2.2N	1600	-	55	50	45	50
G2	2000	HR	3p/4p	E2.2N	2000	-	55	50	45	50
G2	2000	VR	3p/4p	E2.2N	2000	-	55	50	45	50
G2	2000	F	3p/4p	E2.2N	2000	-	55	50	45	50
G3	2000	HR	3p/4p	E2.2H	2000	-	75	75	65	75
G3	2000	VR	3p/4p	E2.2H	2000	-	75	75	65	75
G3	2500	HR	3p/4p	E2.2H	2500	-	75	75	65	75
G3	2500	VR	3p/4p	E2.2H	2500	-	75	75	65	75
G3	1600	HR	3p/4p	E2.2H	1600	-	75	75	65	75
G3	1600	VR	3p/4p	E2.2H	1600	-	75	75	65	75
G3	3000	VR	3p/4p	E4.2H	3200	3000	75	75	65	75
G4	3200	HR	3p/4p	E4.2H	4000	3200	75	75	65	75
G4	3200	VR	3p/4p	E4.2H	3200	-	75	75	65	75
G4	3600	VR	3p/4p	E4.2H	4000	3600	80	80	75	80
G4	3600	VR	3p/4p	E4.2H	4000	-	80	80	75	80
G5	3200	HR	3p/4p	E4.2V	3200	-	100	100	75	100
G5	3200	VR	3p/4p	E4.2V	3200	-	100	100	75	100
G5	4000	VR	3p/4p	E4.2V	4000 ⁽¹⁾	-	100	100	75	100
G5	4000	HR	3p/4p	E4.2V	4000 ⁽²⁾	-	100	100	75	100
G5	4500	HR	3p/4p	E4.2V	4000 ⁽²⁾	-	100	100	75	100
G5	4500	VR	3p/4p	E6.2V	4000	-	100	100	75	100
G5	5000	VR	3p/4p	E6.2V	5000	-	100	100	75	100
G6	6300	VR	3p	E6.2V	6300	-	100	100	75	100

Note

(1) Derating to 3920A; (2) Derating to 3400A

Legend

HR= Orizzontal terminals

VR= Vertical terminals

F= Front terminals

Accessories and Trip Unit

This new retrofitting solution guarantees the use of all the mechanical and electrical accessories of the Emax 2.

With the retrofit kits with Emax 2 it is possible to choose amid three different Trip Units to replace the Novomax's ones: Ekip Dip, Ekip Touch, Ekip Hi-Touch available in the versions LI, LSI, and LSIG.



Protection functions	T	S1	S2	Ekip DIP (LI - LSI - LSIG)	Ekip Touch (LI - LSI - LSIG)	Ekip Hi-Touch (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	-	-	-	-	○	○

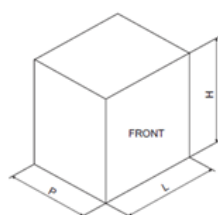
The S2 series relè offers the same type of protections as S1 series plus additional features, i.e. :

- 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

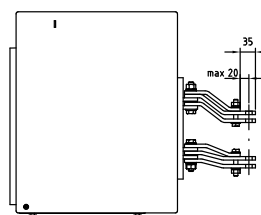
The S2 series is suitable for system with higher level of control and monitoring

Checks before ordering

Before ordering, it is important verify some dimensions according to the following indications:



Check the minimum cubicle dimensions according to the indications on the tables.



Make sure that the bus-bars do not exceed the maximum dimension indicated.

Withdrawable version

TYPE	L (III) [mm]		L (IV) [mm]		H [mm]		P [mm]	
	Emax2	Novomax	Emax2	Novomax	Emax2	Novomax	Emax2	Novomax
E2.2-G2	400	384	490	479	515	485	355	514
E2.2-G3	400	466	490	581	515	625	355	576
E4.2-G3	500	466	600	581	545	625	355	576
E4.2-G4	500	586	600	701	545	625	355	576
E4.2 - G5	500	811	600	926	545	625	355	576
E6.2 - G5	900	811	1000	936	545	625	355	576
E6.2 - G6	900	1051	-	-	545	625	355	576

Fixed version

TYPE	L (III) [mm]		L (IV) [mm]		H [mm]		P [mm]	
	Emax2	Novomax	Emax2	Novomax	Emax2	Novomax	Emax2	Novomax
E2.2-G2	400	320	490	415	515	510	221	350
E2.2-G3	400	380	490	495	545	629	221	405
E4.2-G3	500	380	600	495	545	629	221	405
E4.2-G4	500	500	600	615	545	629	221	405
E4.2-G5	500	725	600	840	545	629	221	405

ABB SACE S.p.A.
A division of ABB S.p.A.
L.V. Breakers
Via Pescaria, 5
24123 Bergamo - Italy
Phone: +39 035 395.111
Fax: +39 035 395.306-433

The data and illustrations are not binding.
We reserve the right to modify the contents of this document on the basis of technical development of the products, without prior notice.
Copyright 2020 ABB. All rights reserved.

www.abb.com/service
www.abb.com/contact-centers