

Retrofit kits

Hard Bus Retrofill EntelliGuard G UL to Emax 2 ANSI C37/ 1066 / CSA Standard



With only few modification actions and sustainable costs, retrofitting kits are the perfect solution to improve a low voltage switchgear. ABB has developed new hard bus retrofitting kits to replace and upgrade the GE EntelliGuard G circuit breaker with the ABB latest family of SACE Emax 2.

Value propositions



Safety & Protection

Highest quality level confirmed by certified products. ABB brand is associated with buying high quality products with robust design.



Easy to install

Easy installation requires limited shut-down. Instructional sheet is provided with the product.



Continuous operation

PREDICT feature in ABB Ability™ ECDS for Predictive Maintenance. Reduction of the total life cost of the switchgear and spare parts availability. Diagnosis and installation with Ekip Connect Software.



Optimum Interface

Ekip Power Controller to improve energy efficiency. Connection into IoT and integration into systems with different communication protocols.

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Service offers a unique way to upgrade installed hardware and software to the next generation, by changing the worn or outdated parts while maintaining the original plant and equipment configuration.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 ELSP Lab, accredited by ACCREDIA and acknowledged by important international certification bodies such as ACAE / LOVAG, ANCE, ASTA, ETL SEMKO, UL, CSA and Naval Registers.

SACE Entelliguard overview

We are introducing, as a new retrofitting kit solution, the Hard Bus Retrofill EntelliGuard G to Emax 2 ANSI C37 / 1066 / CSA standard available for 3 poles - fixed and withdrawable versions - EntelliGuard G Envelope 1-2-3 from 800A to 5000A with vertical terminals. These solutions are suitable for OEMs switchgears.

ABB offers the Hard Bus Retrofill solution to upgrade EntelliGuard G devices with Emax 2. This is the traditional retrofit kit for which the complete Entelliguard circuit breakers/switch disconnectors need to be replaced. The kit consists in a Emax 2 device equipped with special terminals to fit the existing busbars. This solution is available for both Fixed and Withdrawable versions. All retrofit solutions have been tested for mechanical and electrical operations, short circuit breaking capacity, short circuit withstand current and dielectric properties according to ANSI 1066/C37/CSA standard.

The Hard Bus Retrofill is suitable for EntelliGuard G, 3 poles vertical terminal version, standard ANSI C37/1066/CSA according to the following solutions

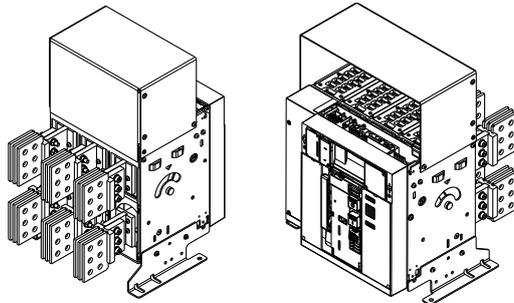
HBRF - EntelliGuard G ANSI/UL1066 to Emax 2 ANSI C37/1066/CSA

Fixed versions

EntelliGuard G			Emax 2			Icu/Ics [kA] 254 V	Icu/Ics [kA] 508 V	Icu/Ics [kA] 635 V	Icw(1s)
Version	Type	In [A]	Version	Type	In [A]				
Envelope 1	N	up to 1600	E2.2	S-A	1600 ⁽¹⁾	65	65	65	65
Envelope 1	H	up to 1600	E2.2	H-S	1600 ⁽¹⁾	85	85	65	65
Envelope 1	P	up to 1600	E2.2	V-A	1600 ⁽¹⁾	100	100	65	65
Envelope 1	N	2000	E2.2	S-A	2000	65	65	65	65
Envelope 1	H	2000	E2.2	H-A	2000	85	85	65	65
Envelope 1	P	2000	E2.2	V-A	2000	100	100	65	65
Envelope 3	M	4000	E6.2	V-A	4000	100	100	100	85
Envelope 3	B	3200 - 4000	E6.2	V-A	4000 ⁽²⁾	100	100	100	100
Envelope 3	M	5000	E6.2	V-A	5000	100	100	100	85
Envelope 3	B	5000	E6.2	V-A	5000	100	100	100	100

(1) Rating Plug In=800...1200A as mandatory accessory to retrofit Envelope1 with In = 800...1200A

(2) Rating Plug In=3200A as mandatory accessory to retrofit Envelope3 with In = 3200A



The kit consists of:

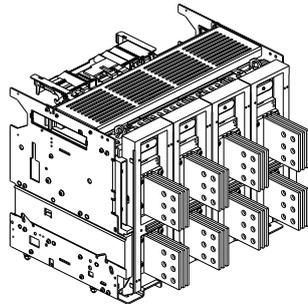
- Fixing plates to mount the new breaker
- Adapting terminals
- Instructional manual
- Insulating cover
- Kit for door's adaptation as accessory

**HBRF - EntelliGuard G ANSI/UL1066 to Emax 2 ANSI C37/1066/CSA
Withdrawable version**

EntelliGuard G			Emax 2						
Version	Type	In [A]	Version	Type	In [A]	Icu/Ics [kA] 240 V	Icu/Ics [kA] 580 V	Icu/Ics [kA] 600 V	Icw(1s)
Envelope 1	N	up to 1600	E2.2	S-A	1600 ⁽¹⁾	65	65	65	42
Envelope 1	H	up to 1600	E2.2	H-S	1600 ⁽¹⁾	85	85	85	50
Envelope 1	P	up to 1600	E2.2	V-A	1600 ⁽¹⁾	100	100	100	50
Envelope 1	N	2000	E2.2	S-A	2000	65	65	65	42
Envelope 1	H	2000	E2.2	H-A	2000	85	85	65	50
Envelope 1	P	2000	E2.2	V-A	2000	100	100	65	50
Envelope 2	N	2500	E4.2	V-A	2500	65	65	65	42
Envelope 2	H	2500	E4.2	V-A	2500	85	85	65	50
Envelope 2	M	2500	E4.2	V-A	2500	100	100	100	65
Envelope 2	H	3000	E4.2	V-A	3200 ⁽²⁾	85	85	65	50
Envelope 2	M	3000	E4.2	V-A	3200 ⁽²⁾	100	100	100	65
Envelope 3	M	4000	E6.2	V-A	4000	100	100	100	65
Envelope 3	M	5000	E6.2	V-A	5000	100	100	100	65

(1) Rating Plug In=800...1200A as mandatory accessory to retrofit Envelope1 with In = 800...1200A

(2) Adjust the protections L,S,I,G according to the system capability. The retrofitting kit guarantees performances up to 3000A



The kit consists of:

- Base supports to mount Emax2 at a similar high of the intelliguard G
- Adapting terminals kit
- Instructional manual
- Kit for door's adaptation as accessory

It is possible to upgrade also Entelliguard G UL489 standard with a special Hard Bus Retrofill solution to Emax 2. In this cases, it is pre-configured a dedicated trip unit with the protection I always in "ON".
The tables below show the solutions available

HBRF - EntelliGuard G UL489 to Emax 2 ANSI C37/1066/CSA

Fixed versions

EntelliGuard G			Emax 2			Icu/Ics [kA] 254 V	Icu/Ics [kA] 508 V	Icu/Ics [kA] 635 V	Icw(1s)
Version	Type	In [A]	Version	Type	In [A]				
Envelope 1	S	up to 1200	E2.2	S-A	up to 1200	65	65	50	50
Envelope 1	N	up to 1600	E2.2	S-A	up to 1600	65	65	65	65
Envelope 1	H	up to 1600	E2.2	H-A	up to 1600	85	85	65	65
Envelope 1	P	up to 1600	E2.2	V-A	up to 1600	100	100	65	65
Envelope 1	N	2000	E2.2	S-A	2000	65	65	65	65
Envelope 1	H	2000	E2.2	H-A	2000	85	85	65	65
Envelope 1	P	2000	E2.2	V-A	2000	100	100	65	65
Envelope 2	E	up to 1600	E4.2	V-A	up to 1600	85	85	85	85
Envelope 2	M	up to 1600	E4.2	V-A	up to 1600	100	100	100	85
Envelope 2	E	2000	E4.2	V-A	2000	85	85	85	85
Envelope 2	M	2000	E4.2	V-A	2000	100	100	100	85
Envelope 2	E	3200	E4.2	V-A	3200	85	85	85	85
Envelope 2	M	3200	E4.2	V-A	3200	100	100	100	85
Envelope 3	M	up to 5000	E6.2	V-A	up to 5000 ⁽¹⁾	100	100	100	65
Envelope 3	B	4000 - 5000	E6.2	V-A	4000 - 5000	100	100	100	100

(1) Rating Plug In=3200A as mandatory accessory to retrofit Envelope3 with In = 3200

HBRF - EntelliGuard G UL489 to Emax 2 ANSI C37/1066/CSA

Withdrawable version

EntelliGuard G			Emax 2			Icu/Ics [kA] 240 V	Icu/Ics [kA] 580 V	Icu/Ics [kA] 600 V	Icw (1s)
Version	Type	In [A]	Version	Type	In [A]				
Envelope 1	S	up to 1200	E2.2	S-A	up to 1200	65	65	50	42
Envelope 1	N	up to 1600	E2.2	S-A	up to 1600	65	65	65	42
Envelope 1	H	up to 1600	E2.2	H-A	up to 1600	85	85	65	50
Envelope 1	P	up to 1600	E2.2	V-A	up to 1600	100	100	65	50
Envelope 1	N	2000	E2.2	S-A	2000	65	65	65	42
Envelope 1	H	2000	E2.2	H-A	2000	85	85	65	50
Envelope 1	P	2000	E2.2	V-A	2000	100	100	65	50
Envelope 2	M	up to 1600	E4.2	V-A	up to 1600	100	100	100	65
Envelope 2	M	2000	E4.2	V-A	2000	100	100	100	65
Envelope 2	N	2500	E4.2	S-A	2500	65	65	65	42
Envelope 2	H	2500	E4.2	H-A	2500	85	85	65	50
Envelope 2	M	2500	E4.2	V-A	2500	100	100	100	65
Envelope 3	M	up to 5000	E6.2	V-A	up to 5000 ⁽¹⁾	100	100	100	65

(1) Rating Plug In=3200A as mandatory accessory to retrofit Envelope3 with In = 3200

Accessories and Trip Unit

Emax 2 internal mechanical and electrical accessories are compatible with the ones of EntelliGuard G. On the table, information about the solutions for external accessories.

EntelliGuard G External Accessories	Solution with Emax 2
Cable Interlocks	Replace all interlocked breakers in the system.
Time delay module (TMD)	Replace with Emax 2 Electronic time-delay device for undervoltage release - UVD.
Auxiliary switches (8NO+8NC)	Chose Emax 2 AUX 15Q in case AUX4Q + AUX6Q does not provide enough contacts.
Voltage conditioner plate	Emax 2 has internal voltage sensing in these situations: - Ekip Touch/G-Touch + Measuring Package - Ekip Hi-Touch/G Hi Touch. By default, voltage input is wired to the bottom terminals; if top is desired make sure to specify on the order. Order the external voltage socket arrangement in case the use of external potential transformers is desired.
Door interlocks	Replace with the Emax 2 DLC, DLP or DLR solution.
Neutral Rogowski CTs	Replace with Emax 2 External current sensors (in a 3P4W system).
External CT for ground-fault detection	Replace zero sequence CT for the earthing conductor of the main power supply by Emax 2's homopolar toroid.
Modbus/Profibus COMM	Emax 2 needs to be ordered with Ekip Com Modbus RS485 or Ekip Com Profibus plus the Ekip Supply Module (Ekip Touch/Hi-Touch).
Auxiliary power supply 24V dc	Ekip Supply Module is needed.
Key Interlock mounted on the cassette	Evaluate the use of: - key lock and padlock in open position KLC/PLC - key lock and padlock in racked-in/racked-out position KLC/PLP.
Zone Selectivity Interlocking	Contact ABB for information.
Multi Source GF	Contact ABB for information.
RELT Switch	Contact ABB for information.

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



	GE Entelliguard TU	Ekip DIP	Ekip Touch	Ekip Hi-Touch
	LI, LSI, LSIg	LI, LSI, LSIg	LI, LSI, LSIg	LI, LSI, LSIg
Protection functions				
Basic protection functions				
L - Overload protection	S	S	S	S
S - Selective short-circuit	S	S	S	S
I - Instantaneous short-circuit	O	S	S	S
G - Earth fault	O	S	S	S
Neutral protection	O	S (4p); M (3p)	S (4p); M (3p)	S (4p); M (3p)
Thermal memory for L&S protections	S (L only)	S	S	S
OT - Internal overtemperature	S	S	S	S
Advanced protection functions				
Start-up function for L, S, & G protections	S	-	S	S
G_ext - Earth fault on toroid	O	-	S	S
Zone selectivity short circuit	O	-	S	S
Measurement functions				
Phase & Neutral current (RMS)	S	M+C	S	S
Voltage: phase-phase, phase-neutral	O	-	M	S
Power: active, reactive, apparent	O	-	M	S
Energy: active, reactive, apparent	O	-	M	S
Frequency	O	-	M	S
Power factor	O	-	M	S
Peak factor	O	-	M	S
Maximum current value for phase	S	C	S	S
Average & max. power, max. & min. voltage	O	-	M	S
Trip history	S	C	S	S
Event log	S	C	S	S
Mechanical operator counter	M	M	M	M
Electric operator counter	S	C	S	S
Total operating time	S	C	S	S
Contact wear	S	C	S	S
Maintenance indicators	S	C	S	S
Circuit-breaker identifying data	S	C	S	S
Data logger	O	-	S	S
Network analyzer	-	-	-	S
Power controller	-	-	O	O

S= supplied as standard

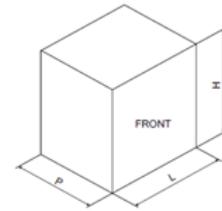
O= optional

M= module or device needed

C= control panel or connection software needed

Checks before ordering

Before ordering, it is important to verify some dimensions taking into account the size of Emax 2 with the one of EntelliGuard G according to the information on the tables below. It is important to highlight that the width of Emax 2 E6.2 (35.43 inch) is higher than the one of EntelliGuard G Envelope 3 (32 inch).



Cubicle Emax2 UL

Insulation distance of installation cubicle

Fixed circuit breakers				Drawout circuit breakers			
	L - Width	H - Height	D - Depth	L - Width	H - Height	D - Depth	
	3p			3p			
E2.2	[mm]	400	500	221	400	440	355
	[inch]	15.74	19.68	8.7	15.74	17.32	13.97
E4.2	[mm]	500	500	221	500	440	355
	[inch]	19.68	19.68	8.7	19.68	17.32	13.97
E6.2	[mm]	900	500	221	900	440	355
	[inch]	35.43	19.68	8.7	35.43	17.32	13.97

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