

Retrofitting kit offering

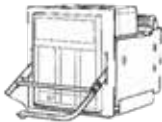
ABB offers a complete range of solutions to upgrade obsolete SACE Megamax circuit breakers with Emax 2:

- **Hard bus retrofit (RF):** the traditional retrofit kit for which the complete SACE Megamax 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 Megamax 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 Megamax 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 Megamax 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.

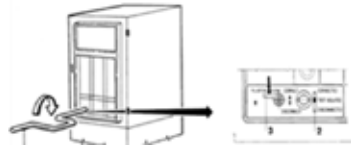
When shutdown time is an issue, the DR or CiC solutions are preferable. Installation time is reduced to minimum as the existing fixed part are not removed; with few adaptations on-site the new Emax2 moving part can be inserted. All retrofit solutions have been tested for mechanical and electrical operations,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

Megamax is available in fixed and withdrawable version that used to have 2 different racking in/out mechanism concepts:

- **Open door (OD):** it requires to open the panel door to rack in and out the moving part



- **Closed door (CD):** no need to open the door to rack in and out the moving part.



	Fixed CB		Withdrawable CB	
	3p	4p	3p	4p
F1B-F1N-F1S-F1H	RF	RF	RF - DR	RF - DR
F2S 2500 - F2H	RF	RF	RF - DR	RF - DR
F2S 3000	<u>RF</u>	<u>RF</u>	<u>RF</u>	<u>RF</u>
F3S	RF	RF	RF	RF
F4S	RF	RF	RF - DR	RF - DR
F5S-F5H 3200-4000	RF	RF	RF - CiC	RF - CiC
F5S-F5H 5000	RF	RF	RF	RF
F6	-	-	<u>RF</u>	-

Note

- The underlined versions are under development

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

Megamax vs Emax 2 advanced retrofitting kit solutions

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

These solutions are available both for Megamax Closed Door and Open Door.

Automatic circuit breakers - Megamax F1/F2 to Emax 2

Megamax	F1											F2		
Performance Levels	B	B	B	N	N	N	S	S	S	H	H	S	H	H
Iu @40°C [A]	1250	1600	2000	1250	1600	2000	1250	1600	2000	1250	1600	2500	2000	2500
Poles	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p
Emax 2	E2.2											E2.2		
Advanced retrofitting solution	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
Performance Levels	B	B	B	N	N	N	N	N	N	H	H	N	H	H
Iu @40°C [A]	1600	1600	2000	1250	1600	2000	1250	1600	2000	1250	1600	2500**	2000	2500**
In (Rating Plug) [A]	1250	1600	2000	1250	1600	2000	1250	1600	2000	1250	1600	2500	2000	2500
Icu/Ics 400-415V [kA]	40	40	40	50*	50*	50*	55	55	55	85	85	65	85	85
Icu/Ics 440-500V [kA]	40	40	40	40	40	40	50	50	50	70	70	60	70	70
Icu/Ics 690V [kA]	35	35	35	35	35	35	45	45	45	55	55	55	55	55
Icw (1s) [kA]	35	35	35	35	35	35	45	45	45	20	20	55	25	30

Switch disconnectors - Megamax F1/F2 to Emax 2

Megamax/MS	F1						F2			
Performance Levels	B	B	B				S	S	S	S
Iu @40°C [A]	1250	1600	2000				1250	1600	2000	2500
Poles	3p/4p	3p/4p	3p/4p				3p/4p	3p/4p	3p/4p	3p/4p
Icw (1s)/MS - 415 V	40	40	40				50	50	50	50
Icw (1s)/MS IEC 60947-2 -690 V	35	35	35				45	45	45	45
Emax 2/MS	E2.2						E2.2			
Emax 2/MS	B	B	B				N	N	N	N
Iu @40°C [A]	1600	1600	2000				1250	1600	2000	2500**
Icw (1s) [kA]	35	35	35				45	45	45	55

Automatic circuit breakers - Megamax F4/F5 to Emax 2

Megamax	F4 ****				F5			
Performance Levels	S		S		S	H	S	H
Iu @40°C [A]	3200		3600		3200	3200	4000	4000
Poles	3p/4p		3p/4p		3p/4p	3p/4p	3p/4p	3p/4p
Emax 2	E4.2				E4.2			
Advanced retrofitting solution	DR		DR		CiC	CiC	CiC	CiC
Performance Levels	H		H		V	V	V	V
Iu @40°C [A]	3200		4000		3200	3200	4000***	4000***
In (Rating Plug) [A]	3200		3600		3200	3200	4000	4000
Icu/Ics 400-415V [kA]	75		75		100	100	100	100
Icu/Ics 440-500V [kA]	75		75		100	100	100	100
Icu/Ics 690V [kA]	65		65		75	85	75	85
Icw (1s) [kA]	65		65		75	85	75	85

Switch disconnectors - Megamax F4/F5 to Emax 2

Megamax/MS	F4 ****				F5			
Performance Levels	S		S		S	H	S	H
Iu @40°C [A]	3200		3600		3200	3200	4000	4000
Poles	3p/4p		3p/4p		3p/4p	3p/4p	3p/4p	3p/4p
Icw (1s)/MS - 415 V	75		80		100	100	100	100
Icw (1s)/MS IEC 60947-2 -690 V	65		65		75	85	75	85
Emax 2/MS	E4.2				E4.2			
Emax 2/MS	H		H		V	V	V	V
Iu @40°C [A]	3200		4000		3200	3200	4000***	4000***
Icw (1s) [kA]	65		65		75	85	75	85

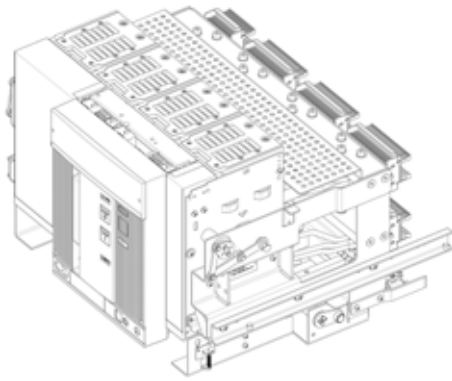
* Ics= 40 kA

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

*** Derating up to 3600 A

**** Direct Replacement for Open Door version is under development

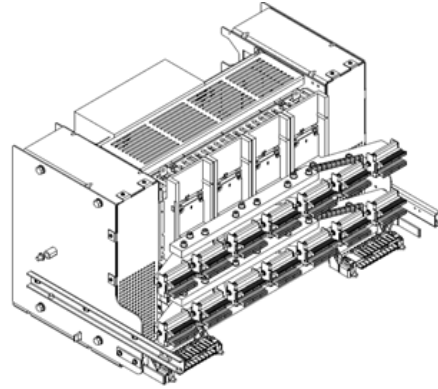
Direct Replacement Solution with Emax 2



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



	AR1 LI	AR1 LS	PR1/P	PR1/P with PR1/A	PR1/P with PR1/C	PR1/P with PR1/C & PR1/D	Ekip DIP	Ekip Touch	Ekip Hi-Touch
Protection functions	LI	LS	LI LSI LSIG	LI LSI LSIG	LI LSI LSIG	LI LSI LSIG	LI LSI LSIG	LI LSI LSIG	LI LSI LSIG
Overload - L									
Inverse long-time delayed trip	●	●	●	●	●	●	●	●	●
Thermal memory	-	-	●	●	●	●	●	●	●
Constant tripping time (t=k)	●	-	●	●	●	●	●	●	●
Constant specific let-through energy (t = k/I ²)	-	-	●	●	●	●	●	●	●
Start-up function	-	-	-	-	-	-	-	●	●
Zone selectivity	-	-	-	-	●	●	-	●	●
Instantaneous overcurrents - I									
Tripping time without intentional delay -	-	●	●	●	●	●	●	●	●
Start-up function	-	-	-	-	-	-	-	●	●
Ground fault - G									
Constant tripping time (t=k)	-	-	●	●	●	●	●	●	●
Constant specific let-through energy (t = k/I ²)	-	-	●	●	●	●	●	●	●
Instantaneous ground fault	-	-	●	●	●	●	●	●	●
Start up function	-	-	-	-	-	-	-	●	●
Zone selectivity	-	-	-	-	●	●	-	●	●
Grand fault ext	-	-	-	-	-	-	-	●	●
Ground fault - 2G	-	-	-	-	-	-	-	-	●
Instantaneous overcurrent - 2I	-	-	-	-	-	-	-	-	●
Time-delayed overcurrent - S2	-	-	-	-	-	-	-	-	●
Directional overcurrent - D	-	-	-	-	-	-	-	-	●
Current imbalance	-	-	-	-	-	-	-	●	●
Power Control	-	-	-	-	-	-	-	○	○
Network analyzer	-	-	-	-	-	-	-	-	●
Real-time monitoring and protection									
Current	-	-	-	●	●	●	○	●	●
Voltage - Power -Energy - Frequency	-	-	-	-	○	○	-	○	●
Maintenance indicators and records	-	-	-	-	●	●	●	●	●
Communication capability	-	-	-	-	-	○	-	○	○

● = Available

○ = Available with additional device

Available trip unit and comparison

SACE Megamax	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 Megamax Fixed Part	Limitation to Q10 (Emax 2 Q4 + Q10)
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 Megamax FP
AUX YU (YU energized)	→ Emax 2 RTC contact - check compatibility before ordering	Emax 2 RTC contact - check compatibility before ordering
PR1/A (Amperometric unit)	→ No longer available - same function in Ekip Hi Touch, Ekip Touch, Ekip DIP with Ekip Multimeter	No longer available - same function in Ekip Hi Touch, Ekip Touch, Ekip DIP with Ekip Multimeter
PR1/C (Control unit)	→ No longer available - same function in Ekip Hi Touch, Ekip Touch	No longer available - same function in Ekip Hi Touch, Ekip Touch
PR1/D (Dialog unit)	→ No longer available - same function in Ekip Hi Touch, Ekip Touch	No longer available - same function in Ekip Hi Touch, Ekip Touch
TV051 (voltage transformer)	→ No longer available - same function in Ekip Hi Touch, Ekip Touch with Ekip Measuring	No longer available - same function in Ekip Hi Touch, Ekip Touch with Ekip Measuring
Megamax Shutter padlock device	→ Megamax 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	→ Emax 2 standard - KLP	Emax 2 standard - KLP
Padlock in Racked in/out position	→ Emax 2 standard - PLP	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 Emax 2 accessories are **not compatible** with these advanced retrofitting kit solutions:

- External 15 O/C AUX
- Mechanical lock for compartment door
- Mechanical interlock system with other CBs
- All accessories of Emax , except the contacts for signaling of CB in racking-in position for the Cradle in Cradle solution.

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

- YO/YU Test Unit
- Current sensor for neutral conductor outside circuit breaker
- Ekip Supply, Communication and external signaling modules
- Ekip Multimeter
- Ekip Control Panel
- Remot reset YR
- Ekip View.