

## Retrofit kits

### Direct Replacement Masterpact M to Emax 2



With just a few modifications to your existing switchgear, Retrofit Kits are a cost effective way to upgrade your electrical system. Direct Replacement allows to upgrade rapidly and reliably an Masterpact M circuit breaker.

Air circuit-breakers put into service many years ago might not provide the reliability and safety assurances required today. Ensuring 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Service offers a unique way to upgrade installed hardware and software to the next generation by changing the worn or outdated parts while maintaining the original plant and equipment configuration.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, a facility 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 for Emax 2.

#### From Circuit-Breaker to Power Manager

SACE Emax 2 improves the efficiency of electrical installations by creating new standards for:

- **Control:** Ekip PowerController to improve energy efficiency and saving
- **Connectivity:** integration into systems featuring integrated communication modules with different protocols: Modbus RS-485, Modbus TCP, Profibus, DeviceNet, EtherNet/IP, IEC61850, Bluetooth
- **Ease of use:** enhanced efficiency and simplicity. Power measurement with Emax 2 advanced trip units
- **Easy to Service:** diagnosis and installation via Ekip Connect Software. Programmed signal to remind when maintenance activities are required. ABB Ability EDCS is also available with Emax 2 for Predictive Maintenance.

# Panorama

ABB proposes a complete range of solution for upgrading obsolete **Masterpact M** circuit breakers using **Emax 2** Retrofit kits:

- **Hard bus retrofit (RF):** the traditional retrofit kit for which the complete Masterpact M circuit breaker needs to be dismantled. The kit comprises a new Emax 2 breaker equipped with special terminals to fit the existing busbars. Available for both Fixed and Withdrawable versions.
- **Direct replacement (DR):** this is the most advanced type of Retrofit solution. Only the moving part of the Masterpact M withdrawable circuit breaker needs to be removed. A special version of the Emax 2 moving part is supplied by ABB for racking in/out of the installed fixed part.

The DR solution is preferable when shut down time is an important issue. Installation time is reduced to the minimum since the existing fixed part need not be removed and the new Emax 2 moving part can be inserted with just a few adaptations on-site.

The Masterpact M to Emax 2 DR Retrofit solution has been tested for mechanical and electrical operations, short circuit breaking capacity, short circuit withstand current and dielectric properties according to IEC standards.

**Note**

- DR is available exclusively for N1 and H1 breaking capacities
- DR for M25 features In max = 2300A for fixed parts with HR terminals
- Please refer to service note [1SDC001030L0202](#) for full details about RF

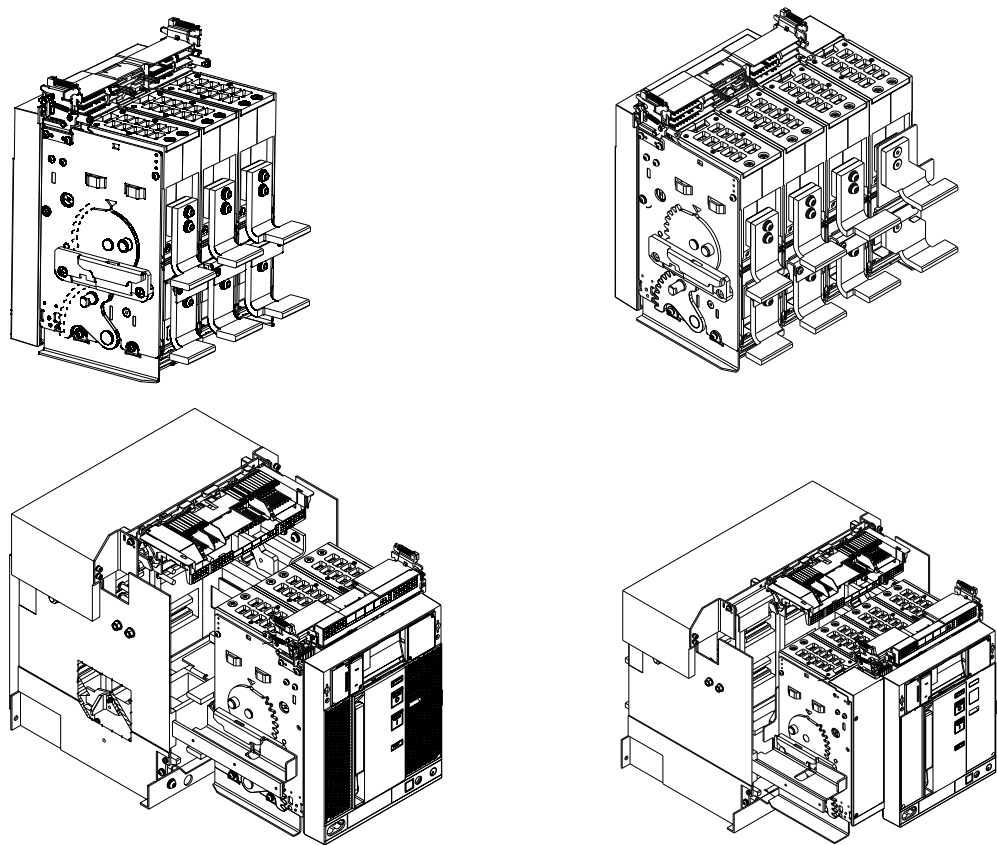
The DR Retrofit solution can only be inserted into fully working existing fixed parts. See checklist below. RF solutions are recommended if results of checks are negative

## Retrofit available solutions

	ABB Solution			
	Fixed CB		Withdrawable CB	
	3p	4p	3p	4p
M08N1				
M10N1	RF	RF	RF - DR	RF-DR
M12N1				
M08H1/H2				
M10H1/H2	RF	RF	RF - DR	RF-DR
M12H1/H2				
M16N1/H1/H2				
M20N1/H1/H2	RF	RF	RF - DR	RF-DR
M25N1/H1/H2				
M32H1/H2	RF	RF	RF	RF
M40H1/H2	RF	–	RF	RF
M50H1/H2	RF	–	RF	RF
M63H1/H2	–	–	RF	–

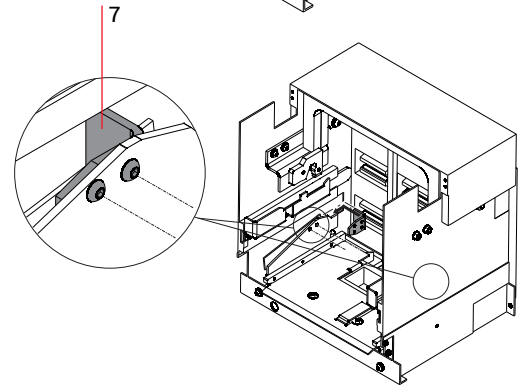
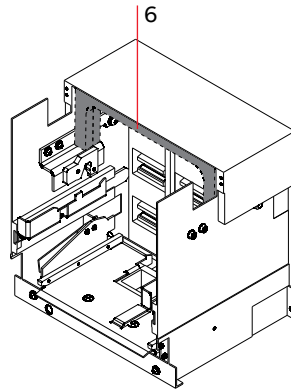
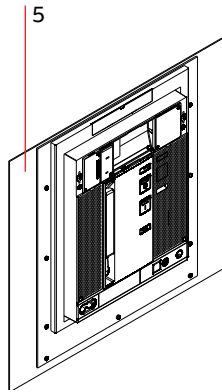
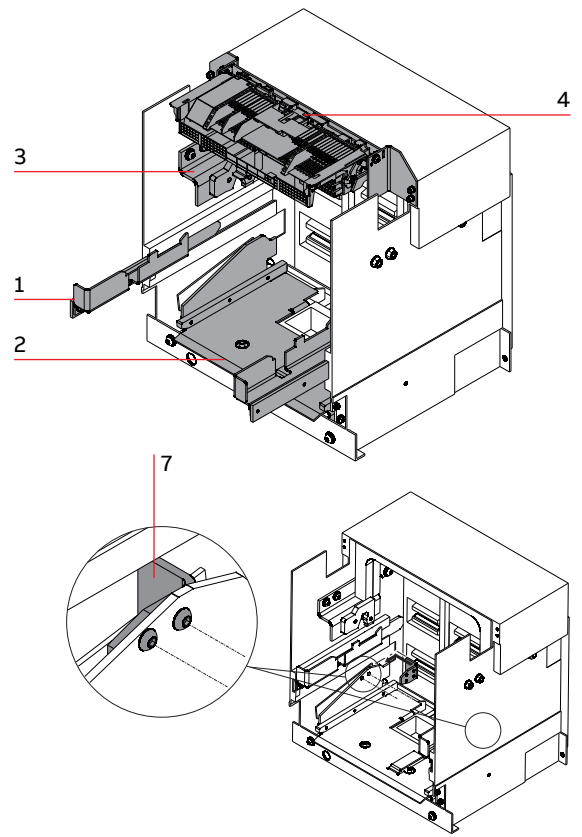
The DR kit consists of:

Special Emax 2 moving part ready to be racked in the Masterpact M fixed part.



Masterpact M fixed part on which the following components are mounted:

1. Draw-out side plates
2. Base Panel for fixed part
3. Rack-in plates
4. Female sliding contacts to rewire according to circuit diagrams
5. Emax 2 door flange with dedicated metallic support
6. Support for fixed part
7. Support plates



## Masterpact M vs Emax 2 Direct Replacement

Correspondences between Masterpact M and Emax 2 for this retrofitting solution:

Original CB: Masterpact M	M08		M10		M12		M16		M20		M25	
Performance Levels	N1	H1	N1	H1	N1	H1	N1	H1	N1	H1	N1	H1
Iu @40°C	800	800	1000	1000	1250	1250	1600	1600	2000	2000	2500	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
Emax 2 Advanced Replacement Solution	DR											
Performance Levels	E2.2N	E2.2N	E2.2N	E2.2N	E2.2N	E2.2N	E2.2B	E2.2N	E2.2N	E2.2H	E2.2N	E2.2H
Iu @40°C	800	800	1000	1000	1250	1250	1600	1600	2000	2000	2500 <sup>(1)</sup>	2500 <sup>(1)</sup>
In (Rating Plug)	800	800	1000	1000	1250	1250	1600	1600	2000	2000	2500 <sup>(1)</sup>	2500 <sup>(1)</sup>
Icu 400-415V	40	65	40	65	40	65	40	65	55	75	55	75
Icu 440-500V	40	65	40	65	40	65	40	65	55	75	55	75
Icu 690V	40	65	40	65	40	65	40	65	55	75	55	75
Icw (1s) - 690V [kA]	40	50	40	50	40	50	40	50	55	75	55	75

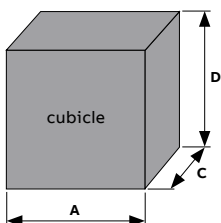
(1) = Derating up to 2300A with fixed part with HR terminals; Ics is 100% of Icu for all the sizes.

Before ordering, always check:

- That the Masterpact Fixed Part is in a good condition, as specified in document [1SDH001279R0002](#).

### Direct replacement for low-cubicle version

It's important to check the cubicle's dimensions before ordering. In case of cubicles with high D less than 485 mm, is available a special version. In this case, the commutation function is performed by cables connected through a male and female sockets instead of sliding contacts.



Panel dimension	DR E2.2 [mm]	Distance from fixed part to sides [mm]
A (3p)	535	+50 to left / +50 to right
A (4p)	650	+50 to left / +50 to right
C	367	-
D*	485	+46 to Top

\* In case of D lower than 485 mm, the special version with low-cubicle is available



## Available trip units and comparison

		STR 18M	28D	38S	58U	68U	Ekip Dip	Touch	Hi-Touch
<b>Protection against overloads</b>	Long time Ir curve		●	●	●	●	●	●	●
	Time delay tr				●	●		●	●
	Thermal memory		●	●	●	●		●	●
<b>Protection against short circuits</b>	Short time Im curve			●	●	○	○	○	●
	Time delay tsd			●	●	○	○	○	●
	Adjustable instantaneous	●	●		●	●	●	●	●
	Fixed instantaneous I			●					
<b>Protection against ground faults</b>	Earth fault			○	○	○	○	○	○
	Time delay			○	○	○	○	○	○
<b>Zone selective interlocking Zsi</b>					○	○		●	●
<b>Load shedding and reconnection</b>					○	○		○	○
<b>Real-time measurements</b>	current		○	○	○	○		●	●
	voltage					○		○	●
	power					○		○	●
	energy					○		○	●
	frequency					○		○	●
<b>Maintenance indicators and records</b>						●	●	●	●
<b>Communication capability</b>					○	○		○	○

● = Basic functions ○ = Optional functions

Electrical and Mechanical accessories mounted in Masterpact M that can be replaced by the corresponding one of Emax 2

<b>Masterpact M</b>	<b>SACE Emax 2</b>
M (motor for charging spings)	→ Emax 2 standard Spring charge motor M
MX and MX2 (shunt opening release)	→ Emax 2 standard YO and YO2
XF (shunt closing release)	→ Emax 2 standard YC
MN (undervoltage release)	→ Emax 2 standard YU
MNR (electronical Delay for MN - into the switchboard)	→ Remove the Masterpact version and add the external one of Emax 2 - D
Current sensor for neutral conductor outside circuit-breaker (into the switchboard)	→ Remove the Masterpact version and add the external one of Emax 2 standard
AUX CB internal Open/closed - (O – F – OF)	→ Emax 2 standard changeover contacts - 4Q - 6Q
AUX Spring charged (CH)	→ Emax 2 standard - S33/M
AUX CB tripped – (SDE)	→ Emax 2 standard changeover contacts - S5
AUX CB ready to close (PF)	→ Emax 2 standard - RTC
AUX programmable contacts (M1..16)	→ Emax 2 standard Ekip Signaling
Key lock in open position (VSPA)	→ Emax 2 standard - KLC
Padlock in open position (VBP)	→ Emax 2 standard - PLC
Key lock in disconnected/connected position (VSPEC)	→ Emax 2 standard - KLP 1 - 2
Padlock in disconnected/connected position (VSE)	→ Emax 2 standard - PLP
Mechanical operation counter (CDM)	→ Emax 2 standard - MOC
IP54 door protection (CCP)	→ Emax 2 standard - IP54
Transparent protective cover for O/C pushbuttons	→ Emax 2 standard - PBC
Connected/disconnected position carriage switches	→ AUP 5 contacts 400V/24V
Arc chute cover (CC)	→ If not present on installed fixed part use fixing support for lateral sides of fixed part, supplied in the kit

The following Emax 2 accessories are not compatible with Emax 2 Direct Replacement kit:

- External 15 O/C AUX
- Mechanical lock for compartment door
- Mechanical interlock system with other CBs
- All accessories for Emax 2 fixed part
- Breaker mismatch protection
- Terminal shield for auxiliary board (CB)

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

- Electronical Delay for MN
- Current sensor for neutral conductor outside circuit-breaker
- Ekip Supply, Communication and external Signaling modules
- Ekip Multimeter; Ekip Control Panel; Ekip View.