TECHNICAL CATALOGUE 2021

EcoUpgrades - Retrofit kit solutions
for low voltage IEC circuit breakers

Next level of service.
The ABB Service portfolio is full of cost-effective, fast-installation and reliable solutions that can extend the electrical system lifespan and maintain its efficiency: updating and upgrading the old technology to the digital era.
ABB is a true enabler of the circular economy to reduce CO_2 emissions and save natural resources.

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Introduction

Introduction

Introduction to Service
Value Proposition

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

Continuous operation
Availability of spare parts and knowhow.
Predict feature optimizes frequency of maintenance.
Energy and asset monitoring.

Easy to install
Fast and easy installation: especially with advanced retrofit solutions where only the moving part of the old circuit-breaker needs to be replaced.
Device upgrading minimises downtime due to installation. When possible, reuse of existing fixing points.

Easy to supervise
Several communication protocols available
Remote communication
Cloud connectivity.

Sustainable
Increased lifespan of the switchgear and saving natural resources:
- about 800 Tons of copper per year
- about 1200 Tons of steel per year
- about 30kTons of CO_2 equivalent emission avoided in the last 5 years.

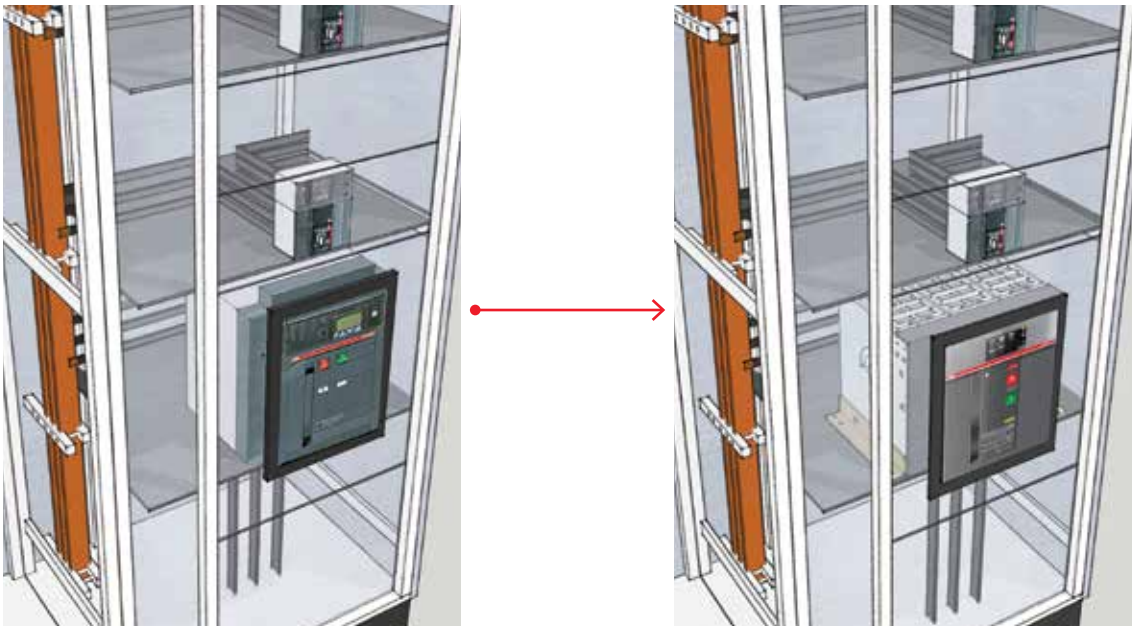
Improved energy efficiency thanks to new product features and capabilities.

Introduction to Retrofit kits

With continuous market growth and increasing demands, unexpected outages must be strongly avoided. As production advances and improves over the years, it is normal for systems to change, loads to increase and harsh environments to impair vital equipment.
Circuit-breakers installed and put into service many years ago might not provide the reliability and safety assurances required nowadays. Although they still continue to operate properly, upgrades and replacements should be planned.
ABB Low Voltage Service offers a unique way to upgrade ABB hardware and software to the next generation, by changing the worn or outdated parts while maintaining the original plant and equipment configuration.
When there is no need to replace a complete switchgear, with just a few cost-effective modifications, retrofit kits are, in most cases, the ideal solution for upgrading the system. Retrofit kits allow old breakers installed to be replaced with latest generation products.

Thanks to the wide range of ABB retrofit kits, customers can enhance the safety of their installations and ensure continuity of service without having to replace the complete switchgear. In addition, high mechanical and electrical reliability and extreme flexibility are assured when retrofit kits are used with Emax 2 and Tmax XT circuit-breaker series. Retrofit kits are specifically designed by ABB to preserve the existing frameworks and minimize downtime. The kits allow the new apparatus to be adapted to the dimensional characteristics of the existing compartments.

Today's reliability and safety requirements are not the same as in the past. Routine maintenance may no longer be sufficient to satisfy customer needs, which include improving electrical and mechanical performance, extending the life of the system or complying with standards and regulations.



Introduction to Retrofit kits

Advantages of retrofit kits
Use of retrofit kits is advantageous
Low cost
- The investment is much less than it would be if new switchgear were to be installed.
  In addition, the retrofitting solution maintains the original configuration of the switchgear equipment and installation
- Planned scheduling and implementation with minimum downtime.

Easy, safe replacement
- no structural changes
- adaptation to auxiliary circuits
- Retrofit kits are always supplied completed with assembly instructions and electric interconnection diagrams.

Safety improvements
- retrofit kits restore the life cycle status of the switchgear
- use of new technology focused on safety and reliability.

Performance
- full interconnectivity with existing distribution systems
- improved control over installations with new electronic protections: energy consumption, power control.

Maintenance and repairs
- Ease of maintenance and improved functionality of the system
- Cost reduction as spare parts for the new circuit-breaker continue to be available for much longer.

Sustainability:
Taking care of our environment is important to us and future generations.
As a true circular economy enabler, ABB Upgrade & Update extends the electrical system lifespan allowing the system to be kept in service, efficiently, for as long as possible, to reduce CO_2 emissions and save raw materials.
This can be achieved by:
- replacing only the obsolete components, thanks to Retrofits
- upgrading it with the latest connected digital features (e.g. Ekip UP)
- adding new digital functions and solutions (e.g. communication protocols)
- access to predictive maintenance thanks to the Predict feature in ABB Ability™ Energy and Asset manager.

How?
- Extending product lifetime and optimizing the total cost of ownership of your assets:
  - Replacing only the individual obsolete and non-maintainable devices instead of replacing the complete structure of the existing system would reduce the consumption of raw material resources.
  - By using active products with higher performance in more compact dimensions
  - Product, accessories, spare parts and support are available for a longer time to be maintained instead of replaced
  - The Predict feature is the simplest way to manage and optimize maintenance activity according to the real needs of the device.
- Monitoring and managing Energy consumption by connecting the device to ABB Ability™ Energy and Asset manager.

Quality
A result of the experience and expertise acquired by the same designers who develop the circuit-breakers, these retrofit kits are only guaranteed by ABB after they have been tested under both standard (Iu) and critical conditions (short-circuit currents).
ABB retrofit kits undergo the same tests as the whole range of ABB circuit-breakers and are certified 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. The lab offers a qualified certification test service for low- and medium-voltage electrical devices and equipment.

For more information about circuit-breakers, certified ratings and their corresponding validity, please contact ABB SACE.

Each retrofit kit is subjected by ABB SACE to the tests listed below, in accordance with IEC 60947-2 or IEC 60947-1:
- racking-in/out operations
- verification of signalling devices
- verification of the safety device that prevents racking-in and racking-out in the closed position
- verification in the disconnected position, to ensure that the specified clearances between isolating contacts cannot be inadvertently reduced
- verification of degree of protection
- dielectric properties (Impulse + Industrial frequency)
- verification of minimum clearances in air
- verification of minimum creepage distances
- temperature-rise test
- ultimate short circuit breaking capacity (240 / 415 / 690 V)
- Rated short time withstand current
- Maintenance manual (safety aspects).

Registro Italiano Navale (RINA): Italian

Low-Voltage Agreement Group

A solution for any need

ABB has a solution for any need
Whenever a device is no longer available on the market and maintenance is no longer efficient, ABB has the perfect solution: Retrofit kits.
Obsolete equipment can be replaced using retrofit kits, which are specifically designed by ABB SACE to preserve the existing frameworks and minimise downtime. ABB has developed different retrofit kit versions to cover all possible customer scenarios:

- Basic: when the installed device is very old and/or in bad condition, hard bus retrofill (RF) can be the best retrofit solution, available for both fixed and withdrawable versions. Solution for competitors circuit-breakers are also available
- Advanced solutions for withdrawable circuit-breakers only:

The advanced versions can only be used if the fixed part of the breaker is in good condition. In order to evaluate the status, ABB SACE Service prepared a document to help customers to assess the conditions of the fixed part (1SDH001279R0002).
Retrofitting a device can also be useful for upgrading the product to the new digital era of industry 4.0

Hard Bus Retrofill (RF)

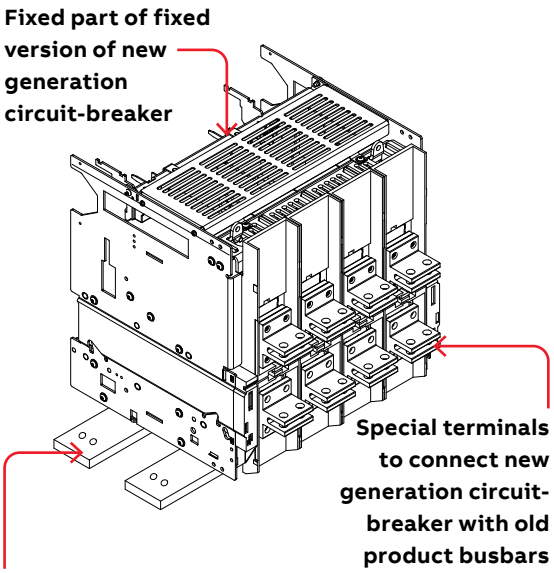
The existing circuit-breaker is completely disassembled (both fixed and moving parts in the case of withdrawable circuit-breakers) and replaced with a more modern ABB circuit-breaker and corresponding adapter kit. The adapter kit contains specially designed, preconfigured busbars and covers for connecting the new circuit-breaker to the existing busbars.
The kit is completed with a transparent panel door template allowing the door to be cut to accommodate the new breaker.

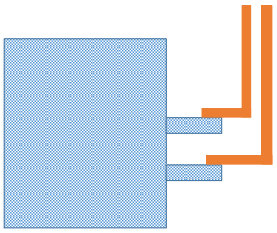
Before ordering
Always check compliance with the dimensions of the new circuit-breaker panel. Remember that new electrical wiring is required. Interlocks can be used only among/between breakers of the same family.

What to order
For fixed circuit-breakers:
- Circuit-breaker + Retrofit kit.

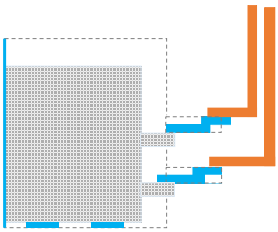
For withdrawable circuit-breakers:
- Moving part
- Fixed part of the new circuit-breaker + Retrofit kit.

Benefits
Hard Bus Retrofill is the perfect solution in any of the following cases:
- when a fixed circuit-breaker must be replaced;
- when the fixed part of the old breaker is damaged and can no longer be repaired;
- when time is not a priority: Hard Bus Retrofill retrofit kits could take some hours to install (the existing breaker must be disassembled and the new one installed)
- when the switchgear must be upgraded and this can be done thanks to the characteristics of the more modern circuit-breaker:
  - Energy and power measurements
  - Power control
  - communication protocols
  - Signalization
  - Digital integration
  - Predictive maintenance (Predict feature ABB Ability™ Energy and Asset manager)
  - Etc...
- when some of the new circuit-breaker's accessories are required: all accessories are 100% compatible with the Hard bus Retrofill kit (RF)
- Retrofit kits can be easily installed thanks to the clear and easy-to-follow instructions supplied.





Before the Retrofit kit



After the Retrofit kit

Fixed part of existing circuit-breaker

Existing switchgear busbars

Fixed Part or fixed version of new circuit-breaker

Retrofit kit

Installed circuit-breaker's room

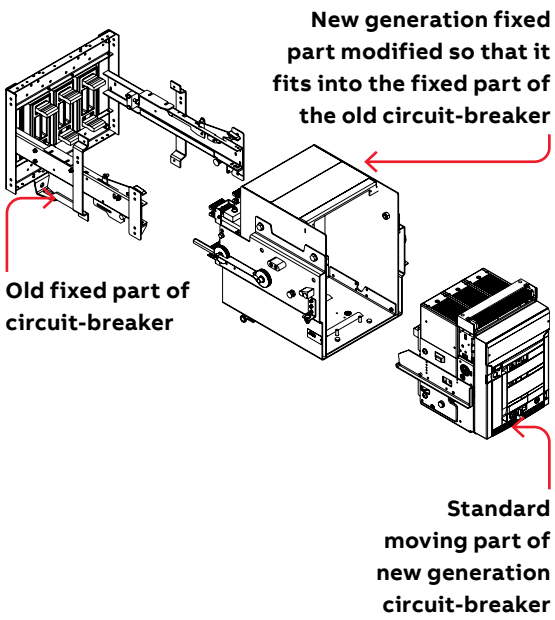
Cradle in Cradle (CiC)

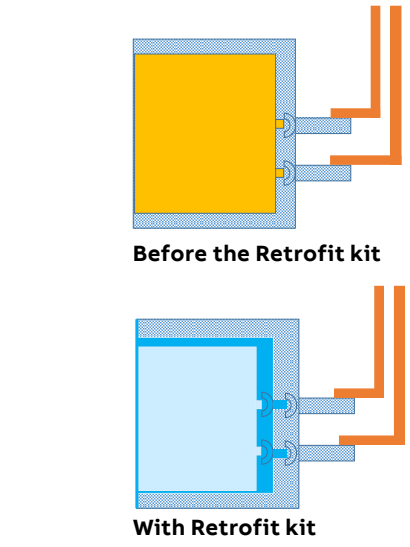
ABB has developed Cradle in Cradle advanced retrofitting solutions for circuit-breakers with very large fixed parts. A second fixed part of the new circuit-breaker can be fitted inside the fixed part of the existing circuit-breaker.
The 2 fixed parts become one single assembly.
A new breaker moving part can then be racked-in, in the standard way. The fixed part of the new circuit-breaker is fully adapted and factory tested.

Before ordering
It is essential to make sure that the fixed part of the old circuit-breaker is in good condition. ABB has issued guidelines to help you with a checklist of the inspections required: 1SDH001279R0002.
The kit is not compatible with any of the accessories for the fixed part of either the new or old circuit-breaker. Once installed, the kit cannot be easily dissembled.

What to order
The kit includes the fixed part of the new circuit-breaker. The moving part of the new circuit-breaker needs to be ordered separately.

Benefits
Cradle in Cradle is the perfect solution when:
- The old product fixed part is still in good conditions;
- Replacement must be performed quickly, as cradle in cradle is a fast solution. There is no need to disassemble the fixed part of the old circuit-breaker and the new breaker can be installed in just a few hours (installation and wiring);
- Safety is a priority: safety is automatically enhanced (key locks, etc....) thanks to all the new safety accessories available for the new breaker;
- The switchgear must be upgraded with the characteristics of the new circuit-breaker:
  - Energy and power measurements
  - Communication protocols
  - Signalization
  - Predictive feature in ABB Ability™ Energy and Asset manager
  - Etc....





Direct replacement (DR)

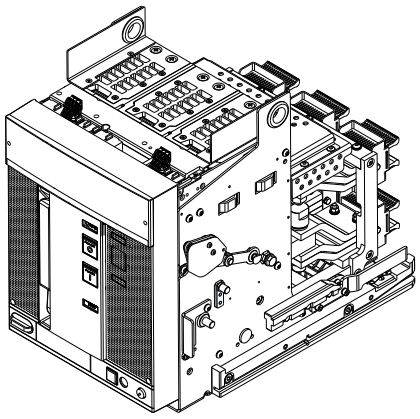
This is the most advanced and rapid solution: the moving part of the existing circuit-breaker is removed and a special moving part of the new circuit-breaker is modified and tested so that it can be immediately fitted into the existing fixed part.

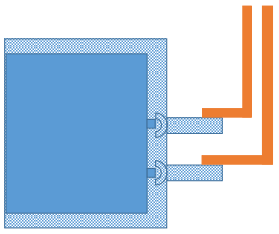
Before ordering
The fixed part of the existing circuit-breaker must be in good condition. ABB has issued guidelines to help you with a checklist of the inspections required: 1SDH001279R0002. Some of the new accessories for the fixed part may not be compatible with the direct replacement kit.
Check for more details in the next pages dedicated to the various products. Once installed, the kit can be easily disassembled.

What to order
The kit always includes the complete new special moving part and installation instructions.

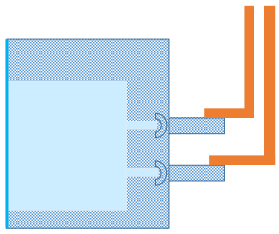
Benefits
Direct replacement is the perfect solution when:
- The existing product fixed part is still in good condition;
- The installation time is short/limited:
  - There is no need to disassemble the existing fixed part
  - Only the panel door needs to be adapted and the new special moving part can be racked-in as quickly and easily as a standard old circuit-breaker moving part
  - all standard accessories are already pre-wired, so no time is wasted while they are being wired.
- Safety is a priority: safety is automatically enhanced (key locks, etc....) thanks to all the new safety accessories available for the new breaker;
- The switchgear must be upgraded and this can be done thanks to the characteristics of the new circuit-breaker:
  - Energy and power measurements
  - Power control
  - Communication protocols
  - Signalization
  - Predictive maintenance (Predict feature in ABB Ability™ Electrical Distribution Control System -EDCS)
  - Etc....

Some kits require a few modifications to the existing fixed part





Before the Retrofit kit



With Retrofit kit

Fixed part of existing circuit-breaker

Existing switchgear busbars

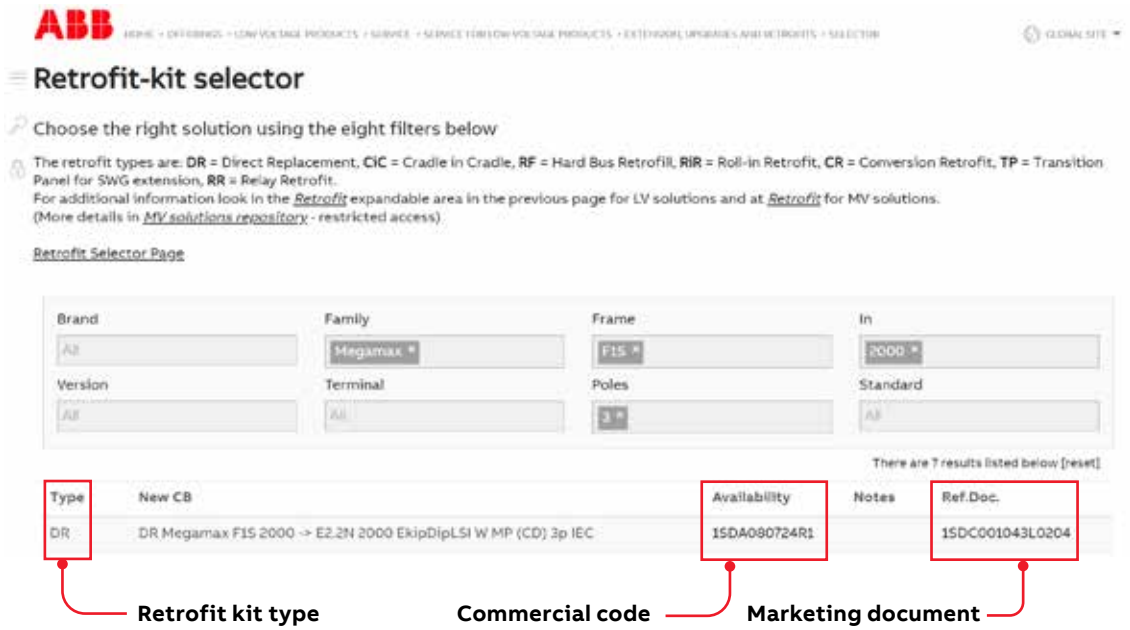
Moving part of installed circuit-breaker

Special new circuit-breaker moving part

Retrofit kit selector

The Retrofit kit selector is an easy online selector tool that you can use to rapidly access the list of all the retrofit kits developed by ABB to replace old circuit-breakers

https://new.abb.com/low-voltage/service/service-for-low-voltage-products/extension-upgrades-and-retrofits/selector



Other solutions

Medium upgrades with Ekip UP
In the case of a recent air circuit-breaker (<10 years, for instance ABB New Emax) still in good condition for which Emax 2 advanced features and/or cloud connection and/or more communication protocols are needed, ABB offers a medium upgrade solution: Ekip UP, the external low-voltage digital unit able to monitor, protect and control the plant. Thanks to the built-in software-based function, Ekip UP is the unit that digitalizes plant performance with the possibility to share all the electronics solutions of an “all-in-one” platform.

The result is a unit suitable for all the different applications including all the required functionalities without additional external devices.

As a multifunctional unit, Ekip UP monitors, protects, predicts the health condition (only associated to New Emax) and controls the power distribution and automation applications. Thanks to its plug&play design, it guarantees ease of use, modularity and flexibility.

Ekip UP versions and features:

					
	Ekip UP Monitor	**Ekip UP Protect**	**Ekip UP Protect +**	**Ekip UP Control**	**Ekip UP Control +**
Control				S	A
Protection	S	A			A
Metering	A	A	A	A	A
Predict feature			P	P	P

S= Standard function
A= Advanced function
P= Available with Predict licence

The Predict feature with Ekip UP is available:
- For New Emax (automatic and switch disconnectors) and Emax 2 switch disconnectors.
- Only after maintenance performed by ABB authorised personnel.

For more details about Ekip UP, please visit the web page: https://new.abb.com/low-voltage/products/circuit-breakers/ekip-up

Light upgrades with trip unit
Do you have a perfectly working Emax 2 air circuit-breaker with basic features (Ekip DIP) but now you need more? ABB offers different easy solutions according to which Emax 2 version you have.
From 2020, SACE Emax 2 trip units offer a complete range of solutions for any installation requirements, for both distribution and generator protection.
New features are now available with a renewed black look and feel. Package solutions are available to fully exploit the potential of the Ekip architecture: Interface Protection System, Embedded ATS, Adaptive Load Shedding and Power Controller. Replacement is available also in the case of a previous version (grey colour) trip unit.
See the document 1SDC200081L0201 for more details about features and solutions

Ekip Dip: The standard trip unit

Ekip Dip LI
Ekip Dip LSI
Ekip Dip LSIG

- Overcurrent protection for distribution systems
- Phase and neutral current measurements
- LED Permanent trip cause signalization
- Ekip Multimeter to display data and measurements.

Ekip Touch: The smart trip unit

Ekip Touch LI
Ekip Touch LSI
Ekip Touch LSIG

- Advanced set of protections and measurements, always upgradable and customizable
- Intuitive touchscreen interface
- High measurement accuracy of electrical parameters.

Ekip Hi-Touch: The ultimate trip unit

Ekip Hi-Touch LSI
Ekip Hi-Touch LSIG

- Complete set of protections and measurements
- Dual protection settings
- Network Analyser function.

Ekip G: The generator trip unit

Ekip G Touch LSIG
Ekip G Hi-Touch LSIG

- Designed for installations with generators such as Genset, cogeneration and marine applications
- Dedicated set of generator protections.

Ekip LCD: The hardened trip unit

Ekip LCD LI
Ekip LCD LSI
Ekip LCD LSIG
Ekip Hi-LCD LSI
Ekip Hi-LCD LSIG
Ekip G LCD LSIG
Ekip G Hi-LCD LSIG

- Suitable for installation in aggressive environments and secure applications
- Available for both distribution and generator protection functions.

ABB Service: Retrofits and much more

Low voltage service portfolio includes a wide range of solutions based on research and designed to keep your plant operating reliably and efficiently.

Maintenance
ABB Service presents different maintenance solutions with the aim of ensuring the continuous operation of your plant. ABB offers corrective and preventive maintenance programs as well as predictive maintenance features developed to guarantee a significant reduction of the total cost due maintenance and repairs.

Corrective
Whenever a fault or a problem happens, ABB can assist you with:
- expert field service engineers
- genuine spare parts
- suggestions.

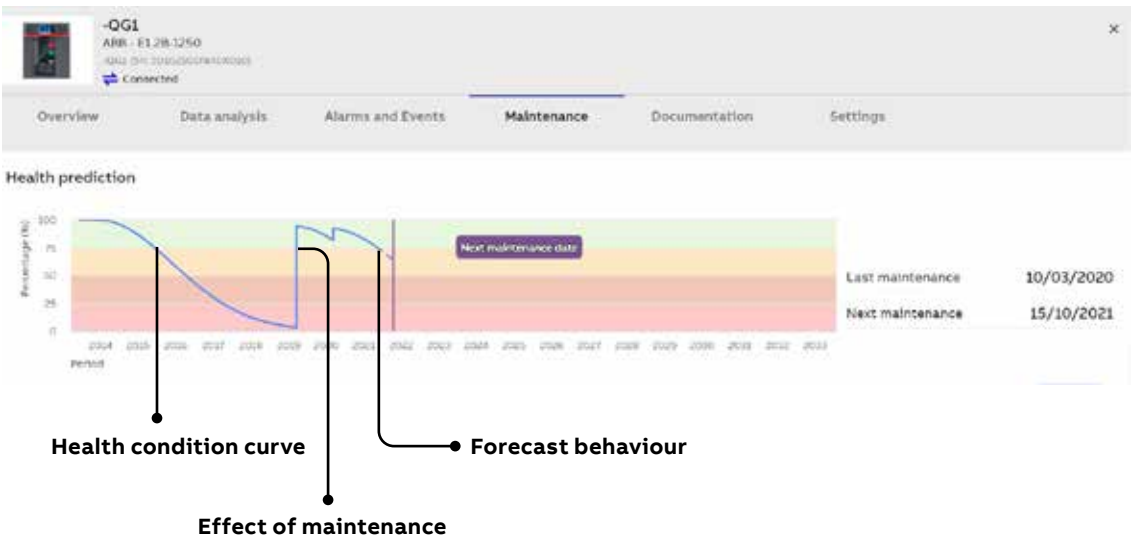
ABB can supply maintenance activity both at the customer's site and in its service factories around the world.

Preventive
ABB offers a dedicated preventive maintenance program (PMP) for each air circuit-breaker. Scheduled maintenance is a good way to maintain the equipment and prevent faults.

Predictive
With access to the digital eve where the devices are connected and can share real time data about their operations, ABB aims to optimize maintenance activity also for medium-small equipment. The ABB Predict feature, integrated into the ABB Ability™ Energy and Asset Manager (EAM) (link: https://new.abb.com/about/our-businesses/electrification/abb-ability/energy-and-asset-manager), is an easy way to monitor the status of the device and predicts the next recommended maintenance date in order to optimize the frequency of maintenance.
The health condition gives the indication about how the device is aging according to operational data and environmental conditions:
- Operational data:
  - Currents - standard and fault
  - Number of open/close operations
  - Voltage (if available)
  - Specific alarm/Error from the trip unit.
- Environmental conditions:
  - Temperature
  - Humidity
  - Vibrations
  - Dust level
  - Corrosive environment.

Do you want to see more? https://library.e.abb.com/public/20b9f53afa0f47faa522f82584b4734e/1SDC200500D0201_rev%20D_Service%20Note_Predictive%20Maintenance_EN.pdf

Health condition curve



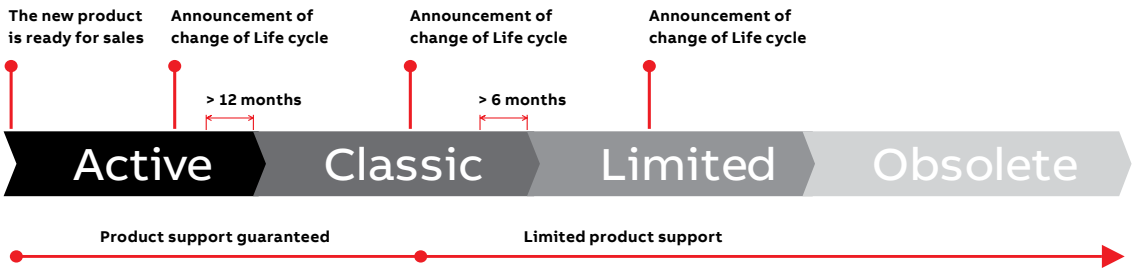
Training
ABB Service performs accurate training sessions targeted at supervisors, technicians, engineers, users and maintenance workers aim to teach how to respond rapidly and efficiently in different critical situations. ABB's training courses are open to customers, partners and own personnel. See the link for more details: https://new.abb.com/low-voltage/service/service-for-low-voltage-products/training

Spare Parts
ABB has identified the most relevant components to offer as spare parts. A dedicated catalogue with a complete list of genuine spare parts is available. In some cases it is necessary to have an ABB technical expert to replace certain components (Type A). Otherwise, ABB Service provides specific installation instructions.
Visit the web page to see the complete list of available spare parts for each circuit-breaker series:
https://new.abb.com/low-voltage/service/service-for-low-voltage-products/spares-and-consumables

Replacement
ABB offers the possibility to replace its own products with completely new ones.
ABB Service guarantees full availability of a product as long as it is in the Classic phase of Life Cycle Management (LCM) and partial availability during the Limited phase. The ABB competent network of service units is spread around the world and is always ready to ensure the satisfaction of customer demands with the utmost care.

LCM
Every year, ABB SACE reviews the Life Cycle Management policy (LCM) for every product and publishes information on the specific product's phase. There are 4 phases: Active, Classic, Limited and Obsolete. (For more details visit the dedicated website: https://new.abb.com/low-voltage/service/service-for-low-voltage-products/replacements).

Active= standard development, production and sale.
Classic= maintenance phase of the product: availability of spare parts is guaranteed.
Limited= spare parts are available.
The production of the entire CB range is not guaranteed and technical support is limited.
Obsolete= technical support is no longer guaranteed. Production of the full CB range has finished, but spare parts might be available.
Retrofit solutions are available.



Training Spare Parts LCM

ABB Service: Retrofits and much more

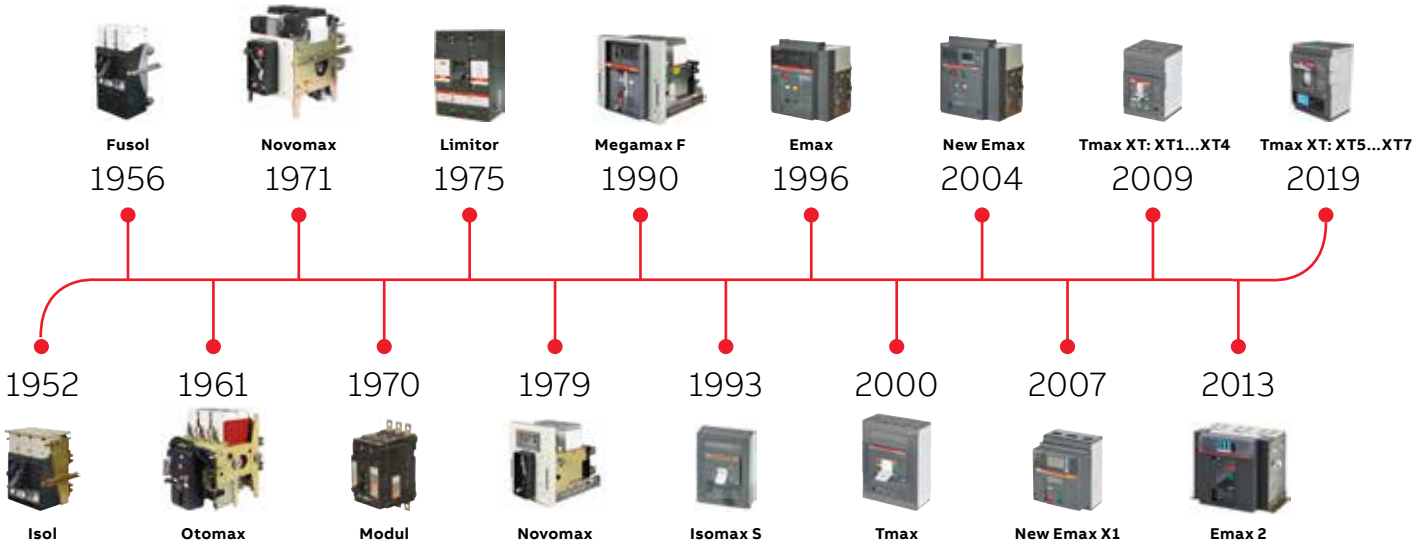


ABB announced it has completed its acquisition of GE Industrial Solutions (GEIS), GE's global electrification solutions business, on 30 June 2018
The following is the Life Cycle Management status for GE products:

Obsolete

MEOO/ME05 | MEO7 | MPACT MK1 | M-PACT | M-PACT PLUS | Spectronic SP | Spectronic S | APU | DS

Classic

EntelliGuard EGL/EGG

Emax/New Emax

New Emax

New Emax
New Emax air circuit-breakers were launched in 2004 as a restyle of the Emax series.
The new Emax air circuit-breaker family was equipped with overcurrent protection for AC installations, available in three types of microprocessor-based releases (PR121, PR122, PR123).

- PR121 with protection functions only
- PR122 with protection, current measurement and dialogue functions
- PR123 with a complete set of functions for protection, measurement, signalling, control and dialogue.

New Emax performance

Iu	[A]	X1			E1		E2				E3					E4			E6	
		X1B	X1N	X1L	E1B	E1N	E2B	E2N	E2S	E2L	E3N	E3S	E3H	E3L	E3V	E4S	E4H	E4V	E6H	E6V
		630	630	630	800	800	1600	1000	800	1250	2500	1000	1000	2000	800	4000	3200	3200	4000	4000
		800	800	800	1000	1000	2000	1250	1000	1600	3200	1250	1250	2500	1250		4000	4000	5000	5000
		1000	1000	1000	1250	1250		1600	1250			1600	1600		1600				6300	6300
		1250	1250	1250	1600	1600		2000	1600			2000	2000		2000					
		1600	1600						2000			2500	2500		2500					
												3200	3200		3200					
Icu [kA]	**660/690V**	42	50	60	42	50	42	55	65	85	65	75	85	85	100	75	85	100	100	100
	500V	42	50	100	42	50	42	55	65	85	65	75	100	85	100	75	100	130	100	130
	440V	42	65	130	42	50	42	65	85	110	65	75	100	110	130	75	100	150	100	150
	380/415V	42	65	150	42	50	42	65	85	130	65	75	100	130	130	75	100	150	100	150
	220/230V	42	65	150	42	50	42	65	85	130	65	75	100	130	130	75	100	150	100	150
Ics [kA]	**660/690V**	42	42	45	42	50	42	55	65	65	65	75	85	65	85	75	85	100	100	100
	500V	42	42	100	42	50	42	55	65	65	65	75	85	65	85	75	100	130	100	100
	440V	42	50	130	42	50	42	65	85	110	65	75	85	110	100	75	100	150	100	125
	380/415V	42	50	150	42	50	42	65	85	130	65	75	85	130	100	75	100	150	100	150
	220/230V	42	50	150	42	50	42	65	85	130	65	75	85	130	100	75	100	150	100	150
Icw [kA]	**1s**	42	42	15	42	50	42	55	65	10	65	75	75	15	85	75	100	100	100	100

—
LCM

New Emax life cycle management

Emax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**New Product/ Replacement**	**Retrofit kits**
Classic until 2021	○	○	○	○	○

○ available until 2022 but verify before ordering
- no longer available

Retrofit solutions

Today New Emax is a classic product and is still produced although it can be easily upgraded to Emax 2 using both advanced and basic retrofit kit solutions without the need to re-certify the switchgear:

- Direct replacement with Emax 2 (DR) from E1 800 to E6 6300A
- Hard Bus Retrofill with Emax 2 (RF) for both fixed and withdrawable versions: the most traditional retrofit kit for which the entire Emax circuit-breaker must be dismantled. The kit comprises an Emax 2 circuit-breaker equipped with special terminals to fit the existing busbars.

The kits allow the new apparatus to be adapted to the dimensional characteristics of the existing compartments. Retrofit kit versions available for New Emax air circuit-breakers:

Retrofit kits available		**X1**			**E2**				**E3**				**E4**			**E6**
Rated Current - Iu [A]		630	630	800		1250	800		1250	1250	800		3200	3200	5000	5000
		800	800	1250	1600	1600	1000		1600	1600	1250	4000	4000	4000	6300	6300
		1000	1000		2000	2000	1250		2000	2000	1600					
		1250	1250				1600	2500	2500	2500	2000					
		1600	1600				2000	3200	3200	3200	2500					
											3200					
Version	**Pole**	**X1B**	**X1N**	**E1N**	**E2B**	**E2N**	**E2S**	**E3N**	**E3S**	**E3H**	**E3V**	**E4S**	**E4H**	**E4V**	**E6H**	**E6V**
Fixed	3P	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF		
	4P	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF					
Withdrawable	3P	RF	RF	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR
	4P	RF	RF	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR	RF/DR

Emax

1996 new family of Emax air circuit-breakers was launched and became greatly appreciated for its reliability and high performance: for the very first time, the protection functions were fully electronic. In addition, Emax was the first series of ABB SACE air circuit-breakers to bear the UL mark.

The Emax air circuit-breaker family was equipped with overcurrent protection for AC installations available in three types of microprocessor-based releases:

- PR111 with protection functions only
- PR112 with protection, current measurement and dialogue functions
- PR113 with a complete set of functions for protection, measurement, signalling, control and dialogue.

In 2016 the last specific type of Emax was also declared obsolete.

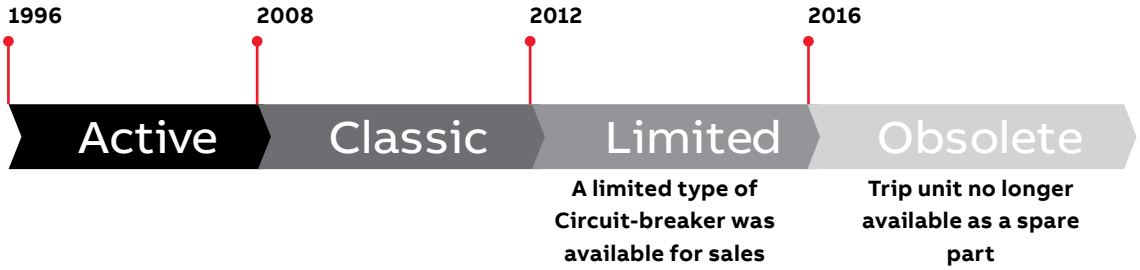
Emax

		E1		E2		E3			E4		E6	
		E1B	**E1N**	**E2B**	**E2N**	**E3N**	**E3S**	**E3H**	**E4S**	**E4H**	**E6H**	**E6V**
Iu [A]		800	800	1600	1250	2500	1250	1250	4000	3200	5000	4000
		1250	1250	2000	1600	3200	1600	1600		4000	6300	5000
					2000		2000	2000				6300
							2500	2500				
							3200	3200				
Icu [kA]	**660/690V**	36	36	42	55	65	75	85	75	85	100	100
	500V	36	36	42	55	65	75	100	75	100	100	100
	440V	42	50	42	65	65	75	100	75	100	100	150
	380/415V	42	50	42	65	65	75	100	75	100	100	150
	220/230V	42	50	42	65	65	75	100	75	100	100	150
Ics [kA]	**660/690V**	36	36	42	55	65	75	85	75	85	100	100
	500V	36	36	42	55	65	75	85	75	100	100	100
	440V	42	50	42	65	65	75	85	75	100	100	125
	380/415V	42	50	42	65	65	75	85	75	100	100	125
	220/230V	42	50	42	65	65	75	85	75	100	100	125
Icw [kA]	1s	36	36	42	55	65	75	75	75	100	100	100

Emax

LCM

Emax life cycle management



Emax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**New Product/ Replacement**	**Retrofit kits**
Obsolete	o (no Trip units available for spares)	○	○	-	○

○ available in 2021 but verify before ordering
- no longer available

Today Emax is obsolete and no longer produced but it can be easily upgraded to New Emax and Emax 2 using both advanced and basic retrofit kit solutions:

- Direct replacement with Emax 2 (DR) from E1 800 to E6 3200A
- Hard Bus Retrofill with Emax 2 (RF) for both fixed and withdrawable versions: the most traditional retrofit kit for which the entire Emax circuit-breaker must be dismantled.
  The kit comprises an Emax 2 circuit-breaker equipped with special terminals to fit the existing busbars. The kits are available for both fixed and withdrawable circuit-breaker versions
- Direct replacement with New Emax E1…E6 for withdrawable version and replacement with New Emax for fixed version.

The kits allow the new apparatus to be adapted to the dimensional characteristics of the existing compartments.

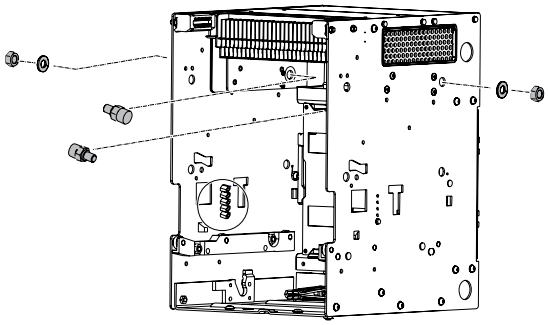
Retrofit kits available		**E1**		**E2**			**E3**				**E4**		**E6**	
Rated Current - Iu [A]		800	800		1250	1250		1250	1250			3200	5000	5000
		1250	1250	1600	1600	1600		1600	1600		4000	4000	6300	6300
				2000	2000			2000	2000	2000				
							2500	2500	2500	2500				
							3200	3200	3200					
Version	**Pole**	**E1B**	**E1N**	**E2B**	**E2N**	**E2L**	**E3N**	**E3S**	**E3H**	**E3L**	**E4S**	**E4H**	**E6H**	**E6V**
Fixed	**3P**	RF	RF	RF	RF	Rep*	RF	RF	RF	Rep*	RF	RF	RF	RF
	4P	RF	RF	RF	RF	Rep*	RF	RF	RF	Rep*	RF	RF	RF	RF
Withdrawable	**3P**	RF/DR	RF/DR	RF/DR	RF/DR	DR*	RF/DR	RF/DR	RF/DR	DR*	RF/DR	RF/DR	RF/DR	RF/DR
	4P	RF/DR	RF/DR	RF/DR	RF/DR	DR*	RF/DR	RF/DR	RF/DR	DR*	RF/DR	RF/DR	RF/DR	RF/DR

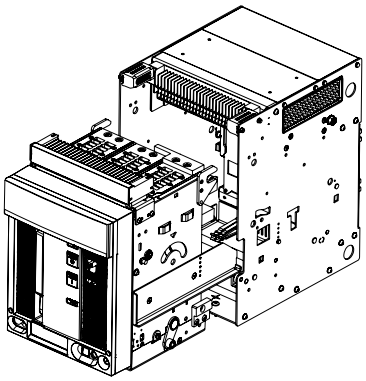
Rep* replacement with new Emax
* DR with new Emax

Emax/New Emax → Emax 2
Direct Replacement

Launched in 2019, the Direct Replacement retrofitting kit consists of a special Emax 2 mobile part developed and tested in the ABB service factory. ABB has developed this advanced retrofit solution to replace Emax/New Emax air circuit-breakers in a very short time: less than 30 minutes.
The solution is available for both 3-pole and 4-pole circuit-breaker versions.

It has been designed to fit correctly inside the Emax/New Emax fixed part and includes:
- Sliding contacts
- Mechanical signalling
- Anti-insertion locks
- Racking in/out lever
- Kit for door adaptation.





Performance for automatic circuit-breaker

Emax / New Emax	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @440V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
E1B	800	3p/4p	E2.2	B	1600	800	42	42	42	42
	1000*	3p/4p	E2.2	B	1600	1000	42	42	42	42
	1250	3p/4p	E2.2	B	1600	1250	42	42	42	42
	1600*	3p/4p	E2.2	B	1600	-	42	42	42	42
E1N	800	3p/4p	E2.2	N	800	-	50	50	50	50
	1000*	3p/4p	E2.2	N	1000	-	50	50	50	50
	1250	3p/4p	E2.2	N	1250	-	50	50	50	50
	1600*	3p/4p	E2.2	N	1600	-	50	50	50	50
E2B	1600	3p/4p	E2.2	B	1600	-	42	42	42	42
	2000	3p/4p	E2.2	B	2000	-	42	42	42	42
E2N	1000*	3p/4p	E2.2	N	1000	-	65	65	55	55
	1250	3p/4p	E2.2	N	1250	-	65	65	55	55
	1600	3p/4p	E2.2	N	1600	-	65	65	55	55
	2000	3p/4p	E2.2	N	2000	-	65	65	55	55
E2S*	800*	3p/4p	E2.2	S	800	-	85	85	65	65
	1000*	3p/4p	E2.2	S	1000	-	85	85	65	65
	1250*	3p/4p	E2.2	S	1250	-	85	85	65	65
	1600*	3p/4p	E2.2	S	1600	-	85	85	65	65
	2000*	3p/4p	E2.2	S	2000	-	85	85	65	65
E3N	2500	3p/4p	E4.2	N	3200	2500	65	65	65	65
	3200	3p/4p	E4.2	N	3200	-	65	65	65	65
E3S	1000*	3p/4p	E4.2	H	3200	1000	75	75	75	75
	1250	3p/4p	E4.2	H	3200	1250	75	75	75	75
	1600	3p/4p	E4.2	H	3200	1600	75	75	75	75
	2000	3p/4p	E4.2	H	3200	2000	75	75	75	75
	2500	3p/4p	E4.2	H	3200	2500	75	75	75	75
	3200	3p/4p	E4.2	H	3200	-	75	75	75	75
E3H	800*	3p/4p	E4.2	V	2000	800	100 (1)	100 (1)	85	85
	1000*	3p/4p	E4.2	V	2000	1000	100 (1)	100 (1)	85	85
	1250	3p/4p	E4.2	V	2000	1250	100 (1)	100 (1)	85	85
	1600	3p/4p	E4.2	V	2000	1600	100 (1)	100 (1)	85	85
	2000	3p/4p	E4.2	V	2000	-	100 (1)	100 (1)	85	85
	2500	3p/4p	E4.2	V	2500	-	100 (1)	100 (1)	85	85
	3200	3p/4p	E4.2	V	3200	-	100 (1)	100 (1)	85	85
E3V*	800*	3p/4p	E4.2	V	2000	800	130 (2)	130 (2)	100 (3)	85
	1250*	3p/4p	E4.2	V	2000	1250	130 (2)	130 (2)	100 (3)	85
	1600*	3p/4p	E4.2	V	2000	1600	130 (2)	130 (2)	100 (3)	85
	2000*	3p/4p	E4.2	V	2000	-	130 (2)	130 (2)	100 (3)	85
	2500*	3p/4p	E4.2	V	2500	-	130 (2)	130 (2)	100 (3)	85
	3200*	3p/4p	E4.2	V	3200	-	130 (2)	130 (2)	100 (3)	85
E4S	4000	3p/4p	E4.2	H	4000 (4)	-	75	75	75	75
	3200	3p/4p	E4.2	V	3200	-	100	100	85	100
	4000	3p/4p	E4.2	V	4000 (4)	-	100	100	85	100
E6H	4000*	3p/4p	E6.2	H	4000	-	100	100	100	100
	5000	3p/4p	E6.2	H	5000	-	100	100	100	100
	6300	3p/4p	E6.2	H	6300	-	100	100	100	100
E6V	3200**	3p/4p	E6.2	V	4000	3200	125	125	100	100
	4000	3p/4p	E6.2	V	4000	-	125	125	100	100
	5000	3p/4p	E6.2	V	5000	-	125	125	100	100
	6300	3p/4p	E6.2	V	6300	-	125	125	100	100

* Version available only for New Emax
** Version available only for Old Emax
(1) Ics= 85 kA; (2) Ics = 100 kA; (3) Ics = 85 kA; (4) derating to 3800A

Emax/New Emax → Emax 2
Direct Replacement

Performance for switch disconnectors

Emax/New Emax	Iu [A]	Poles	Emax 2	Performance Level	Iu [A]	Icw (1s) [kA]
E1B/MS	800	3p/4p	E2.2/MS	B	1600	42
	1000*	3p/4p	E2.2/MS	B	1600	42
	1250	3p/4p	E2.2/MS	B	1600	42
	1600*	3p/4p	E2.2/MS	B	1600	42
E1N/MS	800	3p/4p	E2.2/MS	N	800	50
	1000*	3p/4p	E2.2/MS	N	1000	50
	1250	3p/4p	E2.2/MS	N	1250	50
E2B/MS	1600*	3p/4p	E2.2/MS	N	1600	50
	1600	3p/4p	E2.2/MS	B	1600	42
	2000	3p/4p	E2.2/MS	B	2000	42
E2N/MS	1000*	3p/4p	E2.2/MS	N	1000	55
	1250	3p/4p	E2.2/MS	N	1250	55
	1600	3p/4p	E2.2/MS	N	1600	55
	2000	3p/4p	E2.2/MS	N	2000	55
E2S/MS	800*	3p/4p	E2.2/MS	S	800	65
	1000*	3p/4p	E2.2/MS	S	1000	65
	1250*	3p/4p	E2.2/MS	S	1250	65
	1600*	3p/4p	E2.2/MS	S	1600	65
	2000*	3p/4p	E2.2/MS	S	2000	65
E3N/MS	2500	3p/4p	E4.2/MS	N	3200	65
	3200	3p/4p	E4.2/MS	N	3200	65
E3S/MS	1000*	3p/4p	E4.2/MS	H	3200	75
	1250	3p/4p	E4.2/MS	H	3200	75
	1600	3p/4p	E4.2/MS	H	3200	75
	2000	3p/4p	E4.2/MS	H	3200	75
	2500	3p/4p	E4.2/MS	H	3200	75
	3200	3p/4p	E4.2/MS	H	3200	75
E3V/MS	800*	3p/4p	E4.2/MS	V	2000	85
	1250*	3p/4p	E4.2/MS	V	2000	85
	1600*	3p/4p	E4.2/MS	V	2000	85
	2000*	3p/4p	E4.2/MS	V	2000	85
	2500*	3p/4p	E4.2/MS	V	2500	85
	3200*	3p/4p	E4.2/MS	V	3200	85
E4S/MS	4000	3p/4p	E4.2/MS	H	4000 (1)	75
E4H/MS	3200	3p/4p	E4.2/MS	V	3200	100
	4000	3p/4p	E4.2/MS	V	4000 (1)	100
E6H/MS	4000	3p/4p	E6.2/MS	H	4000	100
	5000	3p/4p	E6.2/MS	H	5000	100
	6300	3p/4p	E6.2/MS	H	6300	100

* Version available only for New Emax
(1) derating 3800 A

Protection functions Emax/New Emax

Protection functions	PR111/P LI, LSI, LSIG	PR112/P LI, LSIG	PR113/P LSI, LSIG	PR121/P LI, LSI LSIG	PR122/P LSI, LSIG	PR123/P LSI, LSIG	Ekip DIP LI, LSI LSIG	Ekip Touch LI, LSI LSIG	Ekip Hi-Touch LI, LSI LSIG
Overload - L									
Inverse long-time delayed trip	●	●	●	●	●	●	●	●	●
Thermal memory	-	●	●	-	●	●	●	●	●
Time-delayed overcurrent - S									
Constant tripping time (t=k)	●	●	●	●	●	●	●	●	●
Constant specific let-through energy (t=k/I^2)	●	●	●	●	●	●	●	●	●
Thermal memory	-	●	-	●	●	●	●	●	
Start-up function	-	-	●	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●	-	●	●
Instantaneous overcurrents - I									
Constant tripping time (t=k)	●	●	●	●	●	●	●	●	●
Start-up function	-	-	●	-	●	●	-	●	●
Ground fault - G									
Constant tripping time (t=k)	-	●	●	●	●	●	●	●	●
Constant specific let-through energy (t=k/I^2)	●	●	●	●	●	●	●	●	●
Start up function	-	-	●	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●	-	●	●
Ground fault on toroid (Gext)	-	●	●	-	●	●	-	●	●
Directional protection - D	-	-	○	-	-	●	-	-	●
Current imbalance	-	●	●	-	●	●	-	●	●
Power Control	-	-	-	-	-	-	-	○	○
Network analyser	-	-	-	-	-	-	-	-	●
Real-time monitoring and protection									
Current	-	●	●	-	●	●	○	●	●
Voltage - Power - Energy - Frequency	-	-	○	-	○	●	-	○	●
Maintenance indicators and records	-	○	●	-	●	●	●	●	●
Communication capability	-	○	○	-	○	○	-	○	○

● Standard features

○ Features available when installing additional devices or using special releases

Emax/New Emax → Emax 2
Direct Replacement

Emax → Emax 2 Protection functions

Emax Trip unit correspondence		→ Emax 2 Trip unit	
PR111/P - LI		→ Ekip Dip - LI or higher	
PR111/P - LSI		→ Ekip Dip - LSI or higher	
PR111/P - LSIG		→ Ekip Dip - LSIG or higher	
PR112/P - LSI		→ Ekip Touch - LSI with Ekip Signalling	
PR112/P - LSIG		→ Ekip Touch - LSIG with Ekip Signalling	
PR112/PDM - LSI		→ Ekip Touch - LSI with Ekip Signalling + Ekip Com Modbus RTU *	
PR112/PDM - LSIG		→ Ekip Touch - LSIG with Ekip Signalling + Ekip Com Modbus RTU *	
PR112/PDL - LSI		→ No replacement	
PR112/PDL - LSIG		→ No replacement	
PR113/P - LSIG		→ Ekip Hi-Touch - LSIG with Ekip Signalling	
PR113/PDM - LSIG		→ Ekip Hi-Touch - LSIG with Ekip Signalling + Ekip Com Modbus RTU *	

* Emax 2 Dialog unit has a different Modbus Protocol interface. Replacement requires modification of Scada systems for use of new parameters (not included)

New Emax → Emax 2 Protection functions

New Emax Trip unit correspondence		→ Emax 2 Trip unit	
PR121/P - LI		→ Ekip DIP - LI or higher	
PR121/P - LSI		→ Ekip DIP - LSI or higher	
PR121/P - LSIG		→ Ekip DIP - LSIG or higher	
PR122/P - LI		→ Ekip Touch - LI or higher	
PR122/P - LSI		→ Ekip Touch - LSI or higher	
PR122/P - LSIG		→ Ekip Touch - LSIG or higher	
PR120/V		→ Ekip Supply	
PR123/P - LSI		→ Ekip Hi Touch - LSI	
PR123/P - LSIG		→ Ekip Hi Touch - LSIG	

* Emax 2 Dialog unit has a different Modbus Protocol interface. Replacement requires modification of Scada systems for use of new parameters (not included)

Accessories and compatibility:
The majority of Emax/New Emax mechanical and electrical accessories can be replaced with Emax 2 ones.

Emax/New Emax		Emax 2
YO (shunt opening release)	→	Emax 2 standard YO
YO2 (second shunt opening release)	→	Emax 2 standard YO2 (alternative YU)
YC (shunt closing release)	→	Emax 2 standard YC
YU (undervoltage release)	→	Emax 2 standard YU
Time-delay device D	→	Emax 2 UVD - cubicle rewiring is required
M (motor for charging springs)	→	Emax 2 standard M (spring charge motor)
SOR Test Unit	→	Emax 2 YO/YU Test Unit - rewiring is required
Electrical signalling of electronic releases tripped S51	→	Emax 2 contact signalling tripping of Ekip protection TU S51/1
External Current sensor for neutral	→	Emax 2 Current sensor for neutral conductor outside CB - cubicle rewiring is required
Homopolar toroid for the main power supply earthing conductor	→	Emax 2 Homopolar toroid for the main power supply earthing conductor - cubicle rewiring is required
Toroid for residual current protection * *	→	Emax 2 Toroid for residual current protection - cubicle rewiring is required
Mechanical operation counter	→	Emax 2 standard MOC
Key lock in open position	→	Emax 2 standard KLC
Padlocks in open position	→	Emax 2 standard PLC
Lock in racked-in/test isolated/racked-out position	→	Emax 2 standard KLP
IP54 door protection	→	Emax 2 standard IP54
AUX Q1…Q10 (O/C auxiliary contacts)	→	AUX Q4 (O/C - standard supply) + AUX Q6 (O/C)
AUX Q1…Q15 (external O/C auxiliary contacts)	→	Re-use those of the Emax/New Emax fixed part (adaptation kit for 15 AUX is required) (1)
AUX spring charged (S33M/2)	→	Emax 2 standard S33M/2
AUX CB racked-in/test isolated/racked-out S75I-S75T-S75E	→	Re-use those of the Emax/New Emax fixed part
AUX YU (YU energised)	→	Emax 2 RTC - check compatibility before ordering
PR120/K Electrical signalling contacts for TU **	→	Emax 2 Ekip Signalling 2K - 4K - 10K (10K to install outside the circuit-breaker)
PR020/K Electrical signalling contacts for TU *	→	Emax 2 Ekip Signalling 2K - 4K - 10K (10K to install outside the circuit-breaker)
PR120/V Measurement module for PR122/P **	→	Emax 2 Ekip Measuring/Ekip Measuring pro for Ekip Touch (feature available as standard with Ekip Hi-Touch)
PR120/D Communication modules *	→	Emax 2 Ekip Com modules - cubicle rewiring is required to install Ekip Cartridge

* Accessories available only for Emax
** Accessories available only for New Emax
(1) The adaptation kit to install the Emax/New Emax 15Q Auxiliary contacts for the E4 version will be available from 01/07/2020

The following accessories, on the other hand, are not compatible with these retrofit kit solutions
- Mechanical locks for compartment door;
- Mechanical interlock system with other CBs;
- All accessories of the Emax 2 fixed part.

Emax/New Emax → Emax 2
Direct Replacement

Accessories and compatibility

Ekip Cartridge for DR Emax/New Emax to Emax 2
With standard Emax 2, Ekip Modules are placed on the sliding contacts of its cradle.
But in the case of direct replacement, the Emax 2 standard fixed part is not involved in matching between the Emax 2 moving part and Emax/New Emax fixed part.

To solve this issue, ABB developed a tailored Ekip Cartridge for Emax/New Emax to Emax 2 direct replacement with special cables to connect the sliding contacts present on the Emax/New Emax fixed part in order to access signal switching between the breaker and the Ekip Modules. Ekip Cartridge for DR Emax/New Emax to Emax 2 has special cables to connect it to the female sliding contact of the existing fixed part in order to allow signal switching between the breaker and the Ekip Modules after having installed the Direct Replacement.
Make sure that Ekip Cartridge for DR Emax/New Emax to Emax 2 is not the same as that of Tmax XT series nor as that of direct replacement Megamax/Novomax to Emax 2. it is a dedicated accessory of the retrofit kit tailored to work correctly with the Direct Replacement and the existing Emax/New Emax fixed part.

Example of order

Case 1:
accessories not needed
Existing circuit-breaker:
E1B 1250A 3p PR111/P LSI withdrawable version with fixed part still in good conditions.
Need to replace for direct replacement with Emax 2.

Part number	Description
1SDA113547R1	DR E2.2B16-OldE1B12 3p W EkipDipLSI

Case 2:
accessories needed
Existing circuit-breaker E3N 2500A 4p PR123/P LSIG withdrawable version with fixed part still in good condition and equipped with the following accessories:

- opening coil (YO@220Vac),
- closing coil (YC@220Vac),
- undervoltage release (YU@110Vac)
- spring charging motor (M@220Vac)
- Padlock

E3N 2500A 4p PR123/P LSIG + YO (220V) + YC (220V) + YU (110V) + M (220V).
Additional modules are also required:
EKIP CARTRIDGE + Ekip Supply (110V) + Ekip Com Ethernet.
Need to replace for direct replacement with Emax 2.

Part number	Description
1SDA113510R1	DR E4.2H32-New E3S25 4p W with acc.
Technical Note for the order: Accessories installed on Breaker	
1SDA107533R1	Ekip Hi-Touch LSIG
1SDA073674R1	YO 220Vac
1SDA073687R1	YC 220Vac
1SDA073698R1	YU 110Vac
1SDA073725R1	M 250Vac
1SDA073841R1	Padlock PLP
1SDA073698R1	Ekip cartridge
1SDA073725R1	Ekip Supply
1SDA073841R1	Ekip Com Ethernet

Emax → New Emax
Direct Replacement

The Direct Replacement retrofitting kit consists of a special New Emax moving part developed and tested in the ABB service factory to 100% replicate the Emax (old) moving part. ABB has developed this solution that copies the electrical scheme of Emax(old) on the New Emax moving part so that no modification is required on the Emax (old) fixed part: This is an advanced retrofit solution for quick replacement of Emax air circuit-breaker as, from a dimensional point of view, Emax and New Emax are very similar products. Moreover, there is also no need to adapt the switchboard panel door.
Direct replacement retrofit kits between Emax (old) and New Emax are available for all Emax sizes. But, since New Emax is no longer an active product, ABB suggests investing in advanced solutions with Active products like direct replacement with Emax 2.

This kit has been designed to fit correctly inside the Emax fixed part and includes:
- Anti-insertion locks
- Racking in/out lever
- Updated electrical scheme to match the Emax (old) fixed part

This solution is recommended for E2L and E3L breakers for which a kit with Emax 2 does not exist.

IMPORTANT NOTES:
The 10 O/C AUX for PR122 and PR123 are not compatible with the Emax/new Emax Direct replacement solution.
For more details see the document: 1SDC001125L0201 (https://library.e.abb.com/public/4d38c2e131eb4e1499f76338ea65f910/1SDC001125L0201_Service%20Note_Retrofitting_Old%20Emax%20vs%20New%20Emax.pdf)

ABB Service is also available to evaluate replacement using an Emax 2 without limiting versions. A study may be required on adaptation of switchgear and plant.

Emax/New Emax → Emax 2
Hard Bus Retrofill

Launched in 2015, the Emax/New Emax to Emax 2 hard bus retrofill retrofit kits have been designed to completely replace the existing circuit-breakers by upgrading the systems to the latest ABB air circuit-breaker series Emax 2.

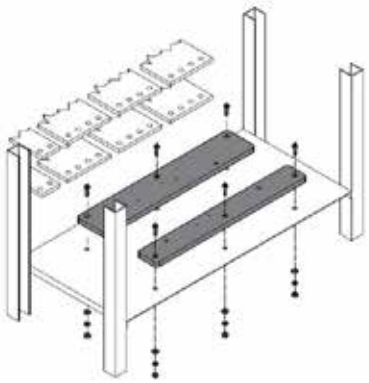
Hard bus retrofill kits require complete disassembly of the Emax/New Emax breaker, both fixed and moving parts in the case of the withdrawable version and the complete breaker in the case of the fixed version. The kits include a special adapter to fix the new breaker in the same Emax/New Emax fixing points so that there is no need to drill the switchboard.

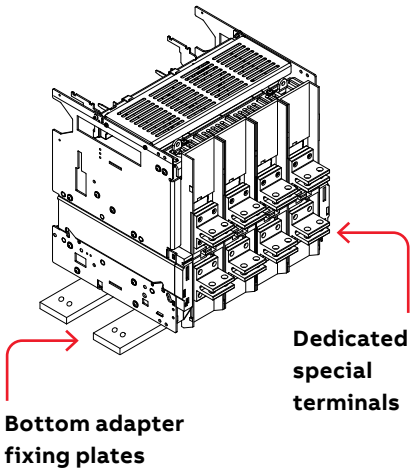
Contents of the kit
For withdrawable version, the retrofit kit consists of:

- Special Emax 2 fixed part with dedicated terminals to connect the breaker easily to the existing switchboard busbars (no modification required on the busbar system)
- Insulating supports
- Bottom plates to fix the Emax 2 in the same Emax/New Emax fixing points
- Adhesive template and metal adapters for panel door cutout
- Mounting instructions and conversion wiring diagram.

For the fixed version, the kit includes the Emax 2 circuit-breaker with:

- Special kits for upper and lower terminals to easily install the new circuit-breaker on existing switchboard busbars (no modification required on the busbar system). During the ordering phase, 2 kits are required: one for upper and one for lower terminals.
- Bottom plates to fix Emax 2 in the same Emax/New Emax fixing points.
- Some versions could have insulating supports adhesive template and metal adapters for panel door cutout.





Emax/New Emax → Emax 2
Hard Bus Retrofill

Withdrawable with Horizontal Rear Terminals

New Emax	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @440V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
X1B	630	3p/4p	E1.2	B	630		42	42	42	42
X1B	800	3p/4p	E1.2	B	800		42	42	42	42
X1B	1000	3p/4p	E1.2	B	1000		42	42	42	42
X1B	1250	3p/4p	E1.2	B	1250		42	42	42	42
X1B	1600	3p/4p	E1.2	B	1600		42	42	42	42
X1N	630	3p/4p	E1.2	N	630		65 (1)	65 (1)	50 (2)	42
X1N	800	3p/4p	E1.2	N	800		65 (1)	65 (1)	50 (2)	42
X1N	1000	3p/4p	E1.2	N	1000		65 (1)	65 (1)	50 (2)	42
X1N	1250	3p/4p	E1.2	N	1250		65 (1)	65 (1)	50 (2)	42
X1N	1600	3p/4p	E1.2	N	1600		65 (1)	65 (1)	50 (2)	42
E1B	800	3p/4p	E2.2	B	1600	800	42	42	42	42
E1B	1000	3p/4p	E2.2	B	1600	1000	42	42	42	42
E1B	1250	3p/4p	E2.2	B	1600	1250	42	42	42	42
E1N	800	3p/4p	E2.2	N	800		50	50	50	50
E1N	1000	3p/4p	E2.2	N	1000		50	50	50	50
E1N	1250	3p/4p	E2.2	N	1250		50	50	50	50
E2B	1600	3p/4p	E2.2	B	1600		42	42	42	42
E2B	2000	3p/4p	E2.2	B	2000		42	42	42	42
E2N	1000	3p/4p	E2.2	N	1000		65	65	55	55
E2N	1250	3p/4p	E2.2	N	1250		65	65	55	55
E2N	1600	3p/4p	E2.2	N	1600		65	65	55	55
E2N	2000	3p/4p	E2.2	N	2000		65	65	55	55
E2S	2000	3p/4p	E2.2	S	2000		85	85	65	65
E3H	800	3p/4p	E4.2	H	4000	800	100 (3)	100 (3)	85	75
E3H	1000	3p/4p	E4.2	H	4000	1000	100 (3)	100 (3)	85	75
E3H	1250	3p/4p	E4.2	H	4000	1250	100 (3)	100 (3)	85	75
E3H	1600	3p/4p	E4.2	H	4000	1600	100 (3)	100 (3)	85	75
E3H	2000	3p/4p	E4.2	H	4000	2000	100 (3)	100 (3)	85	75
E3H	2500	3p/4p	E4.2	H	4000	2500	100 (3)	100 (3)	85	75
E3H	3200	3p/4p	E4.2	H	4000	3200	100 (3)	100 (3)	85	75
E3N	2500	3p/4p	E4.2	N	4000	2500	65	65	65	65
E3N	3200	3p/4p	E4.2	N	4000	3200	65	65	65	65
E3S	1000	3p/4p	E4.2	H	3200	1000	75	75	75	75
E3S	1250	3p/4p	E4.2	H	3200	1250	75	75	75	75
E3S	1600	3p/4p	E4.2	H	3200	1600	75	75	75	75
E3S	2000	3p/4p	E4.2	H	3200	2000	75	75	75	75
E3S	2500	3p/4p	E4.2	H	4000	2500	75	75	75	75
E3S	3200	3p/4p	E4.2	V	4000	3200	75	75	75	75
E3V	800	3p/4p	E4.2	V	2000	800	130 (4)	130 (4)	100 (3)	85
E3V	1250	3p/4p	E4.2	V	2000	1250	130 (4)	130 (4)	100 (3)	85
E3V	1600	3p/4p	E4.2	V	2000	1600	130 (4)	130 (4)	100 (3)	85
E3V	2000	3p/4p	E4.2	V	2000		130 (4)	130 (4)	100 (3)	85
E3V	2500	3p/4p	E4.2	V	2500		130 (4)	130 (4)	100 (3)	85
E3V	3200	3p/4p	E4.2	V	3200		130 (4)	130 (4)	100 (3)	85
E4H	3200	3p	E4.2	V	3200		100	100	85	100
E4H	4000	3p/4p	E4.2	V	4000		100	100	85	100
E4S	4000	3p/4p	E4.2	H	4000		75	75	75	75
E4V	3200	3p/4p	E4.2	V	3200		150	150	100	100
E4V	4000	3p/4p	E4.2	V	4000		150	150	100	100
E6H	4000	3p/4p	E6.2	H	4000		100	100	100	100
E6H	5000	3p/4p	E6.2	H	5000		100	100	100	100
E6H	6300	3p/4p	E6.2	H	6300		100	100	100	100
E6V	4000	3p/4p	E6.2	V	4000		150	150 (5)	100	100
E6V	5000	3p/4p	E6.2	V	5000		150	150 (5)	100	100
E6V	6300	3p/4p	E6.2	V	6300		150	150 (5)	100	100

(1) Ics=50kA; (2) Ics=42kA; (3) Ics=85kA; (4) Ics=100kA; (5) Ics=125kA

Withdrawable with adjustable Horizontal/vertical Rear Terminals

New Emax	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @440V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
X1B	630	3p/4p	E1.2	B	630		42	42	42	42
X1B	800	3p/4p	E1.2	B	800		42	42	42	42
X1B	1000	3p/4p	E1.2	B	1000		42	42	42	42
X1B	1250	3p/4p	E1.2	B	1250		42	42	42	42
X1B	1600	3p/4p	E1.2	B	1600		42	42	42	42
X1N	630	3p/4p	E1.2	N	630		42 (1)	42 (1)	42 (2)	42
X1N	800	3p/4p	E1.2	N	800		50 (1)	50 (1)	50 (2)	42
X1N	1000	3p/4p	E1.2	N	1000		50 (1)	50 (1)	50 (2)	42
X1N	1250	3p/4p	E1.2	N	1250		50 (1)	50 (1)	50 (2)	42
X1N	1600	3p/4p	E1.2	N	1600		42 (1)	42 (1)	42 (2)	42

(1) Ics=50kA; (2): Ics=42kA

Emax/New Emax → Emax 2
Hard Bus Retrofill

Withdrawable version with Vertical Rear Terminals

New Emax	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @440V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
E2B	1600	3p/4p	E2.2	B	1600		42	42	42	42
E2B	2000	3p/4p	E2.2	B	2000		42	42	42	42
E2N	1000	3p/4p	E2.2	N	1000		65	65	55	55
E2N	1250	3p/4p	E2.2	N	1250		65	65	55	55
E2N	1600	3p/4p	E2.2	N	1600		65	65	55	55
E2N	2000	3p/4p	E2.2	N	2000		65	65	55	55
E2S	800	3p/4p	E2.2	S	800		85	85	65	65
E2S	1000	3p/4p	E2.2	S	1000		85	85	65	65
E2S	1250	3p/4p	E2.2	S	1250		85	85	65	65
E2S	1600	3p/4p	E2.2	S	1600		85	85	65	65
E2S	2000	3p/4p	E2.2	S	2000		85	85	65	65
E3H	800	3p/4p	E4.2	H	4000	800	100	100	85	75
E3H	1000	3p/4p	E4.2	H	4000	1000	100	100	85	75
E3H	1250	3p/4p	E4.2	H	4000	1250	100	100	85	75
E3H	1600	3p/4p	E4.2	H	4000	1600	100	100	85	75
E3H	2000	3p/4p	E4.2	H	4000	2000	100	100	85	75
E3H	2500	3p/4p	E4.2	H	4000	2500	100	100	85	75
E3H	3200	3p/4p	E4.2	H	4000	3200	100	100	85	75
E3N	2500	3p/4p	E4.2	N	4000	2500	65	65	65	65
E3N	3200	3p/4p	E4.2	N	4000	3200	65	65	65	65
E3S	1000	3p/4p	E4.2	S	4000	1000	75	75	75	75
E3S	1250	3p/4p	E4.2	S	4000	1250	75	75	75	75
E3S	1600	3p/4p	E4.2	S	4000	1600	75	75	75	75
E3S	2000	3p/4p	E4.2	S	4000	2000	75	75	75	75
E3S	2500	3p/4p	E4.2	S	4000	2500	75	75	75	75
E3S	3200	3p/4p	E4.2	S	4000	3200	75	75	75	75
E3V	800	3p/4p	E4.2	V	2000	800	130	130	100	85
E3V	1250	3p/4p	E4.2	V	2000	1250	130	130	100	85
E3V	1600	3p/4p	E4.2	V	2000	1600	130	130	100	85
E3V	2000	3p/4p	E4.2	V	2000		130	130	100	85
E3V	2500	3p/4p	E4.2	V	2500		130	130	100	85
E3V	3200	3p/4p	E4.2	V	3200		130	130	100	85
E4H	3200	3p	E4.2	V	3200		100	100	85	100
E4H	4000	3p	E4.2	V	4000		100	100	85	100
E4S	4000	3p	E4.2	S	4000		75	75	75	75
E4V	3200	3p	E4.2	V	3200		150	150	100	100
E4V	4000	3p	E4.2	V	4000		150	150	100	100
E6H	4000	3p/4p	E6.2	H	4000		100	100	100	100
E6H	5000	3p/4p	E6.2	H	5000		100	100	100	100
E6H	6300	3p/4p	E6.2	H	6300		100	100	100	100
E6V	4000	3p/4p	E6.2	V	4000		150	150	100	100
E6V	5000	3p/4p	E6.2	V	5000		150	150	100	100
E6V	6300	3p/4p	E6.2	V	6300		150	150	100	100

Fixed version with Horizontal Rear Terminals

New Emax	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @440V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
X1B	630	3p/4p	E1.2	B	630		42	42	42	42
X1B	800	3p/4p	E1.2	B	800		42	42	42	42
X1B	1000	3p/4p	E1.2	B	1000		42	42	42	42
X1B	1250	3p/4p	E1.2	B	1250		42	42	42	42
X1B	1600	3p/4p	E1.2	B	1600		42	42	42	42
X1N	630	3p/4p	E1.2	N	630		65	65	50	42
X1N	800	3p/4p	E1.2	N	800		[65]	65	50	42
X1N	1000	3p/4p	E1.2	N	1000		65	65	50	42
X1N	1250	3p/4p	E1.2	N	1250		65	65	50	42
X1N	1600	3p/4p	E1.2	N	1600		65	65	50	42
E1B	800	3p/4p	E2.2	B	1600	800	42	42	42	42
E1B	1000	3p/4p	E2.2	B	1600	1000	42	42	42	42
E1B	1250	3p/4p	E2.2	B	1600	1250	42	42	42	42
E1B	1600	3p/4p	E2.3	B	1600		42	42	42	42
E1N	800	3p/4p	E2.2	N	800		50	50	50	50
E1N	1000	3p/4p	E2.2	N	1000		50	50	50	50
E1N	1250	3p/4p	E2.2	N	1250		50	50	50	50
E1N	1600	3p/4p	E2.3	N	1600		50	50	50	50
E2B	1600	3p/4p	E2.2	B	1600		42	42	42	42
E2B	2000	3p/4p	E2.2	B	2000		42	42	42	42
E2N	1000	3p/4p	E2.2	N	1000		65	65	55	55
E2N	1250	3p/4p	E2.2	N	1250		65	65	55	55
E2N	1600	3p/4p	E2.2	N	1600		65	65	55	55
E2N	2000	3p/4p	E2.2	N	2000		65	65	55	55
E2S	800	3p/4p	E2.2	S	800		85	85	65	65
E2S	1000	3p/4p	E2.2	S	1000		85	85	65	65
E2S	1250	3p/4p	E2.2	S	1250		85	85	65	65
E2S	1600	3p/4p	E2.2	S	1600		85	85	65	65
E2S	2000	3p/4p	E2.2	S	2000		85	85	65	65
E3H	800	3p/4p	E4.2	H	4000	800	100	100	85	75
E3H	1000	3p/4p	E4.2	H	4000	1000	100	100	85	75
E3H	1250	3p/4p	E4.2	H	4000	1250	100	100	85	75
E3H	1600	3p/4p	E4.2	H	4000	1600	100	100	85	75
E3H	2000	3p/4p	E4.2	H	4000	2000	100	100	85	75
E3H	2500	3p/4p	E4.2	H	4000	2500	100	100	85	75
E3H	3200	3p/4p	E4.2	H	4000	3200	100	100	85	75
E3N	2500	3p/4p	E4.2	N	4000	2500	65	65	65	65
E3N	3200	3p/4p	E4.2	N	4000	3200	65	65	65	65
E3S	1000	3p/4p	E4.2	H	4000	1000	75	75	75	75
E3S	1250	3p/4p	E4.2	H	4000	1250	75	75	75	75
E3S	1600	3p/4p	E4.2	H	4000	1600	75	75	75	75
E3S	2000	3p/4p	E4.2	H	4000	2000	75	75	75	75
E3S	2500	3p/4p	E4.2	H	4000	2500	75	75	75	75
E3S	3200	3p/4p	E4.2	V	4000	3200	75	75	75	75
E3V	800	3p/4p	E4.2	V	2000	800	130	130	100	85
E3V	1250	3p/4p	E4.2	V	2000	1250	130	130	100	85
E3V	1600	3p/4p	E4.2	V	2000	1600	130	130	100	85
E3V	2000	3p/4p	E4.2	V	2000		130	130	100	85
E3V	2500	3p/4p	E4.2	V	2500		130	130	100	85
E3V	3200	3p/4p	E4.2	V	3200		130	130	100	85
E4H	3200	3p	E4.2	V	3200		100	100	85	100
E4H	4000	3p	E4.2	V	4000		100	100	85	100
E4S	4000	3p	E4.2	H	4000		75	75	75	75
E4V	3200	3p	E4.2	V	3200		150	150	100	100
E4V	4000	3p	E4.2	V	4000		150	150	100	100
E6H	4000	3p	E6.2	H	4000		100	100	100	100
E6H	5000	3p	E6.2	H	5000		100	100	100	100
E6H	6300	3p	E6.2	H	6300		100	100	100	100
E6V	4000	3p	E6.2	V	4000		150	150	100	100
E6V	5000	3p	E6.2	V	5000		150	150	100	100
E6V	6300	3p	E6.2	V	6300		150	150	100	100

Emax/New Emax → Emax 2
Hard Bus Retrofill

Protection functions Emax/New Emax

Protection functions	PR111/P LI, LSI, LSIG	PR112/P LI, LSIG	PR113/P LSI, LSIG	PR121/P LI, LSI LSIG	PR122/P LSI, LSIG	PR123/P LSI, LSIG	Ekip DIP LI, LSI LSIG	Ekip Touch LI, LSI LSIG	Ekip Hi-Touch LI, LSI LSIG
Overload - L									
Inverse long-time delayed trip	●	●	●	●	●	●	●	●	●
Thermal memory	-	●	●	-	●	●	●	●	●
Time-delayed overcurrent - S									
Constant tripping time (t=k)	●	●	●	●	●	●	●	●	●
Constant specific let-through energy (t=k/I^2)	●	●	●	●	●	●	●	●	●
Thermal memory	-	●	-	●	●	●	●	●	
Start-up function	-	-	●	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●	-	●	●
Instantaneous overcurrents - I									
Constant tripping time (t=k)	●	●	●	●	●	●	●	●	●
Start-up function	-	-	●	-	●	●	-	●	●
Ground fault - G									
Constant tripping time (t=k)	-	●	●	●	●	●	●	●	●
Constant specific let-through energy (t=k/I^2)	●	●	●	●	●	●	●	●	●
Start up function	-	-	●	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●	-	●	●
Ground fault on toroid (Gext)	-	●	●	-	●	●	-	●	●
Directional protection - D	-	-	○	-	-	●	-	-	●
Current imbalance	-	●	●	-	●	●	-	●	●
Power Control	-	-	-	-	-	-	-	○	○
Network analyser	-	-	-	-	-	-	-	-	●
Real-time monitoring and protection									
Current	-	●	●	-	●	●	○	●	●
Voltage - Power - Energy - Frequency	-	-	○	-	○	●	-	○	●
Maintenance indicators and records	-	○	●	-	●	●	●	●	●
Communication capability	-	○	○	-	○	○	-	○	○

● Standard features
○ Features available when installing additional devices or using special releases

Protection functions

Emax/New Emax Trip unit correspondence		→ Emax 2 Trip unit	
PR111/P - LI		→ Ekip Dip - LI or higher	
PR111/P - LSI		→ Ekip Dip - LSI or higher	
PR111/P - LSIG		→ Ekip Dip - LSIG or higher	
PR112/P - LSI		→ Ekip Touch - LSI with Ekip Signalling	
PR112/P - LSIG		→ Ekip Touch - LSIG with Ekip Signalling	
PR112/PDM - LSI		→ Ekip Touch - LSI with Ekip Signalling + Ekip Com Modbus RTU *	
PR112/PDM - LSIG		→ Ekip Touch - LSIG with Ekip Signalling + Ekip Com Modbus RTU *	
PR112/PDL - LSI		→ No replacement	
PR112/PDL - LSIG		→ No replacement	
PR113/P - LSIG		→ Ekip Hi-Touch - LSIG with Ekip Signalling	
PR113/PDM - LSIG		→ Ekip Hi-Touch - LSIG with Ekip Signalling + Ekip Com Modbus RTU *	
PR121/P - LI		→ Ekip DIP - LI or higher	
PR121/P - LSI		→ Ekip DIP - LSI or higher	
PR121/P - LSIG		→ Ekip DIP - LSIG or higher	
PR122/P -LI		→ Ekip Touch - LI or higher	
PR122/P -LSI		→ Ekip Touch - LSI or higher	
PR122/P –LSIG		→ Ekip Touch - LSIG or higher	
PR120/V		→ Ekip Supply	
PR123/P -LSI		→ Ekip Hi Touch - LSI	
PR123/P –LSIG		→ Ekip Hi Touch - LSIG	

* Emax 2 Dialog unit has a different Modbus Protocol interface. Replacement requires modification of Scada systems for use of new parameters (not included).

Emax/New Emax → Emax 2
Hard Bus Retrofill

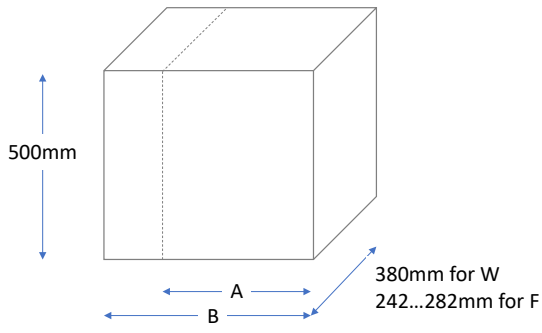
Accessories and compatibility

Emax/New Emax accessories	Emax 2 accessories
YO (shunt opening release)	Emax 2 standard YO
YO2 (second shunt opening release)	Emax 2 standard YO2 (alternative YU)
YC (shunt closing release)	Emax 2 standard YC
YU (undervoltage release)	Emax 2 standard YU
Time-delay device D	Emax 2 UVD - cubicle rewiring is required
M (motor for charging springs)	Emax 2 standard M (spring charge motor)
SOR Test Unit	Emax 2 YO/YU Test Unit - rewiring is required
Electrical signalling of electronic releases tripped S51	Emax 2 contact signalling tripping of Ekip protection TU S51/1
External Current sensor for neutral	Emax 2 Current sensor for neutral conductor outside CB - cubicle rewiring is required
Homopolar toroid for the main power supply earthing conductor	Emax 2 Homopolar toroid for the main power supply earthing conductor - cubicle rewiring is required
Toroid for residual current protection * *	Emax 2 Toroid for residual current protection - cubicle rewiring is required
Mechanical operation counter	Emax 2 standard MOC
Key lock in open position	Emax 2 standard KLC
Padlocks in open position	Emax 2 standard PLC
Lock in racked-in/test isolated/racked-out position	Emax 2 standard KLP
IP54 door protection	Emax 2 standard IP54
AUX Q1…Q10 (O/C auxiliary contacts)	AUX Q4 (O/C - standard supply) + AUX Q6 (O/C)
AUX Q1…Q15 (external O/C auxiliary contacts)	Re-use those of the Emax/New Emax fixed part (adaptation kit for 15 AUX is required) (1)
AUX spring charged (S33M/2)	Emax 2 standard S33M/2
AUX CB racked-in/test isolated/racked-out S75I-S75T-S75E	Re-use those of the Emax/New Emax fixed part
AUX YU (YU energised)	Emax 2 RTC - check compatibility before ordering
PR120/K Electrical signalling contacts for TU **	Emax 2 Ekip Signalling 2K - 4K - 10K (10K to install outside the circuit-breaker)
PR020/K Electrical signalling contacts for TU *	Emax 2 Ekip Signalling 2K - 4K - 10K (10K to install outside the circuit-breaker)
PR120/V Measurement module for PR122/P **	Emax 2 Ekip Measuring/Ekip Measuring pro for Ekip Touch (feature available as standard with Ekip Hi-Touch)
PR120/D Communication modules *	Emax 2 Ekip Com modules - cubicle rewiring is required to install Ekip Cartridge

* Accessories available only for Emax
** Accessories available only for New Emax
(1) The adaptation kit to install the Emax/New Emax 15Q Auxiliary contacts for the E4 version will be available.

Clearance

	A (3p)	B (4p)
E1	400	490
E2	400	490
E3	500	630
E4	700	790
E6	1000	1130



Example of order

Case 1:
accessories not needed

Existing circuit-breaker:
E2B 1600A 3p withdrawable version with vertical rear terminals.

Need to replace it to Emax 2 with hard bus retro-fill retrofit kits.
Emax 2 should be equipped with Ekip touch LSI trip unit.

Part number	Description	Comment
1SDA082694R1	RF E2.2 FP(VR) 2000 ≤ E2B/N/S 3p	Fixed part already equipped with dedicated terminals to adapt the connection to the existing busbars
1SDA072332R1	E2.2B 1600 Ekip Touch LSI 3p WMP	Standard moving part

Emax/New Emax → Emax 2
Hard Bus Retrofill

Case 2:
accessories needed
Existing circuit-breaker is E3S 1250A 3p with-drawable version with vertical rear terminals.
I want the new circuit-breaker to be equipped with the following accessories:
- Opening coil (YO@220Vac)
- The Emax 2 moving part needs to be equipped with the following accessories:
- Ekip Hi-Touch LSIG (black edition)
- Opening coil (YO @240Vac/dc)
- Closing coil (YC @240Vac/dc)
- Internal additional AUX O/C: 6Q 400Vac
- Ekip Com Hub module.

Part number	Description	Comment
1SDA082696R1	RF E4.2V FP(VR) 3200 < E3N/S/H 3p	Fixed part already equipped with dedicated terminals to adapt the connection to the existing busbars
1SDA072519R1	E4.2H 3200 Ekip Hi-Touch LSIG 3p WMP	Rating plug already included. Order the moving part equipped with the following accessories.
1SDA073668R1	YO E1.2..E6.2-XT7-XT7M 24Vac/dc	
1SDA073681R1	YC E1.2..E6.2-XT7M 24Vac/dc	
1SDA073756R1	AUX 6Q 400Vac E2.2...E6.2	
1SDA082894R1	Ekip Com Hub E1.2..E6.2	

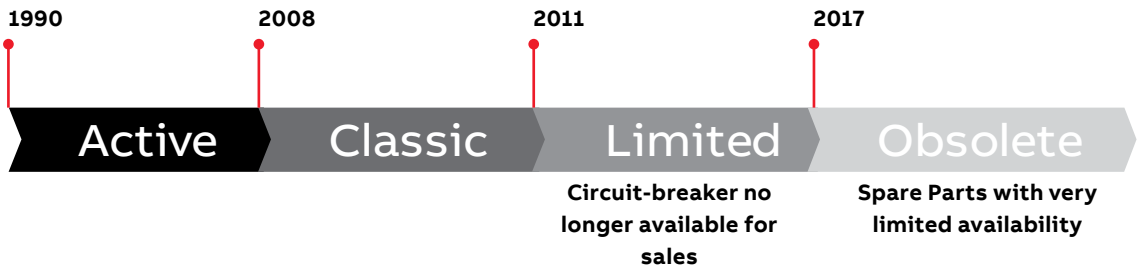
Megamax

Megamax

In 1988 ABB was founded as a major international electro technical group and SACE, following the merger between Swedish company Asea and Swiss company Brown Boveri, became ABB SACE. Launched a year after (1989) the establishment of ABB, Megamax was the first ABB SACE air circuit-breaker released onto the market. After many years of production, Megamax was declared obsolete and no longer sold in 2016.

Megamax had great success in the worldwide market. Even today you can find Megamax still working.
However, the availability of spare parts/accessories is decreasing and maintenance might not be effective any more. For this reason, ABB has developed retrofit solutions (advanced and basic) to replace Megamax circuit-breakers.

Megamax life cycle management



Megamax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**Repair**	**New Product/ Replacement**
Obsolete	o (no Trip units available for spares)	-**	-**	-	-

o available in 2020 but verify before ordering
- no longer available
* verify before ordering due to limited availability
** only ordinary maintenance

Megamax circuit-breakers were available with 2 different racking in and out mechanisms: Open door (OD) and Closed door (CD).
The difference between the 2 solutions is that in the first case (Open door), it is mandatory to open the panel door to rack the circuit-breaker moving part in or out (Fig 1). The racking in/out lever has a “C” shape.

In the Closed door version, the panel door can instead be safety closed while the moving part is racking in or out (Fig 2). This last concept of device racking in/out is typical today among the newest circuit-breaker families.
Since the Closed door version is safer than the Open door, with ABB Emax 2 retrofit kits it is possible to upgrade the racking in/out mechanism.

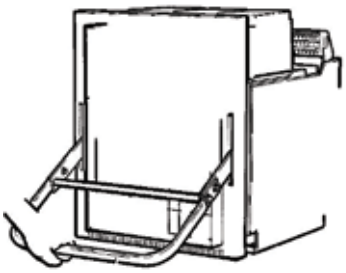


Fig 1

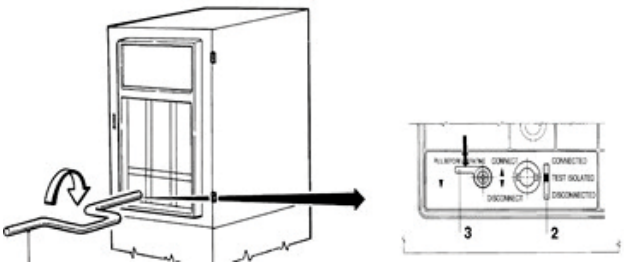


Fig 2

Retrofit kit solutions for Megamax
ABB has created different retrofit solutions to support customers when a Megamax breaker needs to be replaced:

- Hard bus retrofill with Emax 2: the most traditional retrofit kit for which the entire Megamax circuit-breaker must be dismantled. The kit comprises a new Emax 2 circuit-breaker equipped with special terminals to fit the existing busbars. The kits are available for both fixed and withdrawable circuit-breaker versions.
- Cradle in cradle with Emax 2: only for Megamax F5: the kit consists of a special Emax 2 fixed part to be fixed tightly to the Megamax F5 fixed part. A standard Emax 2 moving part completes the breaker.
- Direct replacement with Emax 2: the most advanced retrofit solution: only the moving part of Megamax needs to be removed. A special version of the Emax 2 moving part is supplied by ABB to be racked in/ out of the standard Megamax fixed part. This solution is available for Megamax F1, F2, F4.

Retrofit kits available

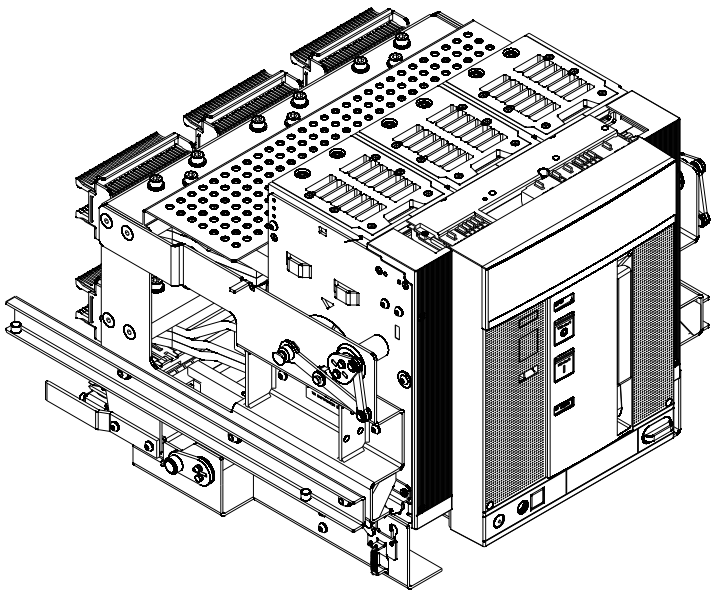
		F1						F2				F3	F4		F5		F6	
Rated Current [A]		1250			1250			2000			2500	2000	3200	3600	3200		6300	
		1600			1600			2500			3000	2500			4000			
		2000										3000			5000			
Version	**Pole**	**F1B**	**F1N**	**F1S**	**F1H**	**F1V**	**F1L**	**F2H**	**F2V**	**F2L**	**F2S**	**F3S**	**F4S**	**F4S**	**F5S**	**F5H**	**F6S**	**F6H**
Fixed	3P	RF	RF	RF	RF	-	-	RF	-	-	RF	RF	RF	RF	RF	RF	-	-
	4P	RF	RF	RF	RF	-	-	RF	-	-	RF	RF	RF	RF	RF	RF	-	-
Withdrawable	3P	RF-DR	RF-DR	RF-DR	RF-DR	-	-	RF-DR	-	-	RF-DR(1)	RF	RF-DR	RF-DR	RF-CiC(2)	RF-CiC(2)	-	-
	4P	RF-DR	RF-DR	RF-DR	RF-DR	-	-	RF-DR	-	-	RF-DR(1)	RF	RF-DR	RF-DR	RF-CiC(2)	RF-CiC(2)	RF	RF

(1) Direct Replacement available only for F2S 2500A
(2) Cradle in Cradle available only for the 3200...4000A versions

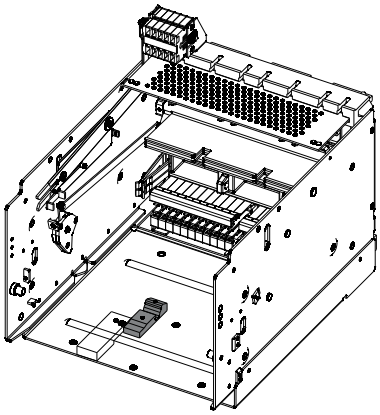
Megamax F1-F2-F4 → Emax 2
Direct replacement

ABB has developed advanced retrofit solutions to replace Megamax in a very short time: less than 30 minutes.
Thanks to this innovative solution, there is no need to disassemble the Megamax fixed part.
Production of the direct replacement starts with a new circuit-breaker in fixed version. It is modified directly in the ABB factory to become a special moving part with the Megamax racking in/out mechanism perfectly replicated.
The activities left to the customer are to adapt the panel door and to rack-in the new moving part.
A special Emax 2 moving part that immediately replaces the Megamax moving part is equipped with the following default configuration:

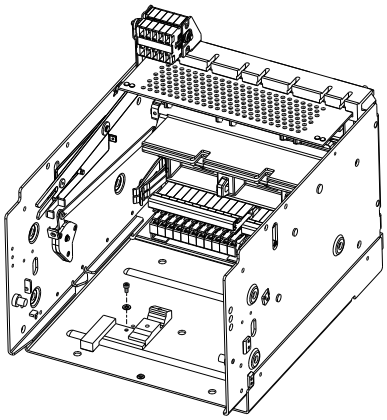
- Emax 2 breaker with dedicated bars, adapting kit and jaw-type contacts to replicate the Megamax moving part.
- The Emax 2 draw-out mechanism can replicate the Megamax in/test/out positions by using Emax 2 drawing in/out racking lever.
- Megamax standard male left and right side sliding contacts to connect with female parts on the Megamax fixed part: all the wirings are already included.
- The moving part is always provided with activating levers for the Megamax standard Open/Closed Auxiliary contacts installed on the fixed part.
- Dedicated wiring solutions according to the original trip unit installed on the Megamax.



TIP: if the user wants to replace the open door (OD) mechanism with the closed door (CD) one, this is possible using the Direct Replacement retrofit kit for F1 and F2 Closed Door with Emax 2. It is mandatory to verify the presence of the component indicated in grey in the following picture on the Megamax Fixed:



If this component is included, the kit allows the addition of an adaptor to convert the racking mechanism from open to closed door:



Megamax F1-F2-F4 → Emax 2
Direct replacement

Megamax automatic air circuit-breakers

Megamax W (CD)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F1B	1250	3p/4p	E2.2	B	1600	1250	40	40	35	40
	1600	3p/4p			1600		40	40	35	40
	2000	3p/4p			2000		40	40	35	40
F1N	1250	3p/4p	E2.2	N	1250		50*	40	35	40
	1600	3p/4p			1600		50**	40	35	40
	2000	3p/4p			2000		50**	40	35	40
F1S	1250	3p/4p	E2.2	N	1250		55	50	45	45
	1600	3p/4p			1600		55	50	45	45
	2000	3p/4p			2000		55	50	45	45
F1H	1250	3p/4p	E2.2	H	1250		85	70	55	20
	1600	3p/4p			1600		85	70	55	20
F2S	2500	3p/4p	E2.2	N	2500*		50	40	35	40
F2H	2000	3p/4p	E2.2	H	2000		85	70	55	20
	2500	3p/4p			2500*		85	70	55	20
F4S	3200	3p/4p	E4.2	H	3200		75	75	65	65
	3600	3p/4p			4000	3600	80	75	65	65

* Derating up to 2400A only for fixed part with horizontal rear terminals; no derating with fixed part equipped with vertical rear terminals
** Ics=40kA
W (CD) withdrawable closed door version

Megamax switch disconnectors

Megamax W (CD)	Iu [A]	Poles	Emax 2/MS	Emax 2 Performance level	Iu [A]	Icw 1s [kA] @690V
F1B/MS	1250	3p/4p	E2.2/MS	B	1600	40
	1600	3p/4p			1600	40
	2000	3p/4p			2000	40
F1N/MS	1250	3p/4p	E2.2/MS	N	1250	40
	1600	3p/4p			1600	40
	2000	3p/4p			2000	40
F1S/MS	1250	3p/4p	E2.2/MS	N	1250	50
	1600	3p/4p			1600	50
	2000	3p/4p			2000	50
F2S/MS	2500	3p/4p	E2.2/MS	N	2500 (1)	65
F4S/MS (3)	3200	3p/4p	E4.2/MS	H	3200	65
	3600	3p/4p			4000 (2)	65

(1) 2400A for fixed part with horizontal rear terminals. No derating for vertical terminals. (2)=3600A
(3) Icu 1s @415V for F4S/MS 3200A=75kA, F4S/MS 3600A=80kA
W (CD) withdrawable closed door version

Trip Unit Protections correspondence

Protection functions	AR1 LI	AR1 LS	PR1/P LI, LSI LSIG	PR1/P with PR1/A LI, LSI LSIG	PR1/P with PR1/C LI, LSI LSIG	PR1/P with PR1/C and PR1/D LI, LSI LSIG	Ekip DIP LI, LSI LSIG	Ekip Touch LI, LSI LSIG	Ekip Hi-Touch 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	-	-	-	-	●	●	-	●	●
Ground fault ext	-	-	-	-	-	-	-	●	●
Ground fault - 2G	-	-	-	-	-	-	-	-	●
Instantaneous overcurrent - 2I	-	-	-	-	-	-	-	-	●
Time-delayed overcurrent - S2	-	-	-	-	-	-	-	-	●
Directional overcurrent - D	-	-	-	-	-	-	-	-	●
Current Unbalance	-	-	-	-	-	-	-	●	●
Power Control	-	-	-	-	-	-	-	○	○
Network analyser	-	-	-	-	-	-	-	-	●
Real-time monitoring and protection									
Voltage - Power - Energy - Frequency -	-	-	-	-	○	○	-	○	●
Communication capability	-	-	-	-	-	○	-	○	○

● Available and integrated
○ Available with additional device
- Not available

Other measurements are available with:
- Ekip Touch c/w Ekip Measuring Pro
- Ekip Hi-Touch: voltage module is connected to lower terminals.

For connection to upper terminals, add the dedicated part number (see Emax 2 catalogue).

Megamax F1-F2-F4 → Emax 2
Direct replacement

Accessories compatibility

Megamax		**Emax 2**
YO (shunt opening release)	→	Emax 2 standard YO
YO2 (shunt opening release)	→	Emax 2 standard YO2 (alternative YU)
YC (shunt closing release)	→	Emax 2 standard YC
YU (undervoltage release)	→	Emax 2 standard YU
M (motor for charging springs)	→	Emax 2 standard Spring charge motor
Q1…Q25 (O/C AUX contacts)	→	Use those of Megamax fixed part
AUX Spring charged (S33M)	→	Emax 2 standard S33 M/2
AUX CB tripped - S51/1	→	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)
CB tripped mechanical indication	→	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)
AUX YU (YU energized)	→	Emax 2 RTC contact - Check compatibility before ordering
TV051 (voltage transformer)	→	No longer available - same function in Ekip Hi Touch, Ekip Touch with Ekip Measuring
MegamaxShutter padlock device	→	Megamax shutter padlock
Key lock/ Padlock in open position	→	Emax 2 standard - KLC/PLC
Key lock/Padlock in racked in/out position	→	Emax 2 standard - KLP*
Mechanical operation counter	→	Emax 2 standard - MOC
IP54 door protection	→	Emax 2 standard - IP54
Transparent protective cover for O/C	→	Emax 2 standard - PBC
Mechanical interlock system with other CBs	→	Not compatible
Time-delay device D	→	Emax 2 UVD - Re-wiring required on the cubicle
SOR Test Unit	→	Emax 2 YO/YU Test Unit - Rewiring required
PR1/A (Amperometric Unit)	→	Same functionality available with Ekip DIP, Ekip Touch, Ekip Hi-Touch with Ekip Multimeter
PR1/C (Control unit)	→	Same functionality available with Ekip Touch or Ekip Hi-Touch
PR1/D (Dialog unit)	→	Same functionality available with Ekip Touch or Ekip Hi-Touch

* only for Closed Door version (CD)

The following accessories guarantee more functions:
- External Plug Socket for the introduction of Zone Selectivity Gzi/Gzo - Szi/Szo features
- Ekip Cartiridge connected to a Plug Socket that can be installed on a DIN guide for the applications of Ekip Modules.

These accessories are dedicated for this Direct Replacement solution and have to be ordered already mounted on the factory.

Emax 2 Accessories incompatible with the Direct Replacement retrofit kit
ATS (due to mechanical interlock)
Homopolar toroid
Mechanical lock for compartment door
Mechanical interlock
Lock for in/test/out positions
Insum com module is no longer available but other protocols are available. In the case of new protocols, a SCADA adaptation is required
Megamax TV 051 (voltage transformer) is no longer available. Use internal Ekip Measuring Pro module
All Emax 2 fixed part accessories

Emax 2 Accessories that can be installed but need to be externally cabled with local adaptation YO/YU Test Unit
Current sensor for neutral conductor outside the circuit-breaker
Remote reset YR
Ekip Multimeter
Ekip View
Ekip Control Panel

Checks before ordering

The conditions of the Megamax fixed part MUST be good. In particular, the following must be checked:
- clamps, terminals and their protective coating must be undamaged, with no traces of repulsion, short-circuiting or corroded copper
- plastic support that houses the terminals must not be cracked, broken or deformed
- condition of the opening mechanism of the terminal shutters: check that it moves smoothly and that the levers are not broken or deformed
- Racking-in guides of the moving part must be in good condition and not damaged. Lubricate if necessary.

For a more complete check, ABB has prepared an easy guide to understand the conditions of your Megamax fixed part:
https://new.abb.com/low-voltage/service/service-for-low-voltage-products/extension-upgrades-and-retrofits/selector
When the Megamax fixed part is not fully working, the best retrofitting solution is the Hard Bus Retrofill.

Megamax F1-F2-F4 → Emax 2
Direct replacement

Example of order

Case 1:
accessories not needed – OPEN DOOR version
Existing circuit-breaker: Megamax F2S 2500A OPEN DOOR 3-pole withdrawable version with fixed part still in good condition.
Need to replace with direct replacement with Emax 2. Ekip DIP LSI trip unit is enough:

Part number	Description
1SDA114698R1	DR E2.2N2500-F2S2500 3p W OD EkipDipLSI

Case 2:
accessories not needed – CLOSED DOOR version
Existing circuit-breaker: Megamax F2S 2500A CLOSED DOOR 3-pole withdrawable version with fixed part still in good condition.
Need to replace with direct replacement with Emax 2. Ekip DIP LSI trip unit is enough:

Part number	Description
1SDA080736R1	DR E2.2N2500-F2S2500 3p W CD EkipDipLSI

Case 3:
accessories needed – OPEN DOOR version
Existing 3-pole circuit-breaker Megamax Open door F2S 2500A, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@110Vac),
- closing coil (YC@110Vac),

I also want to have Ekip touch LSIG trip unit:

Part number	Description
1SDA114567R1	DR E2.2N2500-F2S2500 3p W OD with acc
Technical Note for the order: Accessories installed on Breaker	
1SDA107531R1	Ekip Touch LSIG E1.2..E6.2 Ed.2
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073685R1	YC E1.2..E6.2-XT7M 110-120Vac/dc

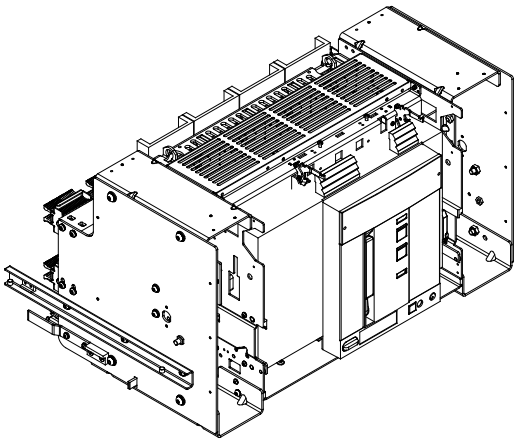
Case 4:
accessories needed – CLOSED DOOR version
Existing 3-pole circuit-breaker Megamax Open door F4S 3200A, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@110Vac),
- closing coil (YC@110Vac),

I also want to have Ekip touch LSIG trip unit and Ekip Supply, Ekip Com HUB module and measuring package.

Part number	Description
1SDA107700R1	DR E4.2H3200-F4S3200 3P W CD WITH ACC
Technical Note for the order: Accessories installed on Breaker	
1SDA107531R1	Ekip Touch LSIG E1.2..E6.2 Ed.2
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073685R1	YC E1.2..E6.2-XT7M 110-120Vac/dc
	Ekip cartridge for DR F4
1SDA074172R1	Ekip Supply 110-240Vac
1SDA082894R1	Ekip Com HUB
1SDA107525R1	Measuring package

Megamax F5 → Emax 2
Cradle in Cradle

The huge dimensions of the fixed part of the Megamax F5 allows the use of a cradle in cradle retrofit kit where a special Emax 2 fixed part is fixed inside the Megamax cradle.
The cradle in cradle retrofit kit consists in replacing only the Megamax circuit-breaker moving part with a modified Emax 2 fixed and moving part ready to be fitted in the Megamax fixed part.



The kit is available for Megamax F5 in withdrawable version, 3 and 4 poles.
The Megamax F5 cradle in cradle retrofit kit consists of:

- Special Emax 2 E4.2 fixed part that is solidly connected to the Megamax fixed part. The new fixed part also includes sliding contacts with 4Q and dedicated wiring for 6Q).
- Kit for door adaptation
- Racking-in/out lever
- Assembly instructions and electric interconnection diagrams.

A standard Emax 2 Moving Part, that has to be purchased separately, can be easily racked in/out of the new fixed part.

Megamax automatic air circuit-breakers

Megamax W (CD)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F5S	3200	3p/4p	E4.2	V	3200		100	100	75	100
F5S	4000	3p/4p			4000*		100	100	75	100
F5S	5000	3p/4p			4000*		100	100	75	100
F5H	3200	3p/4p	E4.2	V	3200		120	100	85	100
F5H	4000	3p/4p			4000*		120	100	85	100
F5H	5000	3p/4p			4000*		120	100	85	100

* Derating up to 3600A

Megamax switch disconnectors

Megamax W (CD)	Iu [A]	Poles	Emax 2 MS	Emax 2 Performance level	Iu [A]	"Icw 1s [kA] @690V"
F5S/MS	3200	3p/4p	E4.2/MS	V	3200	100
	4000	3p/4p			4000*	100
	5000	3p/4p			4000*	100
F5H/MS	3200	3p/4p	E4.2/MS	V	3200	100
	4000	3p/4p			4000*	100
	5000	3p/4p			4000*	100

* Derating up to 3600A

Megamax F5 → Emax 2
Cradle in Cradle

Trip Unit Protections correspondence

	Megamax						Emax 2		
Protection functions	**AR1 LI**	**AR1 LS**	**PR1/P LI, LSI LSIG**	**PR1/P with PR1/A LI, LSI LSIG**	**PR1/P with PR1/C LI, LSI LSIG**	**PR1/P with PR1/C and PR1/D LI, LSI LSIG**	**Ekip DIP LI, LSI LSIG**	**Ekip Touch LI, LSI LSIG**	**Ekip Hi-Touch 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	-	-	-	-	●	●	-	●	●
Ground fault ext	-	-	-	-	-	-	-	●	●
Ground fault - 2G	-	-	-	-	-	-	-	-	●
Instantaneous overcurrent - 2I	-	-	-	-	-	-	-	-	●
Time-delayed overcurrent - S2	-	-	-	-	-	-	-	-	●
Directional overcurrent - D	-	-	-	-	-	-	-	-	●
Current Unbalance	-	-	-	-	-	-	-	●	●
Power Control	-	-	-	-	-	-	-	○	○
Network analyser	-	-	-	-	-	-	-	-	●
Real-time monitoring and protection									
Voltage - Power - Energy - Frequency -	-	-	-	-	○	○	-	○	●
Communication capability	-	-	-	-	-	○	-	○	○

● Available and integrated
○ Available with additional device
- Not available

Amphenol Plug on Megamax Fixed Part cannot be used. Remove it.
Other measurements are available with:
- Ekip Touch c/w Ekip Measuring Pro
- Ekip Hi-Touch: voltage module is connected to lower terminals. For connection to upper terminals, add the dedicated part number (see Emax 2 catalog).

* Insum com module is not available. Other protocols are available. SCADA adaptation is required Megamax TV 051 (voltage transformer) is no longer available. Use internal Ekip Measuring Pro module.

Accessories compatibility

Megamax		Emax 2
YO (shunt opening release)	→	Emax 2 standard YO
YO2 (shunt opening release)	→	Emax 2 standard YO2 (alternative YU)
YC (shunt closing release)	→	Emax 2 standard YC
YU (undervoltage release)	→	Emax 2 standard YU
M (motor for charging springs)	→	Emax 2 standard Spring charge motor
Q1…Q25 (O/C AUX contacts)	→	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
AUX CB tripped - S51/1	→	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 (on request)
CB tripped mechanical indication	→	Emax 2 standard - TU reset (standard supply for automatic CBs)
AUX CB connected/ insulated position - S75S-S75I	→	Emax 2 AUP - Necessary a re-wiring to accessorise the Megamax/Novomax FP
AUX YU (YU energized)	→	Emax 2 RTC contact - Check compatibility before ordering
TV051 (voltage transformer)	→	No longer available - same function in Ekip Hi Touch, Ekip Touch with Ekip Measuring
Megamax Shutter padlock device	→	Emax 2 Shutter lock – SL
Key lock/ Padlock in open position	→	Emax 2 standard - KLC/PLP
Key lock/Padlock in racked in/out position	→	Emax 2 standard - KLP/PLP
Mechanical operation counter	→	Emax 2 standard - MOC
IP54 door protection	→	Emax 2 standard - IP54
Transparent protective cover for O/C	→	Emax 2 standard - PBC
Mechanical interlock system with other CBs	→	Not compatible
Time-delay device D	→	Emax 2 UVD - Re-wiring required on the cubicle
SOR Test Unit	→	Emax 2 YO/YU Test Unit - Rewiring required
PR1/A (Amperometric Unit)	→	Same functionality available with Ekip DIP, Ekip Touch, Ekip Hi-Touch with Ekip Multimeter
PR1/C (Control unit)	→	Same functionality available with Ekip Touch or Ekip Hi-Touch
PR1/D (Dialog unit)	→	Same functionality available with Ekip Touch or Ekip Hi-Touch. The Ekip COM module is needed

Megamax F5 → Emax 2
Cradle in Cradle

Emax 2 Accessories incompatible with the Cradle in Cradle retrofit kit
Mechanical lock for compartment door
Mechanical interlock system with other CB
All accessories of the Emax 2 fixed part, except for the contacts for signalling of circuit-breaker in racked-in, are incompatible

Emax 2 Accessories that can be installed but need to be externally cabled with local adaptation YO/YU Test Unit
Current sensor for neutral conductor outside the circuit-breaker
Remote reset YR
Ekip Multimeter
Ekip View
Ekip Control Panel

Checks before ordering

The conditions of the Megamax fixed part MUST be good. In particular, the following must be checked:

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

For a more complete check, ABB has prepared an easy guide to understand the conditions of your Megamax fixed part:
https://search.abb.com/library/Download.aspx?DocumentID=1SDH001279R0002&LanguageCode=en&DocumentPartId=&Action=Launch
When the Megamax fixed part is not fully working, the best retrofitting solution is the Hard Bus Retrofill.

Minimum cubicle dimensions to be verified before ordering

Clearance for circuit-breakers within compartment					
	[mm]	**A**	**B**	**C**	**D**
F5	3p	150	350	150	756
	4p	150	350	150	871

The "C" dimension is the minimum distance from the circuit-breaker to insulate or earthed wall protected with min. 3 mm thick insulating sheet.

- Data are applicable for use with service voltage of 690 V or less
- The compartment height refers to upper walls protected with an insulating sheet.

The circuit-breakers must only be installed in a vertical position.

Example of order

Case 1:
accessories not needed
Existing circuit-breaker: Megamax F5H 3200A 4-pole withdrawable version with fixed part still in good condition.
Need to replace with cradle in cradle retrofit kit with Emax 2.

Part number	Description
1SDA105326R1	CiC E4.2V 3200-F5S/H 3200 4p W FP

+ order a standard Emax 2 moving part (e.g.: 1SDA073156R1)

Case 2:
accessories needed
Existing 4-pole circuit-breaker Megamax F5S 3200A equipped with S2 trip unit, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@60Vac/dc),
- closing coil (YC@60Vac/dc),
- undervoltage release (YU@60Vac/dc)
- spring charging motor (M@48-60Vac/dc)

I also want to have Ekip touch LSIG trip unit + Ekip Supply 110-240V + Ekip Com HUB + Ekip com Modbus RS-485 + Measuring package + 15 racked in AUX:

Part number for CiC	Description
1SDA105326R1	CiC E4.2V 3200-F5S/H 3200 4p W FP
Equipped with the following accessory:	
1SDA114753R1	15Q AUX 400V RACKED IN

Part number for moving part	Description
1SDA073156R1	E4.2V 3200 Ekip Touch LSIG 4p WMP
Add the following accessories:	
1SDA073671R1	YO E1.2..E6.2-XT7-XT7M 60Vac/dc
1SDA073684R1	YC E1.2..E6.2-XT7M 60Vac/dc
1SDA073697R1	YU E1.2..E6.2-XT7-XT7M 60Vac/dc
1SDA073730R1	M E2.2...E6.2 48-60Vac/dc + MC 24V
1SDA074172R1	Ekip Supply 110-240Vac/dc E1.2..E6.2-XT
1SDA082894R1	Ekip Com Hub E1.2..E6.2
1SDA074150R1	Ekip Com Modbus RS-485 E1.2..E6.2
1SDA107525R1	SW Measuring package for Emax 2

Megamax → Emax 2
Hard Bus Retrofill

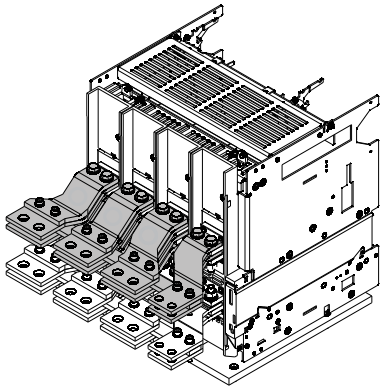
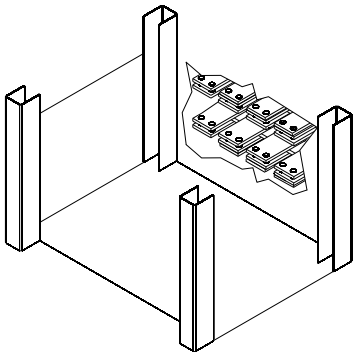
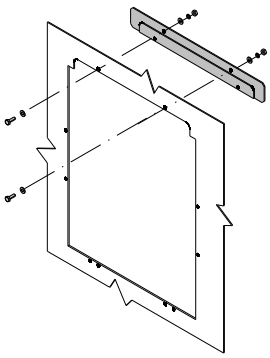
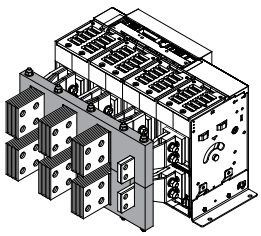
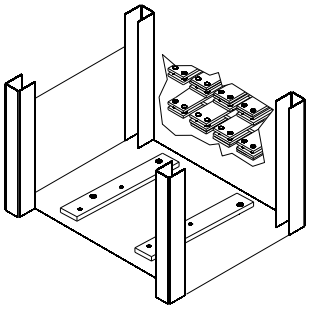
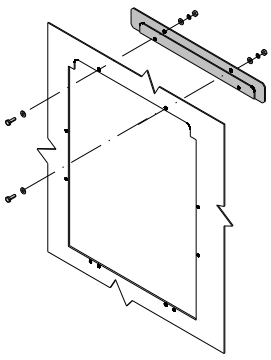
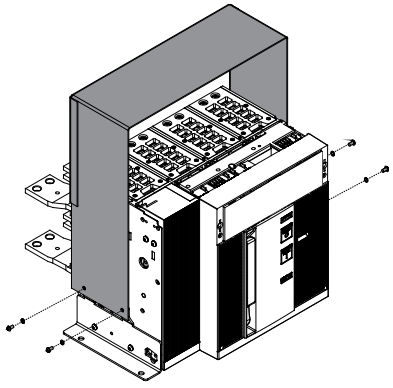
The Hard Bus Retrofill is the easiest solution to install and guarantees a safe switchgear upgrade when advanced retrofit solutions are not available or applicable. The kit consists of a special adaptation kit that allows you to connect the new generation Emax 2 circuit-breaker to the existing switchgear and is suitable for circuit- breakers and switch disconnectors both fixed and withdrawable version.
The result of this combination is a new asset capable of satisfying the customer's needs in the era of industry 4.0.
The kit is available for Megamax in:

- Withdrawable version: 3 and 4 poles. Terminals: rear horizontal (HR), rear vertical (VR), front (F)
- Fixed version: 3 and 4 poles. Terminals: rear horizontal (HR), rear vertical (VR), front (F).

For detailed version see the tables below.

This retrofitting solution consists of:

- Adapting connection busbars designed to connect the Emax 2 to the existing switchgear busbars
- Adapting plates to fix the breaker in the same fixing points as the Megamax (when needed)
- Kit for door adaptation
- In some cases extra insulating material
- Assembly instructions and electric interconnection diagrams.

Withdrawable version with horizontal rear terminals

Megamax W (HR)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F1B	1250	3p/4p	E2.2	B	1600	1250	40	40	35	40
F1B	1600	3p/4p			1600		40	40	35	40
F1B	2000	3p/4p			2000		40	40	35	40
F1H	1250	3p/4p	E2.2	H	1250		85	70	55	20
F1H	1600	3p/4p			1600		85	70	55	20
F1N	1250	3p/4p	E2.2	N	1250		50	40	35	40
F1N	1600	3p/4p			1600		50	40	35	40
F1N	2000	3p/4p			2000		50	40	35	40
F1S	1250	3p/4p	E2.2	S	1250		55	50	45	50
F1S	1600	3p/4p			1600		55	50	45	50
F1S	2000	3p/4p			2000		55	50	45	50
F2H	2000	3p/4p	E2.2	H	2500	2000	85	70	55	25
F2H	2500	3p/4p			2500		85	70	55	30
F2S	2500	3p/4p	E2.2	S	2500		65	60	55	65
F3S	2000	3p/4p	E2.2	H	2500	2000	85	70	55	25
F3S	2500	3p/4p			2500		85	70	55	30
F4S	3200	3p/4p	E4.2	H	4000	3200	75	75	65	75
F5H	3200	3p/4p	E4.2	V	4000	3200	120	100	85	100
F5H	4000	3p/4p			4000		120	100	85	100
F5S	3200	3p/4p	E4.2	V	4000	3200	100	100	75	100
F5S	4000	3p/4p			4000		100	100	75	100

Withdrawable version with vertical rear terminals
Switch disconnector (MS) versions are also available

Withdrawable version with vertical rear terminals

Megamax W (VR)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F1B	1250	3p/4p	E2.2	B	1600	1250	40	40	35	40
F1B	1600	3p/4p			1600		40	40	35	40
F1B	2000	3p/4p			2000		40	40	35	40
F1H	1250	3p/4p	E2.2	H	1250		85	70	55	20
F1H	1600	3p/4p			1600		85	70	55	20
F1N	1250	3p/4p	E2.2	N	1250		50	40	35	40
F1N	1600	3p/4p			1600		50	40	35	40
F1N	2000	3p/4p			2000		50	40	35	40
F1S	1250	3p/4p	E2.2	S	1250		55	50	45	50
F1S	1600	3p/4p			1600		55	50	45	50
F1S	2000	3p/4p			2000		55	50	45	50
F2S	3000	3p/4p	E4.2	H	3200		75	75	65	65
F3S	3000	3p/4p	E4.2	H	3200		75	75	65	65
F4S	3600	3p/4p	E4.2	H	4000		75	75	65	75
F5H	5000	3p/4p	E6.2	H	5000		120	100	85	100
F5S	5000	3p/4p	E6.2	H	5000		100	100	75	100

*In max = 3920A
Switch disconnector (MS) versions are also available. Withdrawable version with vertical rear terminals

Megamax → Emax 2
Hard Bus Retrofill

Withdrawable version with front terminals

Megamax W Front	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F1B	1250	3p/4p	E2.2	B	1600	1250	40	40	35	40
F1B	1600	3p/4p			1600		40	40	35	40
F1B	2000	3p/4p			2000		40	40	35	40
F1H	1250	3p/4p	E2.2	H	1250		85	70	55	20
F1H	1600	3p/4p			1600		85	70	55	20
F1N	1250	3p/4p	E2.2	N	1250		50	40	35	40
F1N	1600	3p/4p			1600		50	40	35	40
F1N	2000	3p/4p			2000		50	40	35	40
F1S	1250	3p/4p	E2.2	S	1250		55	50	45	50
F1S	1600	3p/4p			1600		55	50	45	50
F1S	2000	3p/4p			2000		55	50	45	50
F2H	2000	3p/4p	E2.2	H	2500	2000	85	70	55	25
F2H	2500	3p/4p			2500		85	70	55	30
F2S	2500	3p/4p	E2.2	S	2500		65	60	55	65
F5S	5000	3p/4p	E6.2	H	5000		100	100	75	100
F5H	5000	3p/4p	E6.2	V	5000		120	100	85	100

Switch disconnector (MS) versions are also available

Fixed version with horizontal rear terminals

Megamax F (HR)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F1B	1250	3p/4p	E2.2	B	1600	1250	40	40	35	40
F1B	1600	3p/4p			1600		40	40	35	40
F1B	2000	3p/4p			2000		40	40	35	40
F1H	1250	3p/4p	E2.2	H	1250		85	70	55	20
F1H	1600	3p/4p			1600		85	70	55	20
F1N	1250	3p/4p	E2.2	N	1250		50	40	35	40
F1N	1600	3p/4p			1600		50	40	35	40
F1N	2000	3p/4p			2000		50	40	35	40
F1S	1250	3p/4p	E2.2	N	1250		50	40	35	40
F1S	1600	3p/4p			1600		50	40	35	40
F1S	2000	3p/4p			2000		50	40	35	40
F2H	2000	3p/4p	E2.2	H	2500	2000	85	70	55	25
F2H	2500	3p/4p			2500		85	70	55	30
F2S	2500	3p/4p	E2.2	N	2500		50	40	35	40
F3S	2000	3p/4p	E2.2	H	2500	2000	50	40	35	40
F3S	2500	3p/4p			2500		50	40	35	40
F4S	3200	3p/4p	E4.2	H	4000	3200	85	70	55	25
F5S	3200	3p/4p	E4.2	V	3200	-	100	100	75	100
FH5	3200	3p/4p			3200	-	120	100	85	100
F5S	4000	3p/4p	E4.2	V	4000	-	100	100	75	100
FH5	4000	3p/4p			4000	-	120	100	85	100
F5S	5000	3p/4p	E6.2	V	5000	-	100	100	75	100
FH5	5000	3p/4p			5000	-	120	100	85	100

Switch disconnector (MS) versions are also available

Fixed version with vertical rear terminals

Megamax F (VR)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F2S	3000	3p/4p	E4.2	N	3200		65	60	55	65
F3S	3000	3p/4p	E4.2	S	3200		75	75	65	65
F4S	3600	3p/4p	E4.2	H	4000	3600	80	75	65	80

Switch disconnector (MS) versions are also available

Fixed version with Front terminals

Megamax F (F)	Iu [A]	Poles	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]	Icw (1s) [kA]
F1S	2000	3p	E2.2	H	1600		55	50	45	50
F2S	2500	3p	E2.2	H	2500		55	50	45	50

Switch disconnector (MS) versions are also available

Megamax → Emax 2
Hard Bus Retrofill

Trip Unit Protections correspondence

	Megamax						**Emax 2**		
Protection functions	**AR1 LI**	**AR1 LS**	**PR1/P LI, LSI LSIG**	**PR1/P with PR1/A LI, LSI LSIG**	**PR1/P with PR1/C LI, LSI LSIG**	**PR1/P with PR1/C and PR1/D LI, LSI LSIG**	**Ekip DIP LI, LSI LSIG**	**Ekip Touch LI, LSI LSIG**	**Ekip Hi-Touch 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	-	-	-	-	●	●	-	●	●
Ground fault ext	-	-	-	-	-	-	-	●	●
Ground fault - 2G	-	-	-	-	-	-	-	-	●
Instantaneous overcurrent - 2I	-	-	-	-	-	-	-	-	●
Time-delayed overcurrent - S2	-	-	-	-	-	-	-	-	●
Directional overcurrent - D	-	-	-	-	-	-	-	-	●
Current Unbalance	-	-	-	-	-	-	-	●	●
Power Control	-	-	-	-	-	-	-	○	○
Network analyser	-	-	-	-	-	-	-	-	●
Real-time monitoring and protection									
Voltage - Power - Energy - Frequency -	-	-	-	-	○	○	-	○	●
Communication capability	-	-	-	-	-	○	-	○	○

● Available and integrated
○ Available with additional device
- Not available

Example of order

Case 1:
accessories not needed

Existing circuit-breaker:
F1B 1250A 3p withdrawable version with horizontal rear terminals.

Need to replace it with Emax 2 with hard bus retrofill retrofit kits.
Emax 2 should be equipped with Ekip touch LSI trip unit.

Part number	Description	Comment
1SDA082718R1	FP F1BNSH up 2000A 3p W(HR) -> E2.2BNNH	Fixed part already equipped with dedicated terminals to adapt the connection to the existing busbars
1SDA072332R1	E2.2B 1600 Ekip Dip LSI 3p WMP	Standard moving part

Case 2:
accessories needed

Existing circuit-breaker is F1B 1250A 3p withdrawable version with horizontal rear terminals.
I want the new circuit-breaker to be equipped with the following accessories:

- Retrofit kit (fixed part) with 5 additional position contacts < 24Vdc right and left.

The Emax 2 moving part needs to be equipped with the following accessories:

- Ekip Hi-Touch LSI (black edition)
- Opening coil (YO @220Vac/dc)
- Closing coil (YC 220Vac),
- Undervoltage release (YU 110V)
- Spring charging motor M – 220Vac
- Key lock in open position – KLC-D.

Part number	Description	Note
1SDA082718R1	FP F1BNSH up 2000A 3p W(HR) -> E2.2BNNH	Retrofit kit that includes the accessories to be added as a technical note to the order
1SDA073765R1	AUP 5 additional contacts 24Vdc SX E2.2...E6.2	To be added as loose accessories for the fixed part
1SDA073767R1	AUP 5 additional contacts 24Vdc DX E2.2... E6.2	To be added as loose accessories for the fixed part

Part number	Description
1SDA107532R1	Ekip Hi-Touch LSI (black)
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073685R1	YC E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073698R1	YU E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073724R1	M E2.2...E6.2 100-130Vac/dc
1SDA073791R1	KLC-D Key lock open E2.2...E6.2

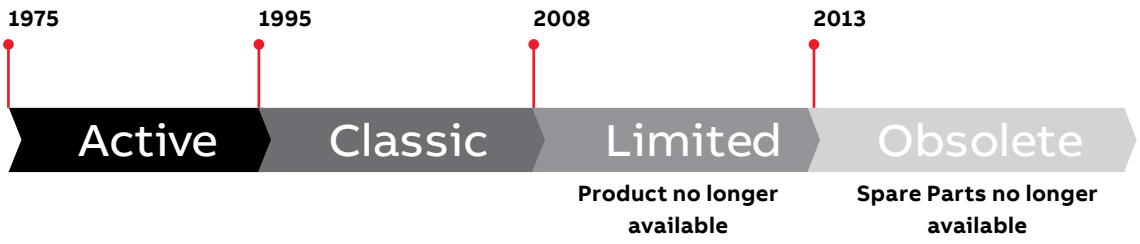
Novomax

Novomax

Air circuit-breaker series was launched in 1971. It was available in different versions and sizes.
SACE Novomax was presented as the most compact air circuit-breaker of that era. Solid and reliable, thanks to the availability of a range consisting of six frames (G30-G2-G3-G4-G5-G6), covered uninterrupted breaking capacity Iu up to 6300A models and guaranteed breaking capacity Icu up to 100kA at 660Vac. The range included T series thermal relays but it could be equipped with electronic relays, S1 and S2 series.

After many years of production, Megamax was declared obsolete and no longer sold from 2014. Novomax was a very robust product. You can still find it in use still working.
Its spare parts and accessories are no longer available today, so maintenance might no longer be effective.
For this reason ABB has developed retrofit solutions (advanced and basic) to replace Megamax circuit-breakers.

Novomax life cycle management



Megamax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**New Product/ Replacement**	**Retrofit kits**
Obsolete	- *	- *	-	-	●

- no longer available
* due to limited availability of spares, maintenance is increasingly difficult
● available

ABB has created different retrofit solutions to support customers when a Novomax breaker needs to be replaced:

Retrofit kits available

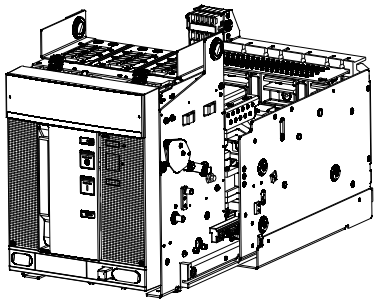
		G30	G2		G3	G4		G5	G6
Rated Current [A]		800	1250	2500	1600	3200	3600	3200	6300
		1250	1600	3000	2000		4000	4000	
		1600	2000		2500			4500	
					3000			5000	
Version	**Pole**								
Withdrawable	3P	DR	RF/DR	-	RF	RF	RF (2)	RF/CiC	RF
	4P	DR	RF/DR	-	RF	RF	RF (2)	RF/CiC	-
Fixed	3P		RF (1)	-	RF	RF	-	RF (3)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

(1) only 2000A version
(2) only 3600A version
(3) only 3200A and 4000A versions

Novomax → Emax 2
Direct Replacement and Cradle in Cradle

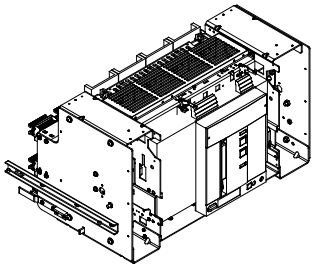
Many advanced retrofit kits have been developed for Novomax air circuit-breakers:
G30: ABB developed a specific direct replacement kit for the Novomax smallest size, G30, with the most modern and compact Emax 2 E1.2: for this specific product the kit includes a special moving part of the E1.2 completely modified in the ABB factory to fit the G30 fixed part. There is no need for any dismantling operation of the existing G30 fixed part. The only operation required is the installation of a device on the fixed part that ensures locking on racking out, and segregation that guarantees IP20 protection with the door open.

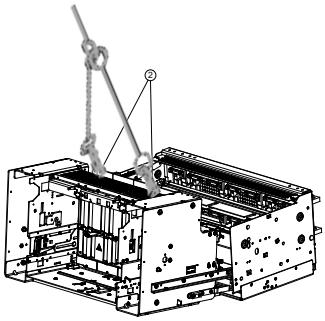
G2 and G4: for the middle sizes of the Novomax air circuit-breaker series, ABB has created a Direct Replacement, which only requires replacement of the mobile part of the old circuit-breaker with a customised Emax 2 mobile part ready to be racked-in in the existing cradle. In this case, the retrofitting kit consists of a special mobile part (it includes dedicated sliding contacts, mechanical signalling, anti-insertion lock, racking in/out lever for the closed-door version) developed and tested in the ABB service factory and ready to be fitted into the Novomax fixed part. The kit is completed with the panel door adaptation.

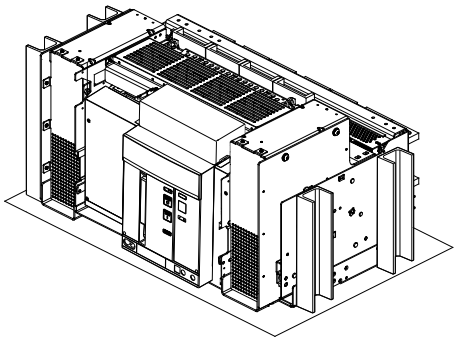


G5: for this size of Novomax, due to huge the dimensions, ABB has released a Cradle in Cradle retrofit kit. It consists in replacing the Novomax moving part with a special Emax 2 fixed part that fits perfectly inside the Novomax fixed part and is ready to work with a standard Emax 2 moving part. In this case, the retrofitting kit consists of:
- Special fixed part (includes sliding contacts with 4Q and dedicated wiring for 6Q)
- Kit for door adaptation
- Racking-in lever

The Emax 2 moving part needs to be ordered separately.







In any advanced retrofit kit solutions for Novomax, the replacement kits are always supplied complete with assembly instructions and electric interconnection diagrams.

Novomax → Emax 2
Direct Replacement and Cradle in Cradle

Novomax automatic air circuit-breakers

Novomax	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu @ 415V [kA]	Icu @440V [kA]	Icu @660V [kA]	Icw 1s [kA]
G30	800	3p/4p	DR	E1.2	N	800		45	45	35	35
	1250	3p/4p				1250		45	45	35	35
	1600	3p/4p				1600		45	45	35	35
G2	1250	3p/4p	DR	E2.2	N	1250		55	50	45	50
	1600	3p/4p				1600		55	50	45	50
	2000	3p/4p				2000		55	50	45	50
	2500	3p/4p				2500*		60	60	55	60
G4	3200	3p/4p	DR	E4.2	H	3200		75	75	65	75
	3600	3p/4p				4000	3600	80	75	65	80
G5***	3200	3p/4p	CiC	E4.2	V	3200		100	100	75	100
	4000	3p/4p				4000**		100	100	75	100

* Derating up to 2400A if the Fixed Part is equipped with horizontal rear terminals; no derating with Fixed part equipped with vertical rear terminals
** Derating up to 3600A
*** For G5 with Iu>4000A, ask ABB

Novomax switch disconnectors

Novomax	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icw 1s [kA]
G30	800	3p/4p	DR	E1.2/MS	N	800		35
	1250	3p/4p				1250		35
	1600	3p/4p				1600		35
G2	1250	3p/4p	DR	E2.2/MS	N	1250		50
	1600	3p/4p				1600		50
	2000	3p/4p				2000		50
	2500	3p/4p				2500*		60
G4	3200	3p/4p	DR	E4.2/MS	H	3200		75
	3600	3p/4p				4000	3600	75
G5***	3200	3p/4p	CiC	E4.2/MS	V	3200		80
	4000	3p/4p				4000**		80

* Derating up to 2400A if the Fixed Part is equipped with horizontal rear terminals; no derating with Fixed part equipped with vertical rear terminals
** Derating up to 3600A
*** For G5 with Iu>4000A, ask ABB

G30 Trip unit	Emax 2 suggested Trip unit
K	Ekip Dip LI or higher version
Ks	Ekip Dip LSI or higher
Ksi	Ekip Dip LSI or higher
KM	Ekip High Touch with L off (dedicated Rating plug)*
KMs	Ekip High Touch with L off (dedicated Rating plug)*
KMsi	Ekip High Touch with L off (dedicated Rating plug)*
KE	Ekip High Touch with L off (dedicated Rating plug), or higher versions
KEs	Ekip High Touch with L off (dedicated Rating plug), or higher versions

Tripping times and curves need to be checked according to the installation
* M protection requires Double S protection

Trip Unit correspondence

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 analyser	-	-	-	-	-	●
Real-time monitoring and protection - Current	-	-	-	○	●	●
Real-time monitoring and protection - Voltage, Power, Energy, Frequency	-	-	-	-	○	●
Maintenance indicators and records	-	-	-	●	●	●
Communication capability	-	-	-	-	○	○

● Available
○ Not available

Novomax → Emax 2
Direct replacement and Cradle in Cradle

Accessories compatibility

Novomax		Emax 2 DR	Emax 2 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 those of Novomax Fixed	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 on request)	Emax 2 special contacts (N/C) S51/2 supplied (on 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 - Re-wiring necessary to accessorise 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/ Padlock in open position	→	Emax 2 standard - KLC/PLC	Emax 2 standard - KLC/PLC
Key lock/Padlock in racked in/out position	→	non compatible	Emax 2 standard - KLP/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	→	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 - Re-wiring required on the cubicle	Emax 2 UVD - Re-wiring required on the cubicle
SOR Test Unit	→	Emax 2 YO/YU Test Unit - Rewiring required	Emax 2 YO/YU Test Unit - Rewiring required
PR1/A (Amperometric Unit)	→	Same functionality available with Ekip DIP, Ekip Touch, Ekip Hi-Touch with Ekip Multimeter	Same functionality available with Ekip DIP, Ekip Touch, Ekip Hi-Touch with Ekip Multimeter
PR1/C (Control unit)	→	Same functionality available with Ekip Touch or Ekip Hi-Touch	Same functionality available with Ekip Touch or Ekip Hi-Touch
PR1/D (Dialog unit)	→	Same functionality available with Ekip Touch or Ekip Hi-Touch	Same functionality available with Ekip Touch or Ekip Hi-Touch adding the ekip COM module

D (electronic Delay for YU - into the switchboard to replace the pneumatic one on G30)

Emax 2 Accessories that can be installed but need to be externally cabled with local adaptation
YO/YU Test Unit
Current sensor for neutral conductor outside the circuit-breaker
Remote reset YR
Ekip Multimeter
Ekip View
Ekip Control Panel

Checks before ordering

The conditions of the Novomax fixed part MUST be good. In particular, the following must be checked:

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

For a more complete check, ABB has prepared an easy guide to understand the conditions of your Novomax fixed part:
https://search.abb.com/library/Download.aspx?DocumentID=1SDH001279R0002&Languag eCode=en&DocumentPartId=&Action=Launch

When the Novomax fixed part is not fully working, the best retrofitting solution is the Hard Bus Retrofill.

Novomax → Emax 2
Direct replacement and Cradle in Cradle

Example of order Novomax G30 → Emax 2

Case 1:
accessories not needed
Existing circuit-breaker: Novomax G30 1250A 3-pole withdrawable version with fixed part still in good condition.
Need to replace for direct replacement with Emax 2 E1.2. Ekip DIP LSI trip unit is enough:

Part number	Description
1SDA081655R1	DR G30-E1.2N 1250 3P Ekip Dip LSI

Case 2:
accessories needed
Existing 4-pole circuit-breaker Novomax G30 1600A, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@440Vac),
- closing coil (YC@440Vac),
- undervoltage release (YU@440Vac)

I also want to have Ekip touch LI trip unit and to add Pushbutton protection:

Part number	Description
1SDA081664R1	DR G30-E1.2N 1600 4P ACC
Technical Note for the order: Accessories installed on Breaker	
1SDA107529R1	Ekip Touch LI E1.2..E6.2 Ed.2
1SDA073678R1	YO E1.2..E6.2-XT7-XT7M 415-440Vac
1SDA073691R1	YC E1.2..E6.2-XT7M 415-440Vac
1SDA073704R1	YU E1.2..E6.2-XT7-XT7M 415-440Vac
1SDA073854R1	PBC Prot. Pushbuttons AP/CH E1.2-XT7M

Example of order Novomax → Emax 2

Case 1:
accessories not needed
Existing circuit-breaker: Novomax G2 2500A , with S2 trip unit, 4-pole withdrawable version with fixed part still in good condition.
Need to replace for direct replacement with Emax 2. Ekip DIP LSI trip unit is enough:

Part number	Description
1SDA114656R1	DR G2 S2 2500-E2.2N 2500 4p Ekip Dip LSI

Case 2:
accessories needed
Existing 4-pole circuit-breaker Novomax G4 3600A equipped with S1 trip unit, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@110Vac),
- closing coil (YC@110Vac),

I also want to have Ekip touch LSIG trip unit and Ekip Cartridge for Novomax + Ekip Supply 110V + Ekip Com HUB + Ekip com Modbus TCP + Measuring package:

Part number	Description
1SDA114626R1	DR G4 S1 3600-E4.2H 3600 4p with acc.
Technical Note for the order: Accessories installed on Breaker	
1SDA107530R1	Ekip Touch LSI E1.2..E6.2 Ed.2
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073685R1	YC E1.2..E6.2-XT7M 110-120Vac/dc
1SDA115913R1	Ekip Cartridge Novomax
1SDA074172R1	Ekip supply 110V
1SDA082894R1	Ekip Com Hub
1SDA074151R1	Ekip com Modbus TCP
1SDA107525R1	Measuring package

Example of order Novomax → Emax 2 CiC

Case 1:
accessories not needed
Existing circuit-breaker: Novomax G5 3200A, with S2 trip unit, 4-pole withdrawable version with fixed part still in good condition.
Need to replace with cradle in cradle retrofit kit with Emax 2:

Part number	Description
1SDA114743R1	CiC G5 S2 3200 - E4.2V 3200 4p

+ order a standard Emax 2 moving part (e.g.: 1SDA073156R1)

Case 2:
accessories needed
Existing 4-pole circuit-breaker Novomax G5 3200A equipped with S2 trip unit, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@60Vac/dc),
- closing coil (YC@60Vac/dc),
- undervoltage release (YU@60Vac/dc)
- spring charging motor (M@48-60Vac/dc)

I also want to have Ekip touch LSIG trip unit + Ekip Supply 110V + Ekip Com HUB + Ekip com Modbus RS-485 + Measuring package + 15 racked in AUX:

Part number for CiC	Description
Equipped with the following accessory:	
1SDA114753R1	15Q AUX 400V RACKED IN

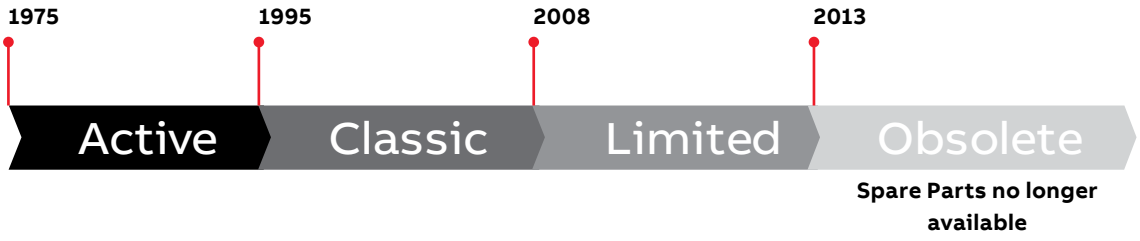
Part number for moving part	Description
1SDA073156R1	E4.2V 3200 Ekip Touch LSIG 4p WMP
Add the following accessories:	
1SDA073671R1	YO E1.2..E6.2-XT7-XT7M 60Vac/dc
1SDA073684R1	YC E1.2..E6.2-XT7M 60Vac/dc
1SDA073697R1	YU E1.2..E6.2-XT7-XT7M 60Vac/dc
1SDA073730R1	M E2.2...E6.2 48-60Vac/dc + MC 24V
1SDA074172R1	Ekip Supply 110-240Vac/dc E1.2..E6.2-XT
1SDA082894R1	Ekip Com Hub E1.2..E6.2
1SDA074150R1	Ekip Com Modbus RS-485 E1.2..E6.2
1SDA107525R1	SW Measuring package for Emax 2

Novomax LG

ABB completed the family of Novomax air circuit-breakers with a current-limiting version: Novomax LG.
AS for standard Novomax, the Lg range included T series thermal relays but it could also be equipped with electronic relays, S1 and S2 series.

Its spare parts and accessories are no longer available today, so maintenance might no longer be effective.
For this reason ABB has developed retrofit solutions to replace Novomax LG circuit-breakers.

Novomax LG life cycle management



Spare Parts no longer available

Megamax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**New Product/ Replacement**	**Retrofit kits**
Obsolete	-	-	-	-	o

o available

ABB has created retrofit solutions to support customers when a Novomax LG breaker needs to be replaced:

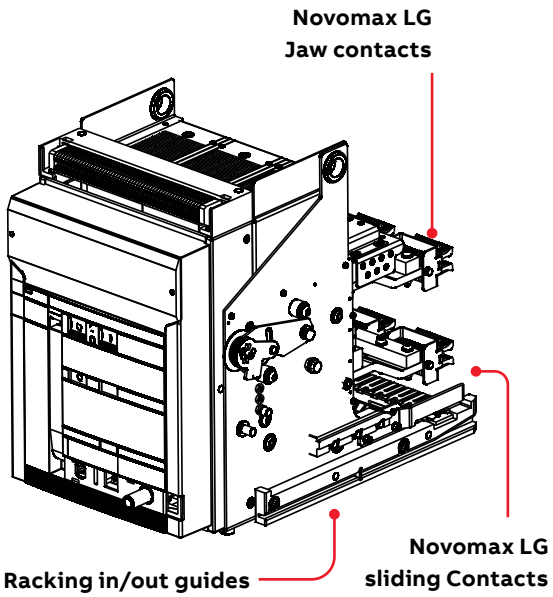
Retrofit kits available

		LG (1)
Rated Current [A]		1250
		1600
		2000
		2500
Version	**Pole**	
Withdrawable	3P	DR*
	4P	DR*
Fixed	3P	-
	4P	-

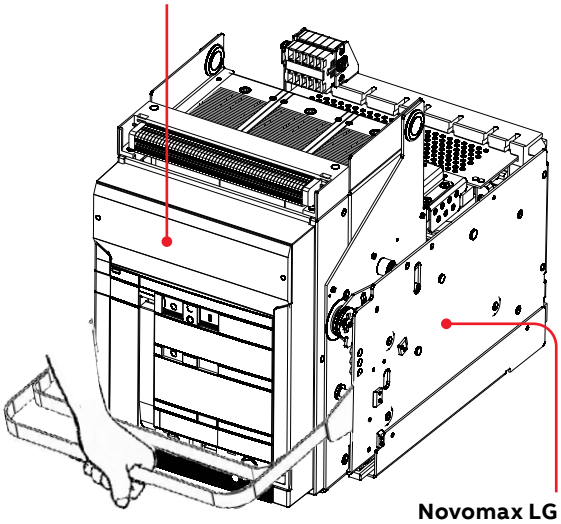
(1) only with release S2
* solutions only for 1250A and 1600A

Novomax LG → New Emax
Direct Replacement

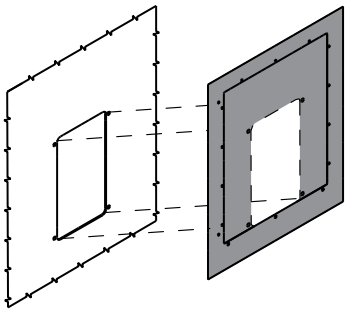
LG air circuit-breakers can be replaced with an advanced direct replacement with New Emax E2L. The kit consists of a special New Emax moving part adapted in the ABB factory to replicate the Novomax LG moving part:



Direct replacement LG → E2L



All that is required is an adaptation of the panel door:



Performance level

Novomax LG	Iu [A]	Poles	Retrofit kit Solution	New Emax	Performance level	Iu [A]	In [Rating plug) [A]	Icu and Ics @ 415V [kA]	Icu and Ics @500V [kA]	Icu and Ics @690V [kA]
LG	1250	3p/4p	DR	E2	L	1250		130	100	65
	1600	3p/4p				1600		130	100	65

* Derating up to 3600A

Part numbers and orders

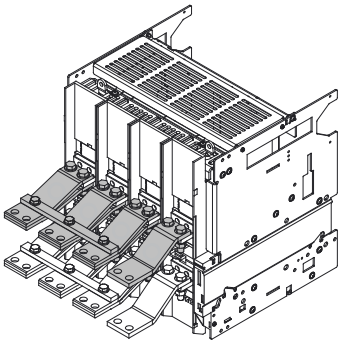
For Part numbers visit the Retrofit kit selector: https://new.abb.com/low-voltage/service/service-for-low-voltage-products/extension-upgrades-and-retrofits/selector

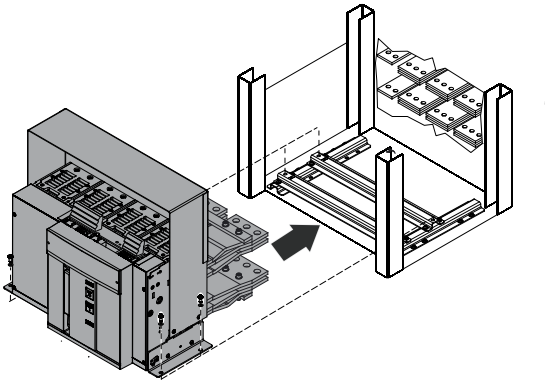
Novomax → Emax 2
Hard bus retrofill

When an advanced solution is not available or - for the withdrawable version - the fixed part is not in good condition, the only solution available is the hard bus retrofill. ABB offers many retrofit kits for Novomax air circuit-breakers:
The kit consists of:

- For the withdrawable version:
  - an Emax 2 fixed part equipped with an adapter kit that includes: copper connections to replicate the Novomax part and in some cases also an insulating material to keep the long new terminals in the appropriate position
  - Fixing plates in order to use the same fixing points as the Novomax
  - Adapter for the panel door.

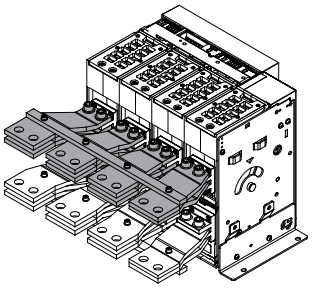
This solution is available for breakers with horizontal rear terminals, vertical rear terminals and, for G2, also for front terminals.





- For the fixed version:
  - An Emax 2 breaker in fixed version equipped with an adapter kit that includes: copper connections to replicate the Novomax part and in some cases also an insulating material to keep the long new terminals in the appropriate position
  - A fixing plate in order to use the same fixing points as the Novomax
  - Adapter for the panel door.

This solution is available for breakers with horizontal rear terminals and vertical rear terminals.



Withdrawable version with horizontal rear terminals

Novomax W (VR)	Iu [A]	Poles	Emax 2	Performance level	Iu [A]	Icu @ 415V [kA]	Icu @440V [kA]	Icu @660V [kA]	Icw (1s) @415V [kA]
G2	1250	3p/4p	E2.2	N	1250	55	50	45	50
	1600	3p/4p			1600	55	50	45	50
	2000	3p/4p			2000	55	50	45	50
G3	1600	3p/4p	E2.2	H	1600	75	75	65	75
	2000	3p/4p			2000	75	75	65	75
	2500	3p/4p	E2.2		2500	75	75	65	75
G4	3200	3p/4p	E4.2		3200	75	75	65	75
G5	3200	3p/4p	E4.2	V	3200*	100	100	75	100
	4000	3p/4p			4000**	100	100	75	100
	4500	3p/4p			4000***	100	100	75	100

* derating to 3400A; ** derating to 3400A; *** derating to 4000A
Switch disconnector versions are also available

Withdrawable version with vertical rear terminals

Novomax W (HR)	Iu [A]	Poles	Emax 2	Performance level	Iu [A]	Icu @ 415V [kA]	Icu @440V [kA]	Icu @660V [kA]	Icw (1s) @415V [kA]
G2	2000	3p/4p	E2.2	N	2000	55	50	45	50
G3	1600	3p/4p	E2.2	H	1600	75	75	65	75
	2000	3p/4p	E2.2	H	2000	75	75	65	75
	2500	3p/4p	E2.2	H	2500	75	75	65	75
	3000	3p/4p	E4.2	H	3200	75	75	65	75
G4	3200	3p/4p	E4.2	H	3200	75	75	65	75
	3600	3p/4p	E4.2	H	4000	75	75	65	75
G5	3200	3p/4p	E4.2	V	3200	100	100	75	100
	4000	3p/4p	E4.2	V	4000*	100	100	75	100
	4500	3p/4p	E6.2	V	5000	100	100	75	100
	5000	3p/4p	E6.2	V	5000	100	100	75	100
G6	6300	3p	E6.2	V	6300	100	100	75	100

* derating to 4000A
Switch disconnector versions are also available

Withdrawable version with front terminals

Novomax W (Front terminals)	Iu [A]	Poles	Emax 2	Performance level	Iu [A]	Icu @ 415V [kA]	Icu @440V [kA]	Icu @660V [kA]	Icw (1s) @415V [kA]
G2	2000	3p/4p	E2.2	N	2000	55	50	45	50

Switch disconnector versions are also available

Novomax → Emax 2
Hard bus retrofill

Fixed version with horizontal rear terminals

Novomax F (HR)	Iu [A]	Poles	Emax 2	Performance level	Iu [A]	Icu @ 415V [kA]	Icu @440V [kA]	Icu @660V [kA]	Icw (1s) @415V [kA]
G2	2000	3p/4p	E2.2	N	2000	50	55	45	50
G3	1600	3p/4p	E2.2	H	1600	75	75	65	75
	2000	3p/4p	E2.2	H	2000	75	75	65	75
	2500	3p/4p	E2.2	H	2500	75	75	65	75
G4	3200	3p/4p	E4.2	H	3200	75	75	65	75
G5	3200	3p/4p	E4.2	V	3200	100	100	75	100
	4000	3p/4p	E4.2	V	4000	100	100	75	100

Switch disconnector versions are also available.

Fixed version with vertical rear terminals

Novomax F (VR)	Iu [A]	Poles	Emax 2	Performance level	Iu [A]	Icu @ 415V [kA]	Icu @440V [kA]	Icu @660V [kA]	Icw (1s) @415V [kA]
G3	3000	3p/4p	E4.2	H	3200	75	75	65	75

Switch disconnector versions are also available.

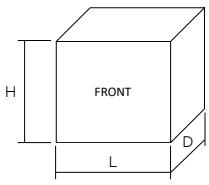
Trip Unit correspondence

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 analyser	-	-	-	-	-	●
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 modules
○ Not available

Clearance for circuit-breakers within compartment

Verify the actual size of the cell before purchasing.



[mm]	L (3p)		L (4p)		H		D		Notes
Novomax-Emax 2	Emax 2	Novomax	Emax 2	Novomax	Emax 2	Novomax	Emax 2	Novomax	
G2-E2.2	400	320	490	415	515	510	221	350	P verified; H, L quote by verifying that E2.2 is wider and higher than G2
G3-E2.2	400	380	490	495	545	629	221	405	P verified; H, L quote by verifying that E2.2 is wider and higher than G3
G3-E4.2	500	380	600	495	545	629	221	405	P verified; H, L quote by verifying that E2.2 is wider and higher than G3
G4-E4.2	500	600	600	615	545	629	221	405	P, L, H verified
G5-E4.2	500	725	600	840	545	629	221	405	P, L, H verified

Novomax → Emax 2
Hard bus retrofill

Example of order

Case 1:
accessories not needed

G2 1600A 4p withdrawable version with horizontal rear terminals.
Need to replace it with Emax 2 with hard bus retrofill retrofit kits.

Emax 2 should be equipped with Ekip touch LSG trip unit.

Part number	Description	Comment
1SDA112899R1	RF FP G2 1600A WHR 4p -> E2.2N 1600A	Fixed part already equipped with dedicated terminals to adapt the connection to the existing busbars
1SDA072978R1	E2.2N 1600 Ekip Hi-Touch LSI 4p WMP	Standard moving part

Case 2:
accessories needed

The existing circuit-breaker G2 2000A 4p fixed version is equipped with the following accessories

- Emax 2 equipped with Ekip Hi-Touch LSI (black edition)
- Opening coil (YO @220Vac/dc)
- Closing coil (YC 220Vac)
- Spring charging motor M – 220Vac.

Part number	Description	Note
1SDA113966R1	G2 2000 4p FHR - E2.2N 2000 with acc.	Retrofit kit that includes the accessories to be added as a technical note to the order:

Part number	Description
1SDA107532R1	Ekip Hi-Touch LSI (black)
1SDA073674R1	YO E1.2..E6.2 220-240Vac/dc
1SDA073687R1	YC E1.2..E6.2 220-240Vac/dc
1SDA073725R1	M E2.2...E6.2 220-250Vac/dc

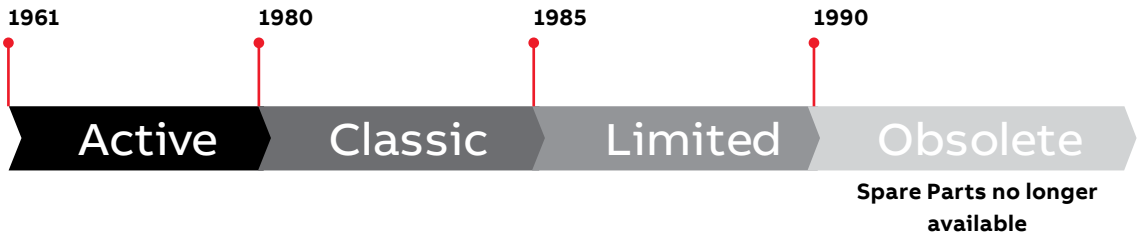
Otomax

Otomax

The Otomax air circuit-breaker series was launched in 1961. It was available in different versions and sizes. With a large range of versions, it was considered a very high performance series of air circuit-breaker.
Consisting of 3 main frames, P, covered uninterrupted breaking capacity Iu up to 6300A models and guaranteed breaking capacity Icu up to 100kA at 660Vac.

After many years of production Megamax was declared obsolete.
Its spare parts and accessories are no longer available today, so maintenance might no longer be effective.
For this reason, ABB has developed retrofit solutions (advanced and basic) to replace Otomax circuit-breakers.

Otomax life cycle management



Megamax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**New Product/ Replacement**	**Retrofit kits**
Obsolete	-	-	-	-	●

- no more available
* available

ABB has created different retrofit solutions to support customers when an Otomax breaker needs to be replaced.

Retrofit kit solutions

3 poles	**P1A**				**P1B**					**P1C**				
Rated Current [A]	800	1250	1250	2000	1000	1250	1600	2000	2500	1000	1250	1600	2000	2500
Retrofit kit solutions	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	CiC	RF/ CiC	RF/ CiC	RF/ CiC	CiC	CiC	CiC	CiC	CiC

3 poles	**P2A**						**P2B**						**P2C**							
Rated Current [A]	800	1250	1600	2000	3000	4000	1000	1600	2000	2500	3000	4000	1000	1250	1600	2000	2500	3200	4000	4500
Retrofit kit solutions	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF	RF	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF/ CiC	RF	RF

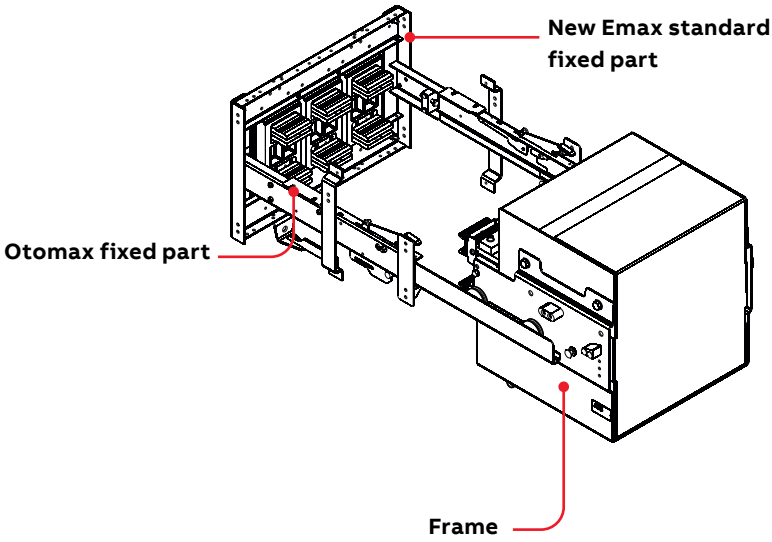
3 poles	**P3A**				**P3B**				**P3C**				
Rated Current [A]	1600	2000	3000	4000	2000	2500	3000	4000	2000	2500	3200	4000	4500
Retrofit kit solutions	RF/ CiC	RF	RF/ CiC	RF	RF/ CiC	RF/ CiC	RF/ CiC	RF	RF/ CiC	RF/ CiC	RF/ CiC	RF	RF

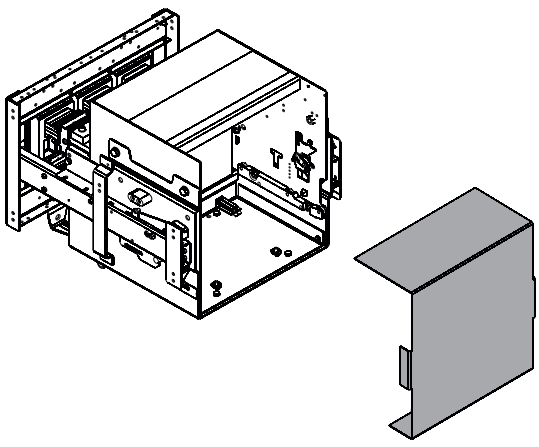
Otomax → New Emax
Cradle in Cradle

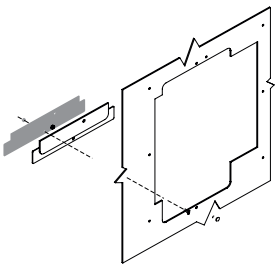
ABB has developed Cradle in cradle retrofit kits with New Emax r to replace Otomax air circuit-breakers, obsolete Otomax withdrawable (W) 3-pole air circuit-breakers from 800A to 3200A. The kit comprises a dedicated cradle with special jaw contacts designed to fit into the fixed part of Otomax circuit-breakers. The fixed part of the New Emax fits perfectly into the frame. Assembly only requires a few simple operations:

- Remove the moving part of Otomax
- Install the retrofit kit, which includes the special New Emax fixed part
- Rack in the New Emax moving part.

Special guides facilitate the racking-in phase and once the New Emax fixed part has been fitted into the Otomax fixed part, the two are permanently matched. The panel door must be modified to accommodate the New Emax front cover. The kit includes the New Emax flange and a transparent template to adapt the door to the new requirements. The solution is as fast and efficient as the existing installation. The fixed part of Otomax must be in good condition, as described in the guidelines provided in document 1SDH001279R0002.







Otomax → New Emax
Cradle in Cradle

Retrofit versions available

Otomax	Iu [A]	Poles	Retrofit kit Solution	New Emax	New Emax Performance level	Iu [A]	In [Rating plug) [A]	Icu @ 380V [kA]	Icu @500V [kA]	Icu @660V [kA]	Icw 1s [kA]
P1A	800	3p	CiC	E2	S	800		32	30		30
	1250	3p		E2	B	1250		32	30		30
	1250	3p		E3	B	1600		35	32		32
	2000	3p		E3	N	2000		35	32		32
P1B	1000	3p	CiC	E2	N	1000		32	30		30
	1250	3p		E2	N	1250		32	30		30
	1600	3p		E2	N	1600		32	30		30
	2000	3p		E3	S	2000		35	32		32
	2500	3p		E3	N	2500		35	32		32
P1C	1000	3p	CiC	E2	N	1000		36	32		38
	1250	3p		E2	N	1250		36	32		38
	1600	3p		E2	N	1600		36	32		38
	2000	3p		E3	S	2000		36	32		38
	2500	3p		E3	N	2500		36	32		38
P2A	800	3p	CiC	E2	S	800		52	50		50
	1250	3p		E2	N	1250		52	50		50
	1600	3p		E3	S	1600		55	52		52
	2000	3p		E3	S	2000		55	52		52
	3000	3p		E4	H	3200		57	55		55
P2B	1000	3p	CiC	E2	N	1000		52	50		50
	1600	3p		E2	N	1600		52	50		50
	2000	3p		E3	S	2000		55	52		52
	2500	3p		E3	N	2500		55	52		52
P2C	1000	3p	CiC	E2	N	1000		52	50	50	50
	1250	3p		E2	N	1250		52	50	50	50
	1600	3p		E2	N	1600		52	50	55	50
	2000	3p		E3	S	2000		55	52	52	52
	2500	3p		E3	N	2500		55	52	52	52
	3200	3p		E4	H	3200		57	55		55
P3A	1600	3p	CiC	E3	S	1600		75	75		75
	3000	3p		E4	H	3200		100	100		100
P3B	2000	3p	CiC	E3	S	2000		75	75		75
	2500	3p		E3	S	2500		75	75		75
	3000	3p		E4	H	3200		100	100		100
P3C	2000	3p	CiC	E3	S	2000		75	75		75
	2500	3p		E3	S	2500		75	75		75
	3200	3p		E4	H	3200		100	100		100

A dedicated 3000A Rating plug has been developed specifically for this retrofitting kit

Trip Unit correspondence

Protection functions	K LI, LSI	S LI, LSI	PR121	PR122	PR123
					
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 analyser	-	-	-	-	●
Real-time monitoring and protection - Current	-	-	○	●	●
Real-time monitoring and protection - Voltage, Power, Energy, Frequency	-	-	-	○	●
Maintenance indicators and records	-	-	●	●	●
Communication capability	-	-	-	●*	●*

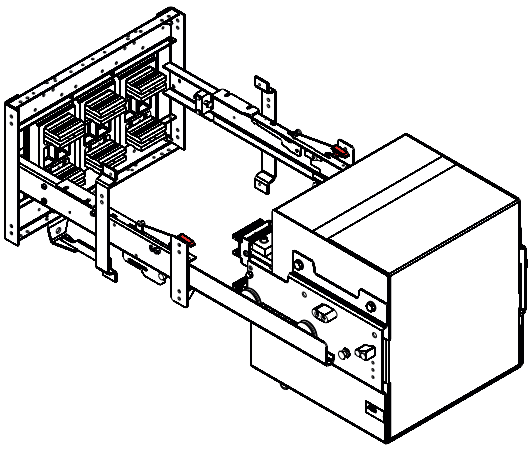
● Available
●* Available with communication module
○ Not available

Otomax → New Emax
Cradle in Cradle

Accessories and compatibility

Otomax		**New Emax**
YO (shunt opening release)	→	New Emax standard YO
YC (shunt closing release)	→	New Emax standard YC
YU (undervoltage release)	→	New Emax standard YU
M (spring loading motor)	→	New Emax standard spring charging motor
AUX spring charged (S33M)	→	New Emax standard S33 M/2
O/C AUX contacts	→	New Emax has 4 AUX for standard. For more add 6 AUX with additional ordering number. It is also possible to order another 15 O/C AUX (external).
AUX CB tripped - S51	→	New Emax standard contacts (N/O) S51/1 (standard supply for automatic circuit-breaker)
Circuit-breaker tripped mechanical indication	→	New Emax standard - TU reset (standard supply for automatic circuit-breaker)
AUX circuit-breaker connected/ isolated position - S75S-S75I	→	Included in the New Emax sliding contacts (standard supply)
Key lock in open position	→	New Emax standard - KLC
Padlock in open position	→	New Emax standard - PLC
Shutter padlock device	→	New Emax standard shutter padlock
Key lock in Racked in/out position	→	New Emax standard - KLP
IP54 door protection	→	New Emax standard - IP54
Transparent protective cover for O/C pushbuttons	→	New Emaxstandard - PBC

Checks before ordering
The cradle in cradle advanced retrofit kit is available only for Otomax with fixed part equipped with levers (see in red in the following picture):



It is also possible to use:
Cradle in cradle retrofit kit between Otomax circuit-breaker and New Emax + Direct replacement between New Emax and Emax 2.

For any other Otomax version, only hard bus retrofill can be offered.
Check the condition of the Otomax fixed part in accordance with the indications in the following document:
https://search.abb.com/library/Download.aspx?DocumentID=1SDH001279R0002&Languag eCode=en&DocumentPartId=&Action=Launch

Example of order Novomax → Emax 2 CiC

Case 1:
accessories not needed
Existing circuit-breaker: Otomax P1A 800A 3-pole withdrawable version with fixed part still in good condition.
Need to replace with cradle in cradle retrofit kit with New Emax.

Part number	Description
1SDA107774R1	KIT RETR.CiC P1A-B P2A 800 3P--> E2S 800

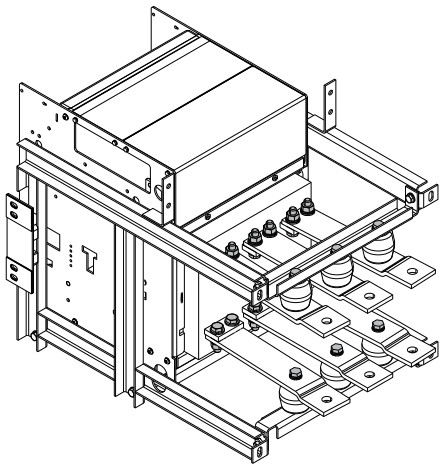
the kit includes the fixed part with horizontal rear terminals

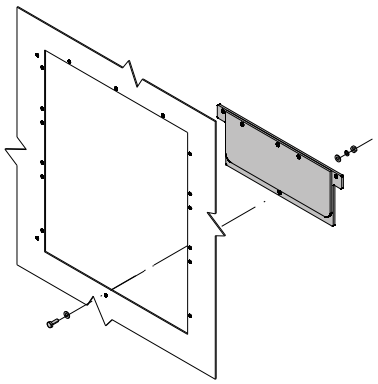
+ order a standard New Emax moving part (E2S).
Or, as an alternative, a direct replacement between Emax and Emax 2.

Otomax → Emax 2
Hard bus retrofill

When an advanced solution is not available or when - for the withdrawable version - the fixed part is no longer in good condition, the only solution available is the hard bus retrofill.
ABB offers many retrofit kits for Otomax air circuit-breakers:

The hard bus retrofill retrofit kit is available only for the withdrawable version and consists of:
- Special Emax 2 fixed part
- Dedicated structure for an optimized and strong connection to the existing switchboard's busbars
- Special SACE Emax 2 adapter busbars according to the size to be mounted on the fixed part
- Kit for door adaptation.





Otomax	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu @ 380V [kA]	Icu @500V [kA]	Icw 1s [kA]
P1A	800	3p	RF	E2.2	B	1600	800	32	30	30
	1250	3p		E2.2	B	1600	1250	32	30	30
	1250	3p		E2.2	B	1600	-	35	32	32
	2000	3p		E4.2	N	3200	2000	35	32	32
P1B	1000	3p	RF	E2.2	B	1600	1000	32	30	30
	1600	3p		E2.2	B	1600		32	30	30
	2000	3p		E2.2	B	2000		35	32	32
	2500	3p		E4.2	N	3200	2500	35	32	32
P2A	800	3p	RF	E2.2	N	800		52	50	50
	1250	3p		E2.2	N	1250		52	50	50
	1600	3p		E2.2	N	1600		55	52	52
	2000	3p		E4.2	N	3200	2000	55	52	52
	3000	3p		E4.2	N	3200	3000	57	55	55
	4000	3p		E6.2	H	4000		57	55	55
P2B	1000	3p	RF	E2.2	N	800		52	50	50
	1600	3p		E2.2	N	1250		52	50	50
	2000	3p		E2.2	N	1600		55	52	52
	2500	3p		E4.2	N	3200	2000	55	52	52
	3000	3p		E4.2	N	3200	3000	57	55	55
	4000	3p		E6.2	H	4000		57	55	55
P2C	1000	3p	RF	E2.2	N	1000		52	50	50
	1250	3p		E2.2	N	1250		52	50	50
	1600	3p		E2.2	N	1600		52	50	50
	2000	3p		E2.2	N	2000		55	52	52
	2500	3p		E4.2	N	3200	2500	55	52	52
	3200	3p		E4.2	N	3200		57	55	55
	4000	3p		E6.2	H	4000		57	55	55
	4500	3p		E6.2	H	4000		57	55	55
P3A	1600	3p	RF	E2.2	H	1600		75	75	75
	2000	3p		E4.2	H	3200	2000	75	75	75
	3000	3p		E4.2	V	3200	3000	100	100	100
	4000	3p		E6.2	H	4000		100	100	100
P3B	2000	3p	RF	E2.2	H	2000		75	75	75
	2500	3p		E4.2	H	3200	2500	75	75	75
	3000	3p		E4.2	V	3200	3000	100	100	100
	4000	3p		E6.2	H	4000		100	100	100
P3C	2000	3p	RF	E2.2	H	2000		75	75	75
	2500	3p		E4.2	H	3200	2500	75	75	75
	3200	3p		E4.2	V	3200		100	100	100
	4000	3p		E6.2	H	4000		100	100	100
	4500	3p		E6.2	H	4000		100	100	100

A dedicated 3000A Rating plug has been developed specifically for this retrofitting kit

Otomax → Emax 2
Hard bus retrofill

Trip Unit correspondence

Protection functions	**K** **LI, LSI**	**S** **LI, LSI**	**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 analyser	-	-	-	-	●
Real-time monitoring and protection - Current	-	-	-	●	●
Real-time monitoring and protection - Voltage, Power, Energy, Frequency	-	-	-	-	●
Maintenance indicators and records	-	-	●	●	●
Communication capability	-	-	-	●*	●*

● Available
●* Available with communication module

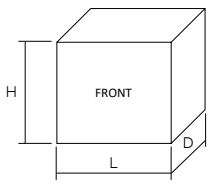
Compatibility of accessories

Otomax		Emax 2
YO (shunt opening release)	→	Emax 2 standard YO
YC (shunt closing release)	→	Emax 2 standard YC
YU (undervoltage release)	→	Emax 2 standard YU
M (spring loading motor)	→	Emax 2 standard spring charging motor
AUX spring charged (S33M)	→	Emax 2 standard S33 M/2
O/C AUX contacts	→	Emax 2 has 4 AUX for standard. For more add 6 AUX with additional ordering number. It is also possible to order another 15 O/C AUX (external).
AUX CB tripped - S51 /1	→	Emax 2 standard contacts (N/O) S51/1 (standard supply for automatic circuit-breaker)
Circuit-breaker tripped mechanical indication	→	Emax 2 standard - TU reset (standard supply for automatic circuit-breaker)
AUX circuit-breaker connected/ isolated position - S75S-S75I	→	Included in the Emax 2 sliding contacts (standard supply)
Key lock in open position	→	Emax 2 standard - KLC
Padlock in open position	→	Emax 2 standard - PLC
Shutter padlock device	→	Emax 2 standard shutter padlock
Key lock in Racked in/out position	→	Emax 2 standard - KLP
IP54 door protection	→	Emax 2 standard - IP54
Transparent protective cover for O/C pushbuttons	→	Emax 2 standard - PBC
Interlock with compartment door	→	Lock to prevent door opening when circuit-breaker is in closed position - DLC
		Lock for racking in / racking out the mobile part when the door is open - DLR
Current sensor for neutral conductor outside the circuit-breaker	→	Emax 2 standard Current sensor for neutral conductor outside the circuit-breaker. Need to install it on busbars

Additional Emax 2 compatible accessories
Emax 2 Time-delay device D UVD - Additional wiring required
Emax 2 YO/YU Test Unit - Additional wiring required
Mechanical interlock system (only with Emax 2 circuit-breakers)
AUX YU (YU energized)
Padlock in Racked in/out position
Mechanical operation counter
Automatic transfer switch (ATS021 ATS022)
Current sensor for neutral conductor outside the circuit-breaker

Clearance for circuit-breakers within compartment

Verify the actual size of the cell before ordering:



[mm]	L (3p)	H	P
Otomax - E2.2	400	500	380
Otomax - E4.2	500	500	380
Otomax - E6.2	900	500	380

Otomax → Emax 2
Hard bus retrofill

Example of order

Case 1:
accessories not needed

Existing circuit-breaker:
P1B 1600A 3p withdrawable version with horizontal rear terminals.

Need to replace with Emax 2 with hard bus retrofill retrofit kits. Emax 2 should be equipped with Ekip touch LSI trip unit.

Part number	Description	Comment
1SDA107774R1	RF FP E2.2/P1-2A1250 P1-2B1600 P2C 1600	Special fixed part
1SDA072335R1	E2.2B 1600 Ekip Touch LSI	Standard moving part

Case 2:
accessories needed

Existing circuit-breaker P2C 1000A 3p withdrawable version
Additional accessories are required:
- 15 aux external
- Opening coil (YO @48Vac/dc)
- Closing coil (YC 380-400Vac),
- On /off operation counter
- Ekip Touch LSI.

Part number	Description	Note
1SDA107772R1	RF FP E2.2/P1-2A800 P1-2B1000 P2C10-1250	Retrofit kit that includes the fixed part
Technical Note to the order: Accessories for the Fixed Part (to be ordered as loose parts)		
1SDA073846R1	15 extra AUX	
1SDA072275R1	E2.2N 1000 Ekip Touch LSI	Standard Emax 2 Moving part equipped with
1SDA073670R1	YO 48Vac/dc	
1SDA073690R1	YC 380-400Vac	
1SDA073781R1	On/off operation counter	

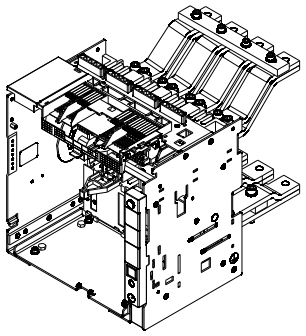
AEG

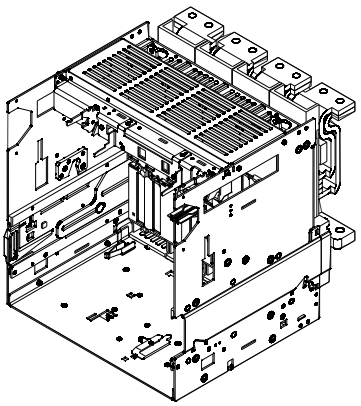
AEG

Hard Bus Retrofill AEG ME07 to Emax 2 available for 3 and 4 pole withdrawable versions – AEG ME07 637-1257 ,1607-2007, 2507 and 3207 from 630A to 3200A up to 690V with Horizontal Rear terminals. This is the traditional retrofit kit for which the complete AEG circuit-breakers/switch disconnectors and related fixed part need to be replaced. The kit uses an Emax 2 device equipped with special terminals to fit the existing busbars.

The kit consists of:

- Base supports to mount Emax 2 at a similar height to the AEG ME breaker
- Terminal adaptation kit
- Instruction manual
- Kit for door adaptation.





AEG → Emax 2
Hard bus retrofill

Performance Hard bus retrofill AEG → Emax 2

HBRF – AEG ME07 to Emax 2 IEC Withdrawable version

AEG Size	Iu [A]	Poles	Rear terminals	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In Rating plug [A]	Icu @380-415V [kA]	Icu @660-690V [kA]	Icw 1s [kA]
ME657N	630-1250	3p/4p	HR	RF	E1.2	B	630-1250		30	-	30
ME807N											
ME1007N											
ME1257N											
ME657N	630-1250	3p/4p	HR	RF	E1.2	N	630-1250		50	50	50
ME807N											
ME1007N											
ME1257N											
ME1607N	1600-2000	3p/4p	HR	RF	E2.2	B	1600-2000		35	-	35
ME2007N											
ME1607S1	1600-2000	3p/4p	HR	RF	E2.2	N	1600-2000		55	55	55
ME2007S1											
ME1607H	1600-2000	3p/4p	HR	RF	E2.2	H	1600-2000		100	60	55
ME2007H											
ME2507N	2500	3p/4p	HR	RF	E2.2	N	2500		40	-	40
ME2507S1	2500	3p/4p	HR	RF	E2.2	N	2500		65	65	55
ME2507H	2500	3p/4p	HR	RF	E2.2	H*	2500		100	75	65
ME3207N	3200	3p/4p	HR	RF	E4.2	N	4000***	3200	40		40
ME3207S1	3200	3p/4p	HR	RF	E4.2	H	4000***	3200	70	70	65
ME3207H	3200	3p/4p	HR	RF	E4.2	V	3200**	3200	100	80	65

* derating Icu=85kA @500V and Icm=187kA @500V
** derating In max= 3000A
*** derating In max= 3000A. Rating plug 3200A mandatory

AEG → Emax 2
Hard bus retrofill

Trip Unit Protections correspondence

	AEG								Emax 2		
	bse 3-1 rms bse 4-1 rms	bse 4-1 rms bse 4-2 rms	bse 3-3 rms bse 4-3 rms	bse 3-3.1 rms bse 4-3.1 rms	bse 3-4 rms bse 4-4 rms	bse 3-5 rms bse 4-5 rms	bse 3-6 rms bse 4-6 rms	bse 3-7 rms bse 4-7 rms	Ekip DIP 	Ekip Touch 	Ekip Hi-Touch 
Protection functions	**LS**	**LS**	**LSI**	**LSI**	**LSIG**	**LSIG**	**LSIG**	**LSIG**	**LI, LSI, LSIG**	**LI, LSI, LSIG**	**LI, LSI, LSIG**
Overload -L											
Inverse long-time delayed trip	●	●	●	●	●	●	●	●	●	●	●
Thermal memory	-	-	-	-	-	-	●	●	●	●	●
Time-delayed overcurrent - S											
Constant tripping time (t=k)	●	●	●	●	●	●	●	●	●	●	●
Constant specific let-through energy ($t = k/I^2$)	-	-	-	-	-	-	●	●	●	●	●
Thermal memory	-	-	-	-	-	-	-	-	●	●	●
Instantaneous overcurrents - I											
Constant tripping time (t=k)	-	-	●	●	●	●	●	●	●	●	●
Ground fault - G											
Constant tripping time (t=k)	-	-	-	-	●	●	●	●	●	●	●
Constant specific let-through energy ($t = k/I^2$)	-	-	-	-	●	●	●	●	●	●	●
Other protections											
Start up function	-	-	-	-	-	-	-	-	-	●	●
Zone selectivity	-	-	-	●	-	●	●	●	-	●	●
Ground fault on toroid (Gext)	-	-	-	-	-	-	-	-	-	●	●
Directional overcurrent - D	-	-	-	-	-	-	-	-	-	-	●
Current Unbalance	-	-	-	-	-	-	-	-	-	●	●
Power Control	-	-	-	-	-	-	-	-	-	○	○
Network analyser	-	-	-	-	-	-	-	-	-	-	●
Real time monitoring protection											
Current	-	-	-	-	-	-	-	-	○	●	●
Voltage - Power - Energy - Frequency -	-	-	-	-	-	-	-	-	-	○	●
Maintenance indicator and records	-	-	-	-	-	-	●	●	●	●	●
Communication capability	-	-	-	-	-	-	-	●	-	○	○

● = available as standard supply ○ = available as optional request - = not available

Emax 2 internal mechanical and electrical accessories are compatible with those of AEG ME07.

The following table provides information about the solutions for external accessories.

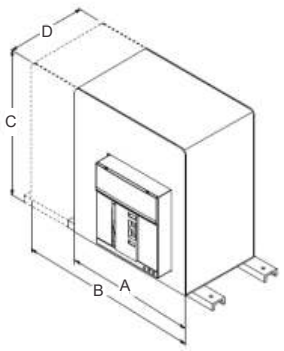
AEG ME 07 External Accessories		Solution with Emax 2
Cable Interlocks	→	Replace all interlocked breakers in the system.
Time delay module (TMD)	→	Replace with Emax 2 Electronic time-delay device for undervoltage release - UVD.
Door interlock	→	Replace with Emax 2 accessory
Door interlocks	→	Replace with the Emax 2 DLC, DLP or DLR solution
Neutral CTs	→	Replace with Emax 2 External current sensors (in a 3P4W system)
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 24Vdc	→	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

Checks before ordering

Before ordering, it is important to verify certain dimensions, taking into account the size of Emax 2 and the size of AEG ME07 according to the information in the table below:

Dimensions of the compartment	A	B	C	D
[mm]	3p	4p		
E1.2	280	350	440*	252
E2.2	400	490	500	355
E4.2	500	600	500	355

*390 for voltages <=440Vac



AEG → Emax 2
Hard bus retrofill

Example of order

Case 1:
accessories not needed

Existing circuit-breaker:
ME1607S1 1600 A 3p withdrawable version with horizontal rear terminals.

Need to replace it to Emax 2 with hard bus retrofill retrofit kits.
Emax 2 should be equipped with Ekip touch LSI trip unit.

Part number	Description	Comment
1SDA116986R1	HBRF AEG ME07S1 1600-2000 -E2.2N WHR 3p	Fixed part and dedicated kit to allow the connection to the existing busbars
1SDA072382R1	E2.2N 1600 Ekip Dip LSI 3p WMP	Standard moving part

Case 2:
accessories needed

Existing circuit-breaker is ME1607S1 1600 A 3p withdrawable version with horizontal rear terminals. I want the new circuit-breaker to be equipped with the following accessories:
- Retrofit kit (fixed part) .

The Emax 2 moving part needs to be equipped with the following accessories:
- Ekip Hi-Touch LSI (black edition)
- Opening coil (YO @220Vac/dc)
- Closing coil (YC 220Vac)
- Undervoltage release (YU 110V)
- Spring charging motor M - 220Vac
- Key lock in open position - KLC-D.

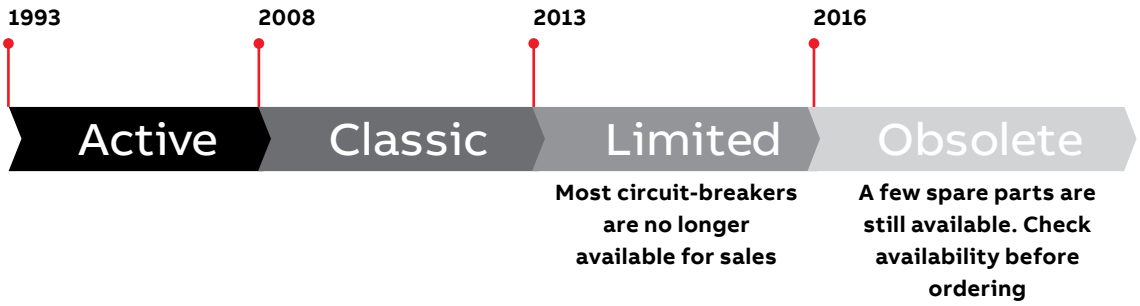
Part number	Description	Note
1SDA116986R1	HBRF AEG ME07S1 1600-2000 -E2.2N WHR 3p	Fixed part and dedicated kit to allow the connection to the existing busbars
1SDA72385R1	E2.2N 2000 1600 Ekip Touch LSI 3p WMP	
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc	
1SDA073685R1	YC E1.2..E6.2-XT7-XT7M 110-120Vac/dc	
1SDA073698R1	YU E1.2..E6.2-XT7-XT7M 110-120Vac/dc	
1SDA073724R1	M E2.2...E6.2 100-130Vac/dc	
1SDA073791R1	KLC-D Key lock open E2.2...E6.2	

Isomax

Isomax

In 1993 ABB SACE launched Isomax on the market: a new generation of Moulded Case Circuit-breaker capable of fulfilling all installation requirements, from smaller users to large industrial electrical power distribution plants, thanks to its high quality, reliability and performance under all conditions. Today the entire Isomax Family is obsolete and no longer produced.

Isomax life cycle management



Isomax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**Repair**	**New Product/ Replacement**
Obsolete	○ *	**	-	-	-

○ available in 2020, but verify before ordering
- not available
* verify before ordering due to limited availability.
** only ordinary maintenance (related to availability of spares)

ABB developed a number of retrofit kits to easily replace the biggest sizes of Isomax moulded case circuit-breakers:

- Hard bus retrofill for S7 with Emax 2 E1.2
- Direct replacement for S7 with Tmax XT XT7
- Hard bus retrofill for S8 with Tmax T8.

Retrofit kits available

		S7	S8
Rated Current [A]		1250	2000
		1600	2500
			3200
Version	**Poles**		
Withdrawable	3P	DR*/RF	-
	4P	DR*/RF	-
Fixed	3P	RF	RF
	4P	RF	RF

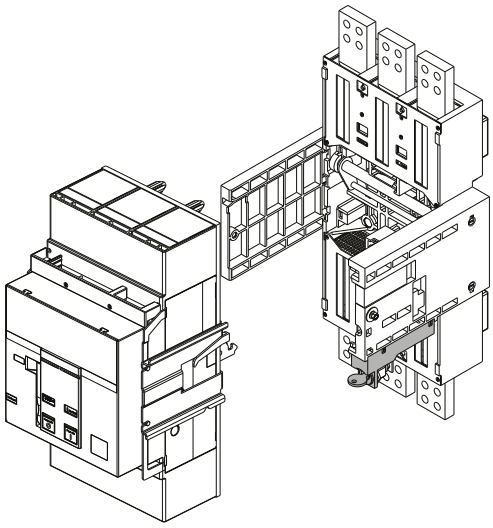
* for 1600A version: derating to 1500A with horizontal rear terminals. Derating to 1400A with Front terminals

S7 → XT7 (IEC)
Direct Replacement

Isomax S7 IEC circuit-breakers can be replaced with the most recent Tmax XT XT7 series thanks to both the advanced direct replacement retrofit kit and the standard hard bus retrofill solutions available.
In the case of hard bus retrofill, the kit includes the E1.2 breaker equipped with special terminals and insulating plate.
For the withdrawable version, as well as the hard bus retrofill, there is also the direct replacement solution with Tmax XT XT7, when the Isomax S7 fixed part is still in good condition.
This retrofit kit includes a special XT7 moving part to rack the new breaker in and out from a standard S7 fixed part. The customer can choose freely between XT7 with Lever or motorized.
All that remains to be done is to adapt the panel door. The rotary handle to rack the moving part in/out is the same as the one used for Isomax S7.

The kit can be installed rapidly and specific personnel are not required. However, is it essential for the Isomax S7 fixed part to be in good condition.
For more details consult the guide (1SDH001279R0002).
The DR kit consists of:

- Special Tmax XT7-XT7M special moving part assembled and tested in ABB factory and ready to be racked-in into Isomax S7 cradle that includes:
  - Plug-socket already assembled on the moving
  - part for commutation of electrical and electronic accessories
  - Mechanical signaling
  - Special Key lock to adapt on Isomax S7 cradle
  - Anti-insertion lock
  - Racking in/out lever
- Kit for the door's adaption
- Instructional manual



S7 → XT7 (IEC)
Direct Replacement

Correspondence table for Direct Replacement Isomax S7 to XT7-XT7M

Automatic circuit-breakers and switch-disconnectors – Isomax S7

Isomax	Iu [A]	Poles	Tmax XT7	Iu [A]	Icu 380-415V [kA]	Icu 440V [kA]	Icu 500V [kA]	Icu @690V [kA]	Icw 1s 440V [kA]
S7S	1250	3p/4p	XT7S - XT7S/M	1250	50	40	35	20	15
S7S	1600	3p/4p	XT7S - XT7S/M	1600*	50	40	35	20	20
S7H	1250	3p/4p	XT7H - XT7H/M	1250	65	55	45	25	15
S7H	1600	3p/4p	XT7H - XT7H/M	1600*	65	55	45	25	20
S7L	1250	3p/4p	XT7L - XT7L/M	1250	100	80	70	35	15
S7L	1600	3p/4p	XT7L - XT7L/M	1600*	100	80	70	35	20
S7D	1250	3p/4p	XT7D - XT7D/M	1250	-	-	-	-	20
S7D	1600	3p/4p	XT7D - XT7D/M	1600*	-	-	-	-	20

* * derating with Isomax fixed part equipped with:
- Front terminals: 1450A;
- Horizontal terminals: 1450A;
- Vertical terminals: 1550A.

Accessories compatibility

Isomax S7	DR S7 to XT7-XTM-E1.2
YO	YU
YO	YU
YU + time-lag device	YU + Delay device for undervoltage release -UVD
Connectors for duty releases	Plug-socket already mounted on the moving part of the DR
Stored energy motor operating mechanism	Motor Operator (M) + YC +YO (solution suitable only in case of DR S7 to XT7M)
Direct-mounted rotary handle operating mechanism	Direct rotary handle - RHD (solution suitable only in case of DR S7 to XT7)
Rotary handle operating mechanism with transmission rod	Transmitted rotary handle - RHE (solution suitable only in case of DR S7 to XT7)
Key lock for open position	Supplied as default
Signalling unit SACE PR010/K	Ekip Signaling 2K - Ekip Signaling 10K (externaly cabled)
Current transformer for neutral conductor outside circuit-breaker	XT7 - XT7M current sensor for neutral conductor outside the circuit-breaker - cubicle's rewiring is required
AUX 2Q (O/C)	AUX 4Q
AUX SY + AUX 1Q (O/C)/AUX 2Q (O/C)	AUX SY + AUX 4Q (in case of XT7) 2K-1 + AUX 4Q (in case of XT7M)

The following XT7-XT7M accessories are not compatible with the Direct Replacement:
- Mechanical locks for compartment door
- Mechanical interlock system with other CBs
- All accessories of XT7-XT7M fixed part.

While the following Emax 2 accessories can be installed with an external re-wiring with local adaptation:
- Ekip Multimeter
- Ekip Control Panel
- Remote Reset YR
- Ekip View
- YC (in case of XT7M YC needs local wiring adaptation).

Example of order

Case 1:
accessories not needed
Existing circuit-breaker: Isomax S7H 1250 3-pole withdrawable version with fixed part still in good condition. Need to replace with direct replacement with Tmax XT7 H Ekip DIP LSI trip unit.
The following is enough:

Part number	Description
1SDA117169R1	DR S7H to XT7H-M 1250 Ekip Dip LSI 3p

Case 2:
accessories needed
Existing 4-pole circuit-breaker Isomax S7H 1600, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- opening coil (YO@440Vac),
- closing coil (YC@440Vac),
- undervoltage release (YU@440Vac)

I also want to have Ekip touch LSI trip unit.

Part number	Description
1SDA117206R1	DR S7H to XT7H-M 1600 with acc 4p
Technical Note for the order: Accessories installed on breaker	
1SDA101921R1	Ekip Touch LSI XT7/XT7M
1SDA073678R1	YO E1.2..E6.2-XT7-XT7M 415-440Vac
1SDA073691R1	YC E1.2..E6.2-XT7M 415-440Vac
1SDA073704R1	YU E1.2..E6.2-XT7M 415-440Vac

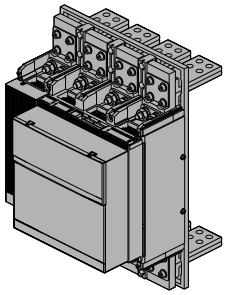
S7 → Tmax XT XT7/Emax 2 E1.2
Hard Bus Retrofill

Isomax S7 IEC circuit-breakers in fixed version can be replaced with the most recent Emax 2 E1.2/ Tmax XT7-XT7M series using the hard bus retrofill solutions now available.
In the case of hard bus retrofill, the kit includes the new breaker equipped with special terminals and insulating plate.

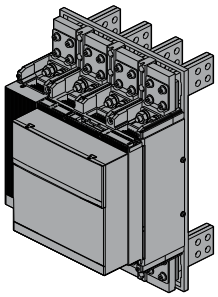
The Hard Bus Retrofill consists of:
- E1.2-XT7 already equipped with adapting terminals
- Terminal covers
- Instruction manuals
- Kit for door adaptation.

The Hard Bus Retrofill solutions are available for replacing Isomax S7 according to each type of terminal F, EF, VR, HR:

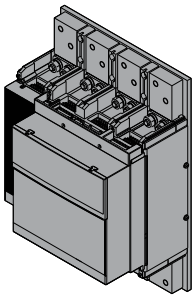
HR



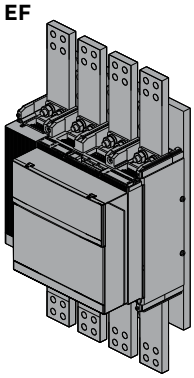
VR



F



EF



Fixed version

Isomax	Iu	Terminals	Poles	Tmax XT7	E1.2	Iu	Icu and Ics 415V	Icu and Ics 440V	Icu and Ics 500V	Icu and Ics 690V	Icu and Ics
	[A]					[A]	[kA]	[kA]	[kA]	[kA]	[kA]
S7S	1250	F - EF - HR - VR	3p/4p	XT7S-XT7S/M	E1.2C	1250	50	40	35	20	15
S7S	1600**	F - EF - HR - VR	3p/4p	XT7S-XT7S/M	E1.2C	1600	50	40	35	20	20
S7H	1250	F - EF - HR - VR	3p/4p	XT7H-XT7H/M	E1.2N	1250	65	55	45	25	15
S7H	1600**	F - EF - HR - VR	3p/4p	XT7H-XT7H/M	E1.2N	1600	65	55	45	25	20
S7L	1250	F - EF - HR - VR	3p/4p	XT7L-XT7L/M		1250	100	80	70	35	15
S7L	1600**	F - EF - HR - VR	3p/4p	XT7L-XT7L/M		1600	100	80	70	35	20
S7D	1250	F - EF - HR - VR	3p/4p	XT7D-XT7D/M	E1.2B/MS	1250					25*
S7D	1600**	F - EF - HR - VR	3p/4p	XT7D-XT7D/M	E1.2B/MS	1600					25*

* Tmax XT7D-XT7D/M 20kA

**Derating up to 1450A for F, EF terminals and up to 1500A for HR

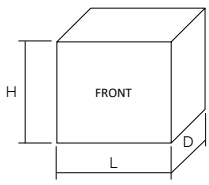
Trip Unit Protections correspondence

	PR211/P	PR212/P	Ekip DIP	Ekip Touch	Ekip Hi-Touch
					
Protection functions	**I - LI**	**LSI - LSIG**	**LI, LSI, LSIG**	**LI, LSI, LSIG**	**LI, LSI, LSIG**
overload protection - L	●	●	●	●	●
Time delay overcurrent protection $I^2*t=cost$ - S		●	●	●	●
Time delay overcurrent protection (t=k) - S		●	●	●	●
Instantaneous overcurrent protection - I	●	●	●	●	●
Earth fault protection - G		●	●	●	●
Network analyzer					●
Real-time monitoring and protection - Current		●	○	●	●
Real-time monitoring and protection - Voltage, Power, Energy, Frequency				○	●
Maintenance indicators and records			○	●	●
Communication capability		○		○	○

● = standard features ○ = Features available as optional or installing additional devices
PR212/D Communication capability using the release PR212/PD-L (LonTalk Protocol) or PR212/PD-M (Modbus RTU Protocol).

Clearance for circuit-breakers within compartment

Before ordering, it is important verify that the minimum panel dimensions are respected in order to mount correctly the new device:



	L (3p) [mm]		L (4p) [mm]		H [mm]		D [mm]	
HBRF Type	E1.2-XT7/XT7M	S7	E1.2-XT7/XT7M	S7	E1.2-XT7/XT7M	S7	E1.2-XT7/XT7M	S7
F-EF-HR-VR	250	240	322	310	382,5	540	130	146,5

S7 → Tmax XT XT7/Emax 2 E1.2
Hard Bus Retrofill

Example of order

Case 1:
accessories not needed
Existing circuit-breaker:
S7S 1250A 3p fixed version with front terminals.
Need to replace it to Tmax XT XT7 with hard bus retrofill retrofit kits.
Tmax XT XT7 should be equipped with Ekip DIP LSI trip unit.

Part number	Description
1SDA114941R1	RF XT7S/S7S 1250 Ekip Dip LSI F F 3p

Case 2:
accessories needed
Existing circuit-breaker is S7H 1600A 3p fixed version with horizontal rear terminals. I want the new circuit-breaker, E1.2, to be equipped with the following accessories.
- Ekip Touch LSIG
- Opening coil (YO @220Vac/dc)
- Closing coil (YC @220Vac/dc),
- Spring charging motor 220Vac/dc
- Rating plug 1600A

Part number	Description	Note
1SDA115769R1	RF E1.2N/S7H 1600 WITH ACC F HR 3p	Circuit-breaker to be completed with additional accessories to be ordered as loose accessories
1SDA107531R1	Ekip Touch LSIG E1.2..E6.2 Ed.2	
1SDA074226R1	Rating Plug 1600 E2.2..E6.2	
1SDA073674R1	YO E1.2..E6.2-XT7-XT7M 220-240Vac/dc	
1SDA073687R1	YC E1.2..E6.2-XT7M 220-240Vac/dc	
1SDA073711R1	M E1.2 220-250Vac/dc	

S8 → T8 (IEC/UL)
Hard Bus Retrofill

Isomax S8 moulded case circuit-breaker, available only in fixed version, entered the "Obsolete" phase and is no longer produced.
ABB Service has developed an easy retrofit kit with Tmax T8 circuit-breakers.

The retrofit kit is available for both 3-pole and 4-pole versions and equipped with different terminals:
The 3-pole version is a T8 circuit-breaker with a panel door adapter while the 4-pole version is a special T8 circuit-breaker with a different 4th terminal for the neutral.

S8-T8 Fixed hard bus retrofill solutions with Vertical Rear terminals

Isomax	Performance level	Iu [A]	Poles	Retrofit kit Solution	New circuit-breaker	Performance level	Iu [A]	Icu @415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
S8	H	2000	3p/4p	RF	T8	L	2000	85	50	40	35
		2500	3p/4p				2500	85	50	40	35
		3200	3p/4p				3200	85	50	40	35
S8	V	2000	3p/4p	RF	T8	V	2000	120	70	50	40
		2500	3p/4p				2500	120	70	50	40
		3200	3p/4p				3200	120	70	50	40
S8	D	2000	3p/4p	RF	T8	D	2000				40
		2500	3p/4p				2500				40
		3200	3p/4p				3200				40

S8-T8 Fixed hard bus retrofill solutions with Front terminals

Isomax	Performance level	Iu [A]	Poles	Retrofit kit Solution	New circuit-breaker	Performance level	Iu [A]	Icu @415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
S8	H	2000	3p/4p	RF	T8	L	2000	85	50	40	35
		2500	3p/4p				2500	85	50	40	35
		3200	3p/4p				3200	85	50	40	35
S8	V	2000	3p/4p	RF	T8	V	2000	120	70	50	40
		2500	3p/4p				2500	120	70	50	40
		3200	3p/4p				3200	120	70	50	40
S8	D	2000	3p/4p	RF	T8	D	2000				40
		2500	3p/4p				2500				40

S8 → T8 (IEC/UL)
Hard Bus Retrofill

Trip Unit Protections correspondence

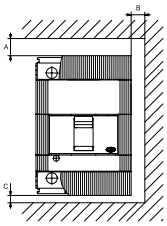
Protection functions	PR212/P LSI-LSIG	PR232/P LSI	PR331/P LSIG	PR332/P LI- LSI-LSIG - LSIRc
Inverse long-time delayed trip - L	●	●	●	●
Short circuit constant tripping time (t=k) - S	●	●	●	●
Instantaneous not adjustable - I	●	●	●	●
Ground fault constant tripping time (t=k) - G	●	○	●	●
Residual current Rc	○	○	○	●
Over temperature - OT	○	○	○	●
Unbalance phase with define time-delay trip - U	○	○	○	●
Undervoltage - UV	○	○	○	●*
Overvoltage - OV	○	○	○	●*
Residual voltage - RV	○	○	○	●*
Reversal of Power - RP	○	○	○	●*
Underfrequency - UF	○	○	○	●*
Overfrequency - OF	○	○	○	●*

● Available
●* Available with PR330/V
○ Not available

Isomax S8		RF
YO (shunt opening release)	→	T8 standard YO
YC (shunt closing release)	→	T8 standard YC
YU (undervoltage release)	→	T8 standard YU
M (spring loading motor)	→	T8 standard spring charging motor
O/C AUX contacts: 3 O/C + 1 trip + Closing spring charged	→	4 open/closed contacts for PR332 (4 contacts on changeover + 1 contact dedicated to the release
PR212/K	→	
PR010/K	→	

Additional T8 Accessories compatible with S8-T8 hard bus retrofill
Contact signalling undervoltage release de-energised (Aux. contact YU)
Trip reset
Mechanical operation counter
Padlock in the open position
Key lock in the open position
Transparent protection for pushbutton – TCP
IP54 Door protection
Homopolar sensor for the main power supply earthing conductor (star centre of the transformer)
Homopolar toroid for residual current protection
PR330/V-T8 (optional on PR332/P)
PR330/D-M (optional on PR332/P)
PR330/R Actuation unit
BT030 Wireless communication unit
PR030/B Power supply unit
HMI030 Interface from front of switchgear
LD030 DO Signalling unit

Insulation distance for installation in metallic cubicle:



[mm]	A	B	C
T8	200	30	120

S8 → T8 (IEC/UL)
Hard Bus Retrofill

Example of order

Case 1:
accessories not needed

Existing circuit-breaker:
S8 2500A 3p fixed version with front terminals.
Need to replace it with T8 with hard bus retrofill retrofit kits.

Tmax T8 should be equipped with a PR331/P LSI trip unit:

Part number	Description	Comment
1SDA079951R1	T8L-S8H 2500 PR331/P LSI IN=2500 3P F F	The kit already includes the circuit-breaker

Case 2:
accessories needed

Existing circuit-breaker is S8 3200 3p fixed version with vertical rear terminals. I want the new circuit-breaker, T8, to be equipped with the following accessories

- PR332/P LSIG
- Opening coil (YO @220Vac/dc)
- Closing coil (YC @220Vac/dc),
- Spring charging motor 220Vac/dc
- Rating plug 1600A

Part number	Description	Note
1SDA079973R1	RF T8L-S8H 3200 3200 3P F VR WITH ACC	Circuit-breaker to be completed with additional accessories
1SDA074546R1	PR332/P-LSIG T8 new	
1SDA074553R1	RATING PLUG In=1600A T7-T7M-X1 new	
1SDA038292R1	SOR 220-240Vac/dc	
1SDA038302R1	SCR 220-240Vac/dc	
1SDA038324R1	M 220-250Vac/dc	

Modul

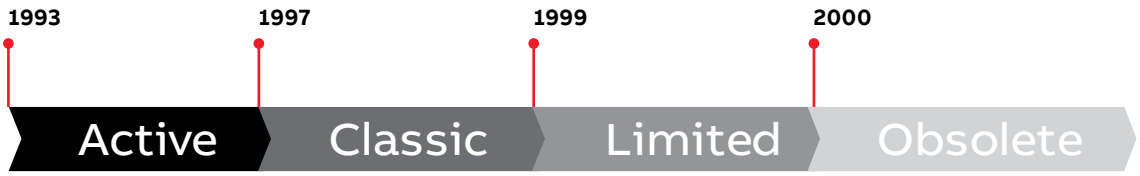
Modul

In 1993, ABB SACE launched the series of new moulded case circuit-breakers on the market: Modul.
This new series of circuit-breaker was suitable for:

- Rated uninterrupted currents from 100A to 3200A
- Rated breaking capacities up to 120kA at 380/415Vac: a very high performance for that period.

Due to their great operational reliability, Modul circuit-breakers can still be found in operation today. Today the complete SACE Modul family is obsolete and no longer produced.
However, SACE Modul circuit-breakers can be replaced with the more recent Tmax and Tmax XT series thanks to the advanced direct replacement retrofitting solutions available.
These retrofit kits include a special Tmax/Tmax XT adapter for the fixed part that can be installed on the fixed part of Modul circuit-breakers. The kit is completed with a special Tmax/Tmax XT moving part. All that remains to be done is to adapt the panel door.
The kit can be installed rapidly and specific personnel are not required. However, is it essential for the fixed part to be in a good condition.

Modul life cycle management



Most circuit-breakers no longer available for sales

Isomax	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**Repair**	**New Product/ Replacement**
Obsolete	-	-	-	-	-

○ available
- not available

ABB developed a retrofit kit to quickly replace some frames of Modul moulded case circuit-breakers

- Direct replacement Tmax or Tmax XT

Retrofit kits available

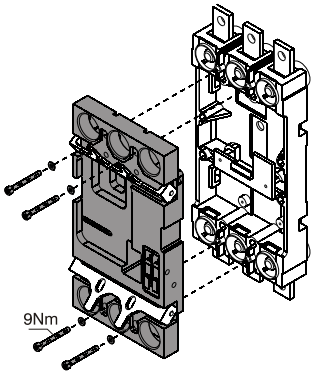
		SN	SH
Rated Current [A]		100	100
		125	125
		160	160
		250	250
		400	400
Version	**Poles**		
Plug in	3P	DR	DR
	4P	DR	DR
Fixed	3P	-	-
	4P	-	-

SN/SN up to 400A → Tmax/Tmax XT
Direct Replacement

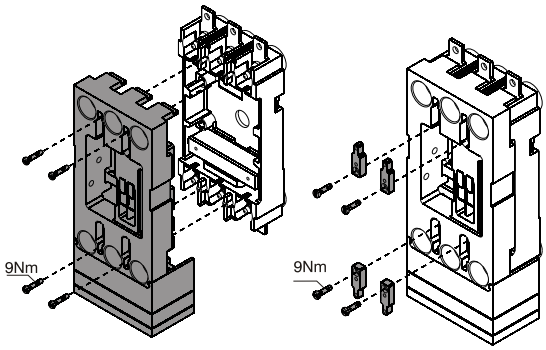
Modul IEC moulded case circuit-breakers, in withdrawable version, can be replaced with the most recent Tmax and Tmax XT series with the advanced direct replacement retrofit kit solutions. The kit consists of:

- A special adapting plate to be connected to the Modul fixed part
- Dedicated connectors for XT4
- Special moving part of the new generation circuit-breaker
- Terminal covers
- Flange for panel door. For T5, it is equipped with a dedicated plate due to the greater depth (1.5cm).

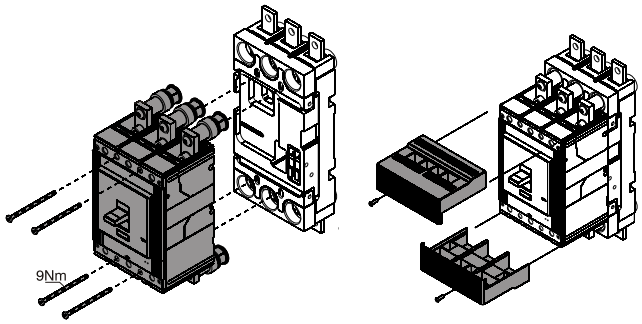
T5



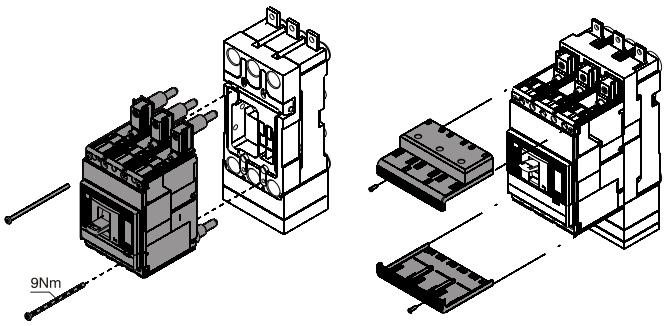
XT4



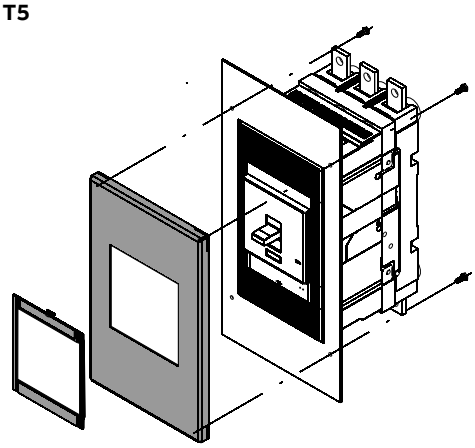
T5



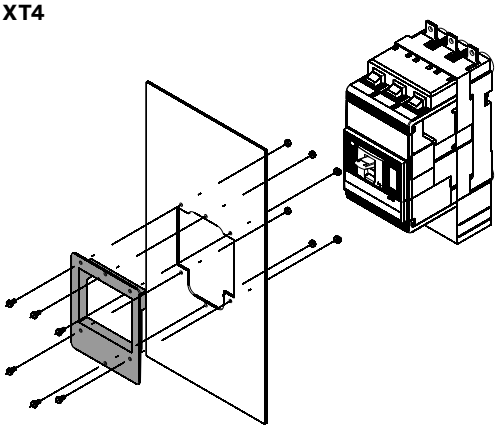
XT4



T5



XT4



SN/SN up to 400A → Tmax/Tmax XT
Direct Replacement

Modul	Iu [A]	Poles	Retrofit kit Solution	New circuit breaker	Emax 2 Performance level	Iu [A]	In [Rating plug) [A]	Icu @ 415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
SN	100	3p/4p	DR	XT2	S	160		60	30	20	-
	125	3p/4p				160		60	30	20	-
	160	3p/4p		XT4	S	250		60	30	20	-
	250	3p/4p				250		60	30	20	-
	400	3p/4p		T5	N	400		60	30	20	5
SH	100	3p/4p	DR	XT4	H	250		30	20	10	-
	125	3p/4p				250		30	20	10	-
	160	3p/4p				250		30	20	10	-
	250	3p/4p				250		30	20	10	-
	400	3p/4p		T5	H	400		35	25	18	5

Trip Unit Protections

Even though Modul circuit-breakers used to have a thermomagnetic release, the only trip units available for the direct replacement retrofit kit are electronic.

Protection functions	XT2/XT4					T5		
	Ekip LS/I	Ekip I	Ekip LSI	Ekip LSIG	Ekip E-LSIG*	PR221 DS LS/I - I	PR222 DS/P LSI - LSIG	PR222 DS/PD LSI - LSIG
Inverse long-time delayed trip - L	●	○	●	●	●	●	●	●
Short circuit constant tripping time (t=k) - S	● (as an alternative to I)	○	●	●	●	●	●	●
Instantaneous not adjustable - I	● (as an alternative to S)	●	●	●	●	●	●	●
Ground fault constant tripping time (t=k) - G	○	○	○	●	●	○	●	●

● Available
○ Not available
* more measurements are present with Ekip E: Voltage:
– phase-phase, phase-neutral;
– Power: active, reactive and apparent;
– Power factor;
– Frequency and peak factor;
– Energy: active, reactive, apparent, counter.

Compatibility of accessories

Modul		Tmax	Tmax XT
YO (shunt opening release)	→	Tmax standard YO	Tmax XT standard YO
YU (undervoltage release)	→	Tmax standard YU	Tmax XT standard YU
Time-delay device D	→	Tmax UVD - cubicle rewiring is required	Tmax UVD - cubicle rewiring is required
AUX Q1-Q2 (O/C auxiliary contacts)	→	Tmax standard, but it must be wired at the ABB factory. Therefore, one must specify 2Q during the ordering phase with a note *	Tmax standard, but it must be wired at the ABB factory. Therefore, one must specify 2Q during the ordering phase with a note
AUX Q2-S51 (1O/C and electrical signalling of tripping of electronic releases S51)	→	Tmax standard, but it must be wired at the ABB factory. Therefore, one must specify Q + S51 during the ordering phase with a note **	Tmax standard, but it must be wired at the ABB factory. Therefore, one must specify Q + S51 during the ordering phase with a note
AUP: circuit-breaker connected circuit-breaker insulated	→	already included in the kit	already included in the kit
Rotary handle on circuit-breaker. It can be equipped with Padlock and:	→	direct (RHD):	"Direct rotary handle (RHD) It can be equipped padlock and with:"
- Key lock	→	- Key lock	- Key lock
Rotary handle on panel door with adjustable depth. It can be fitted with: It can be equipped with Padlock and:	→	Rotary handle transmitted (RHE): installed on the panel door	Rotary handle transmitted (RHE): installed on the panel door
- padlock device	→	- padlock device	- padlock device
- IP54	→	IP54 Protection	IP54 Protection
Spring charge motor (M)	→	MOE MOE-E	MOE MOE-E. The motor is not installed and it is without the adapter plug. It must be cabled
padlock device	→	Front for operating lever mechanism	Front for operating lever mechanism

* or image 15 (Q1+Q2).
**Specify if you have image 19 (Q2+S51)
see Modul catalogue: link

While the following Tmax or Tmax XT accessories are not compatible with the kit:

- ATS
- Mechanical interlock
- Accessories for fixed part.

SN/SN up to 400A → Tmax/Tmax XT
Direct Replacement

All the direct replacements for Modul circuit-breakers need to be ordered from ABB service with a PDF order specifying the kit (direct replacement) and the circuit-breaker in fixed version with front terminals + accessories (if needed).

Example of order:
I need to replace a 3-pole Modul SN160 160 with a more modern XT4 equipped with Ekip LSI trip unit and opening coil (110Vac).
What to order:
1SDA069459R1 → KIT SN160/250 - XT4S 250 3p
1SDA068485R1 → XT4S 250 Ekip LSI In=250A 3p F F
1SDA066324R1 → SOR-C 110-127Vac / 110-125Vdc.

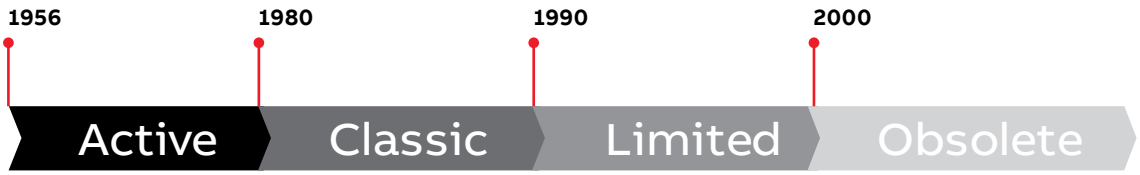
Isol/ Fusol

Isol/Fusol

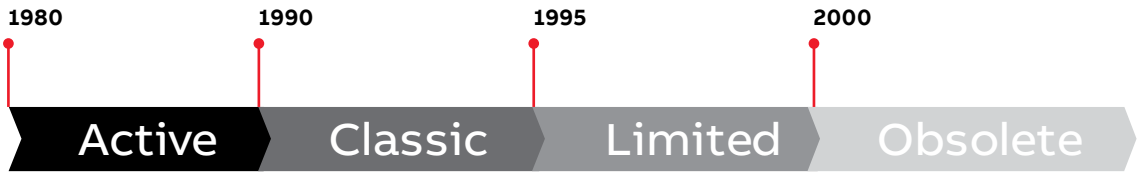
In 1956 SACE (now ABB) launched the series of moulded case circuit- breakers on the market: Isol. The SACE Isol series was characterised by six versions for rated uninterrupted currents Iu from 63 to 800A and breaking capacity Icu up to 25kA at 440Vac.
These circuit-breakers were equipped with thermomagnetic releases for protection in the case of a short circuit, either with instantaneous trip or with selective time delayed trip (for the Z 630-800/MM circuit-breakers).

Due to their great operational reliability, Isol/ Fusol circuit-breakers can still be found in operation today.
Today the complete SACE Isol and Fusol families are both obsolete and no longer produced.
However, SACE Isol and Fusol withdrawable circuit-breakers can be replaced with the more recent Tmax series thanks to the advanced cradle in cradle retrofitting solutions available.

Isol life cycle management



Fusol life cycle management



Isol/Fusol	Service solutions				
Life Cycle·Management (LCM)	**Spare Parts/ Accessories**	**Maintenance**	**Training**	**New Product/ Replacement**	**Retrofit kits**
Obsolete	-	-	-	-	-

- no longer available
● available

ABB developed a retrofit kit to quickly replace some frames of Isol/Fusol moulded case circuit-breakers:
• Cradle in Cradle with Tmax

Retrofit kit solutions

		Isol		Fusol
Rated Current [A]		Z630	Z800	FZ630
		400		400
		500		500
		630		630
			800	
Version	**Poles**			
Withdrawable	3P	**CiC**	**CiC**	**CiC**
	4P	-	-	
Fixed	3P	-	-	
	4P	-	-	

Isol/Fusol → Tmax
Cradle in Cradle

Cradle In Cradle of Z630/Z800 with Tmax T6
These retrofit kits include a special Tmax adapter for the fixed part that can be installed on the fixed part of Isol/ Fusol circuit-breakers. The result is a completely revamped fixed part that can house the standard moving part of Tmax. All that remains to be done is to adapt the panel door. The kit can be installed rapidly and specific personnel are not required. However, is it essential for the fixed part to be in a good condition.

The kit comprises:
- Adapter plate for the fixed part
- Panel adapter
- Installation instructions.

Benefits
- No need to disassemble the fixed part of Isol/ Fusol
- Enhanced safety
- Guaranteed continuity of service
- Easy, fast installation
- Reduced maintenance and spare parts costs
- Tmax continues to be available for a long time
- Tmax accessories and spare parts also continue to be available for a long time.

Isol	Iu [A]	Poles	Retrofit kit Solution	New circuit-breaker	Performance level	Iu [A]	Icu @415V [kA]	Icu @500V [kA]
Z630	400	3p	CiC	T6	S	630	25	25
	500	3p					25	25
	630	3p					25	25
Z800	800	3p	CiC	T6	S	800	25	25

Isol	Iu [A]	Poles	Retrofit kit Solution	New circuit-breaker	Performance level	Iu [A]	Icu @415V [kA]	Icu @500V [kA]
FZ630	400	3p	CiC	T6	V	630	100	85
	500	3p					100	85
	630	3p					100	85

Isol/Fusol → Tmax
Cradle in Cradle

Accessories compatibility
All Isol and Fusol accessories can be replaced by Tmax ones.
Bear in mind, however, that there are fewer auxiliary contacts available for Tmax.
You need to rewire the spring charging motor and consider that it has a different depth.
The following Tmax accessories are not compatible with the kit:

- ATS
- Mechanical interlock
- Accessories for fixed part.

Example of order:
Ask ABB.

Competitors

Competitors

ABB has also developed some retrofits to replace competitors' old air circuit-breakers:

In particular here is a list of the brands and families covered by ABB retrofit solutions:

Brand	Family	version	Retrofit solution	ABB circuit-breaker
Schneider	Masterpact M	Withdrawable		Emax 2
		Fixed	RF	Emax 2
Siemens	3WN1 3WN6	Withdrawable	RF RF+DR	New Emax Emax 2
Terasaki	AT	Withdrawable	RF	New Emax

Schneider (Merlin Gerin) Masterpact M

ABB ensures operating continuity between Masterpact M of the Masterpact Merlin Gerin (now Schneider) series of air circuit-breakers and the most recent series of ABB SACE circuit-breakers.

Masterpact M		**M08**				**M10**				**M12**				**M16**			
	In [A]	**800**				**1000**				**1250**				**1600**			
Performance levels		**N1**	**H1**	**H2**	**L1**	**N1**	**H1**	**H2**	**L1**	**N1**	**H1**	**H2**	**L1**	**N1**	**H1**	**H2**	**L1**
Icu [kA]	220/415V	40	65	100	130	40	65	100	130	40	65	100	130	40	65	100	130
	440V	40	65	100	110	40	65	100	110	40	65	100	110	40	65	100	110
	500/690V	40	65	85	65	40	65	85	65	40	65	85	65	40	65	85	65
Ics [kA]	% Icu	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Icw (1s) [kA]		30	50	50	12	30	50	50	12	30	50	50	12	40	50	50	17

Masterpact M		**M20**				**M25**				**M32**		**M40**		**M50**		**M63**	
	In [A]	**2000**				**2500**				**3200**		**4000**		**5000**		**6300**	
Performance levels		**N1**	**H1**	**H2**	**L1**	**N1**	**H1**	**H2**	**L1**	**H1**	**H2**	**H1**	**H2**	**H1**	**H2**	**H1**	**H2**
Icu [kA]	220/415V	55	75	100	130	55	75	100	130	75	100	75	100	100	150	100	150
	440V	55	75	100	110	55	75	100	110	75	100	75	100	100	150	100	150
	500/690V	55	75	85	65	55	75	85	65	75	85	75	85	85	85	85	85
Ics [kA]	% Icu	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Icw (1s) [kA]		55	75	75	17	55	75	75	17	75	75	75	75	100	100	100	100

ABB retrofit kits are designed to preserve the performance specifications of the existing switchgear and reduce downtime to the minimum.
ABB offers 2 possible retrofit solutions for Masterpact M:

1. Advanced retrofit kit direct replacement (DR) type for circuit-breakers in withdrawable version. In this case, the old Masterpact M is replaced with an ABB Emax 2 air circuit-breaker.
2. Basic retrofit kit type Hard Bus retrofill (HR) for both versions of circuit-breakers: withdrawable and fixed. The ABB breaker used is Emax 2.

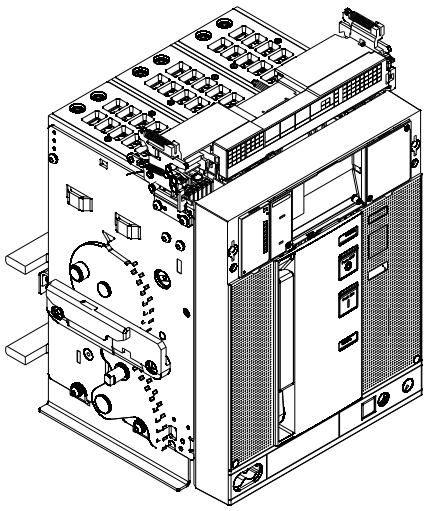
	M08			**M10**			**M12**			**M16**		
Masterpact M Performance level	**N1**	**H1**	**H2**	**N1**	**H1**	**H2**	**N1**	**H1**	**H2**	**N1**	**H1**	**H2**
Iu [A]	800	800	800	1000	1000	1000	1250	1250	1250	1600	1600	1600
Poles	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p
Emax 2 Retrofit kit Solution	DR/RF	DR/RF	RF	DR/RF	DR/RF	RF	DR/RF	DR/RF	RF	DR/RF	DR/RF	RF

	M20			**M25**			**M32**		**M40**		**M50**		**M63**	
Masterpact M Performance level	**N1**	**H1**	**H2**	**N1**	**H1**	**H2**	**H1**	**H2**	**H1**	**H2**	**H1**	**H2**	**H1**	**H2**
Iu [A]	2000	2000	2000	2500	2500	2500	3200	3200	4000	4000	5000	5000	6300	6300
Poles	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p	3p	3p/4p	3p/4p	3p/4p	3p/4p
Emax 2 Retrofit kit Solution	DR/RF	DR/RF	RF	DR/RF	DR/RF	RF	RF	RF	RF	RF	RF	RF	RF	RF

Masterpact M → Emax 2
Direct Replacement

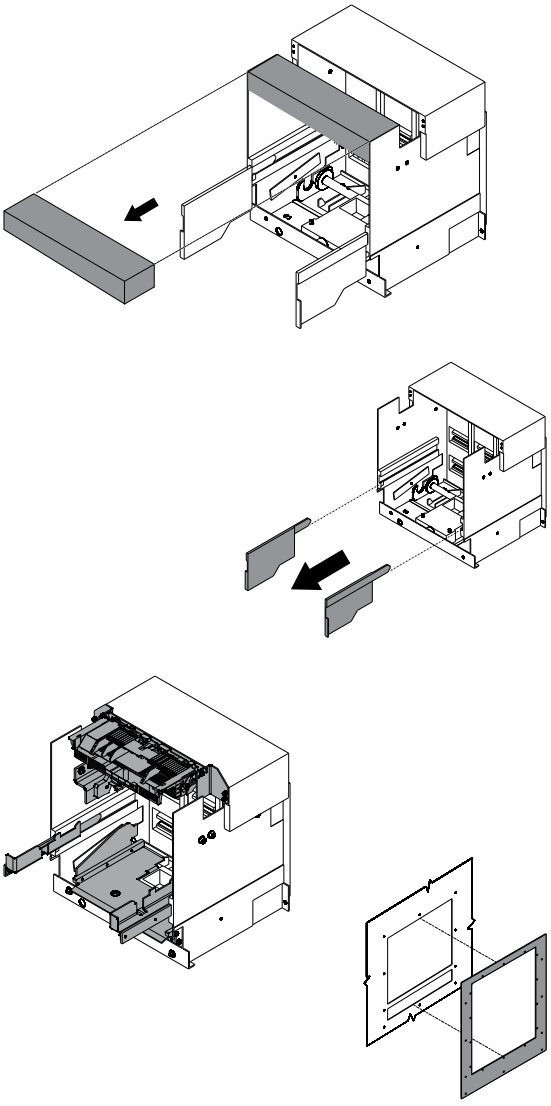
The Direct Replacement kit for Masterpact M is easy to install guaranteeing a significant reduction of downtime. The new solution, in fact, consists in replacing only the mobile part of the old circuit-breaker while allowing all the Masterpact M fixed parts to be preserved. The result of this combination is a new apparatus capable of satisfying the customer's needs.
The retrofit kit consists of:
The Direct Replacement solution has been developed by introducing modifications both on the moving part of the Emax 2 and on the fixed part of the Masterpact M.

- The Emax 2 moving part is subject to special changes regarding terminals, lower slides and lateral sides. The dedicated Emax 2 moving part is assembled and tested in the factory in order to be racked in the Masterpact M fixed part.



The following materials need to be assembled on the Masterpact M fixed part:

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



This solution is available for the withdrawable Masterpact M circuit-breakers, type M08 M10 M12 M16 M20 M25 with Breaking Capacity N1 and H1:

Masterpact M	Masterpact M Performance level	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	Icu @415V [V]	Icu @500V [V]	Icu @690V [V]	Icw 1s [kA]
M08	N1	800	3p/4p	DR	E2.2	N	800	40	40	40	40
	H1	800	3p/4p		E2.2	N	800	65	65	65	50
M10	N1	1000	3p/4p	DR	E2.2	N	1000	40	40	40	40
	H1	1000	3p/4p		E2.2	N	1000	65	65	65	50
M12	N1	1250	3p/4p	DR	E2.2	N	1250	40	40	40	40
	H1	1250	3p/4p		E2.2	N	1250	65	65	65	50
M16	N1	1600	3p/4p	DR	E2.2	B	1600	40	40	40	40
	H1	1600	3p/4p		E2.2	N	1600	65	65	65	50
M20	N1	2000	3p/4p	DR	E2.2	N	2000	55	55	55	55
	H1	2000	3p/4p		E2.2	H	2000	75	75	75	75
M25	N1	2500	3p/4p	DR	E2.2	N	2500*	55	55	55	55
	H1	2500	3p/4p		E2.2	H	2500*	75	75	75	75

*derating 2300A for horizontal rear version only

Masterpact M → Emax 2
Direct Replacement

Trip unit correspondence

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

● available as a basic function
○ available with additional module
- not available

Compatibility of accessories

Masterpact M		Emax 2
MX and MX2 (Shunt opening release)	→	Emax 2 standard - YO and YO2
M (spring charging motor)	→	Emax 2 standard spring charging motor - M
MN (undervoltage release)	→	Emax 2 standard - YU
XF (shunt closing release)	→	Emax 2 standard - YC
MNR (electronic delay for MN - into the switchboard)	→	Remove the Masterpact one and add the external one of Emax 2 - D
Current sensor for neutral conductor outside circuit-breaker (into the switchboard)	→	Remove the Masterpact one and add the external one of Emax 2 standard
AUX O/C internal contacts (O-F-OF)	→	Emax 2 standard changeover contacts - Q
AUX spring charged (CH)	→	Emax 2 standard - S33 M
AUX CB tripped - SDE	→	Emax 2 standard - S51
AUX CB ready to close (PF)	→	Emax 2 standard - RTC
AUX Programmable contacts (M1...16)	→	Emax 2 standard (with Ekip Signalling)
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
Arc chute cover (CC)	→	if not present on the installed fixed part, use the fixing support for the lateral sides of the fixed part, supplied in the retrofit kit

The following accessories, instead, are not compatible with the Emax 2 Direct Replacement kit:
- External 15 O/C AUX
- AUX CB connected/ insulated position (CE - CD - CT)
- Mechanical lock for compartment door
- Mechanical interlock system with other CBs
- All accessories of the Emax 2 fixed part
- Terminal shield for auxiliary board (CB)
- Breaker mismatch protection.

The following Emax 2 accessories can be installed, but need to be externally cabled with local adaptation:
- Electronic Delay for MN
- Current sensor for neutral conductor outside the circuit-breaker
- Ekip Supply, Communication and external Signalling modules
- Ekip Multimeter; Ekip Control Panel ; Ekip View.

Masterpact M → Emax 2
Direct Replacement

Checks before ordering:
The conditions of the Masterpact fixed part MUST be good. In particular, the following must be checked:

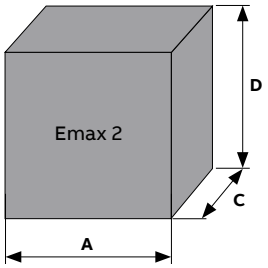
- jaw contacts, their protective coating, plastic support and shutters must be undamaged. The plastic support that houses the terminals must not be cracked, broken or deformed
- Make sure that the fixed part is not distorted or deformed.
- Make sure that the opening linkage mechanisms of the jaw contacts are not damaged
- Make sure that there is no dust or carbon residue due to circuit-breaker operations. If necessary, clean the fixed part.
- Make sure that the protective coatings of the materials are undamaged
- Make sure that the screws on the fixed part are properly tightened

For a more complete checking list, ABB has prepared an easy guide to understand the conditions of your Masterpact M fixed part: conditions:
https://search.abb.com/library/Download.aspx?DocumentID=1SDH001279R0002&LanguageCode=en&DocumentPartId=&Action=Launch
Whenever the Masterpact M fixed part is not fully working, the best retrofitting solution is the Hard Bus Retrofill.

For Part numbers visit the Retrofit kit selector:
https://new.abb.com/low-voltage/service/service-for-low-voltage-products/extension-upgrades-and-retrofits/selector.

Direct replacement for low-cubicle version
It is very important to check the cubicle's dimensions before ordering: in the case of cubicles with high D less than 485mm, a dedicated retrofit version is available.
In this case, the commutation function is performed by cables connected through male and female sockets instead of traditional sliding contacts.

Example of order



Panel dimensions	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

if D measure is lower than 485mm, contact ABB for a special version for low-cubicle

Example of order

Case 1:
accessories not needed
Existing circuit-breaker: Masterpact M M16 N1 4-pole withdrawable version with fixed part still in good condition.
Need to replace for direct replacement with Emax 2.

Part number	Description
1SDA104022R1	DR E2.2B1600-M16 N1 1600 4p W EkipDipLSI

Case 2:
accessories needed
Existing 3-pole circuit-breaker M20 H1, equipped with STR 58 U trip unit, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- Opening coil (YO@110Vac),
- Closing coil (YC@24Vdc),
- Spring charging motor (M@220Vac)
- Padlock

I also want to have Ekip touch LSI trip unit and add: Ekip Supply module, HUB communication module, HUB and TCP communication module + software package: measuring package.

Part number	Description
1SDA104035R1	DR E2.2H2000-M20 H1 2000 3p W with acc
Technical Note for the order: Accessories installed on Breaker	
1SDA107530R1	Ekip Touch LSI
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073681R1	YC E1.2..E6.2-XT7M 24Vac/dc
1SDA073725R1	M E2.2...E6.2 220-250Vac/dc
1SDA073858R1	PBC Prot. Pushbuttons O/C E2.2...E6.2
1SDA074173R1	Ekip Supply 24-48VDC E1.2..E6.2-Tmax XT
1SDA082894R1	Ekip Com Hub E1.2..E6.2
1SDA074151R1	Ekip Com Modbus TCP E1.2..E6.2
1SDA107525R1	SW Measuring package per Emax 2
1SDA073858R1	

Case 3:
accessories needed – low cubicle
Existing 3-pole circuit-breaker M20 H1, equipped with STR 58 U trip unit, withdrawable version with fixed part still in good condition and equipped with the following accessories:
- Opening coil (YO@110Vac),
- Closing coil (YC@24Vdc),
- Spring charging motor (M@220Vac)
- Padlock

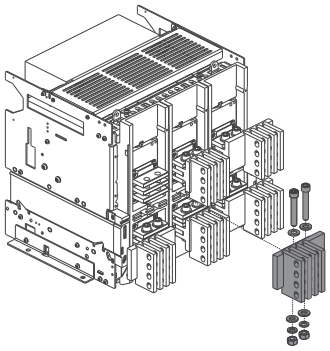
I also want to have Ekip touch LSI trip unit. Remember that there is no possibility to order Ekip modules so far (but check it with your ABB local Service).

Part number	Description
1SDA114461R1	DR E2.2N-M25N1 3pW with acc low cubicle
Technical Note for the order: Accessories installed on Breaker	
1SDA107530R1	Ekip Touch LSI
1SDA073672R1	YO E1.2..E6.2-XT7-XT7M 110-120Vac/dc
1SDA073681R1	YC E1.2..E6.2-XT7M 24Vac/dc
1SDA073725R1	M E2.2...E6.2 220-250Vac/dc
1SDA073858R1	PBC Prot. Pushbuttons O/C E2.2...E6.2

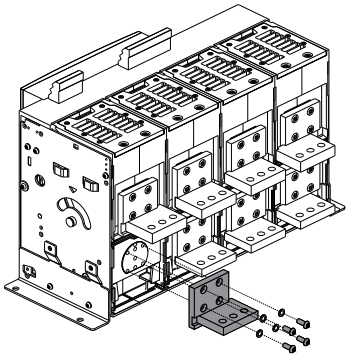
Masterpact M → Emax 2
Hard Bus Retrofill

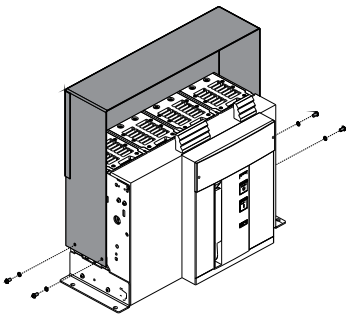
Launched in 2014 and 2015, the Masterpact M to Emax 2 hard bus retrofill retrofit kits have been designed to completely replace the existing circuit-breakers, upgrading the systems to the latest ABB Air Circuit-Breaker series Emax 2.
Hard bus retrofill kits require complete disassembly of the Masterpact M air circuit-breaker, both fixed and moving parts, in case of withdrawable version and the complete breaker in the case of the fixed version. When possible, the kits include a special adapter to fix the new breaker in the same Masterpact M fixing points so that there is no need to drill the switchboard. Otherwise a special adhesive sheet can be put on the bottom plate to easily define the new fixing points that need to be drilled.

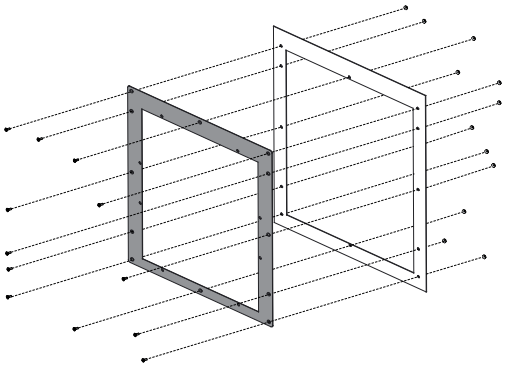
The retrofit kit consists of:
For the withdrawable version
- Special Emax 2 fixed part with dedicated terminals to connect the new one easily to the existing switchboard busbars (no modification on the busbar system is required)
- Insulating supports
- Bottom plates to fix the Emax 2 in the same Masterpact M fixing points
- Adhesive template and metal adapters for panel door cutout
- Mounting instructions and conversion wiring diagram.



For the fixed version, the kit includes the Emax 2 circuit-breaker with:
- Special kits for upper and lower terminals to easily install the new circuit-breaker on existing switchboard busbars (no modification required on the busbar system). During the ordering phase, 2 kits are required: one for upper and one for lower terminals.
- Bottom plates to fix Emax 2 in the same Emax/ New Emax fixing points
- Some versions could have insulating covers
- Adhesive template and metal adapters for panel door cutout.







Masterpact M Withdrawable with horizontal rear terminals	Masterpact M Performance level	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In - Rating Plug [A]	Icu @415V [V]	Icu @500V [V]	Icu @690V [V]	Icw 1s [kA]
M08	N1	800	3p/4p	RF	E4.2	N	3200	800	40	40	40	30
	H1	800	3p/4p		E4.2	N	3200	800	65	65	65	50
	H2	800	3p/4p		E4.2	H	3200	800	100	85	85	50
M10	N1	1000	3p/4p	RF	E4.2	N	3200	1000	40	40	40	30
	H1	1000	3p/4p		E4.2	N	3200	1000	65	65	65	50
	H2	1000	3p/4p		E4.2	H	3200	1000	100	85	85	50
M12	N1	1250	3p/4p	RF	E4.2	N	3200	1250	40	40	40	30
	H1	1250	3p/4p		E4.2	N	3200	1250	65	65	65	50
	H2	1250	3p/4p		E4.2	H	3200	1250	100	85	85	50
M16	N1	1600	3p/4p	RF	E4.2	N	3200	1600	40	40	40	40
	H1	1600	3p/4p		E4.2	N	3200	1600	65	65	65	50
	H2	1600	3p/4p		E4.2	H	3200	1600	100	85	85	50
M20	N1	2000	3p/4p	RF	E4.2	H	3200	2000	55	55	55	55
	H1	2000	3p/4p		E4.2	H	3200	2000	75	75	75	75
	H2	2000	3p/4p		E4.2	H	3200	2000	100	85	85	75
M25	N1	2500	3p/4p	RF	E4.2	H	3200	2500	55	55	55	55
	H1	2500	3p/4p		E4.2	H	3200	2500	75	75	75	75
	H2	2500	3p/4p		E4.2	H	3200	2500	100	85	85	75
M32	H1	3200	3p/4p	RF	E4.2	H	3200 (1)		75	75	75	75
	H2	3200	3p/4p		E4.2	H	3200 (1)		100	85	85	75
M40	H1	4000	3p	RF	E4.2	H	4000 (2)		75	75	75	75
	H2	4000	3p		E4.2	H	4000 (2)		100	85	85	75
M50	H1	5000	3p/4p	RF	E6.2	H	5000		100	85	85	100
	H2	5000	3p/4p		E6.2	V	5000		150	85	85	100
M63	H1	6300	3p/4p	RF	E6.2	H	6300 (3)		100	85	85	100
	H2	6300	3p/4p		E6.2	V	6300 (3)		150	85	85	100

(1) derating In=3000A
(2) derating In=3450A
(3) derating In=5900A

Masterpact M → Emax 2
Hard Bus Retrofill

Masterpact M Withdrawable with vertical rear terminals	**Masterpact M Performance level**	**Iu [A]**	**Poles**	**Retrofit kit Solution**	**Emax 2**	**Emax 2 Performance level**	**Iu [A]**	**In - Rating Plug [A]**	**Icu @415V [V]**	**Icu @500V [V]**	**Icu @690V [V]**	**Icw 1s [kA]**
M08	N1	800	3p/4p	RF	E4.2	N	3200	800	40	40	40	30
	H1	800	3p/4p		E4.2	N	3200	800	65	65	65	50
	H2	800	3p/4p		E4.2	H	3200	800	100	85	85	50
M10	N1	1000	3p/4p	RF	E4.2	N	3200	1000	40	40	40	30
	H1	1000	3p/4p		E4.2	N	3200	1000	65	65	65	50
	H2	1000	3p/4p		E4.2	H	3200	1000	100	85	85	50
M12	N1	1250	3p/4p	RF	E4.2	N	3200	1250	40	40	40	30
	H1	1250	3p/4p		E4.2	N	3200	1250	65	65	65	50
	H2	1250	3p/4p		E4.2	H	3200	1250	100	85	85	50
M16	N1	1600	3p/4p	RF	E4.2	N	3200	1600	40	40	40	40
	H1	1600	3p/4p		E4.2	N	3200	1600	65	65	65	50
	H2	1600	3p/4p		E4.2	H	3200	1600	100	85	85	50
M20	N1	2000	3p/4p	RF	E4.2	H	3200	2000	55	55	55	55
	H1	2000	3p/4p		E4.2	H	3200	2000	75	75	75	75
	H2	2000	3p/4p		E4.2	H	3200	2000	100	85	85	75
M25	N1	2500	3p/4p	RF	E4.2	H	3200	2500	55	55	55	55
	H1	2500	3p/4p		E4.2	H	3200	2500	75	75	75	75
	H2	2500	3p/4p		E4.2	H	3200	2500	100	85	85	75
M32	H1	3200	3p/4p	RF	E4.2	H	3200		75	75	75	75
	H2	3200	3p/4p		E4.2	H	3200		100	85	85	75
M40	H1	4000	3p	RF	E4.2	H	4000 (1)		75	75	75	75
	H2	4000	3p		E4.2	H	4000 (1)		100	85	85	75
M50	H1	5000	3p/4p	RF	E6.2	H	5000		100	85	85	100
	H2	5000	3p/4p		E6.2	V	5000		150	85	85	100
M63	H1	6300	3p/4p	RF	E6.2	H	6300		100	85	85	100
	H2	6300	3p/4p		E6.2	V	6300		150	85	85	100

(1) derating In=3900A

Masterpact M fixed with horizontal rear terminals	Masterpact M Performance level	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In - Rating Plug [A]	Icu @415V [V]	Icu @500V [V]	Icu @690V [V]	Icw 1s [kA]
M08	N1	800	3p/4p	RF	E4.2	N	3200	800	40	40	40	30
	H1	800	3p/4p		E4.2	N	3200	800	65	65	65	50
	H2	800	3p/4p		E4.2	H	3200	800	100	85	85	50
M10	N1	1000	3p/4p	RF	E4.2	N	3200	1000	40	40	40	30
	H1	1000	3p/4p		E4.2	N	3200	1000	65	65	65	50
	H2	1000	3p/4p		E4.2	H	3200	1000	100	85	85	50
M12	N1	1250	3p/4p	RF	E4.2	N	3200	1250	40	40	40	30
	H1	1250	3p/4p		E4.2	N	3200	1250	65	65	65	50
	H2	1250	3p/4p		E4.2	H	3200	1250	100	85	85	50
M16	N1	1600	3p/4p	RF	E4.2	N	3200	1600	40	40	40	40
	H1	1600	3p/4p		E4.2	N	3200	1600	65	65	65	50
	H2	1600	3p/4p		E4.2	H	3200	1600	100	85	85	50
M20	N1	2000	3p/4p	RF	E4.2	H	3200	2000	55	55	55	55
	H1	2000	3p/4p		E4.2	H	3200	2000	75	75	75	75
	H2	2000	3p/4p		E4.2	H	3200	2000	100	85	85	75
M25	N1	2500	3p/4p	RF	E4.2	H	3200	2500	55	55	55	55
	H1	2500	3p/4p		E4.2	H	3200	2500	75	75	75	75
	H2	2500	3p/4p		E4.2	H	3200	2500	100	85	85	75
M32	H1	3200	3p/4p	RF	E4.2	H	3200		75	75	75	75
	H2	3200	3p/4p		E4.2	H	3200		100	85	85	75
M40	H1	4000	3p	RF	E4.2	H	4000 (1)		75	75	75	75
	H2	4000	3p		E4.2	H	4000 (1)		100	85	85	75
M50	H1	5000	3p	RF	E6.2	H	5000		100	85	85	100
	H2	5000	3p		E6.2	V	5000		150	85	85	0

(1) derating In=3700A

Masterpact M → Emax 2
Hard Bus Retrofill

Masterpact M fixed with vertical rear terminals	Masterpact M Performance level	Iu [A]	Poles	Retrofit kit Solution	Emax 2	Emax 2 Performance level	Iu [A]	In - Rating Plug [A]	Icu @415V [V]	Icu @500V [V]	Icu @690V [V]	Icw 1s [kA]
M08	H1	800	3p/4p	RF	E4.2	N	3200	800	65	65	65	50
	H2	800	3p/4p		E4.2	H	3200	800	100	85	85	50
M10	H1	1000	3p/4p	RF	E4.2	N	3200	1000	65	65	65	50
	H2	1000	3p/4p		E4.2	H	3200	1000	100	85	85	50
M12	H1	1250	3p/4p	RF	E4.2	N	3200	1250	65	65	65	50
	H2	1250	3p/4p		E4.2	H	3200	1250	100	85	85	50
M16	N1	1600	3p/4p	RF	E4.2	N	3200	1600	40	40	40	40
	H1	1600	3p/4p		E4.2	N	3200	1600	65	65	65	50
	H2	1600	3p/4p		E4.2	H	3200	1600	100	85	85	50
M20	N1	2000	3p/4p	RF	E4.2	H	3200	2000	55	55	55	55
	H1	2000	3p/4p		E4.2	H	3200	2000	75	75	75	75
	H2	2000	3p/4p		E4.2	H	3200	2000	100	85	85	75
M25	N1	2500	3p/4p	RF	E4.2	H	3200	2500	55	55	55	55
	H1	2500	3p/4p		E4.2	H	3200	2500	75	75	75	75
	H2	2500	3p/4p		E4.2	H	3200	2500	100	85	85	75
M32	H1	3200	3p/4p	RF	E4.2	H	3200		75	75	75	75
	H2	3200	3p/4p		E4.2	H	3200		100	85	85	75
M40	H1	4000	3p	RF	E4.2	H	4000		75	75	75	75
	H2	4000	3p		E4.2	H	4000		100	85	85	75
M50	H1	5000	3p	RF	E6.2	H	5000		100	85	85	100
	H2	5000	3p		E6.2	V	5000		150	85	85	100

Trip unit correspondence

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

● available as a basic function
○ available with additional module
- not available

Masterpact M → Emax 2
Hard Bus Retrofill

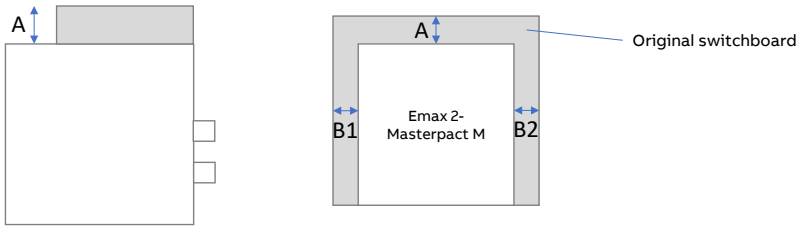
Compatibility of accessories

Masterpact M		Emax 2
MX and MX2 (Shunt opening release)	→	Emax 2 standard - YO and YO2
M (spring charging motor)	→	Emax 2 standard spring charging motor - M
MN (undervoltage release)	→	Emax 2 standard - YU
XF (shunt closing release)	→	Emax 2 standard - YC
MNR (electronical delay for MN - into the switchboard)	→	Remove the Masterpact one and add the external one of Emax 2 - D
AUX O/C internal contacts (O-F-OF)	→	Emax 2 standard changeover contacts - Q
AUX spring charged (CH)	→	Emax 2 standard - S33 M
AUX CB tripped - SDE	→	Emax 2 standard - S51
AUX CB ready to close (PF)	→	Emax 2 standard - RTC
AUX Programmable contacts (M1...16)	→	Emax 2 standard (with Ekip Signalling)
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
Arc chute cover (CC)	→	if not present on the installed fixed part, use the fixing support for the lateral sides of the fixed part, supplied in the retrofit kit
AUX CB connected/ insulated position – (CE – CD – CT)	→	Emax 2 standard auxiliary position contacts - AUP
Breaker mismatch protection	→	Emax 2 standard supply
safety shutters (VO)	→	Emax 2 standard Shutter lock – SL
Mechanical lock for compartment door	→	Emax 2 standard Lock for racking-out mechanism with circuit-breaker in closed position - DLR
Mechanical interlocks between breakers	→	Emax 2 standard mechanical interlock (only between/among Emax 2 circuit-breakers)

The following Emax 2 accessories can be installed, but need to be externally cabled with local adaptation:

- Current sensor for neutral conductor outside the circuit-breaker
- Ekip Supply, Communication and external Signalling modules
- Ekip Multimeter
- Ekip Control Panel
- Ekip View.

Checks before ordering:
Verify the required standard clearance for Emax 2 air circuit-breakers before ordering:



Retrofit kit type (Withdrawable version)	**For metal parts**		
[mm]	**A**	**B1/B2**	**B1=B2 (required)**
M08...M16 --> E4.2 3p	164	55/55	37.5
M08...M16 --> E4.2 4p	164	44/55	24.5
M20, M25 --> E4.2 3p	164	55/55	37.5
M20, M25 --> E4.2 4p	164	44/55	24.5
M32 --> E4.2 3p	164	55/55	37.5
M32 --> E4.2 4p	164	44/55	24.5
M40 --> E4.2 3p	164	112.5/112.5	37.5
M50 --> E6.2 3p	164	56/56	48.5
M50 --> E6.2 4p	164	167.5/48.5	35.5
M63 --> E6.2 3p	164	171/171	48.5
M63 --> E6.2 4p	164	108/108	35.5

Retrofit kit type (Fixed version)	**For metal parts**		
[mm]	**A**	**B1/B2**	**B1=B2 (required)**
M08...M16 --> E4.2 3p	235	89/89	37.5
M08...M16 --> E4.2 4p	235	78/89	35.5
M20, M25 --> E4.2 3p	235	89/89	58
M20, M25 --> E4.2 4p	235	78/89	45
M63 --> E6.2 4p	235	89/89	235
M32 --> E4.2 4p	235	78/89	235
M08...M16 --> E4.2 3p	235	146,5/146,5	58
M50 --> E6.2 3p	58	90/90	58

Emax 2 circuit-breakers must be installed in the vertical position on a base plate or on rails.

Masterpact M → Emax 2
Hard Bus Retrofill

Example of order

Case 1:
accessories not needed

Existing circuit-breaker: Masterpact M M40 H2 3p in fixed version with horizontal rear terminals.

Need to replace it with Emax 2 with hard bus retrofill retrofit kits. Ekip DIP LSI is enough.

Part number	Description	Comment
1SDA082567R1	RF E4.2H 40 EkipDipLSI 4p->M40 H1-H2 FVR	Retrofit already includes the circuit-breaker and dedicated terminals to adapt the connection to the existing busbars

Case 2:
accessories needed

Existing circuit-breaker: Masterpact M M08 H1 3p fixed version with vertical rear terminals is equipped with the following accessories:

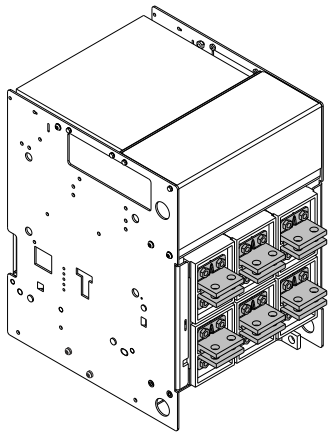
- Opening coil (YO @220Vac/dc)
- Closing coil (YC @220Vac/dc),
- Undervoltage release (YU@ 220Vac)
- Spring charging motor M – 220Vac
- Padlock in open position.

On the Emax 2 breaker I want the same accessories and Ekip Touch LI trip unit and 800A rating plug:

Part number	Description	Note
1SDA082574R1	RF E4.2N 32 3p->M08..16H1 FVR with acc	The retrofit kit requires accessories to be added as a technical note to the order
Accessories to be added as technical note to the order:		
1SDA107529R1	Ekip Touch LI (black)	
1SDA074223R1	Rating Plug 800 E1.2..E6.2	
1SDA073674R1	YO E1.2..E6.2 220-240Vac/dc	
1SDA073687R1	YC E1.2..E6.2 220-240Vac/dc	
1SDA073700R1	YU E1.2..E6.2 220-240Vac/dc	
1SDA073711R1	M E1.2 220-250Vac/dc	
1SDA073803R1	PLC E2.2..E6.2 Padlocks in open D=4mm	

Siemens → New Emax (or Emax 2)
Hard bus retrofill

ABB ensures operating continuity between Siemens 3WN1 and 3WN6 air circuit-breakers and the recent series of New Emax circuit-breakers. If necessary, it is also possible to use instead of a standard New Emax moving part the direct replacement between New Emax/Emax 2.
These retrofit kits are designed to preserve the existing switchgear and reduce downtime to the minimum. Special copper adapters can be installed on the standard New Emax terminals so as to reproduce the copper bar connections of the Siemens breakers.



The result is a fully upgraded system with all the advantages of the new technology offered by ABB New Emax or Emax 2 circuit-breakers
The retrofit kit consists of:
In the case of the withdrawable version:
- dedicated plates for the fixed part, so that the New Emax circuit-breaker can be installed in the same place as the Siemens version
- Special adapter busbars for the New Emax fixed part, different dimensions according to the size and the type of terminals
- adhesive template for adaptation of the compartment door
- Adapter kit for the panel door.

The moving part can be either New Emax or Direct replacement (DR) Emax → Emax 2.

Siemens → New Emax (or Emax 2)
Hard bus retrofill

Retrofit kit solutions available for 3WN1 Siemens air circuit-breakers. Withdrawable version with horizontal rear terminals:

Siemens 3WN1 Withdrawable with horizontal rear terminals	Iu [A]	Poles	Retrofit kit Solution	New Emax	New Emax Performance level	Iu [A]	In (Rating plug) [A]	Icu @ 415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
3WN10	630	3p	RF	E2	S	800	630	65	65	60	50
3WN11	800	3p/4p	RF	E2	S	800		65	65	60	50
3WN12	1000/ 1250	3p/4p	RF	E2	S	1000/ 1250		65	65	60	50
3WN13	1250	3p/4p	RF	E2	S	1250		80	65	60	65
3WN14	1600	3p/4p	RF	E2	S	1600		80	80	60	75
3WN15	2000	3p/4p	RF	E3	H	2000		80	80	60	75
3WN16	2500	3p/4p	RF	E3	H	2500		80	80	60	75
3WN17	3200	3p/4p	RF	E3	H	3200		80	80	60	75
3WN18	4000	4p	RF	E6	H	4000		100	100	80	100
3WN19	5000	3p/4p	RF	E6	H	5000		100	100	80	100
	6300	3p	RF	E6	H	6300 (1)		100	100	80	100

(1)=derating 5200A
it's possible to use DR Emax- Emax 2 as an alternative to the New Emax moving part

Withdrawable version with vertical rear terminals:

Siemens 3WN1 Withdrawable with vertical rear terminals	Iu [A]	Poles	Retrofit kit Solution	New Emax	New Emax Performance level	Iu [A]	In (Rating plug) [A]	Icu @ 415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
3WN10	630	3p	RF	E2	S	800	630	65	65	60	50
3WN11	800	3p/4p	RF	E2	S	800		65	65	60	50
3WN12	1000/ 1250	3p/4p	RF	E2	S	1000/ 1250		65	65	60	50
3WN13	1250	3p/4p	RF	E2	S	1250		80	65	60	65
3WN14	1600	3p/4p	RF	E2	S	1600		80	80	60	75

it's possible to use DR Emax- Emax 2 as an alternative to the New Emax moving part

Withdrawable version with front terminals:
With New Emax:

Siemens 3WN1 Withdrawable with front terminals	Iu [A]	Poles	Retrofit kit Solution	New Emax	New Emax Performance level	Iu [A]	In [Rating plug) [A]	Icu @ 415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
3WN10	630	3p	RF	E2	S	800	630	65	65	60	50
3WN11	800	3p/4p	RF	E2	S	800		65	65	60	50
3WN12	1000/ 1250	3p/4p	RF	E2	S	1000/ 1250		65	65	60	50
3WN13	1250	3p/4p	RF	E2	S	1250		80	65	60	65
3WN14	1600	3p/4p	RF	E2	S	1600		80	80	60	75
3WN15	2000	3p/4p	RF	E3	H	2000		80	80	60	75
3WN16	2500	3p/4p	RF	E3	H	2500		80	80	60	75
3WN17	3200	4p	RF	E3	H	3200(1)		80	80	60	75
3WN18	4000	3p	RF	E6	H	4000(2)		100	100	80	100

(1)=derating 2900A
(2)=derating 3700A
it's possible to use DR Emax- Emax 2 as an alternative to the New Emax moving part

Retrofit kit solutions available for 3WN6 Siemens air circuit-breakers. Withdrawable version with horizontal rear terminals:

Siemens 3WN6 Withdrawable with horizontal rear terminals	Iu [A]	Poles	Retrofit kit Solution	New Emax	New Emax Performance level	Iu [A]	In [Rating plug) [A]	Icu @ 415V [kA]	Icu @500V [kA]	Icu @690V [kA]	Icw 1s [kA]
3WN60	630	3p/4p	RF	E2	S	800	630	65	65	65	65
3WN61	800	3p/4p	RF	E2	S	800		65	65	65	65
3WN62	1000	3p/4p	RF	E2	S	1000		65	65	65	65
3WN63	1250	3p/4p	RF	E2	S	1250		65	65	65	65
3WN64	1600	3p/4p	RF	E2	S	1600		65	65	65	65
3WN65	2000	3p/4p	RF	E3	H	2000		80	80	80	75
3WN66	2500	3p/4p	RF	E3	H	2500		80	80	80	75
3WN67	3200	3p/4p	RF	E3	H	3200(1)		80	80	80	75

(1)=derating 5200A
it's possible to use DR Emax- Emax 2 as an alternative to the New Emax moving part

Siemens → New Emax (or Emax 2)
Hard bus retrofill

Withdrawable version with vertical rear terminals:
With New Emax:

Siemens 3WN6 Withdrawable with vertical rear terminals	**Iu [A]**	**Poles**	**Retrofit kit Solution**	**New Emax**	**New Emax Performance level**	**Iu [A]**	**In (Rating plug) [A]**	**Icu @ 415V [kA]**	**Icu @500V [kA]**	**Icu @690V [kA]**	**Icw 1s [kA]**
3WN60	630	3p/4p	RF	E2	S	800	630	65	65	65	65
3WN61	800	3p/4p	RF	E2	S	800		65	65	65	65
3WN62	1000	3p/4p	RF	E2	S	1000		65	65	65	65
3WN63	1250	3p/4p	RF	E2	S	1250		65	65	65	65
3WN64	1600	3p/4p	RF	E2	S	1600		65	65	65	65
3WN65	2000	3p/4p	RF	E3	H	2000		80	80	80	75
3WN66	2500	3p/4p	RF	E3	H	2500		80	80	80	75
3WN67	3200	3p/4p	RF	E3	H	3200		80	80	80	75

it's possible to use DR Emax- Emax 2 as an alternative to the New Emax moving part

Trip Units

Protection functions	PR121/P LI, LSI, LSIG	PR122/P LSI, LSIG	PR123/P LSI, LSIG	Ekip DIP LI, LSI, LSIG	Ekip Touch LI, LSI, LSIG	Ekip Hi-Touch LI, LSI, LSIG
						
Overload - L						
Inverse long-time delayed trip	●	●	●	●	●	●
Thermal memory	-	●	●	●	●	●
Time-delayed overcurrent - S						
Constant tripping time (t=k)	●	●	●	●	●	●
Constant specific let-through energy ($t=k/I^2$)	●	●	●	●	●	●
Thermal memory	●	●	●	●	●	
Start-up function	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●
Instantaneous overcurrents - I						
Constant tripping time (t=k)	●	●	●	●	●	●
Start-up function	-	●	●	-	●	●
Ground fault - G						
Constant tripping time (t=k)	●	●	●	●	●	●
Constant specific let-through energy ($t=k/I^2$)	●	●	●	●	●	●
Start up function	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●
Ground fault on toroid (Gext)	-	●	●	-	●	●
Directional protection - D	-	-	●	-	-	●
Current imbalance	-	●	●	-	●	●
Power Control	-	-	-	-	○	○
Network analyser	-	-	-	-	-	●
Real-time monitoring and protection						
Current	-	●	●	○	●	●
Voltage - Power - Energy - Frequency	-	○	●	-	○	●
Maintenance indicators and records	-	●	●	●	●	●
Communication capability	-	○	○	-	○	○

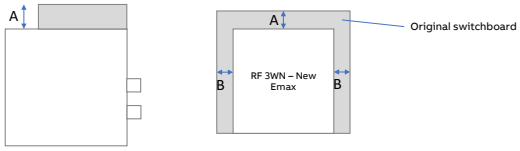
● Available as basic function
○ Available with additional module
- Not available

Siemens → New Emax (or Emax 2)
Hard bus retrofill

Compatibility of accessories:

New Emax compatible accessories (New Emax fixed part and New Emax Moving Part)		Emax 2 compatible accessories (New Emax fixed part and DR Emax-Emax 2 Moving Part)
Electrical accessories		
YO (shunt opening release)	→	YO (shunt opening release)
YO2 (second shunt opening release)	→	YO2 (second shunt opening release)
YC (shunt closing release)	→	YC (shunt closing release)
YU (undervoltage release)	→	YU (undervoltage release)
D (electronic Delay for YU - into the switchboard)	→	D (electronical Delay for YU - into the switchboard)
M (motor for charging springs)	→	M (motor for charging spings)
AUX Spring charged (S33M)	→	AUX Spring charged (S33M)
AUX Open/Closed auxiliary contacts	→	AUX Open/Closed auxiliary contacts
AUX CB connected/test/insulated position	→	AUX CB connected/test/insulated position
Closing Spring charged signalling – S33	→	Closing Spring charged signalling – S33
Electric TU reset	→	Electric TU reset
SOR Test Unit	→	SOR Test Unit
Overcurrent release trip indication	→	Overcurrent release trip indication
Contact for signalling undervoltage release de-energized	→	Contact for signalling undervoltage release de-energized
Mechanical accessories		
Key lock in open position	→	Key lock in open position
Padlock in open position	→	Padlock in open position
Key lock in racked in/test/out position	→	Key lock in racked in/test/out position
Mechanical compartment door lock	→	
Protection for sealable trip unit	→	Protection for sealable trip unit
Mechanical operation counter	→	Mechanical operation counter
IP54 door protection	→	IP54 door protection
O/C pushbutton protection	→	O/C pushbutton protection
Mechanical Interlock (only with other New Emax Circuit-breakers)		
External Neutral (mechanical adaptation to the New Emax one is required)		
Modules		
PR120/K signalling module	→	Ekip Signalling
PR120/V measuring module	→	Ekip Measuring
PR120/D-M Modbus communication module	→	Ekip Com Modbus
PR120/D-BT Bluetooth communication module	→	Ekip Com Profibus
	→	Ekip Com DeviceNet
	→	Ekip Com Ethernet
	→	Ekip Com IEC61850
Not compatible		
		Mechanical interlock
		Mechanical compartment door lock
		External Neutral

Checks before ordering:
All the kits have been designed according to the Siemens dimensions indicated in the 1997 manual edition. Before ordering, make sure that your circuit-breaker matches that version.
Verify the required standard clearance for New Emax air circuit-breakers before ordering:



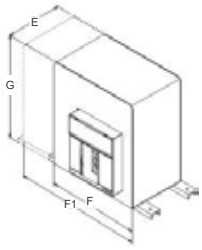
3WN1	For metal parts	
Retrofit kit type	**A**	**B**
3WN10/11/12/13/14 3p --> E2	39	39
3WN15/16 3p --> E3	39	34
3WN17/18 3p --> E4	34	34
3WN19 3p	39	39
3WN10/11/12/13/14 4p --> E2	39	38
3WN15/16/17 4p	39	39
3WN18/19 4p	39	39

Note: Emax circuit-breakers must be installed in the vertical position on a base plate or on rails.

3WN6	For metal parts	
Retrofit kit type	**A**	**B**
3WN6 630...1000A 3p --> E2	39	38
3WN6 630...1000A 4p --> E2	38	38
3WN6 1250...1600A 3p --> E2	38	38
3WN6 1250...1600A p --> E2	39	39
3WN6 2000A 3p --> E3	39	34
3WN6 2000A 4p --> E3	34	34
3WN6 2500...3200A 3p --> E3	39	39
3WN6 2500...3200A 4p --> E3	39	39

Note: Emax circuit-breakers must be installed in the vertical position on a base plate or on rails.

Compartment dimensions
Minimum cubicle dimension:



New breaker	E	F (3 poles)	F1 (4 poles)	G
E1-E2 [mm]	500	500	500	500
E3 [mm]	500	500	500	380
E4 [mm]	380	380	380	380
E6 [mm]	380	380	380	380

Siemens → New Emax (or Emax 2)
Hard bus retrofill

Example of order

Case 1:
accessories not needed

Existing circuit-breaker: Siemens 3WN10 630A 3p in withdrawable version with horizontal rear terminals. Need to replace it to New Emax with hard bus retrofill retrofit kits.

Part number	Description	Comment
1SDA080902R1	RF 3WN10-12 630...1000A 3pW F>E2S FPincl	Retrofit already includes the fixed part with dedicated terminals to adapt the connection to the existing busbars

+ New Emax (E2S) moving part to be ordered separately

Case 2:
accessories needed

Existing circuit-breaker: Siemens 3WN65 2000 3p withdrawable version with vertical rear terminals is equipped with the following accessories:

- Opening coil (YO @220Vac/dc)
- Closing coil (YC @220Vac/dc)
- Undervoltage release (YU@ 220Vac)
- Spring charging motor M – 220Vac
- Padlock in open position.

On New Emax breaker I want the same accessories and Pr122/P LSIG Trip unit:

Part number	Description	Note
1SDA080892R1	RF 3WN65 2000A 3p W VR->E3H FPincl	Retrofit already includes the fixed part with dedicated terminals to adapt the connection to the existing busbars
Moving part to be ordered apart:		
1SDA056453R1	E3H 2000 PR122/P-LSIG In=2000A 3p W MP	
Equipped with the following accessories:		
1SDA038292R1	Shunt open.Release 220/240V E1/6-t8	
1SDA038302R1	Shunt closing release 220/240V E1/6-t8	
1SDA038312R1	Under voltage release 220/240V E1/6-t8	
1SDA038324R1	Geared motor device 220/250V E1/6-t8	
1SDA038351R1	Padlock dev.In open pos.D=4mm E1/6-t8	

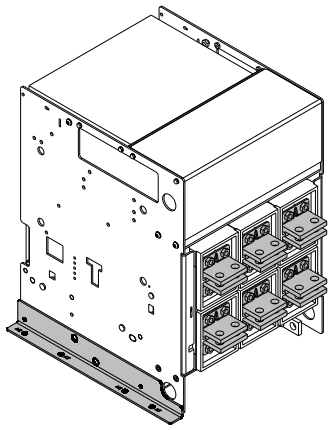
Terasaki → New Emax (or Emax 2)
Hard bus retrofill

Customers can easily replace their air circuit-breakers Terasaki AT Series in withdrawable version with the more modern ABB New Emax or Emax 2 series and therefore upgrade their installed base.
The kits are available only for 3-pole circuit-breaker and only for 1250A, 1600A and 2500A equipped with horizontal or vertical rear terminals
ABB provides two possible retrofit solutions:

1) Replacement of the complete Terasaki device, adding the New Emax fixed part equipped with adapter plates to match the ones present in the switchboard and dedicated connecting busbars. A standard New Emax moving part can now be installed.
2) The second option is very similar to the previous one: Replacement of the complete Terasaki device, adding the New Emax fixed part equipped with adapter plates to match the ones present in the switchboard and dedicated connecting busbars. The difference is in the moving part: instead of using the New Emax moving part, use the Direct replacement between New Emax and Emax 2. In this way the end user can have the most advanced circuit-breaker with all its advanced features.

The new Retrofill kits have been designed by ABB to minimize both the out of service and the installation time. The kit includes the fixed part of the New Emax circuit-breaker equipped with dedicated plates to replicate the fixing holes of the Terasaki circuit-breaker.
The retrofit kit consists of:

- dedicated plates for the fixed part, so that it can be easily installed in the
- Special adapter busbars for the New Emax fixed part, different dimensions according to the size and the type of terminals
- adhesive template for adaptation of compartment door.



Terasaki → New Emax (or Emax 2)
Hard bus retrofill

Terasaki AT Withdrawable with horizontal rear terminals	**Iu [A]**	**Poles**	**Retrofit kit solution**	**New Emax**	**Emax 2 Performance level**	**Iu [A]**	**In (Rating plug) [A]**	**Icu @ 415V [kA]**	**Icu @500V [kA]**	**Icu @690V [kA]**	**Icw 1s [kA]**
AT	1250	3p	RF	E2N	N	1250		65	65	65	50
AT	50	3p	RF	E2N	N	1600		65	65	50	50
AT	50	3p	RF	E3N	N	50		65	65	50	65

As an alternative to the New Emax Moving part, use the direct replacement between Emax and Emax 2

Terasaki AT Withdrawable with vertical rear terminals	**Iu [A]**	**Poles**	**Retrofit kit solution**	**New Emax**	**Emax 2 Performance level**	**Iu [A]**	**In (Rating plug) [A]**	**Icu @ 415V [kA]**	**Icu @500V [kA]**	**Icu @690V [kA]**	**Icw 1s [kA]**
AT	2500	3p	RF	E2N	N	2500		65	65	35	50
AT	50	3p	RF	E2N	N	50		65	65	50	50
AT	50	3p	RF	E3N	N	50		65	65	50	65

As an alternative to the New Emax Moving part, use the direct replacement between Emax and Emax 2

Trip Units

Protection functions	PR121/P LI, LSI, LSIG	PR122/P LSI, LSIG	PR123/P LSI, LSIG	Ekip DIP LI, LSI, LSIG	Ekip Touch LI, LSI, LSIG	Ekip Hi-Touch LI, LSI, LSIG
						
Overload - L						
Inverse long-time delayed trip	●	●	●	●	●	●
Thermal memory	-	●	●	●	●	●
Time-delayed overcurrent - S						
Constant tripping time (t=k)	●	●	●	●	●	●
Constant specific let-through energy ($t=k/I^2$)	●	●	●	●	●	●
Thermal memory	●	●	●	●	●	
Start-up function	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●
Instantaneous overcurrents - I						
Constant tripping time (t=k)	●	●	●	●	●	●
Start-up function	-	●	●	-	●	●
Ground fault - G						
Constant tripping time (t=k)	●	●	●	●	●	●
Constant specific let-through energy ($t=k/I^2$)	●	●	●	●	●	●
Start up function	-	●	●	-	●	●
Zone selectivity	-	●	●	-	●	●
Ground fault on toroid (Gext)	-	●	●	-	●	●
Directional protection - D	-	-	●	-	-	●
Current imbalance	-	●	●	-	●	●
Power Control	-	-	-	-	○	○
Network analyser	-	-	-	-	-	●
Real-time monitoring and protection						
Current	-	●	●	○	●	●
Voltage - Power - Energy - Frequency	-	○	●	-	○	●
Maintenance indicators and records	-	●	●	●	●	●
Communication capability	-	○	○	-	○	○

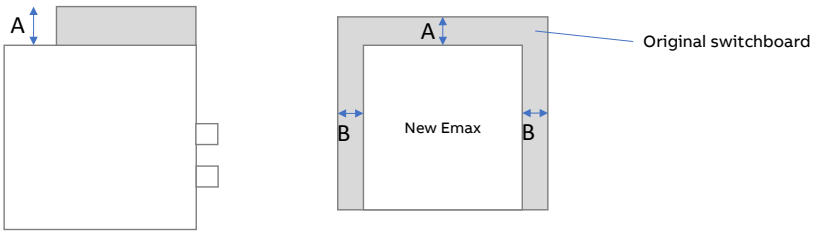
● Available as basic function
○ Available with additional module
- Not available

Terasaki → New Emax (or Emax 2)
Hard bus retrofill

Compatibility of accessories:

New Emax compatible accessories (New Emax fixed part and New Emax Moving Part)		Emax 2 compatible accessories (New Emax fixed part and DR Emax-Emax 2 Moving Part)
Electrical accessories		
YO (shunt opening release)	→	YO (shunt opening release)
YO2 (second shunt opening release)	→	YO2 (second shunt opening release)
YC (shunt closing release)	→	YC (shunt closing release)
YU (undervoltage release)	→	YU (undervoltage release)
D (electronical Delay for YU - into the switchboard)	→	D (electronical Delay for YU - into the switchboard)
M (motor for charging springs)	→	M (motor for charging springs)
AUX Spring charged (S33M)	→	AUX Spring charged (S33M)
AUX Open/Closed auxiliary contacts	→	AUX Open/Closed auxiliary contacts
AUX CB connected/test/insulated position	→	AUX CB connected/test/insulated position
Closing Spring charged signalling – S33	→	Closing Spring charged signalling – S33
Electric TU reset	→	Electric TU reset
SOR Test Unit	→	SOR Test Unit
Overcurrent release trip indication	→	Overcurrent release trip indication
Contact for signalling undervoltage release de-energized	→	Contact for signalling undervoltage release de-energized
Mechanical accessories		
Key lock in open position	→	Key lock in open position
Padlock in open position	→	Padlock in open position
Key lock in racked in/test/out position	→	Key lock in racked in/test/out position
Mechanical compartment door lock	→	
Protection for sealable trip unit	→	Protection for sealable trip unit
Mechanical operation counter	→	Mechanical operation counter
IP54 door protection	→	IP54 door protection
O/C pushbutton protection	→	O/C pushbutton protection
Mechanical Interlock (only with other New Emax Circuit-breakers)		
External Neutral (mechanical adaptation to the New Emax one is required)		
Modules		
PR120/K signalling module	→	Ekip Signalling
PR120/V measuring module	→	Ekip Measuring
PR120/D-M Modbus communication module	→	Ekip Com Modbus
PR120/D-BT Bluetooth communication module	→	Ekip Com Profibus
	→	Ekip Com DeviceNet
	→	Ekip Com Ethernet
	→	Ekip Com IEC61850
Not compatible		
		Mechanical interlock
		Mechanical compartment door lock
		External Neutral

Checks before ordering:

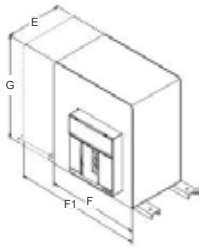


AT	For metal parts	
Retrofit kit type	**A [mm]**	**B**
E2-AT12	39	38
E2-AT16	38	38
E3-AT25	39	39

Note: Emax circuit-breakers must be installed in the vertical position on a base plate or on rails.

Compartment dimensions

Minimum cubicle dimension:



New breaker	E	F (3 poles)	F1 (4 poles)	G
E1-E2 [mm]	500	400	490	380
E3 [mm]	380	380	380	380
E4 [mm]	380	380	380	380
E6 [mm]	380	380	380	380

Terasaki → New Emax (or Emax 2)
Hard bus retrofill

Example of order

Case 1:
accessories not needed
Existing circuit-breaker:
AT1250 3-poles withdrawable version with horizontal rear terminals.
Need to replace it to E2N 1250 with hard bus retrofill retrofit kits.
E2N should be equipped with PR122 LSI.

Part number	Description	Comment
1SDA079990R1	RF AT 1250A 3p W HR → E2N	Fixed part included
1SDA055876R1	E2N 1250 PR122/P-LSI In=1250A 3p W MP	

Any accessory for the moving part can be added.

ATS

ATS010 → ATS022
Hard Bus Retrofill

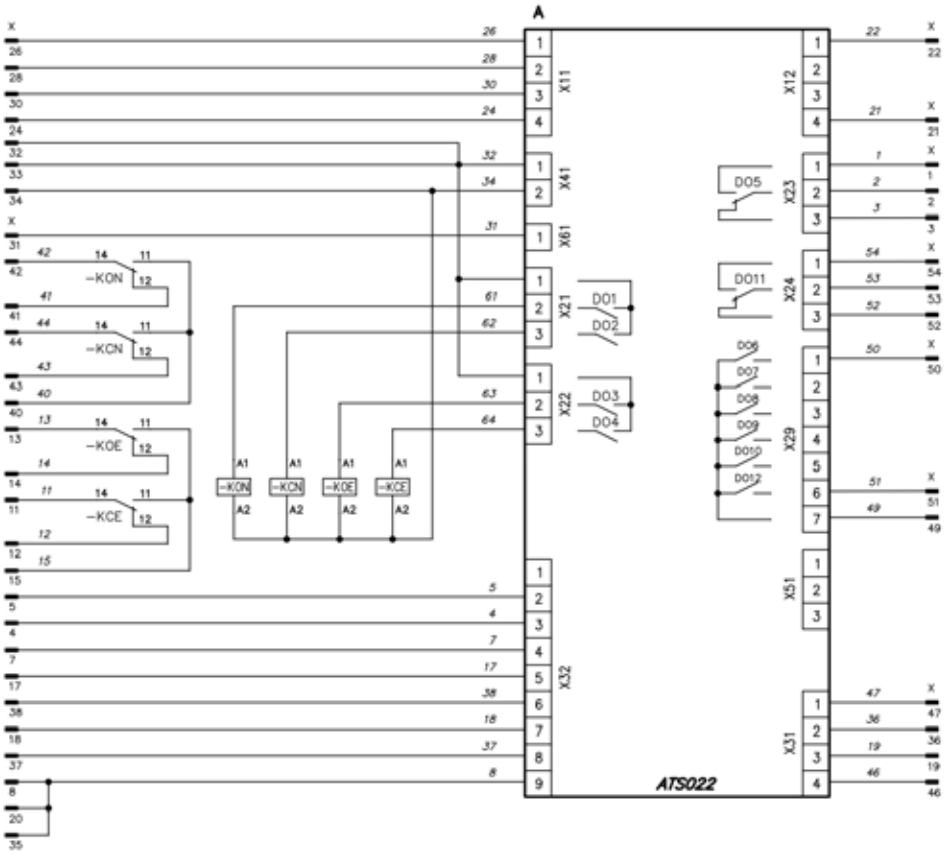
A special retrofit kit for ATS010 has been designed to dramatically reduce the replacement time between ATS010 and ATS022. The kit contains a special connector support plate equipped with pre-wired cable connections to facilitate the wiring operations. The basic purpose of the kit is to provide easy and safe conversion from old to new ATS with simplicity and time saving. The kit allows the new apparatus to be adapted to the dimensional characteristics of the existing compartments, replacing the obsolete models with the latest generation product

The retrofit kit consists of:
- ATS022 device
- Adaptor plates for the door
- A connector support plate equipped with pre-wired cable connections to facilitate the wiring operations.
- The connector sockets of the connector support plate are arranged in the same position as in the ATS010 automatic transfer switch.
- Installation manual with detailed procedure for correct and safe installation
- Instruction sheet to easily convert ATS010 settings to ATS022.

Why replace ATS010 with ATS022
There are significant benefits in switching over to the new ATS022:
- new advance transfer switch with the latest technology and better safety features
- expanded setting details for the switchover function between utility and emergency power supply
- possibility to connect to communication network (Modbus RS485)
- no need for extra power supply (other than communication usage)
- Bus-tie Control
- built-in LCD graphical display
- Can be fitted with ABB circuit-breakers and switch disconnectors, ensuring availability of a complete and coordinated system.

Main differences between ATS010 and ATS022:
- ATS022 always works as Strategy 2 (see chapter 3.2 of ATS010 manual RH0202002)
- In ATS022 the function O/C Control non-priority Loads is still available by means of external releases
- Digital Input:
  - ATS022 does not have the Gen set automatic operation - GEN. AUTO. (See chapter 3.4.7 of ATS010 manual RH0202002)
  - ATS022 offers the SW Enable function as a default. The Remote Reset function can be programmed as an alternative to SW Enable
- If ATS is connected to Isomax circuit-breakers with the direct action motor operating mechanism, the 4 contacts highlighted in red are required but not provided by ABB.

Remember that the voltage value must be consistent.



Checks before ordering:
ATS010 has different dimensions to ATS022:
H=144 mm
L= 144 mm
D=85 mm
Make sure there is room inside the panel before ordering

ATS010 → ATS022
Hard Bus Retrofill

Example of order

Case 1:
accessories not needed
Existing ATS: AST010. It can be easily replaced with a retrofit kit (hard bus retrofill) with ATS022.

Part number	Description	Comment
1SDA070512R1	Retr.Kit ATS010-->ATS022 (included)	ATS022 already included

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