ELECTRIFICATION SERVICE - ITALY

Medium Voltage Retrofit Solutions

ABB Electrification Service portfolio provides the right combination to keep your equipment at peak performance.
Retrofitting is a key element.
From roll-in replacement to hard-bus retrofill, our Service organization can help you to replace your old ABB and non-ABB circuit breakers updating your installed base to the latest technology.
This means additional safety, reliability and reduced environmental impact.

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1. Abbreviations and definitions

/CS	Retrofit screw type with insertion and extraction through a rotative handle
CB	Circuit Breaker
ELSE	Electrification Service
LCM	Life Cycle Management
M&D	Monitor and Diagnostics
In	Nominal current according to IEC 62271-200
Isc	Short circuit current according to IEC 62271-200
RiR	Roll-in Retrofit
Pitch distance	Distance between two phases (central to lateral) in the circuit breaker
Vn	Nominal Voltage according to IEC 62271-200

2. Our service portfolio

ABB's Electrification Services portfolio provides a range of offerings far beyond standard product support: from onsite services for risk reducing installation and startup, to availability services to help you proactivelly reduce downtime and meet your service level commitments.

Start-up and maintenance services
- Installation and commissioning
- Training
- Spares and consumables
- Maintenance (preventive, condition-based and predictive)
  – SWAPs maintenance program
- Extended Warranty

Lifecycle services
- Engineering and consulting
- Extensions, upgrades and retrofit
  – Roll-in Retrofit
  – Onefit/ hard-bus retrofill
- Relay Retrofit Program
- Circuit breaker remote racking systems
  – TruckMaster
  – Motorized circuit breaker truck
- Arc flash protection upgrades
- End of life services
- Replacement

Advanced services
- ABB Ability™ Condition Monitoring for switchgear – SWICOM
- ABB Ability™ Condition Monitoring for electrical systems – CMES
- ABB Ability™ Energy and Asset Manager
- ABB Ability™ Life cycle assessment for electrical systems – MySiteCondition
- ABB Ability™ Backup Management for electrical systems – Data Care

Technical support and repairs
- Remote Assistance for electrical systems
  – RAISE
- Collaborative Operations for electrical systems
  – CLOSER
- Onsite and factory repair and maintenance

Support agreements
- ABB Power Care

3. Life cycle management

Life cycle management (LCM) is the process that enables ABB to innovate and manage products and related services throughout the entire business life cycle — effectively and efficiently. It is ABB's goal to pro-tect our customers' investment beyond the life cycle of the underlying platform products.

The ABB life cycle management process originates from:
IEC 62402, the IEC Application Guide about Obsolescence Management, which stresses the importance of managing obsolescence as an integral part of the design, development, production, and in-service support of a product. The extensive, lengthy experience of ABB for the management of products and their life cycle.

Four stages define the life cycle policy for ABB electrification distribution solutions:

1. **Active**
2. **Classic**
3. **Limited**
4. **Obsolete**

Open communication with our customers is continuous, with notifications provided for each status change several months in advance, as well as a minimum of 10 years of support granted from the Classic phase to the beginning of the Obsolete phase.

Please contact ABB Service team to have an assessment on the Life Cycle Status of your installed base and define the best actions to keep your system running.

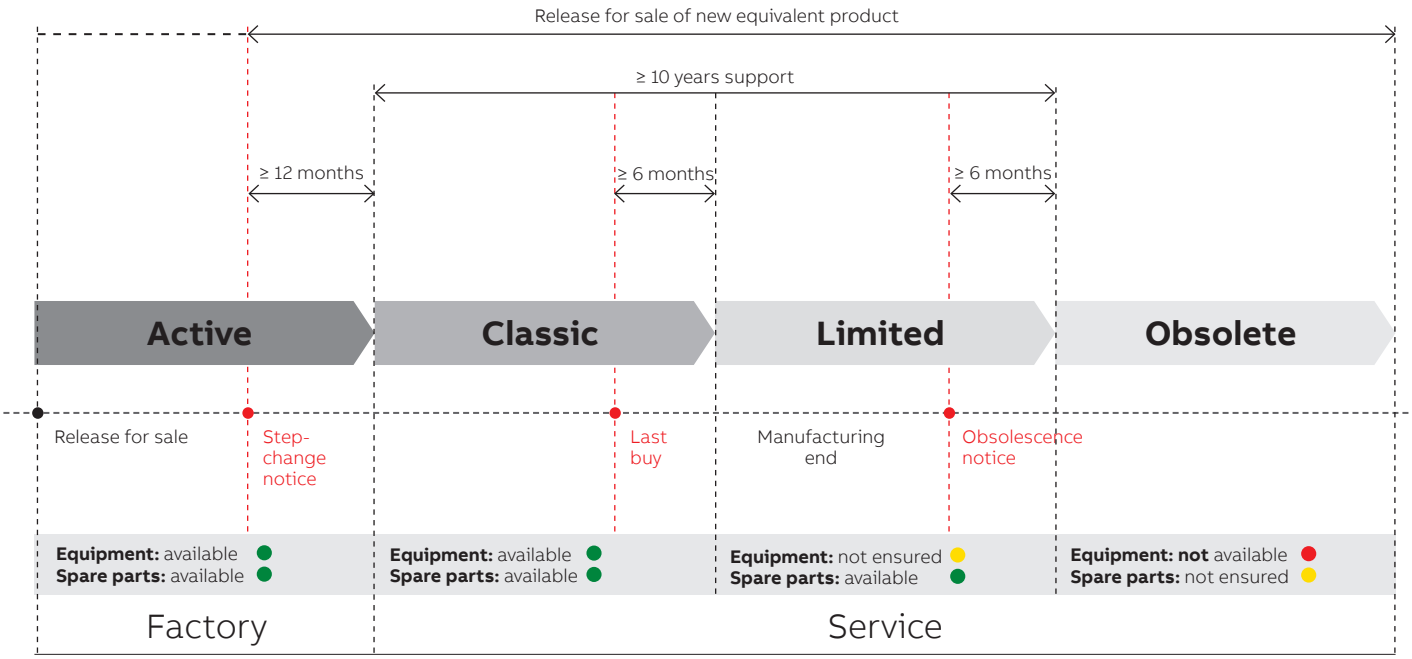


ABB services are at your disposal for making the best use of ABB assets at every life cycle stage.

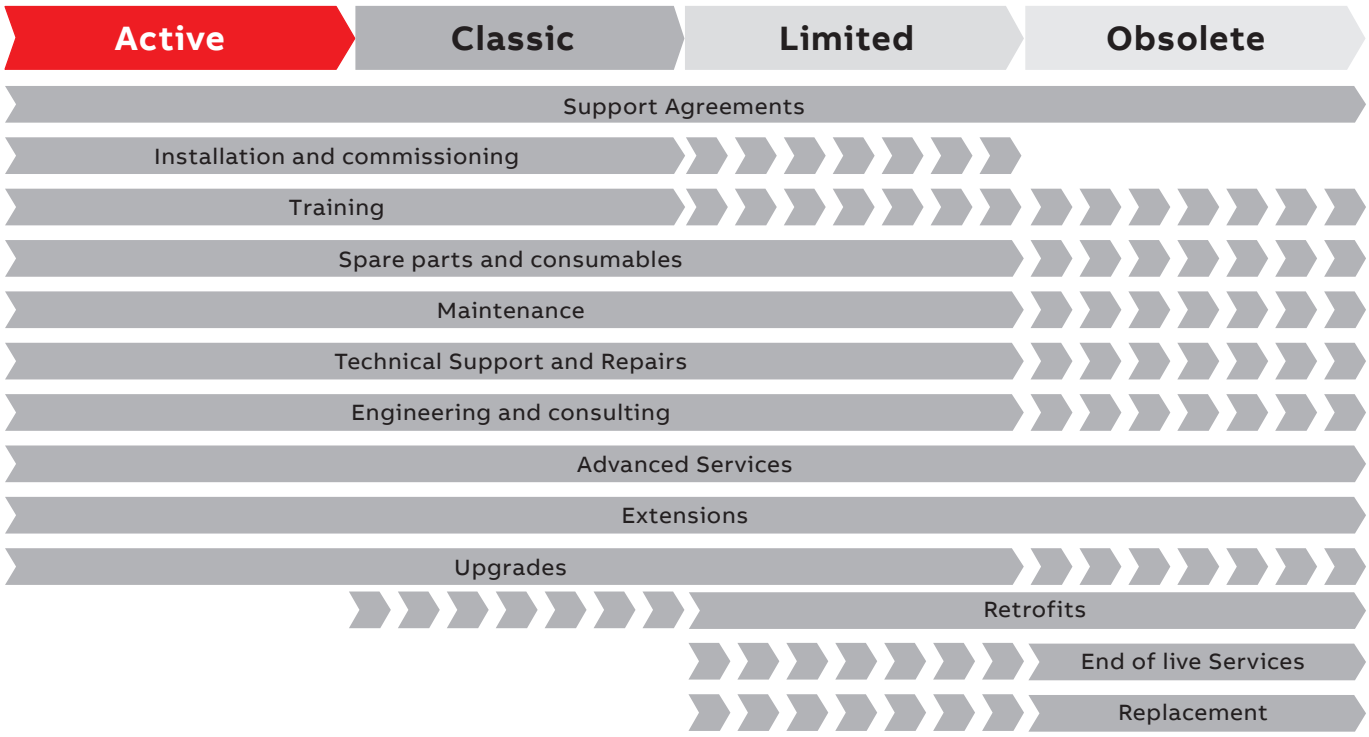
Active
- Long-term support thanks to Power Care customer support agreements
- Extended warranty application
- Worldwide Service competence, ready for prompt actuation
- Certified ABB spare parts ready in stock to guarantee their availability throughout the product lifetime

Classic
- Last Buy opportunity of complete equipment
- Spare parts availability as per active product conditions
- Time to keep equipment healthy via Power Care customer support agreements
- Call for training with wide coverage thanks to worldwide footprint still available.

Limited
- Spare parts fully available
- Retrofit solutions can already be applied
- Power Care customer support agreements designed to keep the service experience as per active products

Obsolete
- Spare parts could be still accessible on request.
- Retrofit solutions are usually available. The use of active products allows a new life to be given to the plants.

Our consultancy services are always available for supporting cost-effective and optimized investments. Special care is given to obtain a soft shift to new applications and solutions.



4. The retrofit concept

Whenever a device is no longer available on the market and/or maintenance is no longer efficient, ABB service team can offer a valid and cost saving solution compared to the full switchgear replacement. Obsolete and limited equipment can be replaced using roll-in retrofit or retrofill kits, which are specifically designed by ABB ELSE team in Italy to minimize downtime and replace only the noble parts, keeping the original switchgear components that are not worn by time.
ABB Service experts conduct site audits on existing installations to assess the condition of equipment, recommend the proper solution, and support the right investment decision.
Even if IEC does not cover retrofit solutions with a dedicated Standard prescribing type testing, ABB applies the highest safety and reliability requirements to ensure products' quality and safety. In fact, ABB design policy adopts the fundamental philosophy of IEEE C37.591 Standard: […] a converted (1) product is a new design and shall be design verified to substantiate that it meets its nameplate ratings as well as applicable standards […]
Circuit breaker retrofits are a cost-effective switchgear modernization solution. The result is an improvement in safety, reliability, maintenance, sustainability and performance.

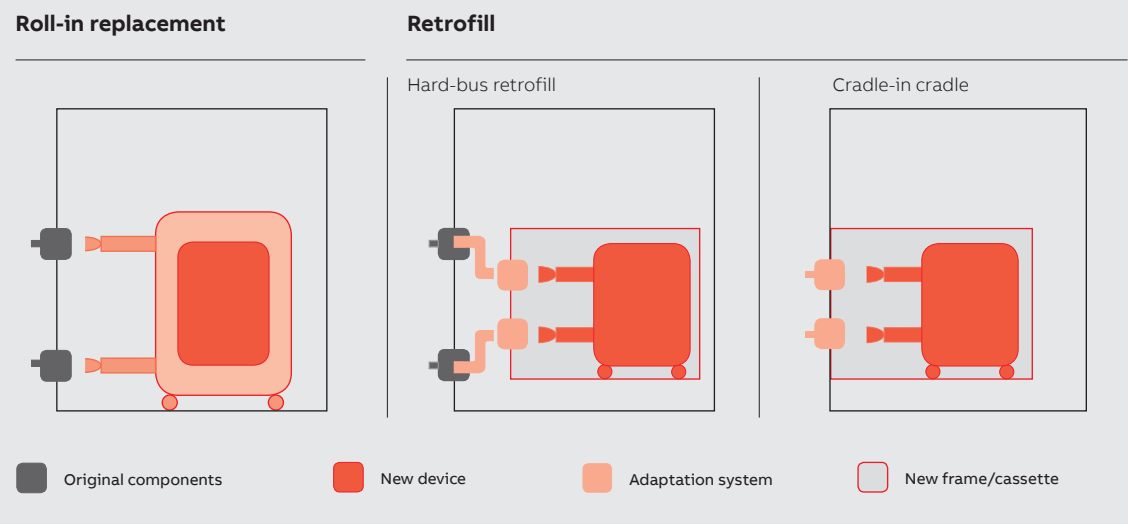
(1) To be considered as Retrofit

ABB is a full-system provider which includes: Site data collection, Design, Manufacturing, Testing, Installation and commissioning.
With our expertise, both ABB and non-ABB equipment can be retrofitted.

Characteristics of the different technical solutions for retrofit

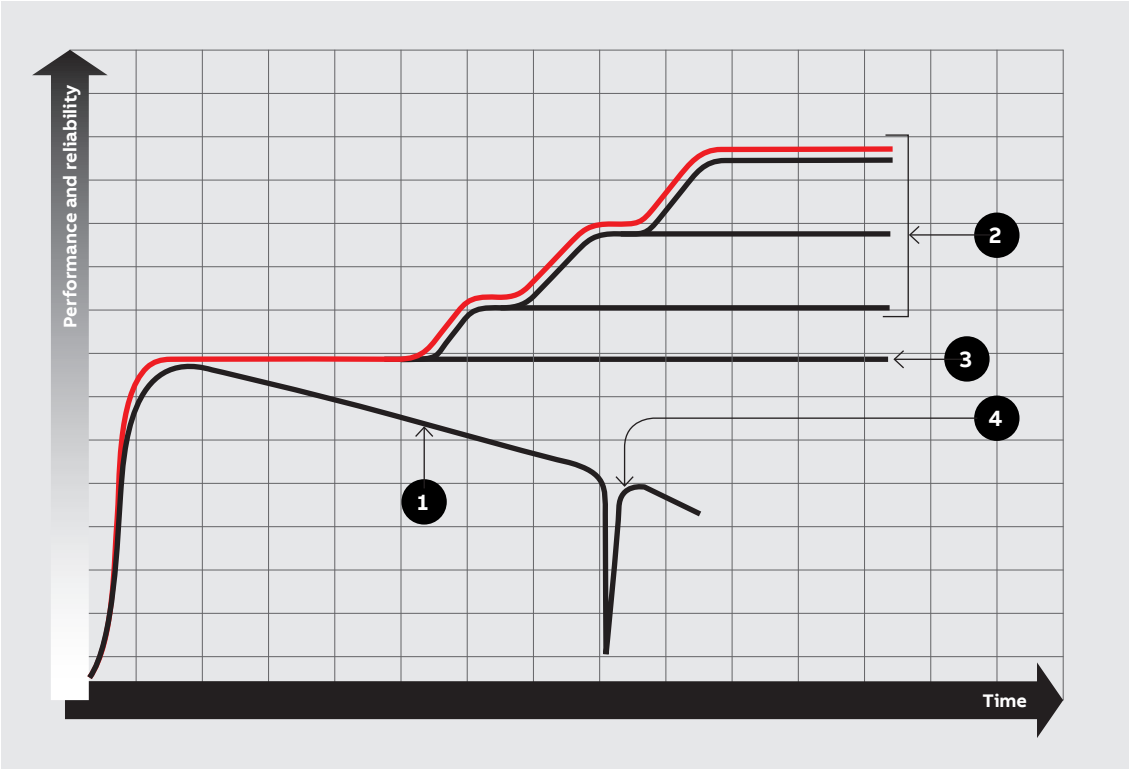
Roll-in Replacement:
- Only new components used
- The new truck carries a standard basic circuit breaker
- High performance and additional features
- Reduced downtime
- Fully type tested
- Plug and play solution

Hard bus Retrofill - Onefit:
- Only new components used
- The new frame hosts a standard circuit breaker
- An additional power circuit makes the connection
- Existing bushings generally remain in place
- Fully type tested



5. Enhance the performance and reliability of your installed base

ABB is offering a full range of solutions to keep your installed base up and running during its entire life cycle.
The SWAPs maintenance program supports you to optimize the maintenance plan for the complete line-up.
SWAPs is a maintenance program based on 5 levels of maintenance (See, Watch, Act, Perform, Secure), where intervals are defined according to the assessment of the equipment environmental and operational conditions, age, previous maintenance performed, and presence of monitoring and diagnostic solutions. The schedule continues till the equipment reaches its end of life, also recommending the right time for relay and circuit breaker retrofit.
When electrical components become obsolete, or a new technology is available, something more than a maintenance program might be required to keep a high efficiency of the installed base. In these cases, upgrade and retrofit solutions enhance the performance and reliability of the full system.



1 No maintenance
2 Upgrade or retrofit solutions
3 Risk and condition-based maintenance
4 Repair

6. Retrofit value proposition

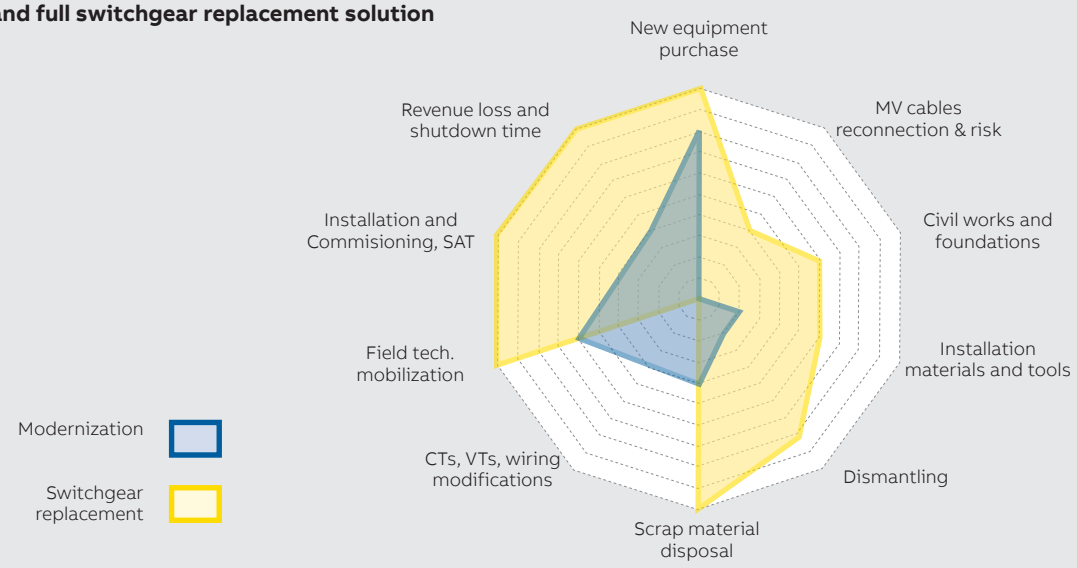
Based on long-time experience and know-how, ABB developed roll-in retrofit and Retrofill solutions specifically tailored to most limited and obsolete medium voltage circuit breakers that were produced by ABB and other manufacturers. This provides the opportunity to eliminate outdated technology like air magnetic or minimum oil, using the latest interrupting technology. The result is a significant improvement in reliability, safety, maintenance, and performance.
Roll-in Retrofit and Retrofill have different benefits for customer. Some of them are common for both solution, some are specific.

Benefits of Roll-in Retrofit and Retrofill (Onefit)

- Last state-of-the-art switching technologies using ABB vacuum or gas SF6 apparatus
- Solution based on type tests according to the latest IEC Standards
- Increase of safety thanks to the available optional features like motorization of the insertion and extraction of the breaker
- Reduction of maintenance cost during the lifetime thanks to the new circuit breaker technology
- Easy implementation of digitalization solution to give access to Asset Manager on cloud solution
- Interchangeability and fast replacement with the existing old circuit breaker
- Safety replacement of the existing interlocks and shutters
- Up to 80% of downtime reduction to install the solution compared to full replacement
- Reduction of totals economic effort (See below picture) compared to the full replacement up to 50%.

ABB service team can support to define the best solution based on technical requirements, available budget and safety improvement required.
Please refer to chapter 7 for more details on how to choose the best solution to renew your installed base.

Total effort comparison between retrofit and full switchgear replacement solution



7. Choose the best solution to renew your old installed base

With our expertise, we can support customer to define the best solution based on the real needs. When the installed base is at the end of life it is possible to choose one of the following options to keep the system up and running:

- Roll-in retrofit
- Retrofill - Onefit
- Full switchgear replacement

The evaluation of the best solution must consider different aspects, as each one has different advantages compared to the others. We can divide the benefits in the following areas: safety, technical, environmental and economic ones. Below tables can help to highlight the different benefits of each solution. It's recommended to contact ABB Service team to perform a tailor-made assessment and define the best investment for the specific case.

Safety benefits

	Risk of internal arc	Internal arc protection	Racking in and out operation	Open and close operations	Interlocks and shutter system
Existing Obsolete CBs	~80% of all electrical accidents are caused by arc flash due to wrong operations, interlock failures, degradation of the insution materials. In old equipment the risk is very high	Old switchgears generally are not tested to withstand an internal arc.	In old CBs the rack-in / out operations are generally performed with open door, exposing the technician to high risk	In old system Switchgear the open and close operations are genrally performed in front of the switchgear	It's common in old switchgear that interlocks and shutter system fails
Roll-in Retrofit (RiR)	Possible failure due to CBs is reduced. The upgrade of the switchgear (shutters, interlocks..) is not in the scope of work of the RiR, it's recommend during installation and commissioning to check the interlocks and shutter system in order to reduce the risk of failure	The upgrade of the switchgear is not in the scope of work so it maintains the orginal Internal arc protection ABB can propose different solution to reduce the effect and durating of an internal arc (e.g UFES solution)	RiR includes the option to motorize the rackin/out (motor on truck or TruckMaster®), to operate the CBs from safaty distance and in some application to change the racking in/out system (e.g with rotative handle)	The realibility of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotly the opening and closing system using ArcSwitch®	The upgrade of the switchgear (shutters, interlocks..) is not in the scope of work of the RiR, it's recommend during installation and commissioning to check the interlocks and shutter system in order to reduce the risk of failure
Onefit Retrofill	The interlocks and shutter system will be replaced, the new ones are according to last international standard reducing the risk of internal arc	Onefit is not changing the orginal Internal arc protection classification of the switchgear, adding the Onefit door provide a protection against internal arc ABB can propose different solution to reduce the effect and durating of an internal arc (e.g UFES solution)	Racking in/out operations are performed with a closed door, the existing system is replaced using rotative handle insertion. Onefit solution includes the option to motorize the rackin/out (motor on truck or TruckMaster®)	The realibility of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotly the opening and closing system using ArcSwitch®	The interlocks and shutter system will be replaced, the new ones are according to last international standard
Switchgear full replacement	The risk of internal arc in new equipment is lower than old one. It's recommened to perform a training on how to operate the switchgear to avoid wrong actions that can couse interanl arc. ABB can propose solution to monitor the partial discharge that could couse and Internal arc (Swicom and PDCom solution)	New switchgear is generally tested against interanl arc. ABB can propose different solution to reduce the effect and durating of an internal arc (e.g UFES solution)	Racking in/out operations are performed with a closed door, the existing system is replaced using rotative handle insertion. Onefit solution includes the option to motorize the rackin/out (motor on truck or TruckMaster®)	The realibility of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotly the opening and closing system using ArcSwitch®	The interlocks and shutter system will be replaced, the new ones are according to last international standard

7. Choose the best solution to renew your old installed base

Econonic benefits

	OPEX	CAPEX	Unforeseen costs during installation & commissioning	Unforeseen costs during operation	Installation and commissioning time
Existing Obsolete product	High opex cost to perfom maintenance of the equipment and high cost of spare parts - if available	high risk on unforeseen CAPEX in emergency condition (No budget allocation) due to failures	-	High risks of lost of product and switchgear due to equipment failures (e.g. Internal arc, missing opening/ closing operation, broken interlocks etc.)	-
Roll-in Retrofit (RiR)	Significant reduction of OPEX costs thanks to new type of CBs. Spare parts prices and availabilities are relative to active equipment, price reduction of the spares are around 50% less than obsolte CBs's spares. Spares lead time is short, it's not required to keep an high spare parts stock.	Limit investment - less than 60% compared to switchgear replacement - considering the full scope of work. It's possible to do partial replacement for only critical feeders based on available budget. The replecement can plan according to planned shutdown and not in emergency situation	RiR is a direct replacement solution so very low risk. Maintenance of the switchgear is suggested to ensure the shutters and interlocks functionality	New CBs failure rates is very limited with proper maintenace plan in place. It's possible to implement digital monitoring solutions with up to 40% of maintenance cost reduction (Refer to SWICOM and Asset Manager) lowering the failure rates.	Fast installation and commissioning, less than 1h per unit with only half busbar out of service.
Onefit Retrofill	Significant reduction of OPEX costs thanks to new type of CBs. Spare parts prices and availabilities are relative to active equipment, price reduction of the spares are around 50% less than obsolte CBs's spares. Spares lead time is short, it's not required to keep an high spare parts stock.	Limit investment - less than 50% compared to switchgear replacement - considering the full scope of work. It's possible to do partial replacement for only critical feeders based on available budget. The replecement can plan according to planned shutdown and not in emergency situation	Onefit is designed to fit in the original panel so the risks are limited. The switchgear frame and copper system must be in good condition while interlocks and shutter will be fully replaced	New CBs failure rates is very limited with proper maintenace plan in place. It's possible to implement digital monitoring solutions with up to 40% of maintenance cost reduction (Refer to SWICOM and Asset Manager) lowering the failure rates. The replacement of the interlocks and shutter reduce the possible failure rates of the full switchgear	Avarage installation & commissioning time 6-8h per unit with only half-busbar out of service.
Switchgear full replacement	Significant reduction of OPEX costs thanks to new type of CBs. Spare parts prices and availabilities are relative to active equipment, price reduction of the spares are around 50% less than obsolte CBs's spares. Spares lead time is short, it's not required to keep an high spare parts stock.	High investment required.	High risks due to extra civil works and possible damages of existing MV cables during the replacement	New CBs failure rates is very limited with proper maintenace plan in place. It's possible to implement digital monitoring solutions with up to 40% of maintance cost reduction (Refer to SWICOM and Asset Manager) lowering the failure rates.	Installation & commissioning time not easily valued due to unexped issues during the activity. The I&C time will be much higher than 8h per unit considering also the existing switchgear disposal and civil works required.

Environmental benefits

	Equipment disposal / Circular economy	Materials disposal during normal operation	Dangerous materials	Failure risks with environmental impact	Risk of Fire
Existing Obsolote product	The complete unit will be disposed also in case of small failure due to unavailability/limitation of spare parts. The risk of failure is higher in obsolete products compared to active ones.	Disposal of exhausted dielectric material in the maintenance activities (e.g. oil in oil CBs) or leakage due to end of life of the CBS (e.g. SF6 in SF6 CBs)	Presence of dangerous materials, like asbestos or Oil. SF6 gas could be danger in case is deteriorated.	High risk of failure that can create a enviromnetal impact (e.g SF6 or oil leakage, toxic smokes creation)	High risks of fire in case of oil breaker, or due to partial discharge for deteriorated insulatation materilas, or due to wrong operations with consequence of an internal arc
Roll-in Retrofit (RiR)	No materials disposal, only the existing CBs if no longer usable. The switchgear frame will remain with a reduction of waste in the avarage of 60% to 70% compered to a SWG replacement (based on old SACE switchgear)	New CBs are sealed for life, it's not required any replacement of the dielectric materials. It is possible to use Vaccum CBs	New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure. It is possible to use Vaccum CBs	Reduced risk of failure compared to old CBs. It's possible to implement digital monitoring to reduce the risk of failure including internal arc (SWICOM, PDCOM for partial dicharge, temperature monitoring and Asset manager solutions)	Very low risk for the new CBs
Onefit Retrofill	Some materials disposal, including the existing CBs if no longer usable in other units. The switchgear frame will remain with a reduction of waste in the avarage of 50% to 60% compered to a SWG replacement (based on old SACE switchgear)	New CBs are sealed for life, it's not required any replacement of the dielectric materials. It is possible to use Vaccum CBs	New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure. It is possible to use Vaccum CBs	Reduced risk of failure compared to old CBs and old shutter/interlocks system, It's possible to implement digital monitoring to reduce the risk of failure including internal arc (SWICOM; PDCOM for partial dicharge, temperature monitoring and Asset manager solutions)	Very low risk for the new CBs and CBs's enclosure
Full replacement	The complete existing switchgear will be disposed (around 1000kg of waste for each unit)	New CBs are sealed for life, it's not required any replacement of the dielectric materials. It is possible to use Vaccum CBs	New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure. It is possible to use Vaccum CBs	Reduced risk of failure compared to old switchgear. It's possible to implement digital monitoring to reduce the risk of failure including internal arc (SWICOM, PDCOM for partial dicharge, temperature monitoring and Asset manager solutions)	Very low risk for the new Switchgear

7. Choose the best solution to renew your old installed base

Technical benefits

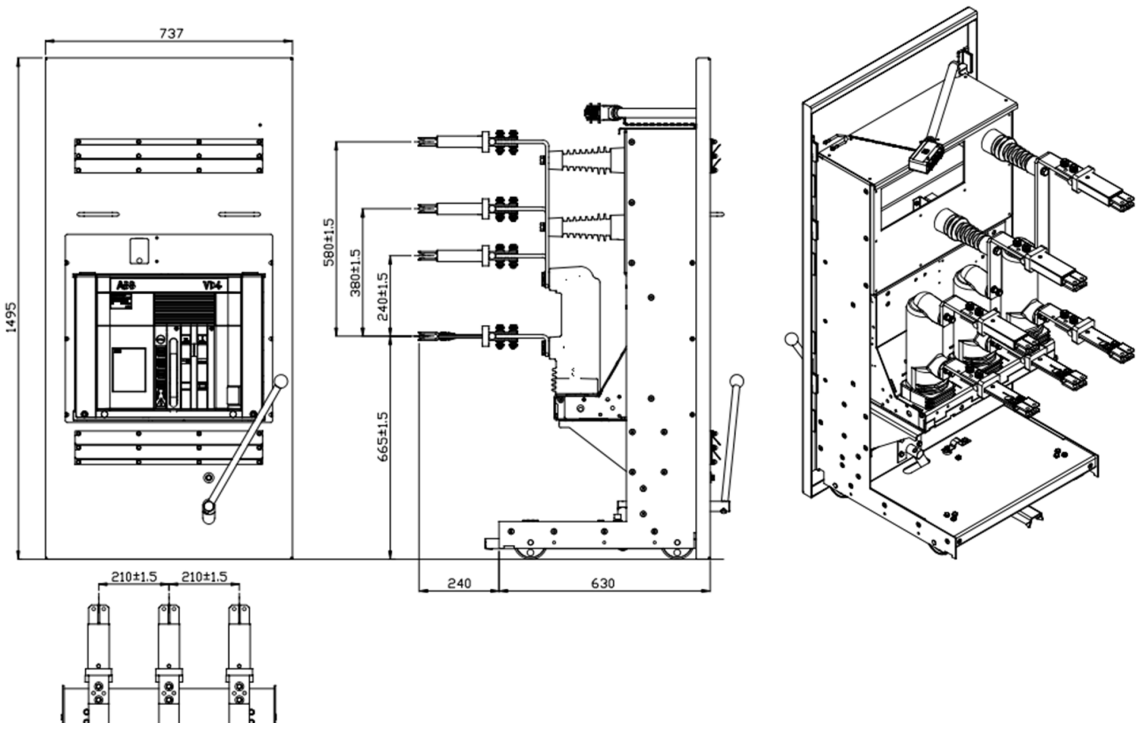
	International Standard	Standardization of the installed base	Operating sequence	Digitalization and new functionalities	Availability of spare parts
Existing Obsolete product	According to old stadandard	Typically different types and brands of CBs are installed, with different operations sequences, different spares and technologies	Operation sequence available generally with slow cycle	Difficult to digitalize an old obolete system	For Obsolete products the spare parts are not guaranteed
Roll-in Retrofit (RiR)	The retrofit CBs is tested according to the latest IEC (or ANSI) standard : IEC 62271-100, IEC 62271-200 The switchgear will remain tested according to the original standard	The RiR will be 100% interchangeable with existing products. Installing RiR in all the installed base the spare parts related to the mechanisms and the basic CBs will be in common.	It's possible to implement fast cycle and reclosure according to last international standard	The digitalization fo the switchgear can be done during the commissioning of the retrofit. With RiR is easy to implement new functionalities. Revamping of the relays can be offered as optional	Fully availability of the spare parts for the CBs
Onefit Retrofill	The retrofit CBs and the enclosure (onefit) is tested according to the latest IEC (or ANSI) standard : IEC 62271-100, IEC 62271-200 The switchgear will remain tested according to the original standard	The CBs for Onefit is standard used also in ABB switchgear. Installing Onefit to all the installed base will allow to have the all the spare parts in common, one type of CBs interchangebale with the the same CBs with the same rating.	It's possible to implement fast cycle and reclosure according to last international standard	The digitalization of the switchgear can be done during the commissioning of the Onefit. There is the option to offer digital CBs VD4-Digitup in order to renew also the relays and CTs	Fully availability of the spare parts for the CBs and enclosure (Onefit)
Switchgear full replacement	The full switchgear is tested according to the latest IEC (or ANSI) standard: IEC 62271-200.	The CBs used in new SWG is a standard CBs produced in the assembling line, the same used in Onefit	It's possible to implement fast cycle and reclosure according to last international standard	Digital switchgear is an available option, new switchgear can be produced according to the functionalities required	Fully availability of the spare parts for the switchgear

8. Available roll-in retrofit solutions

Please find below the list of the available RiR solutions.
Since it's quite common that MV equipment are modified from the original design, the list below is for information only and it's not binding. Every request must be sent to ABB Service marketing team in Italy for further checking of the solution, providing pictures and main dimensions.
If the required solution is not indicated in the below list, please send the request to ABB Service marketing team to evaluate the design effort required. For more details, please refer to chapter 10. Design to order process.

8.1 3AC SIEMENS

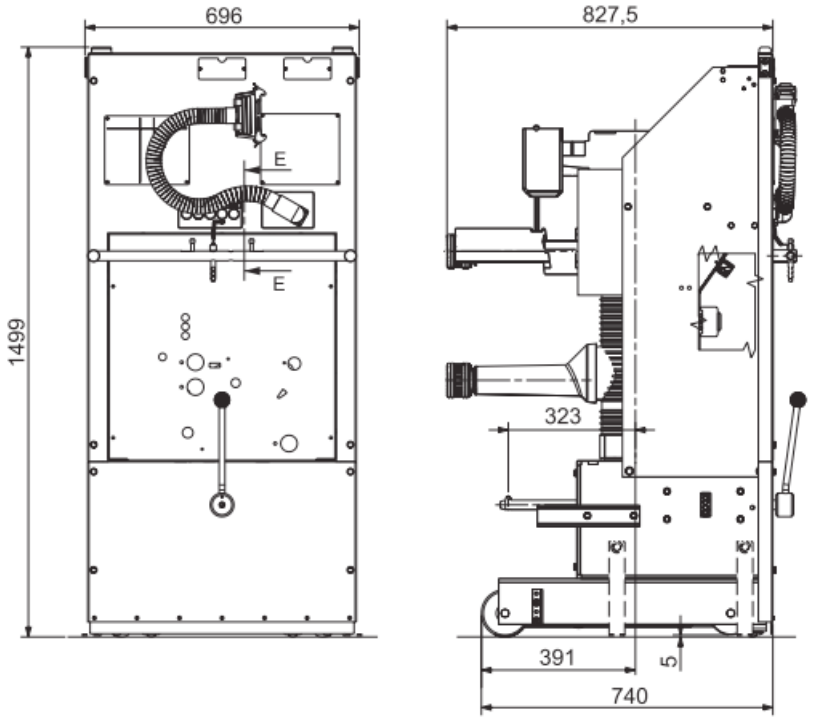
Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn in Isc	RiR dimensional drawing
47	3AC	17.5	630	25	210	8BD	VD4	VD4-3AC	17.06.25	1VCS010496
48	3AC	17.5	1250	25	210	8BD	VD4	VD4-3AC	17.12.25	1VCS010487
49	3AC	17.5	2500	25	210	8BD	VD4	VD4-3AC	17.25.25	1VCS010489



8. Available roll-in retrofit solutions

8.2 CEM GARDY

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
586	CEM Gardy	12	1250	50	210	CEM 12kV	HD4	HD4-HXA/T	12.12.50	1VCS001488G0002
588	CEM Gardy + Fuses	12	1250	50	210	CEM 12kV	HD4	HD4/T	12.12.50 + Fus.	1VCS001509G0001-G0002
587	CEM Gardy + VTs	12	1250	50	210	CEM 12kV	HD4	HD4/T	12.12.50 + T.P.	1VCS001488G0002
589	CEM Gardy + VTs	12	3000	50	210	CEM 12kV	HD4	HD4/T	12.32.50 + T.P. (2700A)	1VCS001510 G0001-G0002



8.3 D6 SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
750	D6-25	7.2	1250	250 MVA	140	UNIARC	HD4	HD4-D6	07.12.32	1VCS017483
415	D6-35	7.2	1250	350 MVA	140	UNIARC	HD4	HD4-D6	07.12.32	1VCS017483

8.4 DR6 DIARC SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
128	DR6-25	7.2	800	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
129	DR6-25	7.2	1250	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
131	DR6-25	7.2	2000	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.32*	1VCS002782
132	DR6-35	7.2	800	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
133	DR6-35	7.2	1250	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
135	DR6-35	7.2	2000	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.32	1VCS002782

8.5 DR7.2 DIARC SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
1	DR7.2-25	7.2	800	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.08.32	1VCS004352
136	DR7.2-25	7.2	800	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	07.08.32	2RDA036208
196	DR7.2-25	7.2	800	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.08.32	2RDA036206
14	DR7.2-35	7.2	800	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
140	DR7.2-35	7.2	800	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	07.08.32	2RDA036208
381	DR7.2-35	7.2	800	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.08.32	2RDA036206
18	DR7.2-50	7.2	800	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	07.08.50	1VCS002782
37	DR7.2-50/C	7.2	800	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004445
162	DR7.2-50/C	7.2	800	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.08.50	2RDA037681
389	DR7.2-50/C	7.2	800	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.08.50	2RDA039771
43	DR7.2-60	7.2	800	600 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.08.50	1VCS003531
168	DR7.2-60	7.2	800	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.08.50	2RDA037681
395	DR7.2-60	7.2	800	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.08.50	2RDA039771
11	DR7.2-25	7.2	1250	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
137	DR7.2-25	7.2	1250	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	07.12.32	2RDA036208
197	DR7.2-25	7.2	1250	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.12.32	2RDA036206
15	DR7.2-35	7.2	1250	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
141	DR7.2-35	7.2	1250	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	07.12.32	2RDA036208
382	DR7.2-35	7.2	1250	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.12.32	2RDA036206
19	DR7.2-50	7.2	1250	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	07.12.50	1VCS002782
38	DR7.2-50/C	7.2	1250	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004445
163	DR7.2-50/C	7.2	1250	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.12.50	2RDA037681
390	DR7.2-50/C	7.2	1250	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.12.50	2RDA039771
44	DR7.2-60	7.2	1250	600 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.12.50	1VCS003531
169	DR7.2-60	7.2	1250	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.12.50	2RDA037681
396	DR7.2-60	7.2	1250	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.12.50	2RDA039771
12	DR7.2-25	7.2	1600	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.32	1VCS002782
16	DR7.2-35	7.2	1600	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.32	1VCS002782
20	DR7.2-50	7.2	1600	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	07.16.50	1VCS002782
39	DR7.2-50/C	7.2	1600	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.16.50	1VCS003531
164	DR7.2-50/C	7.2	1600	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.16.50	2RDA037681
391	DR7.2-50/C	7.2	1600	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.16.50	2RDA039771
45	DR7.2-60	7.2	1600	600 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.16.50	1VCS003531
170	DR7.2-60	7.2	1600	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.16.50	2RDA037681
397	DR7.2-60	7.2	1600	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.16.50	2RDA039771
13	DR7.2-25	7.2	2500	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.32*	1VCS002782
17	DR7.2-35	7.2	2500	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.32	1VCS002782
35	DR7.2-35/C	7.2	2500	350 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.40	1VCS002859
160	DR7.2-35/C	7.2	2500	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.20.40	2RDA037682
387	DR7.2-35/C	7.2	2500	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.20.40	2RDA039769
21	DR7.2-50	7.2	2500	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	07.20.50	1VCS002782
40	DR7.2-50/C	7.2	2500	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.20.50	1VCS002859
165	DR7.2-50/C	7.2	2500	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.20.50	2RDA037682
392	DR7.2-50/C	7.2	2500	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.20.50	2RDA039769
111	DR7.2-60	7.2	2500	600 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.20.50	1VCS002859
171	DR7.2-60	7.2	2500	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.20.50	2RDA037682
398	DR7.2-60	7.2	2500	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.20.50	2RDA039769
36	DR7.2-35/C	7.2	3150	350 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.25.40	1VCS002859
161	DR7.2-35/C	7.2	3150	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.25.40	2RDA037682
388	DR7.2-35/C	7.2	3150	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.25.40	2RDA039769

8. Available roll-in retrofit solutions

8.5 DR7.2 DIARC SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
41	DR7.2-50/C	7.2	3150	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.25.50	1VCS002859
166	DR7.2-50/C	7.2	3150	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.25.50	2RDA037682
393	DR7.2-50/C	7.2	3150	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.25.50	2RDA039769
112	DR7.2-60	7.2	3150	600 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	07.25.50	1VCS002859
172	DR7.2-60	7.2	3150	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.25.50	2RDA037682
399	DR7.2-60	7.2	3150	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.25.50	2RDA039769
167	DR7.2-50/C	7.2	4000	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.34.50	2RDA037683
394	DR7.2-50/C	7.2	4000	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.34.50	2RDA039763
173	DR7.2-60	7.2	4000	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	07.34.50	2RDA037683
400	DR7.2-60	7.2	4000	600 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	07.34.50	2RDA039763

8.6 DR12 DIARC SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
22	DR12-25	12	800	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.08.32	1VCS004352
148	DR12-25	12	800	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	12.08.32	2RDA036208
198	DR12-25	12	800	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.08.32	2RDA036206
23	DR12-25	12	1250	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
149	DR12-25	12	1250	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	12.12.32	2RDA036208
199	DR12-25	12	1250	250 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.12.32	2RDA036206
24	DR12-25	12	1600	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.32	1VCS002782
25	DR12-25	12	2500	250 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.32	1VCS002782
26	DR12-35	12	800	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.08.32	1VCS004352
152	DR12-35	12	800	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	12.08.32	2RDA036208
383	DR12-35	12	800	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.08.32	2RDA036206
27	DR12-35	12	1250	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.32	1VCS004352
153	DR12-35	12	1250	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	12.12.32	2RDA036208
384	DR12-35	12	1250	350 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.12.32	2RDA036206
28	DR12-35	12	1600	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.32	1VCS002782
29	DR12-35	12	2500	350 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.32	1VCS002782
114	DR12-35/C	12	2500	350 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.40	1VCS002859
174	DR12-35/C	12	2500	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.20.40	2RDA037682
401	DR12-35/C	12	2500	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.20.40	2RDA039769
115	DR12-35/C	12	3150	350 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.25.40	1VCS002859
175	DR12-35/C	12	3150	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.25.40	2RDA037682
402	DR12-35/C	12	3150	350 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.25.40	2RDA039769
30	DR12-50	12	800	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004352
156	DR12-50	12	800	500 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	12.08.32	2RDA036208
385	DR12-50	12	800	500 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.08.32	2RDA036206
32	DR12-50	12	1250	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004352
157	DR12-50	12	1250	500 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR	12.12.32	2RDA036208
386	DR12-50	12	1250	500 MVA	150	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.12.32	2RDA036206
33	DR12-50	12	1600	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.40	1VCS002782
34	DR12-50	12	2500	500 MVA	150	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.40	1VCS002782
116	DR12-50/C	12	800	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004445
176	DR12-50/C	12	800	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.08.40	2RDA037681
403	DR12-50/C	12	800	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.08.40	2RDA039771

8.6 DR12 DIARC SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
117	DR12-50/C	12	1250	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004445
177	DR12-50/C	12	1250	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.12.40	2RDA037681
404	DR12-50/C	12	1250	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.12.40	2RDA039771
118	DR12-50/C	12	1600	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.40	1VCS003531
178	DR12-50/C	12	1600	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.16.40	2RDA037681
405	DR12-50/C	12	1600	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.16.40	2RDA039771
119	DR12-50/C	12	2500	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.40	1VCS002859
179	DR12-50/C	12	2500	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.20.40	2RDA037682
406	DR12-50/C	12	2500	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.20.40	2RDA039769
120	DR12-50/C	12	3150	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.25.40	1VCS002859
180	DR12-50/C	12	3150	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.25.40	2RDA037682
407	DR12-50/C	12	3150	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.25.40	2RDA039769
121	DR12-50/C	12	4000	500 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.32.40	1VCS002970
181	DR12-50/C	12	4000	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.34.40	2RDA037683
408	DR12-50/C	12	4000	500 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.34.40	2RDA039763
122	DR12-75	12	800	750 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004445
182	DR12-75	12	800	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.08.50	2RDA037681
409	DR12-75	12	800	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.08.50	2RDA039771
123	DR12-75	12	1250	750 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.12.40	1VCS004445
183	DR12-75	12	1250	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.12.50	2RDA037681
410	DR12-75	12	1250	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.12.50	2RDA039771
124	DR12-75	12	1600	750 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.16.40	1VCS003531
184	DR12-75	12	1600	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.16.50	2RDA037681
411	DR12-75	12	1600	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.16.50	2RDA039771
125	DR12-75	12	2500	750 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.20.40	1VCS002859
185	DR12-75	12	2500	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.20.50	2RDA037682
412	DR12-75	12	2500	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.20.50	2RDA039769
126	DR12-75	12	3150	750 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.25.40	1VCS002859
186	DR12-75	12	3150	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.25.50	2RDA037682
413	DR12-75	12	3150	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.25.50	2RDA039769
127	DR12-75	12	4000	750 MVA	200	MTS12 CR10 Fixed part	VD4	VD4-DR	12.32.40	1VCS002970
187	DR12-75	12	4000	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR/CS	12.34.50	2RDA037683
414	DR12-75	12	4000	750 MVA	200	MTS12 CR10 Fixed part	HD4	HD4-DR	12.34.50	2RDA039763

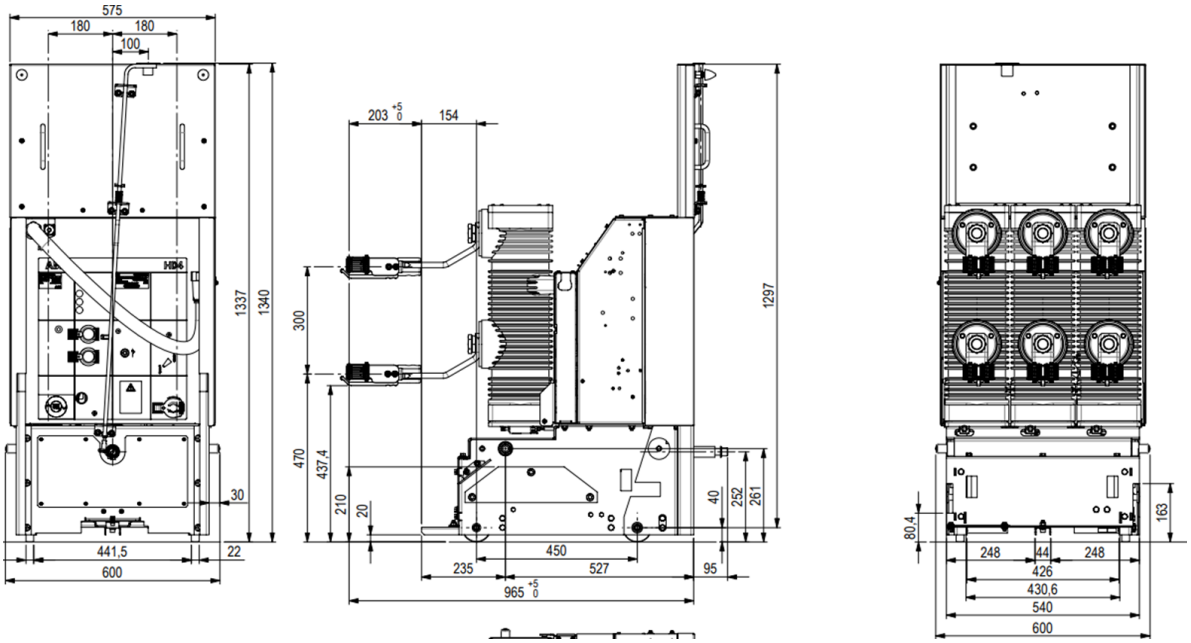
8. Available roll-in retrofit solutions

8.7 DR24 DIARC SACE

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
447	DR24-50	24	800	25 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.12.25	1VCS015778
454	DR24-50	24	800	31.5 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.08.32	1VCS017904
448	DR24-50	24	1250	25 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.12.25	1VCS015778
455	DR24-50	24	1250	31.5 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.12.32	1VCS017904
458	DR24-50	24	1600	31.5 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.16.32	1VCS017904
460	DR24-50	24	2000	31.5 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904
462	DR24-50	24	2500	31.5 - 500MVA	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904
449	DR24-75	24	800	25 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.12.25	1VCS015778
456	DR24-75	24	800	31.5 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.08.32	1VCS017904
450	DR24-75	24	1250	25 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.12.25	1VCS015778
457	DR24-75	24	1250	31.5 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.12.32	1VCS017904
459	DR24-75	24	1600	31.5 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.16.32	1VCS017904
461	DR24-75	24	2000	31.5 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904
463	DR24-75	24	2500	31.5 - 750MVA	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904

8.8 DSE47R Merlin Gerin

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
549	DSE47R	12	1200	40	180	DSE	HD4	HD4-DSE47R	12.12.40	1VCS016512
550	DSE47R	12	2500	40	240	DSE	HD4	HD4-DSE47R	12.25.40	1VCS016516



8. Available roll-in retrofit solutions

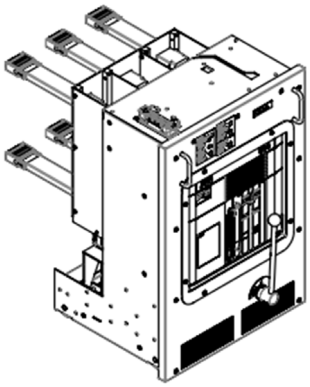
8.9 eVD4 ABB with VD4 digitup

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
93	eVD4	12-17.5	1250-1600	40	210	Fixed application	VD4	VD4 Digitup	12-17.12-16.40	1VCS012089
94	eVD4	12-17.5	2000	upto 40	210	Fixed application	VD4	VD4 Digitup	12-17.16-20.16-20-25-32-40	1VCS012088
95	eVD4	12-17.5	1250-1600	40	275	Fixed application	VD4	VD4 Digitup	12-17.12-16.40	1VCS012093
96	eVD4	12-17.5	2000	upto 40	275	Fixed application	VD4	VD4 Digitup	12-17.16-20.16-20-25-32-40	1VCS012091
97	eVD4	12-17.5	2500	upto 40	275	Fixed application	VD4	VD4 Digitup	12-17.25.20-25-32-40	1VCS012092
103	eVD4	12-17.5	630-1250	up to 31.5	150	Fixed application	VD4	VD4 Digitup	12-17.06-12.16-20-25-32	1VCS012086
104	eVD4	12-17.5	630-1250	up to 31.5	210	Fixed application	VD4	VD4 Digitup	12-17.06-12.16-20-25-32	1VCS012087
105	eVD4	12-17.5	630-1250	up to 31.5	275	Fixed application	VD4	VD4 Digitup	12-17.06-12.16-20-25-32	1VCS012090
107	eVD4	12-17.5	1600	upto 40	210	Fixed application	VD4	VD4 Digitup	12-17.16-20.16-20-25-32-40	1VCS012088
108	eVD4	12-17.5	1600	upto 40	275	Fixed application	VD4	VD4 Digitup	12-17.16-20.16-20-25-32-40	1VCS012091
98	eVD4/P	12-17.5	1250-1600	40	210	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.12-16.40	1VCS012098
99	eVD4/P	12-17.5	2000	upto 40	210	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.16-20.20-25-32-40	1VCS012094
100	eVD4/P	12-17.5	1250-1600	40	275	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.12-16.40	1VCS012095
101	eVD4/P	12-17.5	2000	upto 40	275	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.16-20.20-25-32-40	1VCS012096
102	eVD4/P	12-17.5	2500	upto 40	275	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.25.20-25-32-40	1VCS012097
106	eVD4/P	12-17.5	630-1250	up to 31.5	150	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.06-12.16-20-25-32	1VCS012065
109	eVD4/P	12-17.5	1600	up to 31.5	210	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.16-20.16-20-25-32-40	1VCS012094
110	eVD4/P	12-17.5	1600	up to 31.5	275	UniGear/PowerCube	VD4	VD4 Digitup/P	12-17.16-20.16-20-25-32-40	1VCS012096

Remark: Full revamping of the panel is required. Please contact ABB IT SRV Marketing team to evaluate the best solution

8.10 FG2 Fluarc Merlin Gerin

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
52	FG2	17.5	630	20	180	Fluarc	VD4	VD4-FG2	17.06.20	1VCS016500
92	FG2	17.5	1250	31.5	180	Fluarc	VM1	VM1-FG2	17.12.32	1VCS011970



8.11 HA1 SACE in UniverC / CBE enclosure

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
481	HA1/ZC	12	630	12	150	CBE UniverC	VD4	VD4/C	12.06.16	2RDA041363
476	HA1/ZC	12	630	12	150	CBE UniverC	HD4	HD4/C	12.06.16	2RDA040852
470	HA1/ZC	24	630	12	210	CBE UniverC	VD4	VD4/C	24.06.16	2RDA040857
464	HA1/ZC	24	630	12	210	CBE UniverC	HD4	HD4/C	24.06.16	2RDA040854
489	HA1/ZC	17.5/12p	630	12	150	CBE UniverC	VD4	VD4/C	17.06.16	2RDA041363
486	HA1/ZC	17.5/12p	630	12	150	CBE UniverC	HD4	HD4/C	17.06.16	2RDA040852
482	HA1/ZC	12	1250	12	150	CBE UniverC	VD4	VD4/C	12.12.16	2RDA041363
483	HA1/ZC	12	1250	16	150	CBE UniverC	VD4	VD4/C	12.12.16	2RDA041363
484	HA1/ZC	12	1250	20	150	CBE UniverC	VD4	VD4/C	12.12.20	2RDA041363
485	HA1/ZC	12	1250	25	150	CBE UniverC	VD4	VD4/C	12.12.25	2RDA041363
477	HA1/ZC	12	1250	12	150	CBE UniverC	HD4	HD4/C	12.12.16	2RDA040852
478	HA1/ZC	12	1250	16	150	CBE UniverC	HD4	HD4/C	12.12.16	2RDA040852
479	HA1/ZC	12	1250	20	150	CBE UniverC	HD4	HD4/C	12.12.20	2RDA040852
480	HA1/ZC	12	1250	25	150	CBE UniverC	HD4	HD4/C	12.12.25	2RDA040852
471	HA1/ZC	24	1250	12	210	CBE UniverC	VD4	VD4/C	24.12.16	2RDA040857
472	HA1/ZC	24	1250	16	210	CBE UniverC	VD4	VD4/C	24.12.16	2RDA040857
473	HA1/ZC	24	1250	20	210	CBE UniverC	VD4	VD4/C	24.12.20	2RDA040857
465	HA1/ZC	24	1250	12	210	CBE UniverC	HD4	HD4/C	24.12.16	2RDA040854
466	HA1/ZC	24	1250	16	210	CBE UniverC	HD4	HD4/C	24.12.16	2RDA040854
467	HA1/ZC	24	1250	20	210	CBE UniverC	HD4	HD4/C	24.12.20	2RDA040854
490	HA1/ZC	17.5/12p	1250	12	150	CBE UniverC	VD4	VD4/C	17.12.16	2RDA041363
491	HA1/ZC	17.5/12p	1250	16	150	CBE UniverC	VD4	VD4/C	17.12.16	2RDA041363
487	HA1/ZC	17.5/12p	1250	12	150	CBE UniverC	HD4	HD4/C	17.12.16	2RDA040852
488	HA1/ZC	17.5/12p	1250	16	150	CBE UniverC	HD4	HD4/C	17.12.16	2RDA040852

8. Available roll-in retrofit solutions

8.12 HA2 SACE in UniverC / CBE enclosure

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
496	HA2/ZC	12	1250	25	150	CBE UniverC	VD4	VD4/C	12.12.25	2RDA041363
497	HA2/ZC	12	1250	31.5	150	CBE UniverC	VD4	VD4/C	12.12.32	2RDA041363
493	HA2/ZC	12	1250	25	150	CBE UniverC	HD4	HD4/C	12.12.25	2RDA040852
494	HA2/ZC	12	1250	31.5	150	CBE UniverC	HD4	HD4/C	12.12.32	2RDA040852
501	HA2/ZC	12	1600	25	210	CBE UniverC	HD4	HD4/C	12.16.25	TN7151
502	HA2/ZC	12	1600	31.5	210	CBE UniverC	HD4	HD4/C	12.16.32	TN7151
498	HA2/ZC	17.5	1250	25	150	CBE UniverC	VD4	VD4/C	17.12.25	2RDA041363
495	HA2/ZC	17.5	1250	25	150	CBE UniverC	HD4	HD4/C	17.12.25	2RDA040852
503	HA2/ZC	17.5	1600	20	210	CBE UniverC	HD4	HD4/C	17.16.25	TN7151
504	HA2/ZC	17.5	1600	25	210	CBE UniverC	HD4	HD4/C	17.16.25	TN7151
474	HA2/ZC	24	1250	25	210	CBE UniverC	VD4	VD4/C	24.12.25	2RDA040857
468	HA2/ZC	24	1250	25	210	CBE UniverC	HD4	HD4/C	24.12.25	2RDA040854
535	HA2/ZC	24	1600	20	275	CBE UniverC	HD4	HD4/C	24.16.25	TN7157
536	HA2/ZC	24	1600	25	275	CBE UniverC	HD4	HD4/C	24.16.25	TN7157

8.13 HA3 SACE in UniverC / CBE enclosure

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
505	HA3/ZC	12	1600	31.5	210	CBE UniverC	HD4	HD4/C	12.16.32	TN7151
506	HA3/ZC	12	1600	40	210	CBE UniverC	HD4	HD4/C	12.16.40	TN7151
507	HA3/ZC	12	1600	50	210	CBE UniverC	HD4	HD4/C	12.12.50	TN7151
509	HA3/C	12	2000	31.5	210	CBE UniverC	HD4	HD4/C	12.16.32	TN7151
510	HA3/C	12	2000	40	210	CBE UniverC	HD4	HD4/C	12.16.40	TN7151
511	HA3/C	12	2000	50	210	CBE UniverC	HD4	HD4/C	12.16.50	TN7151
519	HA3/ZC	12	2500	25	275	CBE UniverC	HD4	HD4/C	12.20.25	TN7153
520	HA3/ZC	12	2500	31.5	275	CBE UniverC	HD4	HD4/C	12.20.32	TN7153
521	HA3/ZC	12	2500	40	275	CBE UniverC	HD4	HD4/C	12.20.40	TN7153
522	HA3/ZC	12	2500	50	275	CBE UniverC	HD4	HD4/C	12.20.50	TN7153
524	HA3/C	12	3150	25	275	CBE UniverC	HD4	HD4/C	12.25.25	TN7155
525	HA3/C	12	3150	31.5	275	CBE UniverC	HD4	HD4/C	12.25.32	TN7155
526	HA3/C	12	3150	40	275	CBE UniverC	HD4	HD4/C	12.25.40	TN7155
527	HA3/C	12	3150	50	275	CBE UniverC	HD4	HD4/C	12.25.50	TN7155
513	HA3/C	17.5	1600	25	210	CBE UniverC	HD4	HD4/C	17.16.25	TN7151
514	HA3/C	17.5	1600	31.5	210	CBE UniverC	HD4	HD4/C	17.16.32	TN7151
515	HA3/C	17.5	1600	40	210	CBE UniverC	HD4	HD4/C	17.16.40	TN7151
516	HA3/C	17.5	2000	25	210	CBE UniverC	HD4	HD4/C	17.16.25	TN7151
517	HA3/C	17.5	2000	31.5	210	CBE UniverC	HD4	HD4/C	17.16.32	TN7151
518	HA3/C	17.5	2000	40	210	CBE UniverC	HD4	HD4/C	17.16.40	TN7151
529	HA3/C	17.5	2500	25	275	CBE UniverC	HD4	HD4/C	17.20.25	TN7153
530	HA3/C	17.5	2500	31.5	275	CBE UniverC	HD4	HD4/C	17.20.32	TN7153
531	HA3/C	17.5	2500	40	275	CBE UniverC	HD4	HD4/C	17.20.40	TN7153
532	HA3/C	17.5	3150	25	275	CBE UniverC	HD4	HD4/C	17.25.25	TN7155
533	HA3/C	17.5	3150	31.5	275	CBE UniverC	HD4	HD4/C	17.25.32	TN7155
534	HA3/C	17.5	3150	40	275	CBE UniverC	HD4	HD4/C	17.25.40	TN7155
475	HA3/ZC	24	1250	25	210	CBE UniverC	VD4	VD4/C	24.12.25	2RDA040857
469	HA3/ZC	24	1250	25	210	CBE UniverC	HD4	HD4/C	24.12.25	2RDA040854
499	HA3/ZC	24	1250	31.5	210	CBE UniverC	HD4	HD4/C	24.12.32	TN7156

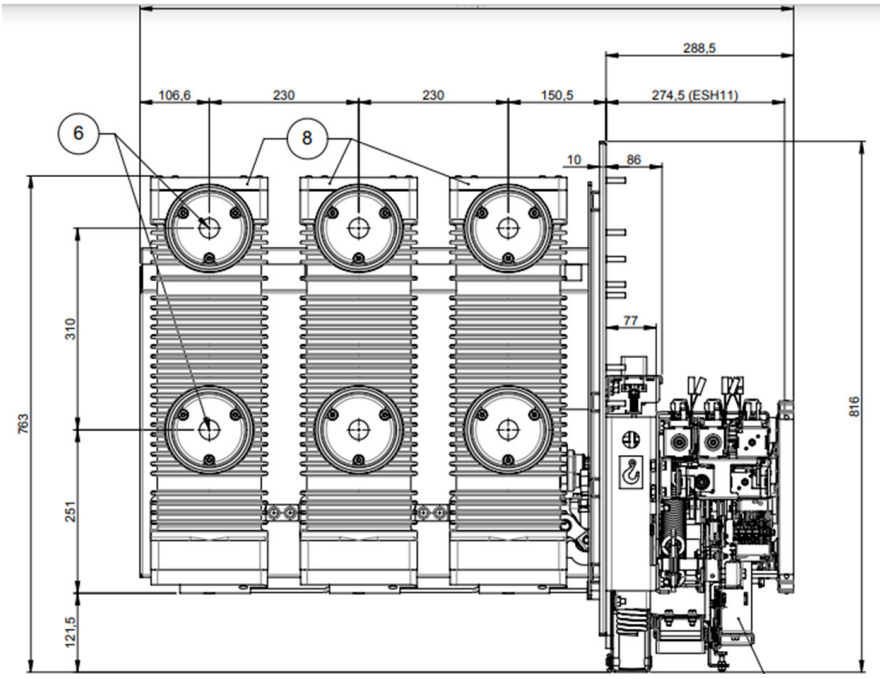
8.13 HA3 SACE in UniverC / CBE enclosure

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
500	HA3/ZC	24	1250	40	210	CBE UniverC	HD4	HD4/C	24.12.40	TN7156
537	HA3/C	24	1600	25	275	CBE UniverC	HD4	HD4/C	24.16.25	TN7157
538	HA3/C	24	1600	31.5	275	CBE UniverC	HD4	HD4/C	24.16.32	TN7157
539	HA3/C	24	1600	40	275	CBE UniverC	HD4	HD4/C	24.16.40	TN7157
540	HA3/C	24	2000	25	275	CBE UniverC	HD4	HD4/C	24.16.25	TN7157
541	HA3/C	24	2000	31.5	275	CBE UniverC	HD4	HD4/C	24.16.32	TN7157
542	HA3/C	24	2000	40	275	CBE UniverC	HD4	HD4/C	24.16.40	TN7157
543	HA3/C	24	2500	25	275	CBE UniverC	HD4	HD4/C	24.20.25	TN7158
544	HA3/C	24	2500	31.5	275	CBE UniverC	HD4	HD4/C	24.20.32	TN7158
545	HA3/C	24	2500	40	275	CBE UniverC	HD4	HD4/C	24.20.40	TN7158
546	HA3/C	24	3150	25	275	CBE UniverC	HD4	HD4/C	24.25.25	TN7159
547	HA3/C	24	3150	31.5	275	CBE UniverC	HD4	HD4/C	24.25.32	TN7159
548	HA3/C	24	3150	40	275	CBE UniverC	HD4	HD4/C	24.25.40	TN7159
508	HA3/C	12p	1600	50	210	CBE UniverC	HD4	HD4/C	17.12.50	TN7151
512	HA3/C	12p	2000	50	210	CBE UniverC	HD4	HD4/C	17.16.50	TN7151
523	HA3/C	12p	2500	50	275	CBE UniverC	HD4	HD4/C	17.20.50	TN7153
528	HA3/C	12p	3150	50	275	CBE UniverC	HD4	HD4/C	17.25.50	TN7155

8. Available roll-in retrofit solutions

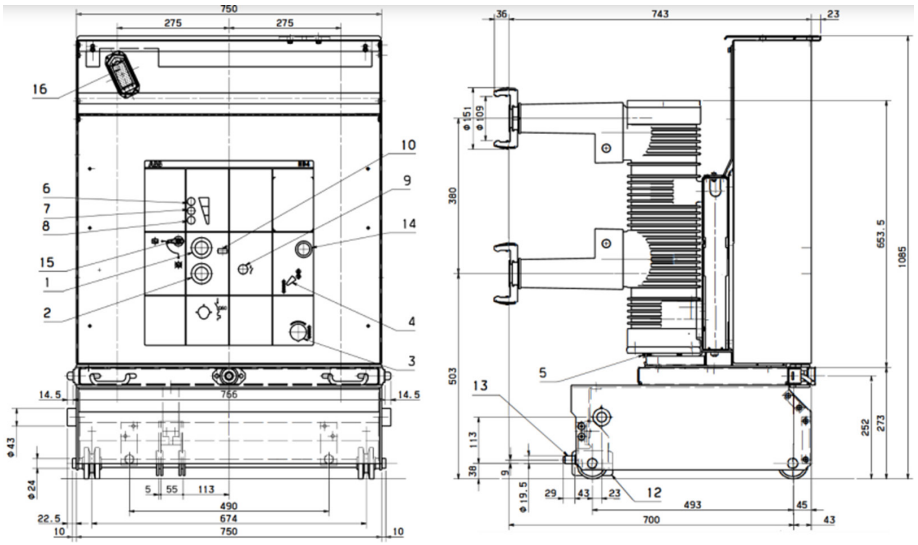
8.14 HA3 in BEU3

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
89	HA3/BEU3	24	1250	31.5	230	BEU3	HD4	HD4-HA3/BEU3	24.12.32	1VCS011601
88	HA3/BEU3	36	1250	31.5	230	BEU3	HD4	HD4-HA3/BEU3	36.12.32	1VCS011601
551	HA3/BEU3	36	1250	25	230	BEU3	HD4	HD4-HA3/BEU3	36.12.25	1VCS011601



8.15 HA3/NFsG in UniverG12

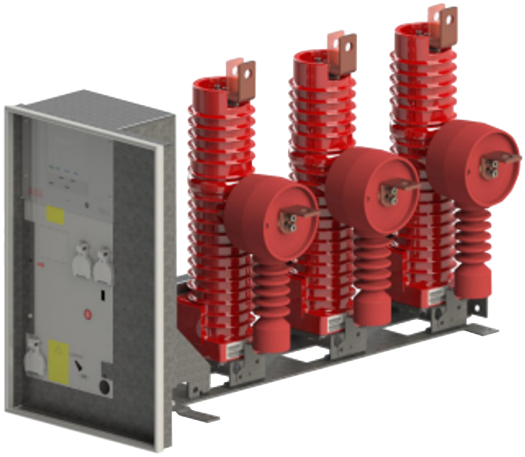
Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
437	HA3/NFsG	12	1600	31.5	210	UniverG12	HD4	HD4/NFsG	12.16.32	TN7337
438	HA3/NFsG	12	1600	40	210	UniverG12	HD4	HD4/NFsG	12.16.50	TN7337
439	HA3/NFsG	12	1600	50	210	UniverG12	HD4	HD4/NFsG	12.16.50	TN7337
440	HA3/NFsG	12	2500	31.5	275	UniverG12	HD4	HD4/NFsG	12.20.32	TN7338
441	HA3/NFsG	12	2500	40	275	UniverG12	HD4	HD4/NFsG	12.20.50	TN7338
442	HA3/NFsG	12	2500	50	275	UniverG12	HD4	HD4/NFsG	12.20.50	TN7338
443	HA3/NFsG	12	3600	31.5	275	UniverG12	HD4	HD4/NFsG	12.32.32	TN7340
444	HA3/NFsG	12	3600	40	275	UniverG12	HD4	HD4/NFsG	12.32.50	TN7340
445	HA3/NFsG	12	3600	50	275	UniverG12	HD4	HD4/NFsG	12.32.50	TN7340

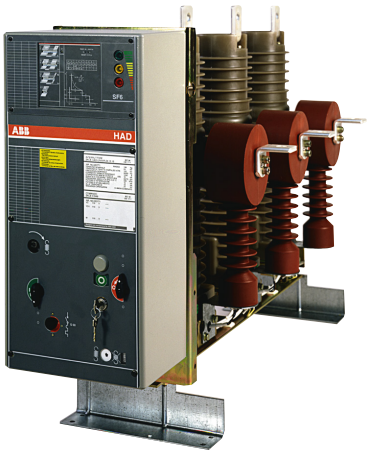


8. Available roll-in retrofit solutions

8.16 HAD SACE lateral circuit breaker

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
581	HAD	12	630-800-1250	12-16-20-25	300	ABB and NOT ABB	HD4	HD4/R-HAD	12.06-08-12.12-16-20-25	TN7234+ retrofit kit
582	HAD	17.5	630-800-1250	12-16-20	300	ABB and NOT ABB	HD4	HD4/R-HAD	17.06-08-12.12-16-20	TN7234+ retrofit kit
583	HAD	24	630-800-1250	12-16-20	300	ABB and NOT ABB	HD4	HD4/R-HAD	24.06-08-12.12-16-20	TN7234+ retrofit kit



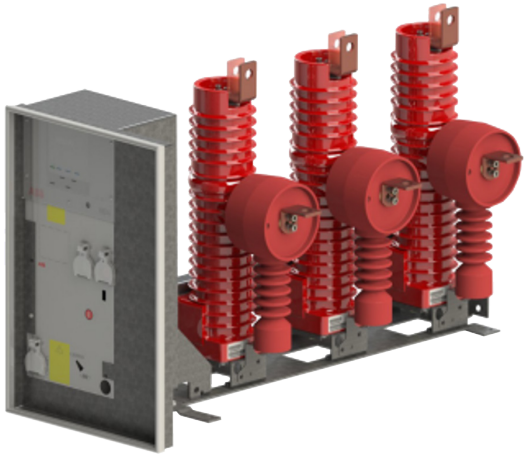


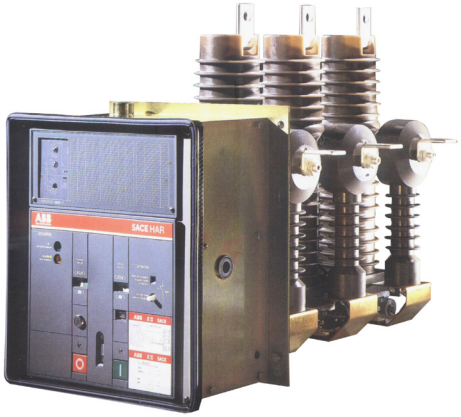
Remarks

HD4/R-HAD can be provided when the original HAD circuit breaker is installed using the ABB standard connections. In the other case ABB provides a standard HD4/R fixed circuit breaker without pliers and it will be necessary to study the relevant mechanical adaptations on site. Please consider that the HD4/R circuit breaker cover is bigger than HAD original one, so it could be necessary to modify the circuit breaker compartment door.

8.17 HAR SACE lateral circuit breaker

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
552	HAR	12	630-800-1250	12-16-20-25	300	ABB and NOT ABB	HD4	HD4/R-HAR	12.06-08-12.12-16-20-25	TN7234+ retrofit kit
553	HAR	17.5	630-800-1250	12-16-20	300	ABB and NOT ABB	HD4	HD4/R-HAR	17.06-08-12.12-16-20	TN7234+ retrofit kit
554	HAR	24	630-800-1250	12-16-20	300	ABB and NOT ABB	HD4	HD4/R-HAR	24.06-08-12.12-16-20	TN7234+ retrofit kit





Remarks

HD4/R-HAR can be provided when the original HAR circuit breaker is installed using the ABB standard connections. In the other cases ABB provides a standard HD4/R fixed circuit breaker without pliers and it will be necessary to study the relevant mechanical adaptations on site.

8.18 H-Breaking SACE in UniverC / CBE enclosure

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
590	H/ZC	12	630	16	150	UniverC/CBE	HD4	HD4/C	12.06.16	2RDA040852
591	H/ZC	12	1250	16	150	UniverC/CBE	HD4	HD4/C	12.12.16	2RDA040852
592	H/ZC	12	630	25	150	UniverC/CBE	HD4	HD4/C	12.06.25	2RDA040852
593	H/ZC	12	1250	25	150	UniverC/CBE	HD4	HD4/C	12.12.25	2RDA040852
594	H/ZC	12	630	31.5	150	UniverC/CBE	HD4	HD4/C	12.06.32	2RDA040852
595	H/ZC	12	1250	31.5	150	UniverC/CBE	HD4	HD4/C	12.12.32	2RDA040852
596	H/ZC	17.5	630	16	150	UniverC/CBE	HD4	HD4/C	17.06.16	2RDA040852
597	H/ZC	17.5	1250	16	150	UniverC/CBE	HD4	HD4/C	17.12.16	2RDA040852
598	H/ZC	17.5	630	25	150	UniverC/CBE	HD4	HD4/C	17.06.25	2RDA040852
599	H/ZC	17.5	1250	25	150	UniverC/CBE	HD4	HD4/C	17.12.25	2RDA040852
600	H/ZC	17.5	630	31.5	150	UniverC/CBE	HD4	HD4/C	17.06.32	2RDA040852
601	H/ZC	17.5	1250	31.5	150	UniverC/CBE	HD4	HD4/C	17.12.32	2RDA040852
602	H/ZC	24	630	16	210	UniverC/CBE	HD4	HD4/C	24.06.16	2RDA040854
603	H/ZC	24	1250	16	210	UniverC/CBE	HD4	HD4/C	24.12.16	2RDA040854
604	H/ZC	24	630	20	210	UniverC/CBE	HD4	HD4/C	24.06.20	2RDA040854
605	H/ZC	24	1250	20	210	UniverC/CBE	HD4	HD4/C	24.12.20	2RDA040854
606	H/ZC	24	630	25	210	UniverC/CBE	HD4	HD4/C	24.06.25	2RDA040854
607	H/ZC	24	1250	25	210	UniverC/CBE	HD4	HD4/C	24.12.25	2RDA040854
536	HA2/ZC	24	1600	25	275	CBE UniverC	HD4	HD4/C	24.16.25	TN7157

8. Available roll-in retrofit solutions

8.19 HPA in SafeSix

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
201	HPA 12/612C	12	630	12	185	SafeSix/VHA	VD4	VD4-HPA	12.06.32	1VCS015317
235	HPA 12/612C	12	630	12	185	SafeSix/VHA	HD4	HD4-HPA	12.06.32	1VCS012640
416	HPA 12/616C	12	630	16	185	SafeSix/VHA	VD4	VD4-HPA	12.06.32	1VCS015317
241	HPA 12/616C	12	630	16	185	SafeSix/VHA	HD4	HD4-HPA	12.06.32	1VCS012640
212	HPA 12/620C	12	630	20	185	SafeSix/VHA	VD4	VD4-HPA	12.06.32	1VCS015317
247	HPA 12/620C	12	630	20	185	SafeSix/VHA	HD4	HD4-HPA	12.06.32	1VCS012640
218	HPA 12/625C	12	630	25	185	SafeSix/VHA	VD4	VD4-HPA	12.06.32	1VCS015317
253	HPA 12/625C	12	630	25	185	SafeSix/VHA	HD4	HD4-HPA	12.06.32	1VCS012640
224	HPA 12/631C	12	630	31.5	185	SafeSix/VHA	VD4	VD4-HPA	12.06.32	1VCS015317
259	HPA 12/631C	12	630	31.5	185	SafeSix/VHA	HD4	HD4-HPA	12.06.32	1VCS012640
580	HPA 12/1640C	12	630	40	185	SafeSix/VHA	VD4	VD4-HPA	12.06.40	1VCS004159
425	HPA 12/640C	12	630	40	185	SafeSix/VHA	HD4	HD4-HPA	12.06.40	1VCS003774
202	HPA 12/812C	12	800	12	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
236	HPA 12/812C	12	800	12	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
207	HPA 12/816C	12	800	16	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
242	HPA 12/816C	12	800	16	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
213	HPA 12/820C	12	800	20	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
248	HPA 12/820C	12	800	20	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
219	HPA 12/825C	12	800	25	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
254	HPA 12/825C	12	800	25	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
225	HPA 12/831C	12	800	31.5	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
260	HPA 12/831C	12	800	31.5	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
203	HPA 12/1212C	12	1250	12	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
237	HPA 12/1212C	12	1250	12	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
208	HPA 12/1216C	12	1250	16	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
243	HPA 12/1216C	12	1250	16	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
214	HPA 12/1220C	12	1250	20	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
249	HPA 12/1220C	12	1250	20	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
200	HPA 12/1225C	12	1250	25	185	SafeSix/VHA	VD4G	VD4G/HPA-25	12.12.25	1VCS015317
220	HPA 12/1225C	12	1250	25	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
255	HPA 12/1225C	12	1250	25	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
226	HPA 12/1231C	12	1250	31.5	185	SafeSix/VHA	VD4	VD4-HPA	12.12.32	1VCS015317
261	HPA 12/1231C	12	1250	31.5	185	SafeSix/VHA	HD4	HD4-HPA	12.12.32	1VCS012640
230	HPA 12/1240C	12	1250	40	185	SafeSix/VHA	VD4	VD4-HPA	12.12.40	1VCS004159
265	HPA 12/1240C	12	1250	40	185	SafeSix/VHA	HD4	HD4-HPA	12.12.40	1VCS003774
378	HPA 12/1240C	12	1250	40	185	SafeSix/VHA	HD4	HD4-HPA/IN	12.12.40	1VCS003850
204	HPA 12/1612C	12	1600	12	185	SafeSix/VHA	VD4	VD4-HPA	12.16.32	1VCS004159
238	HPA 12/1612C	12	1600	12	185	SafeSix/VHA	HD4	HD4-HPA	12.16.32	1VCS003774
209	HPA 12/1616C	12	1600	16	185	SafeSix/VHA	VD4	VD4-HPA	12.16.32	1VCS004159
244	HPA 12/1616C	12	1600	16	185	SafeSix/VHA	HD4	HD4-HPA	12.16.32	1VCS003774
215	HPA 12/1620C	12	1600	20	185	SafeSix/VHA	VD4	VD4-HPA	12.16.32	1VCS004159
250	HPA 12/1620C	12	1600	20	185	SafeSix/VHA	HD4	HD4-HPA	12.16.32	1VCS003774
221	HPA 12/1625C	12	1600	25	185	SafeSix/VHA	VD4	VD4-HPA	12.16.32	1VCS004159
256	HPA 12/1625C	12	1600	25	185	SafeSix/VHA	HD4	HD4-HPA	12.16.32	1VCS003774
227	HPA 12/1631C	12	1600	31.5	185	SafeSix/VHA	VD4	VD4-HPA	12.16.32	1VCS004159
262	HPA 12/1631C	12	1600	31.5	185	SafeSix/VHA	HD4	HD4-HPA	12.16.32	1VCS003774
231	HPA 12/1640C	12	1600	40	185	SafeSix/VHA	VD4	VD4-HPA	12.16.40	1VCS004159
371	HPA 12/1640C	12	1600	40	185	SafeSix/VHA	HD4	HD4-HPA	12.16.40	1VCS003774
379	HPA 12/1640C	12	1600	40	185	SafeSix/VHA	HD4	HD4-HPA/IN	12.16.40	1VCS003850
205	HPA 12/2012C	12	2000	12	185	SafeSix/VHA	VD4	VD4-HPA	12.20.32	1VCS004160

8.19 HPA in SafeSix

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
239	HPA 12/2012C	12	2000	12	185	SafeSix/VHA	HD4	HD4-HPA	12.20.32	1VCS003774
210	HPA 12/2016C	12	2000	16	185	SafeSix/VHA	VD4	VD4-HPA	12.20.32	1VCS004160
245	HPA 12/2016C	12	2000	16	185	SafeSix/VHA	HD4	HD4-HPA	12.20.32	1VCS003774
216	HPA 12/2020C	12	2000	20	185	SafeSix/VHA	VD4	VD4-HPA	12.20.32	1VCS004160
251	HPA 12/2020C	12	2000	20	185	SafeSix/VHA	HD4	HD4-HPA	12.20.32	1VCS003774
222	HPA 12/2025C	12	2000	25	185	SafeSix/VHA	VD4	VD4-HPA	12.20.32	1VCS004160
257	HPA 12/2025C	12	2000	25	185	SafeSix/VHA	HD4	HD4-HPA	12.20.32	1VCS003774
228	HPA 12/2031C	12	2000	31.5	185	SafeSix/VHA	VD4	VD4-HPA	12.20.32	1VCS004160
263	HPA 12/2031C	12	2000	31.5	185	SafeSix/VHA	HD4	HD4-HPA	12.20.32	1VCS003774
232	HPA 12/2040C	12	2000	40	185	SafeSix/VHA	VD4	VD4-HPA	12.20.40	1VCS004160
266	HPA 12/2040C	12	2000	40	185	SafeSix/VHA	HD4	HD4-HPA	12.20.40	1VCS003774
380	HPA 12/2040C	12	2000	40	185	SafeSix/VHA	HD4	HD4-HPA/IN	12.20.40	1VCS003850
206	HPA 12/2512C	12	2500	12	185	SafeSix/VHA	VD4	VD4-HPA	12.25.32	1VCS006912
240	HPA 12/2512C	12	2500	12	185	SafeSix/VHA	HD4	HD4-HPA	12.25.32	1VCS003774
211	HPA 12/2516C	12	2500	16	185	SafeSix/VHA	VD4	VD4-HPA	12.25.32	1VCS006912
246	HPA 12/2516C	12	2500	16	185	SafeSix/VHA	HD4	HD4-HPA	12.25.32	1VCS003774
217	HPA 12/2520C	12	2500	20	185	SafeSix/VHA	VD4	VD4-HPA	12.25.32	1VCS006912
252	HPA 12/2520C	12	2500	20	185	SafeSix/VHA	HD4	HD4-HPA	12.25.32	1VCS003774
223	HPA 12/2525C	12	2500	25	185	SafeSix/VHA	VD4	VD4-HPA	12.25.32	1VCS006912
258	HPA 12/2525C	12	2500	25	185	SafeSix/VHA	HD4	HD4-HPA	12.25.32	1VCS003774
229	HPA 12/2531C	12	2500	31.5	185	SafeSix/VHA	VD4	VD4-HPA	12.25.32	1VCS006912
264	HPA 12/2531C	12	2500	31.5	185	SafeSix/VHA	HD4	HD4-HPA	12.25.32	1VCS003774
233	HPA 12/2540C	12	2500	40	185	SafeSix/VHA	VD4	VD4-HPA	12.25.40	1VCS006912
267	HPA 12/2540C	12	2500	40	185	SafeSix/VHA	HD4	HD4-HPA	12.25.40	1VCS003774
234	HPA 12/3140C	12	3150	40	185	SafeSix/VHA	VD4	VD4-HPA	12.32.40	1VCS006917
268	HPA 12/3140C	12	3150	40	185	SafeSix/VHA	HD4	HD4-HPA	12.32.40	1VCS003515
319	HPA 17/612C	17.5	630	12	185	SafeSix/VHA	HD4	HD4-HPA	17.06.25	1VCS003775
329	HPA 17/620C	17.5	630	20	185	SafeSix/VHA	HD4	HD4-HPA	17.06.25	1VCS003775
334	HPA 17/625C	17.5	630	25	185	SafeSix/VHA	HD4	HD4-HPA	17.06.25	1VCS003775
320	HPA 17/812C	17.5	800	12	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
330	HPA 17/820C	17.5	800	20	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
335	HPA 17/825C	17.5	800	25	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
321	HPA 17/1212C	17.5	1250	12	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
326	HPA 17/1216C	17.5	1250	16	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
331	HPA 17/1220C	17.5	1250	20	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
336	HPA 17/1225C	17.5	1250	25	185	SafeSix/VHA	HD4	HD4-HPA	17.12.25	1VCS003775
327	HPA 17/2016C	17.5	2000	16	185	SafeSix/VHA	HD4	HD4-HPA	17.20.25	1VCS003775
332	HPA 17/2020C	17.5	2000	20	185	SafeSix/VHA	HD4	HD4-HPA	17.20.25	1VCS003775
337	HPA 17/2025C	17.5	2000	25	185	SafeSix/VHA	HD4	HD4-HPA	17.20.25	1VCS003775
328	HPA 17/2516C	17.5	2500	16	185	SafeSix/VHA	HD4	HD4-HPA	17.25.25	1VCS003775
283	HPA 17/2520C	17.5	2500	20	185	SafeSix/VHA	HD4	HD4-HPA	17.25.25	1VCS003775
338	HPA 17/2525C	17.5	2500	25	185	SafeSix/VHA	HD4	HD4-HPA	17.25.25	1VCS003775
344	HPA 24/612C	24	630	12	185	SafeSix/VHA	HD4	HD4-HPA	24.06.25	1VCS003775
349	HPA 24/616C	24	630	16	185	SafeSix/VHA	HD4	HD4-HPA	24.06.25	1VCS003775
354	HPA 24/620C	24	630	20	185	SafeSix/VHA	HD4	HD4-HPA	24.06.25	1VCS003775
359	HPA 24/625C	24	630	25	185	SafeSix/VHA	HD4	HD4-HPA	24.06.25	1VCS003775
345	HPA 24/812C	24	800	12	185	SafeSix/VHA	HD4	HD4-HPA	24.08.25	1VCS003775
350	HPA 24/816C	24	800	16	185	SafeSix/VHA	HD4	HD4-HPA	24.08.25	1VCS003775
355	HPA 24/820C	24	800	20	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
360	HPA 24/825C	24	800	25	185	SafeSix/VHA	HD4	HD4-HPA	24.08.25	1VCS003775

8. Available roll-in retrofit solutions

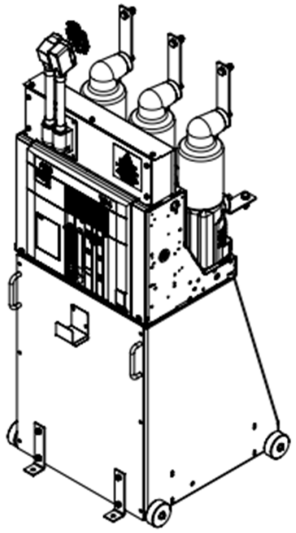
8.19 HPA in SafeSix

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
346	HPA 24/1212C	24	1250	12	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
351	HPA 24/1216C	24	1250	16	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
346	HPA 24/1212C	24	1250	12	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
351	HPA 24/1216C	24	1250	16	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
356	HPA 24/1220C	24	1250	20	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
361	HPA 24/1225C	24	1250	25	185	SafeSix/VHA	HD4	HD4-HPA	24.12.25	1VCS003775
347	HPA 24/2012C	24	2000	12	185	SafeSix/VHA	HD4	HD4-HPA	24.20.25	1VCS003775
352	HPA 24/2016C	24	2000	16	185	SafeSix/VHA	HD4	HD4-HPA	24.20.25	1VCS003775
357	HPA 24/2020C	24	2000	20	185	SafeSix/VHA	HD4	HD4-HPA	24.20.25	1VCS003775
362	HPA 24/2025C	24	2000	25	185	SafeSix/VHA	HD4	HD4-HPA	24.20.25	1VCS003775
348	HPA 24/2512C	24	2500	12	185	SafeSix/VHA	HD4	HD4-HPA	24.25.25	1VCS003775
353	HPA 24/2516C	24	2500	16	185	SafeSix/VHA	HD4	HD4-HPA	24.25.25	1VCS003775
358	HPA 24/2520C	24	2500	20	185	SafeSix/VHA	HD4	HD4-HPA	24.25.25	1VCS003775
363	HPA 24/2525C	24	2500	25	185	SafeSix/VHA	HD4	HD4-HPA	24.25.25	1VCS003775

Remarks
Dedicated HD4-HPA retrofit solution versions are available for Ireland and Denmark.

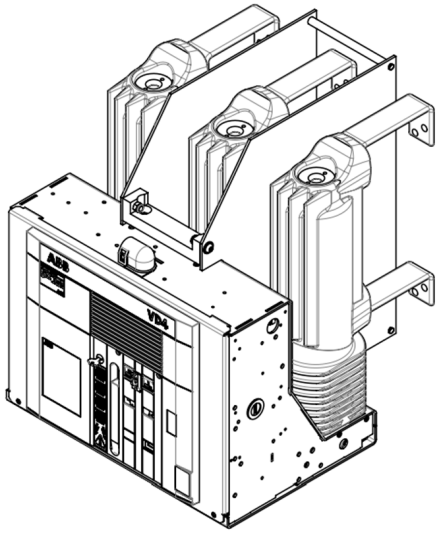
8.20 RM 12-25

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
749	RM 12-25	12	630	250 MVA	210	open air	VD4	VD4-RM free standing	12.06.16	1VCS019163R0001



8.21 SD 24/1250 – 750 BBC switchgear

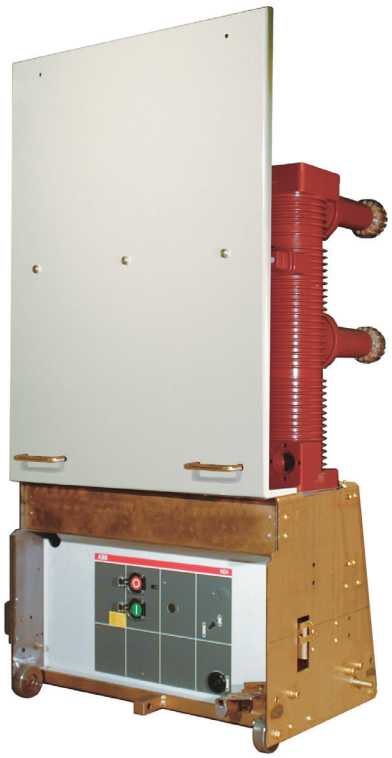
Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
446	SD 24/1250 - 750	24	1250	750 MVA	210	BBC switchgear	VD4	VD4-SD	24.12.32	1VCS017450R0001



8. Available roll-in retrofit solutions

8.22 SFAsG 36 Sace in UniverG36

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
555	SFA/sG	36	800	12-16-20	280	UniverG36	HD4	HD4/sG	36.12.20	TN7166
557	SFA/sG	36	800	25	280	UniverG36	HD4	HD4/sG	36.12.25	TN7166
559	SFA/sG	36	800	31.5	280	UniverG36	HD4	HD4/sG	36.12.32	TN7166
567	SFA/sG-CD	36	800	12-16-20	280	UniverG36	HD4	HD4/sG-CD	36.12.20	TN7362
569	SFA/sG-CD	36	800	25	280	UniverG36	HD4	HD4/sG-CD	36.12.25	TN7362
571	SFA/sG-CD	36	800	31.5	280	UniverG36	HD4	HD4/sG-CD	36.12.32	TN7362
556	SFA/sG	36	1250	12-16-20	280	UniverG36	HD4	HD4/sG	36.12.20	TN7166
558	SFA/sG	36	1250	25	280	UniverG36	HD4	HD4/sG	36.12.25	TN7166
560	SFA/sG	36	1250	31.5	280	UniverG36	HD4	HD4/sG	36.12.32	TN7166
568	SFA/sG-CD	36	1250	12-16-20	280	UniverG36	HD4	HD4/sG-CD	36.12.20	TN7362
570	SFA/sG-CD	36	1250	25	280	UniverG36	HD4	HD4/sG-CD	36.12.25	TN7362
572	SFA/sG-CD	36	1250	31.5	280	UniverG36	HD4	HD4/sG-CD	36.12.32	TN7362
561	SFA/sG	36	1600	12-16-20	280	UniverG36	HD4	HD4/sG	36.16.20	TN7166
562	SFA/sG	36	1600	25	280	UniverG36	HD4	HD4/sG	36.16.25	TN7166
563	SFA/sG	36	1600	31.5	280	UniverG36	HD4	HD4/sG	36.16.32	TN7166
573	SFA/sG-CD	36	1600	12-16-20	280	UniverG36	HD4	HD4/sG-CD	36.16.20	TN7362
574	SFA/sG-CD	36	1600	25	280	UniverG36	HD4	HD4/sG-CD	36.16.25	TN7362
575	SFA/sG-CD	36	1600	31.5	280	UniverG36	HD4	HD4/sG-CD	36.16.32	TN7362
564	SFA/sG	36	2000	20	280	UniverG36	HD4	HD4/sG	36.20.20	TN7166
565	SFA/sG	36	2000	25	280	UniverG36	HD4	HD4/sG	36.20.25	TN7166
566	SFA/sG	36	2000	31.5	280	UniverG36	HD4	HD4/sG	36.20.32	TN7166
576	SFA/sG-CD	36	2000	20	280	UniverG36	HD4	HD4/sG-CD	36.20.20	TN7362
577	SFA/sG-CD	36	2000	25	280	UniverG36	HD4	HD4/sG-CD	36.20.25	TN7362
578	SFA/sG-CD	36	2000	31.5	280	UniverG36	HD4	HD4/sG-CD	36.20.32	TN7362



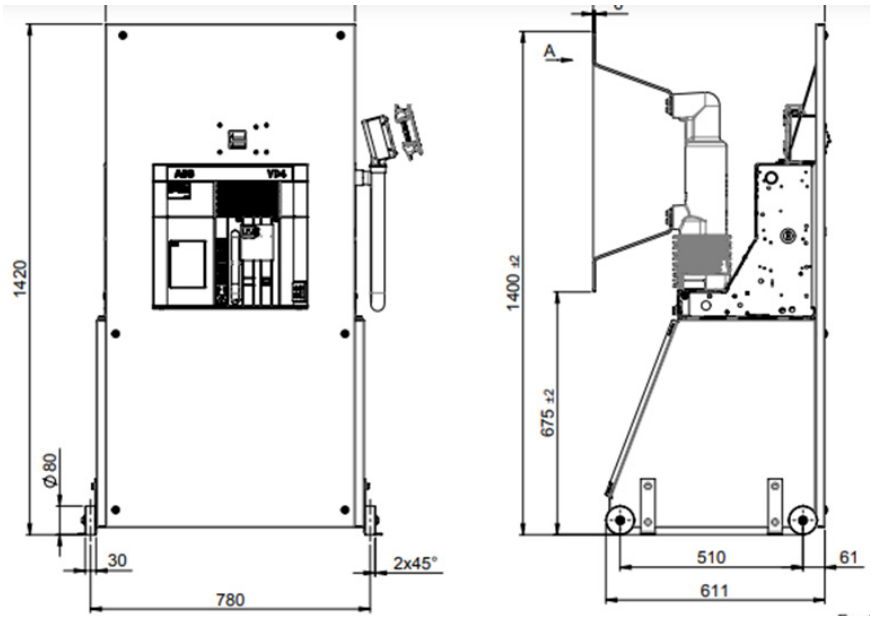
8.23 SFAs 24 in MT24 enclosure

Valid only if the enclosure is equipped with the interlock double guide on the bottom

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
78	SFAs	24	800	31.5	250	MT 24 TN10115	HD4	HD4-DR	24.08.32	1VCS017904
79	SFAs	24	800	40	250	MT 24 TN10115	HD4	HD4-DR	24.08.32	1VCS017904
77	SFAs	24	1250	25	250	MT 24 TN10115	HD4	HD4-DR	24.12.25	1VCS015778
80	SFAs	24	1250	31.5	250	MT 24 TN10115	HD4	HD4-DR	24.12.32	1VCS017904
81	SFAs	24	1250	40	250	MT 24 TN10115	HD4	HD4-DR	24.12.32	1VCS017904
82	SFAs	24	1600	31.5	250	MT 24 TN10115	HD4	HD4-DR	24.16.32	1VCS017904
83	SFAs	24	1600	40	250	MT 24 TN10115	HD4	HD4-DR	24.16.32	1VCS017904
84	SFAs	24	2000	31.5	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904
451	SFAs	24	2000	40	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904
452	SFAs	24	2500	31.5	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904
453	SFAs	24	2500	40	250	MT 24 TN10115	HD4	HD4-DR	24.20.32	1VCS017904

8.24 SFAU with DY525 ENEL homologation

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
426	SFAU	24	1250	16	275	Open air	VD4	VD4U DY525 Ed.00	24	2RDA038983A0001
427	SFAU	24	2500	16	275	Open air	VD4	VD4U DY525 Ed.00	24	2RDA038984A0001



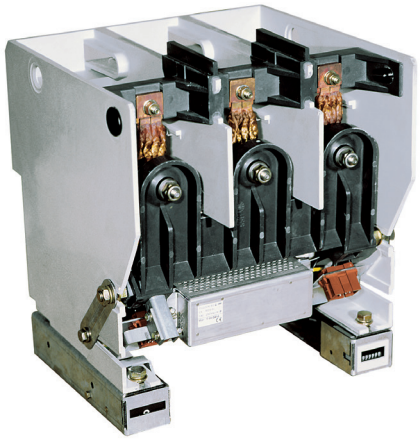
8. Available roll-in retrofit solutions

8.25 SRC SACE contactor in CBE1

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
609	SRC/ZC 7	7.2	400	-	150	UniVerC / CBE1-SRC	VSC	VSC7-SRC	07.04	1VCS003660
610	SRC/ZC 12	12	400	-	150	UniVerC / CBE1-SRC	VSC	VSC12-SRC	12.04	1VCS003660

8.26 VRC SACE contactor fixed version / UniverC CBE / ZS1 switchgear / Unimotor

Id	Exting CBs type	Vn [kV]	In [A]	Isc [kA] / [MVA]	Pitch [mm]	Panel application	RiR family	RiR CBs type	Rating code Vn In Isc	RiR dimensional drawing
435	VRC7	7.2	600	6	150	fixed	V-Contact	V7	7.2kV 400A	TN7068
433	VRC7/UN	7.2	600	6	108	Unimotor	V-Contact	V7/UN	7.2kV 400A	TN7071
429	VRC7/ZC	7.2	600	6	150	UniverC /CBE	V-Contact	V7/C	7.2kV 400A	TN7070
431	VRC7/ZC	7.2	600	6	150	ZS1	V-Contact	V7/Z	7.2kV 400A	TN7070
436	VRC12	12	450	6	150	fixed	V-Contact	V12	12kV 400A	TN7068
434	VRC12/UN	12	450	6	108	Unimotor	V-Contact	V12/UN	12kV 400A	TN7071
430	VRC12/ZC	12	450	6	150	UniverC /CBE	V-Contact	V12/C	12kV 400A	TN7070
432	VRC12/ZC	12	450	6	150	ZS1	V-Contact	V12/Z	12kV 400A	TN7070



9. Onefit solution

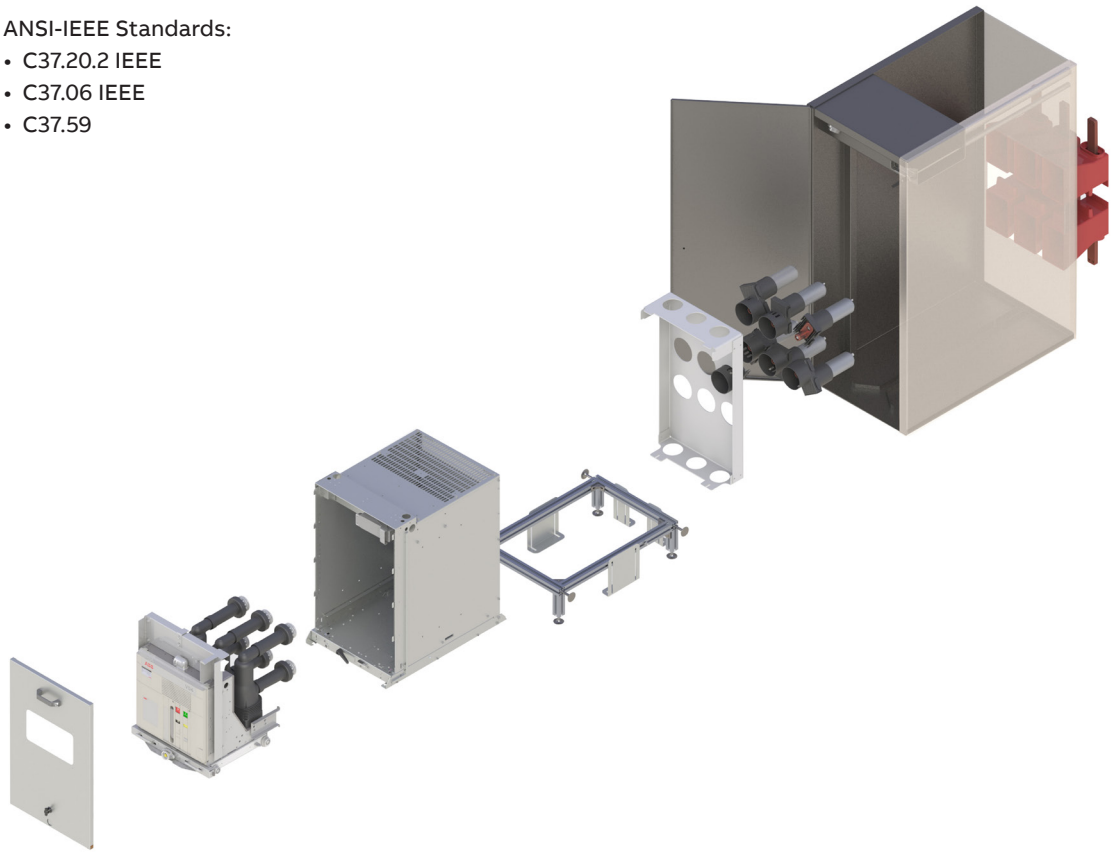
OneFit is the latest ABB hard-bus retrofill design concept for easy connection of new standard apparatus to a wide range of existing panels. It can be installed on ABB and non-ABB medium voltage assets.
OneFit is composed by a frame hosting the new circuit breaker. It is connected to the existing switchgear bushings by an additional power circuit, that acts also as inner interface with the new breaker. This solution balances the need for a retrofill solution with reasonably limited site works and linked outage.
OneFit is available both for panel with horizontal draw out and for vertical lift breakers.
It is developed in accordance with latest IEC, ANSI and GB Standards.
The OneFit solutions have been developed starting from sample panels representative of a wider range in terms of general dimensions, primary contact types, racking movements and ratings.

For these panels the type tests have been performed according to latest standards

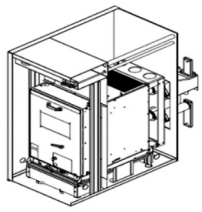
IEC Standards:
- 62271-1 (for the frame)
- 62271-100 (for the circuit breaker)
- 62271-200 tests performed in the original

ANSI-IEEE Standards:
- C37.20.2 IEEE
- C37.06 IEEE
- C37.59

It is possible, on request, to issue a dedicated declaration to extend the validity of the performed tests to the dedicated solutions for the other switchgear typologies with similar dimension characteristics and ratings.
Type testing according to respectively IEC 62271-200 or IEEE C37.20.2 may be performed on order providing an original panel.
Please refer to **OneFit webpage** for all the OneFit relevant documentation.
In the following sections the available OneFit solutions are indicated.
It is important to collect dimensions of the panel to check the compatibility with OneFit frame and use the proper OneFit kit.
Please contact service team in order to provide the required information to proceed with the evaluation.



OneFit Safety kit for IEC Standards



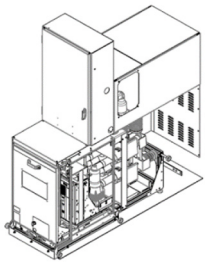
Horizontal drawout breakers

OneFit kit with screwed (SCAS) or round copper adaptation system (RCAS)						
Un [kV] ([1])	Isc [kA]	In = 630 A	In = 1250 A	In = 1600-2000 A	In = 2500 A	In = 3150 A ([3])
12 - 17.5	25					
	31.5					
	40 ([1])					
	50 ([4])					
24	25					
	31.5					
	40 ([2])					

([1]) High ratings up to 2000 A and 40 kA are available in special circuit breaker execution in P150 for panel width <700mm with OneFit W600
([2]) Available only with HD4, a previous analysis is needed,contact the factory
([3]) Rated current above 2500A requires forced ventilation in W800 OneFit frame
([4]) Special RCAS solution is required for high kA or power contacts with diameter higher than 38mm

OneFit kit with flat copper adaptation system (FCAS) ([5])					
	In = 630 A	In = 1250 A	In = 1600-2000 A	In = 2500 A	In = 3150 A
12 - 17.5 - 24 kV up to 40 kA					

([5]) Required for Flat contact systerm of original circuit breaker
Note: OneFit frame selection depends on ratings and panel dimensions.



Vertical lift breakers

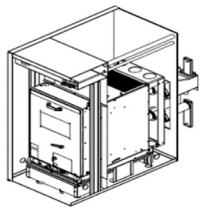
Onefit kit with screwed (SCAS) or round copper adaptation system (RCAS)							
Un [kV]	Isc [kA]	In = 400 A	In = 630 A	In = 800 A	In = 1250 A	In = 1600-2000 A	In = 2500 A
12 - 17.5	25						
	31.5						
	40						
	50 ([4])						

Available solutions

Contact ABB

9. Onefit solution

OneFit Safety kit for ANSI-IEEE Standards



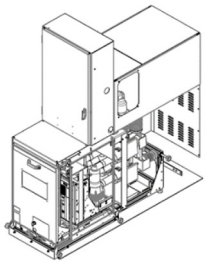
Horizontal drawout breakers

One Fit kit with screwed (SCAS) or round copper adaptation system (RCAS)				
Un [kV] ([1])	Isc [kA]	In = 1200 A	In = 2000 A	In = 3000 A ([3])
5 - 15	25			
	31.5			
	40			
	50 ([2])			

([1]) High ratings up to 2000 A and 40 kA are available in special circuit breaker execution in P150 for 26" panel width, contact the Service team
([2]) Special RCAS solution is required for high kA or power contacts with diameter higher than 1"1/2
([3]) Rated current above 2500A requires forced ventilation in W800 OneFit frame

OneFit kit with flat copper adaptation system (FCAS) ([4])			
	In = 1200 A	In = 2000 A	In = 3000 A
5 - 15 up to 40 kA			

([4]) Required for Flat contact systerm of original circuit breaker



Vertical lift breakers

Onefit kit with screwed (SCAS) or round copper adaptation system (RCAS)				
Un [kV]	Isc [kA]	In = 1200 A	In = 2000 A	In > 2000 A
5 - 15	25			
	31.5			
	40			

OneFit kit package addition		
Panel width	26"	36"
ANSI automatic shutter ([4])	•	•

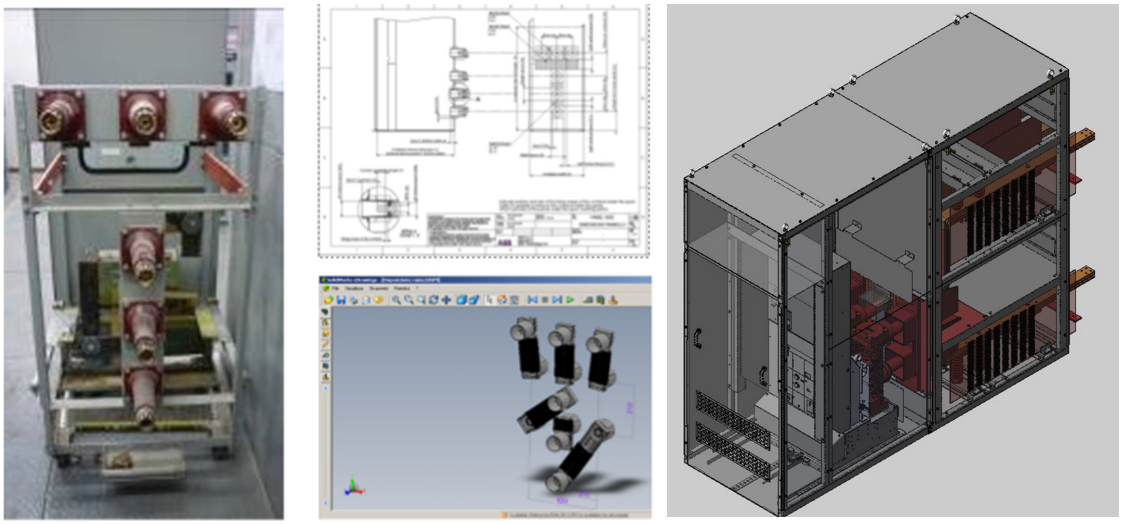
([4]) One per OneFit kit

Available solutions

Contact ABB

10. Design to order process

In case the required solution is not present in this document, the Service team has the full capability to design new retrofit solutions according to the customer needs and installed base.
With the request of offer please contact Service team in order to provide the required information to proceed with the evaluation.



Example of design to order project

11. General remarks

Sometimes the rated current given on the rating label of the original circuit breaker refers to the value of the withdrawable CB only (in open air).
The new retrofit solutions are instead type tested according to IEC 62271 and the rated current value is related to the value tested inside the panel.
The performances indicated on the roll-in retrofit rating plate are guaranteed for installations inside switchgear version equal or equivalent to those ones in which the product has been type tested.
ABB cannot guarantee the performances in different applications. The rating of the CBs installed inside the existing panel could be limited by the panel status and panel rating; if the panel has a lower performance compared to the retrofit breaker, the complete system ratings (Retrofit plus panel) will be limited by the panel ones.
In case the retrofit/Onefit will be installed in a different panel/enclosure than the original one or the one used for the testing, the final rating could be limited by the panel/enclosure.
ABB can guarantee only for the supplied products, the existing ones (like switchgear in case of Roll-in retrofit) are not part of the scope of supply and under ABB responsibility.
To perform the site commissioning in a safe way, the following minimum items shall be considered:

- The commissioning must be performed by expert technicians with a proper authorization
- All retrofit works shall be performed on a de-energized switchgear and following work permit and site safety procedure
- Retrofit commissioning shall check racking and penetration forces, primary disconnect penetration, shutter operation and all interlocks operation verification prior of energization.

More product information:
abb.com/mediumvoltage
Your contact center:
abb.com/contactcenters
More service information:
abb.com/service

1VCP000942 – Rev. A, en – M.V. Retrofit solutions - Technical Catalogue – 2022.02 (GS)