

---

ELECTRIFICATION SERVICE - GERMANY

# 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.**

---

## Table of contents

|                |  |
|----------------|--|
| <b>004</b>     | <b>1. Abbreviations and definitions</b>                                  |
| <b>005</b>     | <b>2. Our service portfolio</b>  |
| <b>006–007</b> | <b>3. Life cycle management</b>  |
| <b>008</b>     | <b>4. The retrofit concept</b>   |
| <b>009</b>     | <b>5. Enhance the performance and reliability of your installed base</b> |
| <b>010</b>     | <b>6. Retrofit value proposition</b>                                     |
| <b>011–014</b> | <b>7. Choose the best solution to renew your old installed base</b>      |
| <b>015–019</b> | <b>8. Available roll-in retrofit solutions</b>                           |
| <b>020</b>     | <b>11. General remarks</b>   |



# 1. Abbreviations and definitions

|                       |   |
|-----------------------|---|
| <b>/CS</b>            | Retrofit screw type with insertion and extraction through a rotative handle |
| <b>CB</b>             | Circuit Breaker   |
| <b>ELSE</b>           | Electrification Service   |
| <b>LCM</b>            | Life Cycle Management   |
| <b>M&amp;D</b>        | Monitor and Diagnostics   |
| <b>In</b>             | Nominal current according to IEC 62271-200                                  |
| <b>Isc</b>            | Short circuit current according to IEC 62271-200                            |
| <b>RiR</b>            | Roll-in Retrofit  |
| <b>Pitch distance</b> | Distance between two phases (central to lateral) in the circuit breaker     |
| <b>Vn</b>             | 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 proactively 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 retrofit
- Relay Retrofit Program
- Circuit breaker remote racking systems
  - TruckMaster
  - Motorized circuit breaker truck
- Arc flash protection upgrades
- End of life services
- Replacement



### Technical support and repairs

- Remote Assistance for electrical systems
  - RAISE
- Collaborative Operations for electrical systems
  - CLOSER
- Onsite and factory repair and maintenance



### 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



### 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 protect 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.

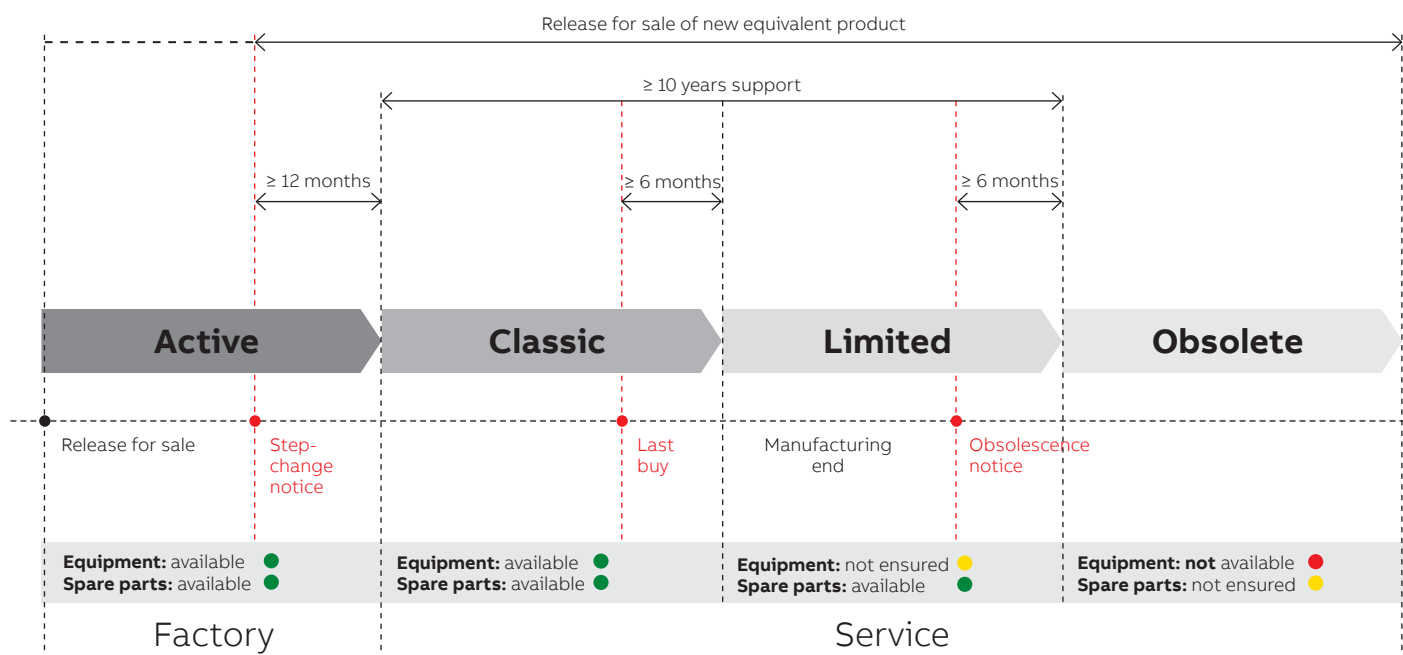




ABB services are at your disposal for making the best use of ABB assets at every life cycle stage.

#### 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.

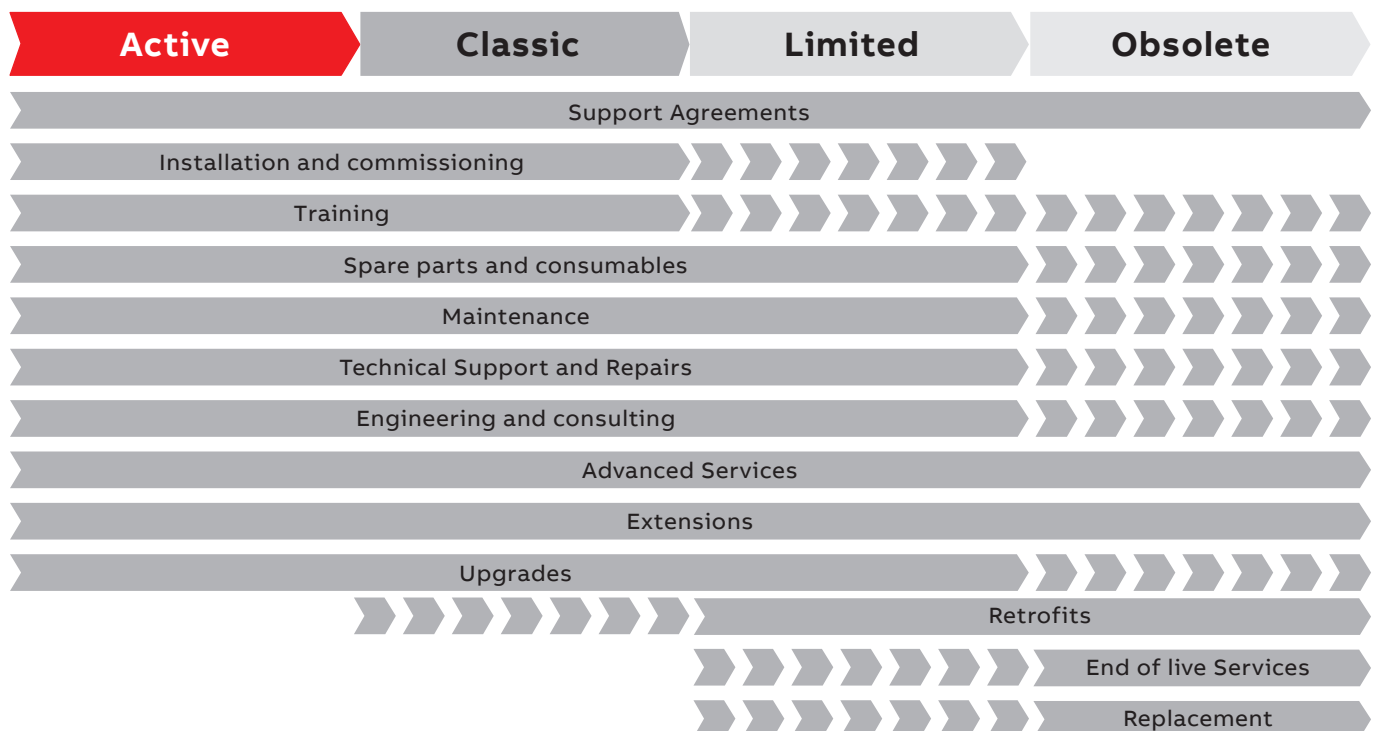
#### Limited

- 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 retrofit kits, which are specifically designed by ABB ELSE team in GERMANY 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 (\*) 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.

(\*) 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.

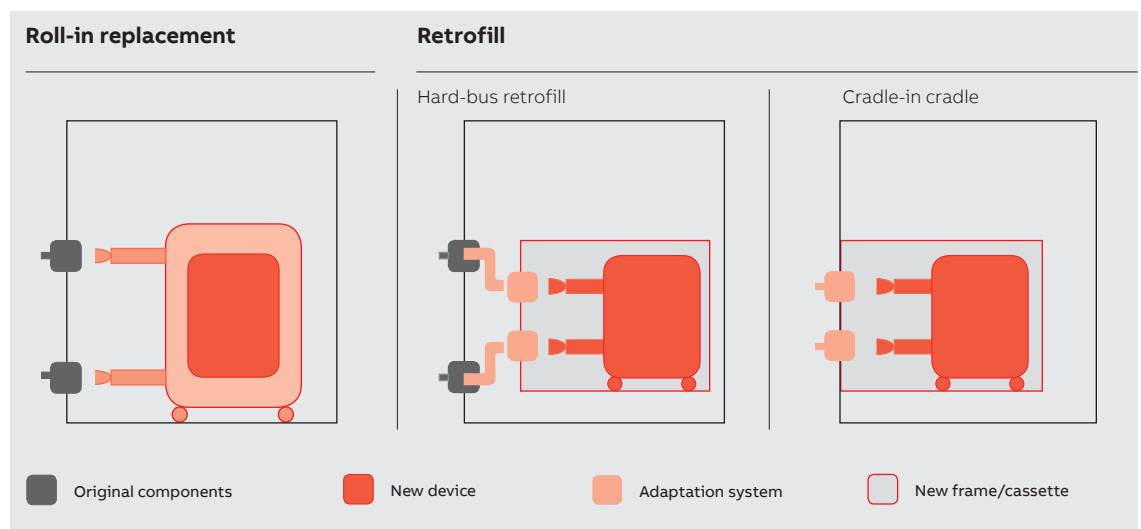
### Characteristics of the different technical solutions for retrofit

#### 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 Retrofit - 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

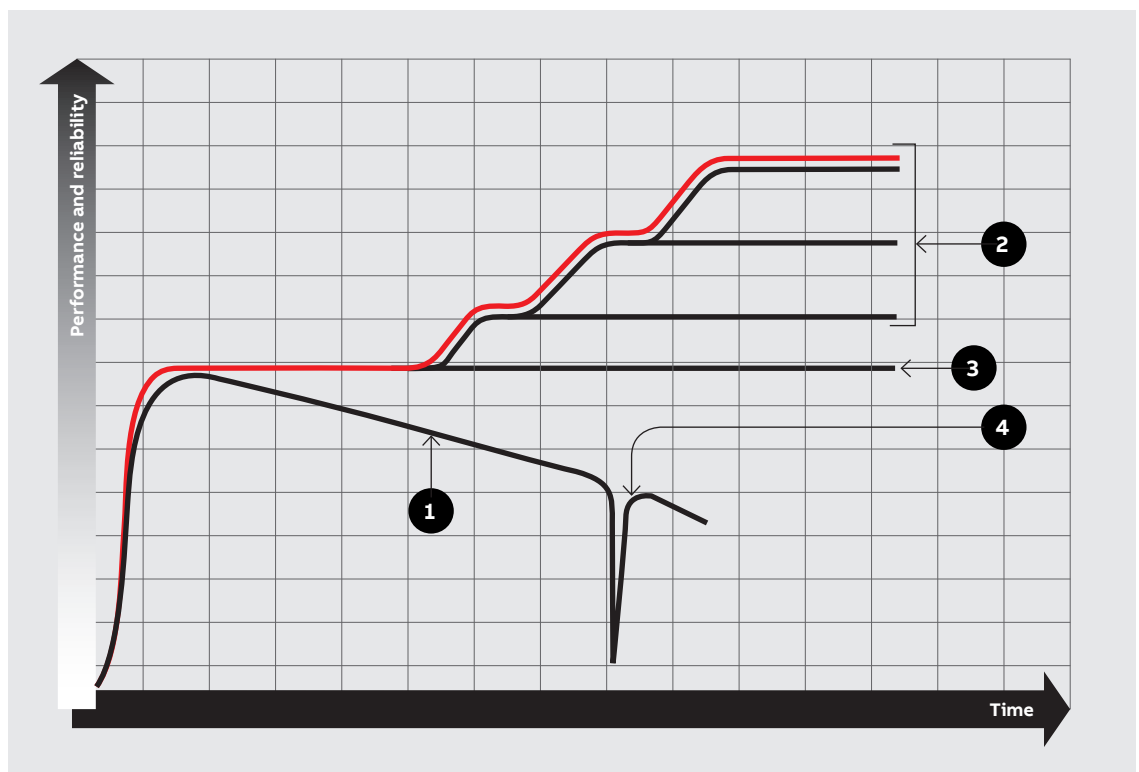
ABB is offering a full range of solutions to keep your installed base up and running during its entire life cycle.

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

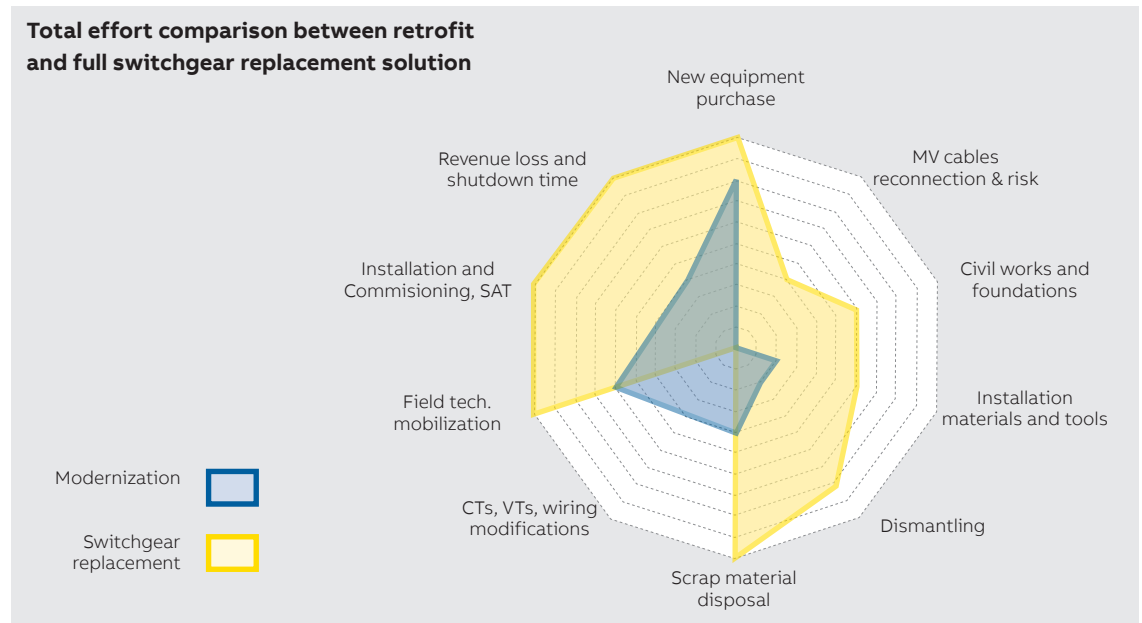
Based on long-time experience and know-how, ABB developed roll-in retrofit and Retrofill solutions specifically tailored to most limited and obsolete medium voltage circuit breakers that were produced by ABB and other manufacturers. This provides the opportunity to eliminate outdated technology like 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

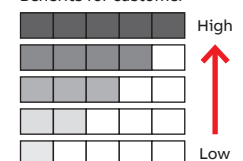
The evaluation of the best solution must consider

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  |
|------------------------------------|---|--|---|---|--|
| <b>Existing Obsolete CBs</b>       | ~80% of all electrical accidents are caused by arc flash due to wrong operations, interlock failures, degradation of the insulation 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 generally performed in front of the switchgear   | It's common in old switchgear that interlocks and shutter system fails   |
| <b>Roll-in Retrofit (RiR)</b>      | 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 recommended 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 original Internal arc protection. ABB can propose different solution to reduce the effect and duration of an internal arc (e.g. UFES solution)   | RiR includes the option to motorize the rack-in/out (motor on truck or TruckMaster®), to operate the CBs from safety distance and in some application to change the racking in/out system (e.g. with rotative handle)         | The reliability of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotely 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 recommended during installation and commissioning to check the interlocks and shutter system in order to reduce the risk of failure |
| <b>Onefit Retrofill</b>            | 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 original 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 duration 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 rack-in/out (motor on truck or TruckMaster®) | The reliability of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotely the opening and closing system using ArcSwitch® | The interlocks and shutter system will be replaced, the new ones are according to last international standard  |
| <b>Switchgear full replacement</b> | The risk of internal arc in new equipment is lower than old one. It's recommended to perform a training on how to operate the switchgear to avoid wrong actions that can cause internal arc. ABB can propose solution to monitor the partial discharge that could cause and Internal arc (Swicom and PD-Com solution) | New switchgear is generally tested against internal arc. ABB can propose different solution to reduce the effect and duration 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 rack-in/out (motor on truck or TruckMaster®) | The reliability of the opening and closing operation in new mechanism of RiR is very high, it's also possible to operate remotely the opening and closing system using ArcSwitch® | The interlocks and shutter system will be replaced, the new ones are according to last international standard  |

Benefits for customer

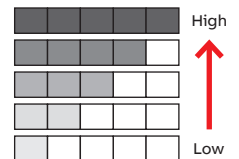


## 7. Choose the best solution to renew your old installed base

### Economic benefits

|                                    | OPEX   | CAPEX   | Unforeseen costs during installation & commissioning   | Unforeseen costs during operation  | Installation and commissioning time  |
|------------------------------------|--|---|--|--|--|
| <b>Existing Obsolete product</b>   | High opex cost to perform 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.)  | -  |
| <b>Roll-in Retrofit (RiR)</b>      | 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 obsolete 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 replacement can plan according to planned shut-down 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 maintenance 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.   |
| <b>Onefit Retrofit</b>             | 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 obsolete 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 replacement can plan according to planned shut-down 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 maintenance 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 | Average installation & commissioning time 6-8h per unit with only half-busbar out of service.  |
| <b>Switchgear full replacement</b> | 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 obsolete 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 maintenance 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.  | 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. |

Benefits for customer



## Environmental benefits

|                                  | Equipment disposal / Circular economy  | Materials disposal during normal operation   | Dangerous materials  | Failure risks with environmental impact   | Risk of Fire   |
|----------------------------------|--|--|--|---|--|
| <b>Existing Obsolete product</b> | 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 environmental 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 insulation materials, or due to wrong operations with consequence of an internal arc |
| <b>Roll-in Retrofit (RiR)</b>    | No materials disposal, only the existing CBs if no longer usable.<br>The switchgear frame will remain with a reduction of waste in the average of 60% to 70% compared 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 Vacuum CBs                                 | New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure.<br>It is possible to use Vacuum 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 discharge, temperature monitoring and Asset manager solutions)                                   | Very low risk for the new CBs  |
| <b>Onefit Retrofit</b>           | 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 average of 50% to 60% compared 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 Vacuum CBs                                 | New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure.<br>It is possible to use Vacuum 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 discharge, temperature monitoring and Asset manager solutions) | Very low risk for the new CBs and CBs's enclosure  |
| <b>Full replacement</b>          | 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 Vacuum CBs                                 | New CBs are sealed for life with no leakage during standard operation and very low risk of leakage in case of failure.<br>It is possible to use Vacuum 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 discharge, temperature monitoring and Asset manager solutions)                            | Very low risk for the new Switchgear   |

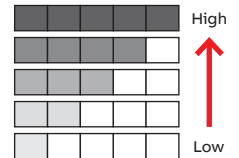


## 7. Choose the best solution to renew your old installed base

### Technical benefits

|                                    | International Standard  | Standardization of the installed base   | Operating sequence   | Digitalization and new functionalities   | Availability of spare parts  |
|------------------------------------|---|---|--|--|--|
| <b>Existing Obsolete product</b>   | According to old standard   | 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 obsolete system   | For Obsolete products the spare parts are not guaranteed                 |
| <b>Roll-in Retrofit (RiR)</b>      | The retrofit CBs is tested according to the latest IEC (or ANSI) standard : IEC 62271-100, IEC 62271-200<br>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 of 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                        |
| <b>Onefit Retrofill</b>            | The retrofit CBs and the enclosure (onefit) is tested according to the latest IEC (or ANSI) standard : IEC 62271-100, IEC 62271-200<br>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 interchangeable 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) |
| <b>Switchgear full replacement</b> | 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                 |

Benefits for customer





## 8. Available roll-in retrofit solutions

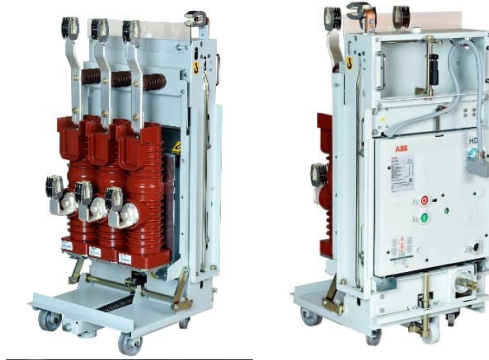
### 8.1 ASEA HKK in VHD/VHE panels

| Id    | Extng 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 |
|-------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-1  | HKK            | 12      | 800    | 12       | 210        | VHD-12            | VD4        | VD4 fixed    | 12.08.16              | GCER007760R0101         |
| DE-2  | HKK            | 12      | 1250   | 12       | 210        | VHD-12            | VD4        | VD4 fixed    | 12.12.16              | GCER007760R0101         |
| DE-3  | HKK            | 12      | 1250   | 12       | 210        | VHD-12            | VD4        | VD4 fixed    | 12.12.25              | GCER007760R0105         |
| DE-4  | HKK            | 12      | 1250   | 12       | 210        | VHD-12            | VD4        | VD4 fixed    | 12.12.40              | GCER007760R0109         |
| DE-5  | HKK            | 12      | 1600   | 12       | 210        | VHD-12            | VD4        | VD4 fixed    | 12.16.40              | GCER007760R0109         |
| DE-6  | HKK            | 12      | 1250   | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.12.40              | GCER007760R0102         |
| DE-7  | HKK            | 12      | 1600   | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.16.40              | GCER007760R0102         |
| DE-8  | HKK            | 12      | 1250   | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.12.25              | GCER007760R0106         |
| DE-9  | HKK            | 12      | 800    | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.08.16              | GCER007760R0107         |
| DE-10 | HKK            | 12      | 3150   | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.31.40              | GCER007760R0110         |
| DE-11 | HKK            | 12      | 2500   | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.25.40              | GCER007760R0111         |
| DE-12 | HKK            | 12      | 3150   | 12       | 210        | VHE-12            | VD4        | VD4 fixed    | 12.31.40              | GCER007760R0121         |
| DE-13 | HKK            | 24      | 1250   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.12.25              | GCER007760R0103         |
| DE-14 | HKK            | 24      | 800    | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.08.16              | GCER007760R0104         |
| DE-15 | HKK            | 24      | 1250   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.12.16              | GCER007760R0104         |
| DE-16 | HKK            | 24      | 2500   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.25.25              | GCER007760R0112         |
| DE-17 | HKK            | 24      | 1250   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.12.25              | GCER007760R0123         |
| DE-18 | HKK            | 24      | 1250   | 24       | 275        | VHD-24            | VM1        | VM1 fixed    | 24.12.25              | GCER007760R0143         |
| DE-19 | HKK            | 24      | 2500   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.25.25              | GCER007760R0118         |
| DE-20 | HKK            | 24      | 1250   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.12.25              | GCER007760R0119         |
| DE-21 | HKK            | 24      | 3150   | 24       | 275        | VHD-24            | VD4        | VD4 fixed    | 24.31.25              | GCER007760R0120         |
| DE-22 | HKK            | 24      | 1250   | 24       | 210        | VHD-24            | VD4        | VD4 fixed    | 24.12.31              | GCER007760R0108         |



## 8.2 ASEA HKK in DELTA panels

| Id    | Extng 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 |
|-------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-23 | HKK            | 12      | 1250   | 12       | 155        | Delta             | VD4        | VD4 fixed    | 12.12.25              | GCER022000R0101         |
| DE-24 | HKK            | 12      | 2500   | 12       | 160/185    | Delta             | VD4        | VD4 fixed    | 12.31.25              | GCER022000R0102         |
| DE-25 | HKK            | 12      | 1250   | 12       | 180        | Delta             | VD4        | VD4 fixed    | 12.12.25              | GCER022000R0103         |
| DE-26 | HKK            | 12      | 630    | 12       | 150        | Delta             | HD4        | HD4 fixed    | 12.06.25              | GCER022000R0104         |



## 8.3 Calor Emag OD3/OD4 panels

| Id    | Extng 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 |
|-------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-27 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-28 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-29 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-30 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-31 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-32 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-33 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-34 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-35 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-36 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-37 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-38 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-39 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-40 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-41 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-42 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-43 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-44 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-45 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-46 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-47 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-48 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-49 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-50 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8000715M0101         |
| DE-51 | OD3 / OD4      | 12      | 630    | 12       | 210        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8000796R0101         |
| DE-52 | OD3 / OD4      | 12      | 1250   | 12       | 210        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8000796R0101         |
| DE-53 | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE7               | VD4        | VD4 fixed    |                       | GCE8001576M0101         |

## 8. Available roll-in retrofit solutions

### 8.3 Calor Emag OD3/OD4 panels

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-54  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE7               | VD4        | VD4 fixed    |                       | GCE8001576M0101         |
| DE-55  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE7               | VD4        | VD4 fixed    |                       | GCE8001576M0101         |
| DE-56  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE7               | VD4        | VD4 fixed    |                       | GCE8001576M0101         |
| DE-57  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE7               | VD4        | VD4 fixed    |                       | GCE8001576M0101         |
| DE-58  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE7               | VD4        | VD4 fixed    |                       | GCE8001576M0101         |
| DE-59  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE8               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-60  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE8               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-61  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE8               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-62  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE8               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-63  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE8               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-64  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE8               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-65  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-66  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-67  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-68  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-69  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-70  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-71  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-72  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-73  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-74  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-75  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-76  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-77  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-78  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-79  | OD3 / OD4      | 24      | 630    | 24       | 210        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-80  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-81  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-82  | OD3 / OD4      | 24      | 1250   | 24       | 210        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001576R0102         |
| DE-83  | OD3 / OD4      | 17      | 630    | 17       | 150        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-84  | OD3 / OD4      | 17      | 630    | 17       | 150        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-85  | OD3 / OD4      | 17      | 630    | 17       | 150        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-86  | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-87  | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-88  | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-89  | OD3 / OD4      | 17      | 630    | 17       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-90  | OD3 / OD4      | 17      | 630    | 17       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-91  | OD3 / OD4      | 17      | 630    | 17       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-92  | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-93  | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-94  | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZE4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-95  | OD3 / OD4      | 12      | 1600   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-96  | OD3 / OD4      | 12      | 1600   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-97  | OD3 / OD4      | 12      | 1600   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-98  | OD3 / OD4      | 12      | 2000   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-99  | OD3 / OD4      | 12      | 2000   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-100 | OD3 / OD4      | 12      | 2000   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-101 | OD3 / OD4      | 12      | 2500   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-102 | OD3 / OD4      | 12      | 2500   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-103 | OD3 / OD4      | 12      | 2500   | 12       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |
| DE-104 | OD3 / OD4      | 17      | 1600   | 17       | 210        | ZE3               | VD4        | VD4 fixed    |                       | GCE8001897M0101         |

## 8.3 Calor Emag OD3/OD4 panels

| Id     | Extng CBs Type | Vn<br>[kV] | In<br>[A] | Isc<br>[kA] | Pitch<br>[mm] | Panel<br>application | RiR<br>family | RiR CBs<br>type | Rating code<br>Vn In Isc | RiR dimensional drawing |
|--------|----------------|------------|-----------|-------------|---------------|----------------------|---------------|-----------------|--------------------------|-------------------------|
| DE-105 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZE3                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-106 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZE3                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-107 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZE3                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-108 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZE3                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-109 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZE3                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-110 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-111 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-112 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-113 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-114 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-115 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-116 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-117 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-118 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-119 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-120 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-121 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-122 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-123 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-124 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-125 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZE4                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-126 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-127 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-128 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-129 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-130 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-131 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-132 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-133 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-134 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-135 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-136 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-137 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-138 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-139 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-140 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZP1                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-141 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-142 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-143 | OD3 / OD4      | 12         | 1600      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-144 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-145 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-146 | OD3 / OD4      | 12         | 2000      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-147 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-148 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-149 | OD3 / OD4      | 12         | 2500      | 12          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-150 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-151 | OD3 / OD4      | 17         | 1600      | 17          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-152 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-153 | OD3 / OD4      | 17         | 2000      | 17          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-154 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-155 | OD3 / OD4      | 17         | 2500      | 17          | 210           | ZP2                  | VD4           | VD4 fixed       |                          | GCE8001897M0101         |
| DE-156 | OD3 / OD4      | 12         | 630       | 12          | 150           | ZE4.3                | VD4           | VD4 fixed       |                          | GCE8001961M0101         |



## 8. Available roll-in retrofit solutions

### 8.3 Calor Emag OD3/OD4 panels

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-157 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-158 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-159 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-160 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-161 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-162 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-163 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZE4.3             | VD4        | VD4 fixed    |                       | GCE8001961M0101         |
| DE-164 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZR2               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-165 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZR2               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-166 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZR2               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-167 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZR2               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-168 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZR2               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-169 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZR2               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-170 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZR3               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-171 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZR3               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-172 | OD3 / OD4      | 12      | 630    | 12       | 150        | ZR3               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-173 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZR3               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-174 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZR3               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-175 | OD3 / OD4      | 12      | 1250   | 12       | 150        | ZR3               | VD4        | VD4 fixed    |                       | GCE8002621M0101         |
| DE-176 | OD3 / OD4      | 36      | 1250   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0101         |
| DE-177 | OD3 / OD4      | 36      | 1250   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0101         |
| DE-178 | OD3 / OD4      | 36      | 1600   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0102         |
| DE-179 | OD3 / OD4      | 36      | 1600   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0102         |
| DE-180 | OD3 / OD4      | 36      | 2000   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0103         |
| DE-181 | OD3 / OD4      | 36      | 2000   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0103         |
| DE-182 | OD3 / OD4      | 36      | 2500   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0103         |
| DE-183 | OD3 / OD4      | 36      | 2500   | 36       | 360        | ZE4               | VD4        | VD4 fixed    |                       | GCER010120R0103         |
| DE-184 | OD3 / OD4      | 36      | 1250   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0104         |
| DE-185 | OD3 / OD4      | 36      | 1250   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0104         |
| DE-186 | OD3 / OD4      | 36      | 1600   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0105         |
| DE-187 | OD3 / OD4      | 36      | 1600   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0105         |
| DE-188 | OD3 / OD4      | 36      | 2000   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0106         |
| DE-189 | OD3 / OD4      | 36      | 2000   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0106         |
| DE-190 | OD3 / OD4      | 36      | 2500   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0106         |
| DE-191 | OD3 / OD4      | 36      | 2500   | 36       | 360        | ZW4               | VD4        | VD4 fixed    |                       | GCER010120R0106         |
| DE-192 | OD3 / OD4      | 36      | 1250   | 36       | 360        | ZE8               | VD4        | VD4 fixed    |                       | GCER010120R0107         |
| DE-193 | OD3 / OD4      | 36      | 1600   | 36       | 360        | ZE8               | VD4        | VD4 fixed    |                       | GCER010120R0108         |
| DE-194 | OD3 / OD4      | 36      | 2000   | 36       | 360        | ZE8               | VD4        | VD4 fixed    |                       | GCER010120R0109         |
| DE-195 | OD3 / OD4      | 36      | 1250   | 36       | 360        | ZE10.2            | VD4        | VD4 fixed    |                       | GCER010120R0110         |
| DE-196 | OD3 / OD4      | 36      | 16000  | 36       | 360        | ZE10.2            | VD4        | VD4 fixed    |                       | GCER010120R0111         |
| DE-197 | OD3 / OD4      | 36      | 2000   | 36       | 360        | ZE10.2            | VD4        | VD4 fixed    |                       | GCER010120R0112         |
| DE-198 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZP1               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-199 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZP1               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-200 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZP1               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-201 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZP1               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-202 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZP1               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-203 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZP1               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-204 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-205 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-206 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-207 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-208 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |

### 8.3 Calor Emag OD3/OD4 panels

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-209 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZP2               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-210 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZW3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-211 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZW3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-212 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZW3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-213 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZW3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-214 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZW3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-215 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZW3               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-216 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-217 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-218 | OD3 / OD4      | 17      | 630    | 17       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-219 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-220 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |
| DE-221 | OD3 / OD4      | 17      | 1250   | 17       | 150        | ZW4               | VD4        | VD4 fixed    |                       | GCE8001731M0101         |



### 8.5 BBC SBKJ in BA1/2 pan

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-222 | SBKJ           | 12      | 630    | 12       | 150        | BA1/2             | VD4 EL     | VD4 EL fixed | 12.06.16              | GCER020200R0101         |
| DE-223 | SBKJ           | 12      | 1250   | 12       |            | BA1/2             | VD4 EL     | VD4 EL fixed | 12.12.31              | GCER020200R0102         |
| DE-224 | SBKJ           | 12      | 2000   | 12       |            | BA1/2             | VD4 EL     | VD4 EL fixed | 12.20.31              | GCER020200R0103         |
| DE-225 | SBKJ           | 12      | 4000   | 12       | 275        | BA1/2             | VD4 EL     | VD4 EL fixed | 12.40.25              | GCER020200R0104         |
| DE-226 | SBKJ           | 12      | 1600   | 12       | 210        | BA1/2             | VD4 EL     | VD4 EL fixed | 12.16.31              | GCER020200R0105         |
| DE-227 | SBKJ           | 12      | 1600   | 12       |            | BA1/2             | VD4 EL     | VD4 EL fixed | 12.16.40              | GCER020200R0106         |
| DE-228 | SBKJ           | 12      | 1250   | 12       | P150       | BA1/2             | VD4 EL     | VD4 EL fixed | 12.12.40              | GCER026100R0101         |



## 8. Available roll-in retrofit solutions

### 8.6 BBC HB/HC/OD/BA/BD in BAX panels

| 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 |
|--------|-----------------|---------|--------|----------|------------|-------------------|-----------------------|-----------------------------|-----------------------|-------------------------|
| DE-229 | HB              | 17      | 1250   | 17       | 210        | BAL               | VD4 EL                | VD4 EL fixed                | 17.12.25              | GCER026293R0101         |
| DE-230 | HC              | 17      | 2500   | 17       | 275        | BAL               | VD4 EL                | VD4 EL fixed                | 17.25.25              | GCER026293R0102         |
| DE-231 | HB              | 17      | 1250   | 17       | 230        | BA2D              | VD4 EL                | VD4 EL fixed                | 17.12.25              | GCER026332R0101         |
| DE-232 | HB              | 17      | 2500   | 17       | 230        | BA2D              | VD4 EL                | VD4 EL fixed                | 17.25.25              | GCER026332R0102         |
| DE-233 | HB              | 17      | 1250   | 17       | 230        | BA2D              | VD4 EL                | VD4 EL fixed                | 17.12.25              | GCER026332R0103         |
| DE-234 | HB/HC/OD        | 12      | 1250   | 12       | 200        | BA1               | VD4 EL                | VD4 EL fixed                | 12.12.31              | GCER020000R1105         |
| DE-235 | HB/HC/OD        | 12      | 1250   | 12       | 200        | BA1               | VD4 EL                | VD4 EL fixed                | 12.12.31              | GCER020000R1106         |
| DE-236 | HB/HC/OD        | 12      | 2500   | 12       | 275        | BA1               | VD4 EL                | VD4 EL fixed                | 12.25.31              | GCER020000R1108         |
| DE-237 | HB/HC/OD        | 12      | 3150   | 12       | 275        | BA1               | VD4 EL                | VD4 EL fixed                | 12.31.40              | GCER020000R1102         |
| DE-238 | HB/HC/OD        | 12      | 1600   | 12       | 275        | BA1               | VD4 EL                | VD4 EL fixed                | 12.16.32              | GCER020000R1109         |
| DE-239 | BA-BD           | 12      | 1250   | 12       | 200        | BA/BD             | VD4 EL                | VD4 EL fixed                | 12.12.32              | GCER007500R0103         |
| DE-240 | HB/HC/OD        | 17      | 1250   | 17       | 210        | BAX               | VD4 EL                | VD4 EL fixed                | 17.12.25              | GCER007150R0111         |
| DE-241 | HB/HC/OD        | 17      | 2500   | 17       | 275        | BAX               | VD4 EL                | VD4 EL fixed                | 17.25.25              | GCER007150R0112         |
| DE-242 | HB/HC/OD        | 17      | 3100   | 17       | 275        | BAX               | VD4 EL                | VD4 EL fixed                | 17.31.25              | GCER007150R0114         |
| DE-243 | HB/HC/OD        | 12      | 630    | 12       | 150        | BAL               | VD4 EL                | VD4 EL fixed                | 12.06.25              | GCER021000R0101         |
| DE-244 | HB/HC/OD        | 12      | 1250   | 12       | 150        | BAL               | VD4 EL                | VD4 EL fixed                | 12.12.25              | GCER021000R0103         |
| DE-245 | HB/HC/OD        | 12      | 1600   | 12       | 210        | BAL               | VD4 EL                | VD4 EL fixed                | 12.16.26              | GCER021000R0104         |
| DE-246 | HB/HC/OD        | 24      | 630    | 24       | 210        | BAL               | VD4 EL                | VD4 EL fixed                | 24.06.25              | GCER021000R0106         |
| DE-247 | HB/HC/OD        | 12      | 1250   | 12       | 150        | BADR              | VD4 EL                | VD4 EL fixed                | 12.12.32              | GCER026331R0101         |
| DE-248 | HB/HC/OD        | 17      | 1250   | 17       | 230        | BA2D              | VD4 EL                | VD4 EL fixed                | 17.12.25              | GCER026332R0101         |
| DE-249 | HB/HC/OD        | 17      | 2500   | 17       | 230        | BA2D              | VD4 EL                | VD4 EL fixed                | 17.25.25              | GCER026332R0102         |
| DE-250 | Univer-II       | 12      | 630    | 12       | 150        | BA                | VD4                   | VD4 fixed                   | 12.06.20              | GCER026294R0101         |
| DE-251 | Univer G        | 12      | 630    | 12       | 150        | BA                | VD4                   | VD4 fixed                   | 12.06.25              | GCER026333R0101         |
| DE-252 | DBH10           | 12      | 1250   | 12       | P180       | DB                | VD4 EL (aufgespreizt) | VD4 EL (aufgespreizt) fixed | 12.12.32              | GCER029000R0101         |



## 8.7 VEM SCI in CSI-CSIM panel

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-253 | SCI            | 24      | 630    | 24       | 275        | CSI-CSIM          | VD4        | VD4 fixed    | 24.06.16              |                         |
| DE-254 | SCI            | 12      | 630    | 12       | 210        | CSI               | VD4        | VD4 fixed    | 12.06.20              |                         |
| DE-255 | SCI            | 24      | 1250   | 24       | 275        | CSI-CSIM          | VD4        | VD4 fixed    | 24.12.25              |                         |



## 8.8 VZ1 in Ritter GT1 panels

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-267 | VZ1            | 12      | 630    | 12       | P150       | Ritter GT1        | VD4        | VD4 fixed    | 12.06.20              | GCER026849R0101         |



## 8.9 AEG MC 506/12-2 in RMB 6/12 panels

| Id     | Extng 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 |
|--------|----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-271 | MC 506/12-2    | 12      | 630    | 12       | 210        | RMB 6/12          | VD4        | VD4 fixed    | 12.06.25              | GCER026006R0101         |

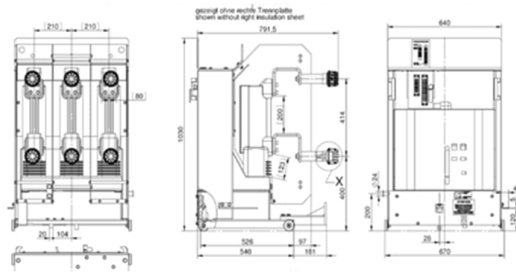




## 8. Available roll-in retrofit solutions

## 8.10 Hitachi MGH in HSI0SG panels

| Id     | Exting CBs Type | Vn [kV] | In [A] | Isc [kA] | Pitch [mm] | Panel application | RfR family | RfR CBs type | Rating code |        | RfR dimensional drawing |
|--------|-----------------|---------|--------|----------|------------|-------------------|------------|--------------|-------------|--------|-------------------------|
|        |                 |         |        |          |            |                   |            |              | Vn          | In Isc |                         |
| DE-275 | MGH-10F-25      | 12      | 630    | 12       | 220        | HSI0SG            | VD4        | VD4 fixed    | 12.06.31    |        | GCER010010R0101         |
| DE-276 | MGH-10L-25      | 12      | 1250   | 12       | 220        | HSI0SG            | VD4        | VD4 fixed    | 12.12.31    |        | GCER010010R0102         |
| DE-277 | MGH-10T-25      | 12      | 1600   | 12       | 220        | HSI0SG            | VD4        | VD4 fixed    | 12.16.31    |        | GCER010010R0103         |
| DE-278 | MGH             | 17      | 2000   | 17       | 210        | HSI0SG            | VD4        | VD4 fixed    | 17.20.31    |        | GCER010010R0107         |



#### 8.4 Siemens 8BC in H515 panels

| 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 |
|--------|-----------------|---------|--------|----------|------------|-------------------|------------|--------------|-----------------------|-------------------------|
| DE-281 | 8BC             | 12      | 1250   | 12       | 0          | H515              | VD4        | VD4 fixed    | 12.12.31              | GCER009010R0102         |
| DE-282 | 8BC             | 17      | 630    | 17       | 0          | H515              | VD4        | VD4 fixed    | 17.06.25              | GCER009010R0110         |







---

More product information:

[abb.com/mediumvoltage](http://abb.com/mediumvoltage)

Your contact center:

[abb.com/contactcenters](http://abb.com/contactcenters)

More service information:

[abb.com/service](http://abb.com/service)