

PRODUCT CATALOG

UniPack-G

Eco-friendly compact secondary substation for harsh environments



The UniPack-G provides the strength and durability of a concrete compact secondary substation (CSS) with the lightweight characteristics of steel.

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UniPack-G values



High safety

Internal arc fault tested
Fire retardant enclosure



Reliability

Corrosion resistant enclosure material using UniPack-G



Long lifetime of internal components with minimal maintenance

Thermal characteristics of enclosure



Easy and fast installation, commissioning and relocation

Lightweight product allows for faster installation



Low cost of ownership

Low maintenance cycle costs



High safety

Internal arc tested per IEC62271-202

- Highest safety in the CSS industry, both for general public and operator
- Arc-tested and low flammability in one material
- Internal arc safety is verified by the type tests per IEC62271-202 with RMU integrated inside CSS

Non-flammable

- Self-extinguishing
- Non-flammable (V0 according to UL94)
- Fire resistant for more than 60 mins, according to ISO834
- Protects equipment and investment over product life cycle

Reliable and proven compartmented design

- CSS is divided in compartments based on the equipment and layout
- Walk-in CSS may have one common MV and LV compartment
- Compartments secure safe access to equipment during operation

Non-toxic housing material

- Enclosure material does not generate harmful gases



Reliability

Mechanically robust

- Maintains mechanical characteristics of concrete CSS in windy conditions
- Robust GRP profile does not bend or deform
- Best external object impact protection
- Any damage on one enclosure module will not be carried over to the next
- Protection against vandalism
- All fastening is located inside the housing
- 2 point locking system as standard, 3 point locking under request
- Padlock is protected by additional cover
- Anti-graffiti coating as an option

Suitable to locations with harsh environments

- UniPack-G can be installed in harsh environments (salty, humid, very high/low temperatures), such as:
- Harbors and close to sea line, aggressive environment like chemical plants, isolated wind farms in cold weather, and isolated solar fields in the desert
- No cracks or weathering
- Degradation of the material due to UV influence will not happen because: UV inhibitor and a protective coating used as standard, and all fastening is done in the inner part not affected by solar radiation
- No water penetration and further oxidation of the metal reinforcement since there is no metal that exists within GRP
- GRP with a high strength-weight ratio and with a degree of flexibility

Self supporting structure

- No need for metal support frame or separate carrying structure
- Therefore, no threat that corrosion will reduce the strength over life cycle

GRP patented profile for full enclosure

- Rust proof housing material
- Patented GRP design provides high longitudinal and transversal strength
- Design applied in full enclosure including doors and ventilation grilles
- UniPack-G performs equal to C5M as for structured steel according to ISO 12944-6
- All external metal parts are stainless steel or hot dip galvanized
- Strength and durability applied also on doors and ventilation grilles
- Rust proof and durable GRP design without compromise



Long lifetime of internal components with minimal maintenance

Low risk of condensation

- Patented GRP design with improved thermal insulation
- Low thermal conductivity of GRP profile
- UniPack-G does not save thermal energy in the walls or roof
- Inner surface temperature of enclosure typically does not drop below the dew point of inner air

Good thermal insulation from the sun's radiation

- UniPack-G patented design provides thermal insulation from the sun's radiation
- UniPack-G has lower temperature in the inner side of the substation wall, whereas steel CSS has no insulation effect
- UniPack-G extends the lifetime of the internal components

Good thermal insulation from cold environments

- UniPack-G's patented design provides thermal insulation for sensitive equipment from the cold climate
- As seen in the figure, UniPack-G maintains higher temperature in the cold climate, where steel CSS has no insulation effect
- UniPack-G extends the lifetime of the internal components

Optimized ventilation

- Different transformer ventilation performance available suitable for different environment and application of CSS
- Ventilation performance is proved by the type tests
- Controlled transformer lifetime as per applicable standard



Easy and fast installation, commissioning and relocation

Lightweight

- Lightweight as steel CSS
- Enclosure weight is up to 4 times lighter than concrete CSS
- More stations can be transported on a single truck compared to concrete CSS
- Lower handling equipment requirements
- Easier and safer handling and won't lead to cracks as what typically happens with concrete CSS

Faster installation

- Lower handling equipment requirements
- Less work at site base preparation
- Can be moved with transformer inside

Perfect solution for remote locations and/or with difficult access



Low cost of ownership

Low transportation and installation cost

- Reduced cost on renting heavy crane
- Reduced costs related to site civil works

No additional cost related to repair during lifetime

- Robust as concrete CSS
- Full enclosure is made of rust proof material
- UV and humidity tested
- Material withstands freezing cycles
- No cracks during handling and lifting

Low maintenance cycle costs

- Repainting not normally required compared to steel CSS
- Any dirt can simply be washed or wiped off

Applications



Renewables and distributed generation

Growth of renewables with distributed generation and increased expectations on operational efficiency, and energy management, are driving the evolution of the distribution grid. UniPack-G is a weather-proof compact secondary substation (CSS) for harsh environments with a modular design to offer any layout for equipment and application requirements.



Industry

Reliable supply, improved operation efficiency and power quality are the main criterias on power supply for industries. Businesses are required to increase operational efficiency with fewer available resources. ABB pre-fabricated substations can offer greater control over energy costs and a reliable energy supply with low environmental impact. Companies can reduce delivery time, on-site resources, risk and associated costs by purchasing CSS units from a single vendor.

Utility

The existing grids are under pressure to deliver the growing demand for power, as well as provide a stable and sustainable supply of electricity through radial and ring connections with alternative supply routes. UniPack-G CSS offers a type-tested solution with remote monitoring and switching for equipment protection and selectivity in pre-designed packages to fulfill the needs in distribution networks.



Infrastructure

As the demand for safe and reliable electricity increases, ABB's infrastructure continues to evolve and innovate in order to accommodate such growth. Harnessing the power to control energy can enable current infrastructure to readily expand. UniPack-G can be delivered with wide variety of special equipment for railway, EV and e-Bus infrastructure.



CSS design evolution

The CSS market was created when distribution utilities started to transfer overhead power lines into underground cables. With cables underground, the traditional, large step-down substation (with its overhead lines) became impractical. Customers now required a compact piece of equipment that could be installed quickly with a minimum amount of site work, but still providing the same functionality as an overhead line substation. Substation enclosure design, layout, enclosure material and appearance have always been in constant development to provide continuous power in a safe and optimized way.

In urban networks, most of the compact substations are internally operated to allow service teams to operate and maintain CSS safely. In rural areas, most substations are externally serviced to minimize installation cost and footprint.

Driven by aesthetics and safety concerns regarding overhead lines, Europe was one of the first regions to embrace the practice of undergrounding cables and installing CSS units. These units can be built on-site with either brick or concrete. Concrete is weather-resistant but very heavy and difficult to work with. On-site construction labor costs can also be significant. However, if the unit is preassembled before shipment to site, the transportation and rigging costs can be excessive. Concrete CSS factories are located in many regions and close to customer sites in an effort to lower transportation costs. While this situation may have been acceptable years ago, it is now challenged by population growth and city expansions that force CSS installations further away from the CSS factory.

As underground cabling and urbanization continued, new, rural locations began to create challenges for heavy concrete CSS units. A lighter and cheaper solution was needed for this evolving CSS market. A steel enclosure was found to meet this demand. With the comparatively lighter weight of a steel CSS, transportation to rural locations was no longer as expensive and heavy on-site installation work was not required; steel provided the same functionality as concrete with much lower weight. This allowed CSS units to be transported and rigged without significantly im-

pacting budgets. However, while lighter than concrete, steel does not have the same strength and is more sensitive to ambient weather conditions. High levels of sunshine may increase the steel temperature to such an extent that a derated transformer has to be used, thus lowering the overall efficiency of the CSS. ABB recognized that customers needed a new CSS enclosure solution – one that combined the benefits of steel and concrete. Ideally, it would be robust enough to protect the equipment inside from the extremes of heat and cold, while being lightweight enough to be easily transported, even to remote locations. To fulfill this need, ABB developed a modular platform that encompasses the strength and durability of concrete with the lightweight characteristics of steel. The platform is suitable not only for housing the CSS, but also for housing a wide range of other electrical equipment. In addition, it is appropriate for cold, moderate and warm climates and for locations ranging from sea-spray-soaked coastlines to remote, heat-seared sandy deserts. This new product range is called UniPack-G, where G stands for glass reinforced polyester (GRP). GRP is a material used in many everyday applications, such as wind turbine blades, boats, civil construction, cable pillars and garden furniture, to name a few.





UniPack-G

GRP is designed to withstand the kinds of weather conditions often found in remote and harsh environments associated with renewable generation. As a UniPack-G CSS enclosure weighs far less than its equivalent in concrete or steel, transportation costs are also minimized while installation in remote locations is easier. And although lighter, GRP has greater durability than both concrete and steel. Since a CSS can be installed in publicly-accessible locations, the UniPack-G's inherent ability to withstand vandalism is important. Its durability also minimizes any chance for possible damages from transportation or shifting, which can occur with concrete. The UniPack-G design has been tested to the highest safety standards in the GB and IEC ranges for CSS applications. In addition, its standard design has passed the internal arc classification (IAC AB) test, which ensures it has the highest level of safety for the public and for operating personnel.

More rural and environmentally harsh locations are being supplied with electricity. Because the UniPack-G has the same robustness as a concrete CSS – with one-third of the weight – and on-site installation and material handling effort is minimal, it is ideally suited for this type of location. UniPack-G is easier to transport over longer distances and requires less lifting effort. This reduces the utility's reliance on local suppliers and allows it to depend on ABB, who can exploit and pass on the advantages that come with being a global supplier. Rural and environmentally harsh locations usually require low-maintenance equipment, such as the UniPack-G, because of remoteness and difficulty of access. In addition, the smarter networks now being installed around the globe can be controlled and monitored remotely, so CSS units are visited less often and this reinforces the requirement that equipment be as maintenance free as possible. The UniPack-G has an exterior that can withstand severe conditions better than a typical CSS enclosure, it is corrosion-resistant and never has to be repainted for corrosion protection. In addition, UniPack-G's GRP enclosure material does not dampen radio waves, so a communication antenna can be installed inside to reduce the risk of vandalism. These features all reduce the maintenance effort and cost for the utility.

Standards

Evolution of standards – from IEC 61330 to IEC 62271-202 ed.2

Before 1995, prefabricated CSS assemblies did not have to comply with international regulations as there was not a standard to reference. In 1995, in order to cover common needs in a variety of countries and to provide a tested level of safety for operators and general public, industry experts, researchers, consumers, and regulators in the CSS business constituted the first standard applicable to this kind of electrical equipment. The first standard for CSS in the International Electrotechnical Commission (IEC) can be found under the number IEC 1330 or IEC 61330.

The standard provided the ratings, defining the design and operation rules to ensure safety of personnel and continuity of operations, as well as the mandatory and optional type tests for verifying the ratings and prescribed routine or factory test to validate the product. This provided useful background information for users and manufacturers.

IEC 61330 was based on the IEC 298 (IEC 60298-200), which was meant for AC metal-enclosed switchgear. In this point, the CSS units could be designed, type- and routine-tested according to common definitions and procedures. This standard was applicable to prefabricated substations that were cable-connected, avoiding old designs connected by overhead power lines, making the substation safer for personnel. At this moment the standard covered CSS units with transformer ratings were not higher than 1600 kVA. This standard covered of internal arcs and the type testing procedures for this type of fault inside the switchgear. Therefore, the safety for both operators and public increased significantly.

In 2001 a unification of standards related to switchgear started within the IEC. All of the standards, dealing in one way or another with medium voltage switchgear, adopted the numbering IEC 62271 with the addition of the different parts depending on the components in fact. In 2006, the standard for prefabricated substations raised up as IEC 62271-202, which was based on the IEC 61330 and the IEC 62271-200.

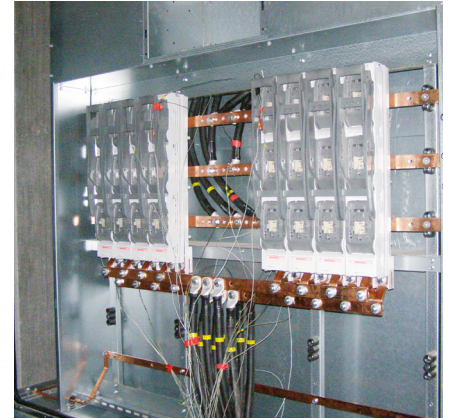
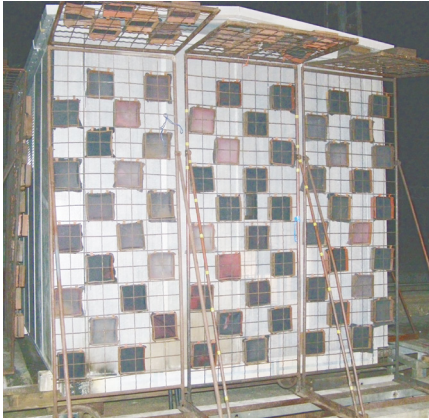
The IEC 62271-202 standard focuses on service conditions, rated characteristics, general structural requirements and test methods on MV/LV or LV/MV CSS units, which are cable-connected to the network and operated from both inside or outside. They are accessible to the general public and have a rated voltage above 1 kV and up to (and including) 52 kV at 50 to 60 Hz. The main purpose of the standard is to increase the general safety level. This is achieved when the CSS fulfills some specified characteristics and ratings, normally given by the network and proven by verified type- and routine test procedures for the assembly. Regarding the internal arc fault type test, it includes wording of PEHLA recommendations concerning internal arc fault testing on complete CSS, as laid down in IEC 62271-200.

In March 2014, a new edition of IEC 62271 was released with some modifications with respect to the edition 1. In the new edition (ed. 2), the temperature rise test methods have been updated, the assessment of electromagnetic fields considered, and optional type testing included. The influence of the product in the environment is now taken into consideration and the internal arc test requirements have been adapted to IEC 62271-200:2011. Requirements for the assessment of pressure relief volumes below the floor and ground have been assigned as well. This new edition of the standard makes a CSS safer for personnel ensuring a better lifetime of the equipment installed in it.

IEC 62271-202 ed.2

In the new edition of the standard, some changes affected the type testing because in this new version, they have been separated as mandatory type tests (which have to be performed always), mandatory type tests where applicable (which have to be performed if it is required by local or national regulations), or by customer with optional type tests (which have to be agreed upon by manufacturer and user).

It is also important to note that all the components installed within a CSS have to be previously type tested in accordance to their relevant standards.



These standards are the following:

- IEC 62271-1 as common specifications for high voltage switchgears
- IEC 62271-200 for AC metal-enclosed switchgears
- IEC 62271-201 for insulation-enclosed switchgears
- IEC 62271-202 high voltage, low voltage prefabricated substation
- IEC 60076 for power transformers
- IEC 61439 for low voltage switchgears

Other standards also have influence in the design of a CSS, which are:

- IEC/TR 62271-208 as a technical report for electromagnetic fields generated by a CSS
- IEC 60529 for the degree of protection provided by enclosures
- IEC 62262 for the degree of protection against external mechanical impact
- IEC 60721 for the classification of environmental conditions

Mandatory type tests

- Dielectric tests - These tests are needed to verify the creepage distances of the design ensuring that no flashover can occur between phases or between phases and earth
- Temperature rise test - The purpose of this test is to verify that the CSS design does not jeopardize the life expectancy of the components installed in the CSS such as the transformer, MV switchgear, LV switchboard and interconnections
- Short time and peak withstand current on main and earthing circuits - The aim of this test is to verify the capability of the CSS's interconnections and earthing circuit to withstand a short circuit
- Verification of the protection - The degree of protection provided by an enclosure can be seen from two different point of views. The first one is from the equipment point of view, in which the equipment is protected against foreign objects or water that might cause a fault. From the second perspective, personnel protection is provided since an enclosure for a CSS has to be protected against the access with a wire

to the live parts

- Calculations and mechanical test - Mechanical loads, such as snow, wind or impacts are tested
- Test to verify the auxiliary and control circuits - Functional tests, electric continuity and dielectric tests are performed

Mandatory type tests (where applicable)

- Internal arc fault tests (if IAC-classification is required) - These tests cover the cases of faults resulting in an arc occurring inside the CSS in the medium voltage switchgear and the medium voltage interconnections. This classification is intended to offer a tested level of protection in the event of an internal arc to personnel operating the substation in normal operating conditions and with its medium voltage switchgear and control gear in a normal service position, as defined in the relevant standard (Class IAC-A) and to persons in the vicinity of the substation with its doors closed (Class IAC-B). This test is very important to ensure the safety for the public, along with service personnel.
- EMC test - A test in the complete CSS is not necessary as the electromagnetic compatibility is tested for the medium voltage switchgear and the low voltage switchboard in accordance with their relevant standards

Optional type tests

- Sound level test (to be agreed with manufacturer and user) - This test is intended to verify the capability of the CSS to attenuate the noise produced by the operation of the transformer
- Measurement or calculation of electromagnetic fields generated by the CSS - This test is performed to prove that the electromagnetic fields generated by the CSS do not present detrimental effects for the health

UniPack-G design

Construction

Compact secondary substation housing consists of an above-ground building to be installed on-site into a base that can be delivered by ABB as an add-on or built-in solution. Above-ground level housing includes doors, roof and ventilation elements, according to application. A non-walk-in solution is meant for outside operation. Walk-in stations have an operating aisle inside the substation.

Material of the station

UniPack-G is made of Glass Reinforced Polyester (GRP) material. The GRP material is used in door, roof, wall and ventilation elements. The substation housing is made of ABB's patented GRP profile, a material offering a strong and rigid structure, as well as separation of outer and inner environments. It also provides safety to personnel and the general public. The substation is modular in design to allow flexible engineering and on-site repair work. The solution is engineered to offer more than 30 years of life for the CSS.

GRP is a composite material made of polyester with a high content of glass. GRP is a lightweight, easily shapeable, extremely strong, and robust material. It has highest strength-to-weight ratio. It is electrically and thermally nonconductive, also with excellent chemical and corrosion resistance while also being fire retardant. GRP is a proven material technology from several industries that have high demands on performance and strength – including wind turbine blades and cable distribution cabinets. It is a material with excellent properties for outdoor enclosures making it an ideal solution for CSS housing.

Inner metal parts, as a standard, are made of galvanized sheet steel (with stainless steel on request). Fasteners are zinc-coated or made of stainless steel in order to provide protection against corrosion.

All housing materials used are fire retardant and self-extinguishing.

Substation walls

UniPack-G substations have a modular design concept letting customer choose many different sizes of enclosure and compartments for their equipment and application requirements. The length of each side of the substation can be increased by adding wall modules. All layouts can be modified in length and width.

The concept of the patented profile provides a self-supporting structure offering strong mechanical strength along with great impact resistance. The housing structure tolerates impacts without breaking or becoming deformed. The self-supporting structure, together with a modular design, allows easy replacement of components in case of serious damage.

The UniPack-G has low thermal conductivity through the roof and walls making the GRP CSS as good as concrete in cold or warm environments, or where temperature variations play a significant role in substation performance. In addition, UniPack-G housing material GRP does not absorb the thermal energy inside, which is a big benefit in hot temperatures. Separated layers also protect internal equipment from temperature rises coming from high solar radiation – the heated surface of the walls and roof is separated from the internal environment by separated layers and insulation in between.

GRP housing panels have the following main characteristics:

- Self-extinguishing according to ASTM D635
- Flammability classification V-0: UL94/GB8924-88
- Minimum thickness of side walls, doors and roof: 50 mm
- Thermal resistance U-value: 7.2 W/(m²*K)
- Non toxic according to EN 45545-2:2013+A1:2015 HL3 for R1 T11.01
- Fire resistance classification according to ISO834: Integrity more than 60 minutes
- Equivalent as C5M as for structured steel according to ISO 12944-6, ISO 2409

Roof

The roof is designed as a separate constructional component which can be lifted off on-site when replacement of equipment is needed. Roof fixation is easy-to-access and detachable after opening the MV and LV doors. The roof is realized with the same modular constructive procedure as the wall panels - structure of GRP profiles and is designed to support an equally distributed load of minimum 250 kg/m².

Doors

Substation doors comply with internal arc fault testing criteria regarding pressure-withstand. Their constructive procedure is the same as the side walls. Rigid doors will not bend. Doors open outwards and are provided with a door stopper in order to maintain them in an open position at 110 degrees for operation and maintenance purposes. There are 2 types of doors: blank doors and standard doors. Standard doors are equipped with a handle and a covered place for a padlock. Blank doors are always used with a standard door to allow a larger entry area. CSS doors are standard with 2 point locking with 3 point locking and variants on request.

The UniPack-G CSS has protective measures, such as locks on all doors to prevent unauthorized access. The doors to the transformer compartment are also supplied with a safety barrier to avoid unintended access. The walk in CSS can be supplied with an internal door handle as well as a panic handle.

Layout and thermal class

Compact substation is divided into compartments, one for the MV switchgear, LV switchboard and distribution transformer. Indoor-operated CSS can have MV and LV equipment in the same compartment with an operation aisle between them. This operating aisle accomplishes the latest version of the IEC 62271-202 ed.2 in terms of the protection of the operator in the event of an internal arc. The transformer compartment determines the substation size. As standard, the transformer compartment is designed for liquid filled transformers. The transformer room is designed for natural ventilation with a temperature class

starting from Class 5K. Other transformer types (ie dry type) are available on request.

Foundation

The UniPack-G portfolio includes different type of stations:

- W – Walk-in - to provide a separated service area from outside conditions
- N – Non walk-in for optimized footprint
- C – Compact version non walk-in substations

Installation

The factory delivers a factory-tested solution to the installation site, and provides all necessary lifting devices for moving the substation. No complicated civil engineering job is needed in advance or during the installation, only a pit has to be excavated and the substation has to be placed into this installation pit. When the substation is in its place, the commissioning can be started after the incoming and outgoing cables have been connected. For detailed information, please see the installation manual.

Benefits

- Strong and rigid design
- Strength and durability of concrete with better characteristics than steel
- Self-supporting structure
- Increased corrosion resistance
- Ideal for harsh conditions
- Different foundation options
- Oil collection pit included
- Lightweight, optimized transportation and installation costs
- Designed to IEC 62271-202

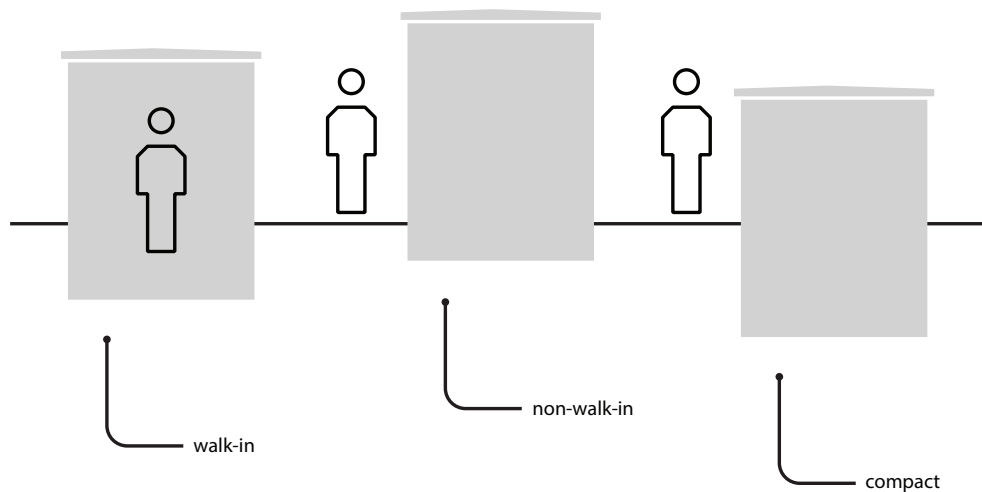
01 Galvanized steel – has a separate oil pit and has to be mounted on concrete base

02 Concrete slab - has a separate oil pit and can be mounted directly to ground

03 Compact – has integrated oil pit and can be mounted directly to ground

Foundation types

All foundation types are designed to withstand the weight of the substation and installed equipment with the possibility of lifting the CSS from four anchors provided in both, the steel base-frame or concrete foundation by using a crane without any damage or distortion.



Examples

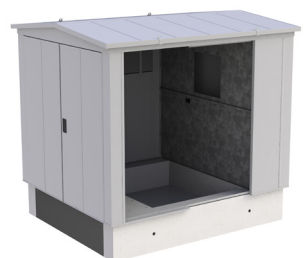
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02



03



Standard layouts

Common challenges:

- Not enough space for low voltage area
- Not enough space for medium voltage area
- Limited footprint
- Substation is surrounded by buildings

There are numerous factors that may define compact substation layout and design. In rural areas, limitations are lower and technical parameters are more important than substation layouts. In urban areas, city planners have booked certain areas for substation installations and substations need to be able to fit. Depending on those limitations, doors, ventilation and compartments can be placed differently or have restrictions. In some areas, walk-in substations are considered to have safer service conditions.

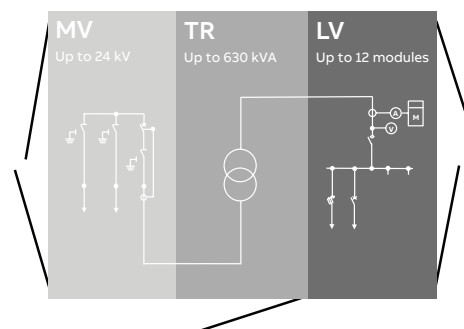
Modular concept

A large number of layout variations have led ABB to develop a modular concept to provide standard platforms and tailormade solutions based on different customer needs. By adding or removing modules, we can offer enclosure sizes up to tens of meters while still keeping the strength similar to the concrete in GRP.



Standard layouts

Spica 6NS



General

UniPack-G Spica 6NS is a CSS for rated values up to 24 kV and 630 kVA. Spica 6NS is delivered with an oil type transformer, up to 4-way SafeRing or SafePlus switchgear, and a switchboard up to 1200 mm wide from the ABB LVS switchboard series. The Spica 6NS foundation is hot dip galvanized steel baseframe with oil collection pit underneath the transformer, to collect the transformer oil in case of leakage.

Spica 6NS is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 630 kVA
- Maximum switchboard size LVS 2-12M
- Locking system for all doors to prevent unauthorized entry of personnel

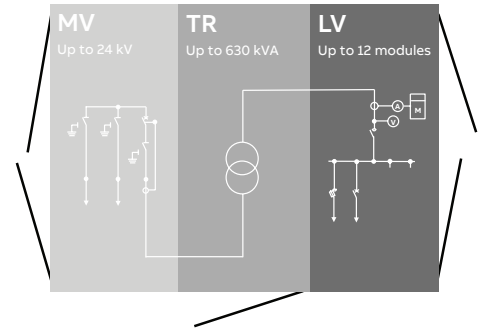
Optional features

- Various oil or dry type transformers up to 630 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 6NS	
Rated power	< 630	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3000 X 1970 X 2455	mm
Transformer compartment dimension (LxWxH)	1230 X 1520 X 2100	mm
Weight of substation excluding transformer (approximate)	1.6	tons
Total transformer losses	7800	W
Rated current of LV panel	< 1000	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 6C



General

UniPack-G Spica 6C is a CSS for rated values up to 24 kV and 630 kVA. Spica 6C is delivered with oil type transformer, up to 4-way SafeRing or SafePlus switchgear, and a switchboard up to 1200 mm wide from the ABB LVS switchboard series. The Spica 6C foundation is a concrete compact type foundation which has an integrated concrete oil collection pit inside, to collect the transformer oil in case of leakage.

Spica 6C is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 630 kVA
- Maximum switchboard size LVS 2-12M
- Locking system for all doors to prevent unauthorized entry of personnel

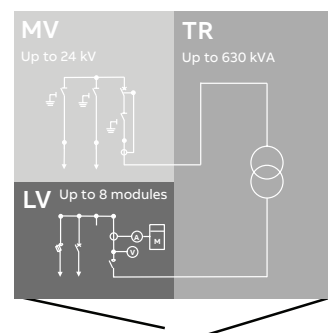
Optional features

- Various oil or dry type transformers up to 630 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 6C	
Rated power	< 630	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3000 X 1970 X 2425	mm
Transformer compartment dimension (LxWxH)	1230 X 1520 X 2165	mm
Weight of substation excluding transformer (approximate)	3.5	tons
Total transformer losses	7800	W
Rated current of LV panel	< 1000	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Castor 6C



General

UniPack-G Castor 6C is a CSS for rated values up to 24 kV and 630 kVA. Castor 6C is delivered with an oil type transformer, up to 2 bay SafeRing or SafePlus switchgear, and a switchboard up to 800 mm wide from the ABB LVS switchboard series. Castor 6C foundation is a concrete compact type foundation which has an integrated concrete oil collection pit inside, to collect the transformer oil in case of leakage.

Castor 6C is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 630 kVA
- Maximum switchboard size LVS 2-8M
- Locking system for all doors to prevent unauthorized entry of personnel

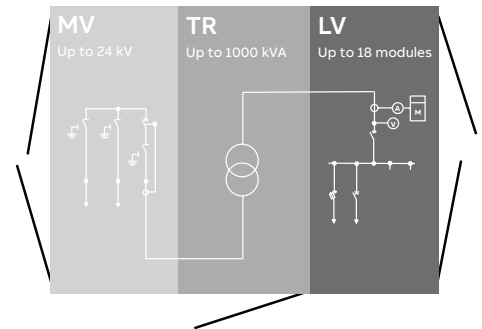
Optional features

- Various oil or dry type transformers up to 630 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Castor 6C	
Rated power	< 630	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	2500 X 1970 X 2425	mm
Transformer compartment dimension (LxWxH)	980 X 1520 X 2140	mm
Weight of substation excluding transformer (approximate)	3.2	tons
Total transformer losses	7800	W
Rated current of LV panel	< 1000	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 10NS



General

UniPack-G Spica 10NS is a CSS for rated values up to 24 kV and 1000 kVA. Spica 10NS is delivered with an oil type transformer, up to 5-way SafeRing or SafePlus switchgear and up to 1800 mm wide switchboard from the ABB LVS switchboard series. Spica 10NS is available with a hot dip galvanized steel baseframe.

Spica 10N is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

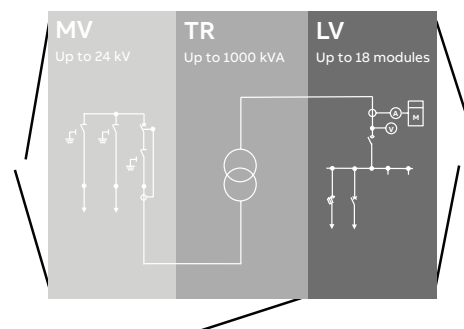
Optional features

- Various oil and dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 10NS	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3000 X 2470 X 2455	mm
Transformer compartment dimension (LxWxH)	1335 X 2180 X 2100	mm
Weight of substation excluding transformer (approximate)	2	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 10NC



General

UniPack-G Spica 10NC is a CSS for rated values up to 24 kV and 1000 kVA. Spica 10NC is delivered with an oil type transformer, up to 5-way SafeRing or SafePlus switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Spica 10C foundation is a concrete slab type foundation. All UniPack-G series CSS include the oil collection pit underneath the transformer, to collect the transformer oil in case of leakage.

Spica 10NC is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

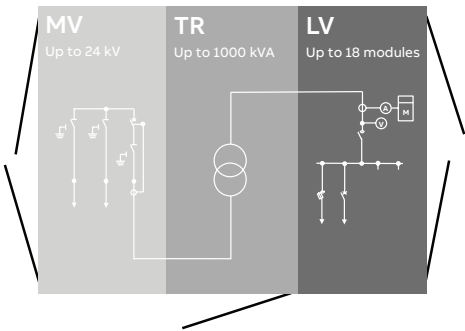
Optional features

- Various oil or dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 10NC	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3000 X 2470 X 2465	mm
Transformer compartment dimension (LxWxH)	1340 X 2180 X 2090	mm
Weight of substation excluding transformer (approximate)	3.7	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 10C



General

UniPack-G Spica 10C is a CSS for rated values up to 24 kV and 1000 kVA. Spica 10C is delivered with an oil type transformer, up to 5-way SafeRing or SafePlus switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Spica 10C foundation is a concrete compact type foundation which has an integrated concrete oil collection pit inside, to collect the transformer oil in case of leakage.

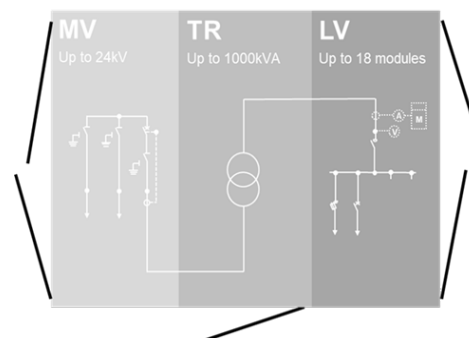
- Spica 10C is supplied with the following standard equipment:**
- SafeRing/SafePlus 12/24 kV switchgear
 - Oil type transformer up to 1000 kVA
 - Maximum switchboard size LVS 3-20M
 - Locking system for all doors to prevent unauthorized entry of personnel

- Optional features**
- Various oil or dry type transformers up to 1000 kVA
 - MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
 - The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
 - LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 10C	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3000 X 2470 X 2450	mm
Transformer compartment dimension (LxWxH)	1230 X 2015 X 2160	mm
Weight of substation excluding transformer (approximate)	4.2	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 15	K

Standard layouts

Spica 10NS US



General

UniPack-G Spica 10NS is a CSS for rated values up to 24 kV and 1000 kVA. Spica 10NS is delivered with an oil type transformer, UniSec switchgear and up to 1800 mm wide switchboard from the ABB LVS switch-board series. Spica 10NS is available with a hot dip galvanized steel baseframe.

Spica 10NS US is supplied with the following standard equipment:

- UniSec switchgear 12/24 kV
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

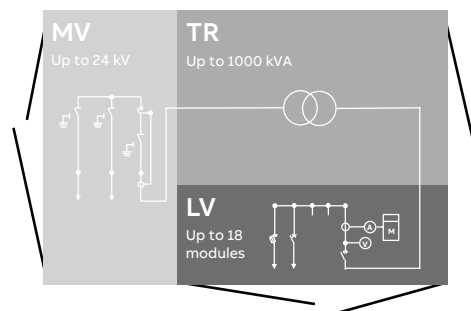
Optional features

- Various oil and dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 10NS US	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3500 X 2475 X 2755	mm
Transformer compartment dimension (LxWxH)	1040 X 1950 X 2100	mm
Weight of substation excluding transformer (approximate)	1.4	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Polaris 10NS



General

UniPack-G Polaris 10NS is a CSS for rated values up to 24 kV and 1000 kVA. Polaris 10NS is delivered with an oil type transformer, up to 4-way SafeRing or SafePlus switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Polaris 10NS foundation is hot dip galvanized steel baseframe with an oil collection pit underneath the transformer, to collect the transformer oil in case of leakage.

Polaris 10NS is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

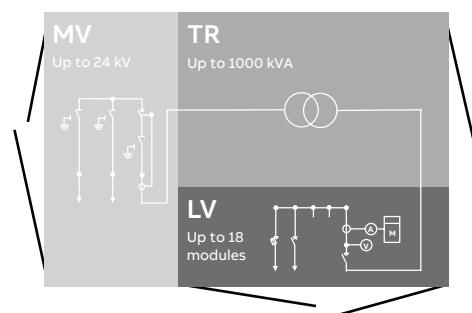
Optional features

- Various oil or dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Polaris 10NS	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3500 X 1970 X 2455	mm
Transformer compartment dimension (LxWxH)	1955 X 1075 X 2105	mm
Weight of substation excluding transformer (approximate)	2	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Polaris 10C



General

UniPack-G Polaris 10C is a CSS for rated values up to 24 kV and 1000 kVA. Polaris 10C is delivered with an oil type transformer, up to 4-way SafeRing or SafePlus switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Polaris 10C foundation is a concrete compact type foundation which has an integrated concrete oil collection pit inside, to collect the transformer oil in case of leakage.

Polaris 10C is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

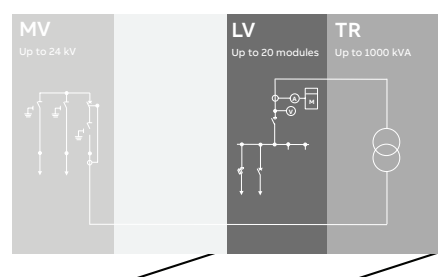
Optional features

- Various oil or dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Polaris 10C	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3500 X 1970 X 2425	mm
Transformer compartment dimension (LxWxH)	1945 X 1080 X 2165	mm
Weight of substation excluding transformer (approximate)	4.4	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Vega 10W



General

UniPack-G Vega 10W is a walk-in CSS for rated values up to 24 kV and 1000 kVA. Vega 10W is delivered with an oil type transformer, up to 5-way SafeRing or SafePlus switchgear, and a switchboard up to 2000 mm wide from the ABB LVS switchboard series. Vega 10W foundation is a concrete slab type foundation with oil collection pit underneath the transformer, to collect the transformer oil in case of leakage.

Vega 10W is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

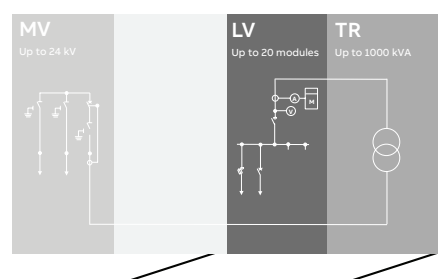
Optional features

- SafeRing/SafePlus 40.5 kV switchgear
- SafeLink 2 12 kV switchgear
- Various oil or dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Vega 10W	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	4500 X 2470 X 2805	mm
Transformer compartment dimension (LxWxH)	1385 X 2180 X 2390	mm
Weight of substation excluding transformer (approximate)	5.9	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Vega 10W with cable cellar



General

UniPack-G Vega 10W with cable cellar is a walk-in CSS for rated values up to 24 kV and 1000 kVA. Vega 10W is delivered with an oil type transformer, up to 5-way SafeRing or SafePlus switchgear, and a switchboard up to 2000 mm wide from the ABB LVS switchboard series. Vega 10W with cable cellar foundation is a concrete slab type foundation with an oil collection pit underneath the transformer, to collect the transformer oil in case of leakage. Vega 10W has predesigned cable cellar delivered with the CSS.

Vega 10W with cable cellar is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 1000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

Optional features

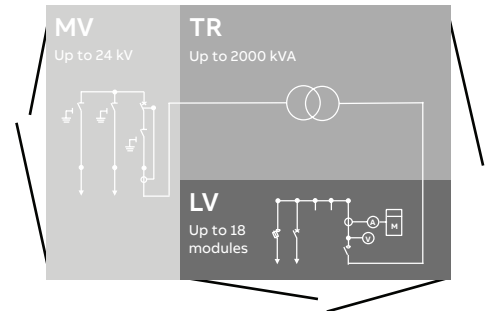
- SafeRing/SafePlus 40.5 kV switchgear
- SafeLink 2 12 kV switchgear
- Various oil or dry type transformers up to 1000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads

- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer
- A sealed pipe entry system into the foundation cellar

Characteristics	UniPack-G – Vega 10W with cable cellar	
Rated power	< 1000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	4500 X 2470 X 3655	mm
Transformer compartment dimension (LxWxH)	1385 X 2180 X 2390	mm
Weight of substation excluding transformer (approximate)	10.8	tons
Total transformer losses	11600	W
Rated current of LV panel	< 1600	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Polaris 20NS



General

UniPack-G Polaris 20NS is a CSS for rated values up to 24 kV and 2000 kVA. Polaris 20NS is delivered with an oil type transformer, up to 5-way SafeRing or SafePlus switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Polaris 20NS foundation is hot dip galvanized steel baseframe with an oil collection pit underneath the transformer, to collect the transformer oil in case of leakage.

Polaris 20NS is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 2000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

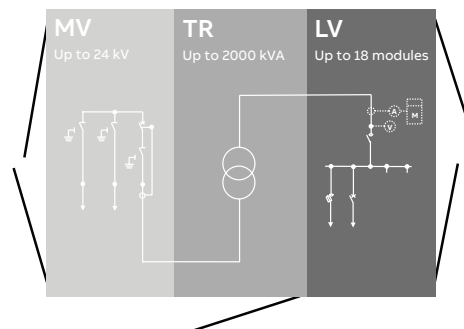
Optional features

- Various oil or dry type transformers up to 2000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Polaris 20NS	
Rated power	< 2000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	3500 X 2470 X 2455	mm
Transformer compartment dimension (LxWxH)	2000 X 1575 X 2105	mm
Weight of substation excluding transformer (approximate)	2.2	tons
Total transformer losses	19800	W
Rated current of LV panel	< 3200	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 20C



General

UniPack-G Spica 20C is a CSS for rated values up to 24 kV and 2000 kVA. Spica 20C is delivered with an oil type transformer, up to 5-way SafeRing / SafePlus 24kV switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Spica 20C foundation is a concrete compact type foundation with Hauff-Technik inlets for MV cables which has an integrated concrete oil collection pit inside, to collect the transformer oil in case of leakage.

Spica 20C is supplied with the following standard equipment:

- SafeRing/SafePlus 12/24 kV switchgear
- Oil type transformer up to 2000 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

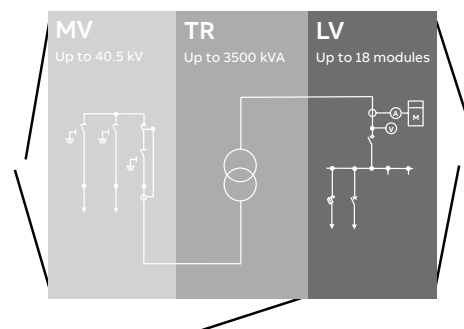
Optional features

- Various oil or dry type transformers up to 2000 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 20C	
Rated power	< 2000	kVA
Rated voltage	< 24	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	4500 X 2470 X 2970	mm
Transformer compartment dimension (LxWxH)	2350 X 2000 X 2400	mm
Weight of substation excluding transformer (approximate)	6.5	tons
Total transformer losses	19450	W
Rated current of LV panel	< 3200	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35 / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 35NS



General

UniPack-G Spica 35NS is a CSS for rated values up to 40.5 kV and 3500 kVA. Spica 35NS is delivered with an oil type transformer, up to 4-way SafeRing / SafePlus 36 or with up to 5-way SafeRing / SafePlus 24 switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Spica 35NS foundation is hot dip galvanized steel baseframe with an oil collection pit underneath the transformer, to collect the transformer oil in case of leakage.

Spica 35NS is supplied with the following standard equipment:

- SafeRing/SafePlus 40.5 kV switchgear
- Oil type transformer up to 3500 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

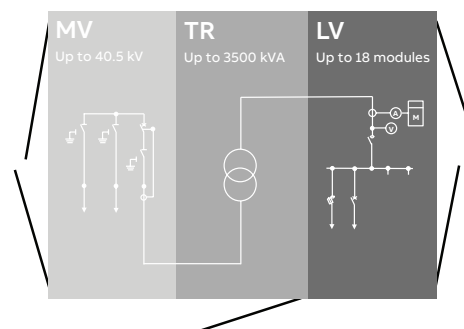
Optional features

- SafeRing/SafePlus 12/24 kV switchgear
- SafeLink 2 12 kV switchgear
- Various oil or dry type transformers up to 3500 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 35Ns	
Rated power	< 3500	kVA
Rated voltage	< 40.5	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	5000 X 2470 X 2805	mm
Transformer compartment dimension (LxWxH)	3060 X 2180 X 2400	mm
Weight of substation excluding transformer (approximate)	3.8	tons
Total transformer losses	35900	W
Rated current of LV panel	< 3200	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K

Standard layouts

Spica 35C



General

UniPack-G Spica 35C is a CSS for rated values up to 40.5 kV and 3500 kVA. Spica 35C is delivered with oil type transformer, up to 4-way SafeRing / SafePlus 36 or with up to 5-way SafeRing / SafePlus 24 switchgear, and a switchboard up to 1800 mm wide from the ABB LVS switchboard series. Spica 35C foundation is a concrete compact type foundation which has an integrated concrete oil collection pit inside, to collect the transformer oil in case of leakage.

Spica 35C is supplied with the following standard equipment:

- SafeRing/SafePlus 40.5 kV switchgear
- Oil type transformer up to 3500 kVA
- Maximum switchboard size LVS 3-20M
- Locking system for all doors to prevent unauthorized entry of personnel

Optional features

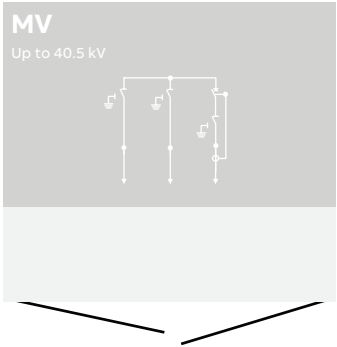
- SafeRing/SafePlus 12/24 kV switchgear
- SafeLink 2 12 kV switchgear
- Various oil or dry type transformers up to 3500 kVA
- MV cable connections can be from Al or Cu. If not specified, then the cross section is selected to fulfill short circuit requirement of the arrangement
- The connecting cables can be equipped with pre-molded / cold shrink / heat shrink cable heads
- LV connection to transformer can be busbar or double insulated cable sized according to the rated power of transformer

Characteristics	UniPack-G – Spica 35Ns	
Rated power	< 3500	kVA
Rated voltage	< 40.5	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	5000 X 2470 X 2790	mm
Transformer compartment dimension (LxWxH)	2750 X 2000 X 2380	mm
Weight of substation excluding transformer (approximate)	8.8	tons
Total transformer losses	35900	W
Rated current of LV panel	< 3200	A
Rated short circuit withstand capacity of LV busbar system	50	kA/1s
Transformer compartment protection degree	23D / 35D / 45	IP
MV/LV compartment protection degree	54	IP
CSS enclosure thermal class (for IP 23D transformer compartment)	From 10	K



Standard layouts

Antares



General
UniSub-G Antares is a walk-in CSS for rated values up to 40.5 kV. Antares is delivered with up to 4-way SafeRing / SafePlus 36 or with up to 5-way SafeRing / SafePlus 24 switchgear. The Antares layout is available with a hot dip galvanized steel baseframe or a concrete slab foundation.

- Antares is supplied with the following standard equipment:**
- SafeRing/SafePlus 40.5 kV switchgear
 - Locking system for all doors to prevent unauthorized entry of personnel

- Optional features**
- SafeRing/SafePlus 12/24 kV switchgear
 - SafeLink 2 12 kV switchgear
 - Fire alarm and extinguisher
 - Auxiliary LV switchboard
 - Internal lighting and sockets
 - Heaters
 - Space for tools and spare parts
 - Compact type concrete foundation

Characteristics	UniSub-G – Antares	
Rated voltage	< 40.5	kV
Short circuit withstand current of internal earthing network	20	kA/1s
Overall dimensions (LxWxH)	2000 X 2470 X 2465	mm
Weight of substation excluding transformer (approximate)	3	tons
MV/LV compartment protection degree	54	IP

Enclosure add-ons

Protection degree

The degree of protection of the entire substation, including doors and ventilation openings, is at least IP23D. Medium voltage and low voltage compartments are rated with IP54 as standard. The correct IP class will assure stable and controlled conditions inside the MV and LV compartments. Higher degrees of protection (IP35 or IP45) for transformer compartment can be provided on request, if an improved protection against ingress of insects, reptiles, etc., or horizontal rain driven by wind is needed.

Ventilation

Natural ventilation is provided by means of ventilation louvers for air intake and extraction in the doors or ventilation wall elements. Natural air circulation ensures sufficient cooling of the transformer. The ventilation louvers are of the V-type or labyrinth. As standard UniPack-G CSS is classified and type tested in accordance with temperature class K10 to K20, temperature class K10 can be achieved for all surface-mounted substations by increasing the ventilation area for the transformer room.

Door gaskets

To provide protection against dust being drawn into the medium voltage and low voltage compartments, the doors can be fitted with gaskets that increase the degree of protection.

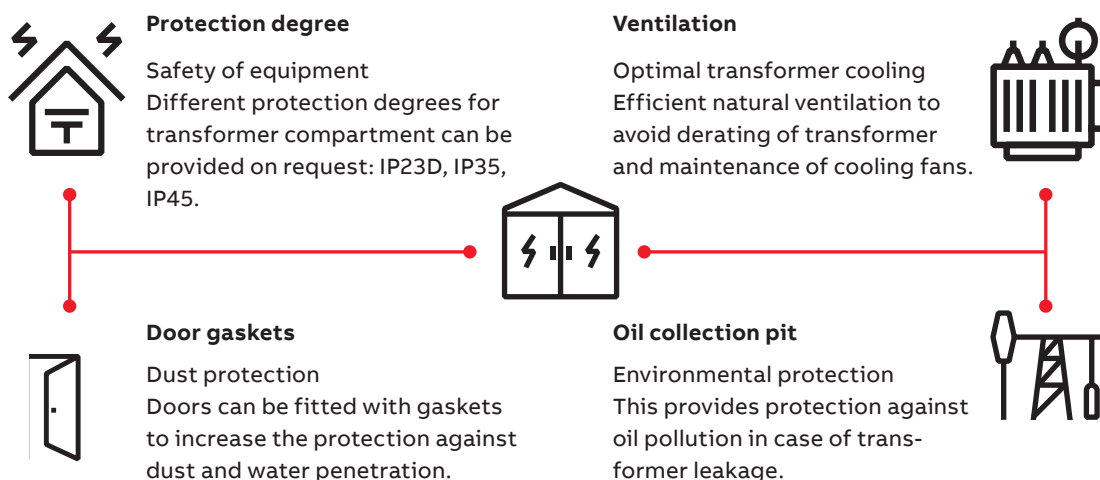
Oil collection pit

Oil collection pit is intended to trap, in case of a transformer failure, the insulating fluid flowing out of the transformer, protecting the ambient environment and groundwater. The oil collection pit is a sealed, fully confined, oil and watertight solution without a supplementary coating.

CSS solutions, of type compact, with a concrete foundation are fitted as standard with an integrated oil collection pit. A separate oil collection pit of 1.5 mm galvanized steel for non walk-in and walk-in stations can be supplied as an add on. The transformer is fitted in the oil collection pit, which has a volume of 20% - 100% of the transformer's oil volume. The oil collection pit provides protection against oil pollution in case of transformer leakage.

As a standard, all concrete substations have an oil collection pit, which can take 100% of the transformer's oil volume. In substations operated from the outside, the oil collection pit is integrated into the substation's concrete base, while the oil collection pit (in substations operated from the inside) is created by the fitting of dividing walls around the transformer.

The oil collection pit provides protection against oil pollution in case of transformer leakage.



Smart grid compatibility

Challenges facing urban network operators

Urban network operators are facing a growing number of challenges and demands from both consumers and the authorities today. Firstly, the commercial consequences of power discontinuities are becoming more severe, urging operators to seek a feasible network upgrade solution. Furthermore, there are new needs emerging, such as charging stations for electrical vehicles, integration of distributed power generation, and support for demand response programs. In short, in urban power distribution, existing cable networks have to take on continuously increasing power consumption. With the decision to upgrade and build power distribution networks, combined with the ability to meet today's efficiency and supply quality requirements, the operators typically face the challenge of a huge existing network, which includes different generations of primary and secondary substations with a wide variety of equipment. In most cases, this infrastructure is aging, which adds the subsequent risk for increased component failure rates. Additionally, in urban environments, automation is a desired functionality, as dense traffic makes it difficult to access the secondary substations.

Distribution grid automation solutions for smart grids

ABB's grid automation solutions take on all these challenges and offer a complete range of solutions, equipment, systems and services for smarter grids.

For decades, ABB has driven the development of advanced protection, supervision, control and

management products and systems for the complete power delivery process. And as a forerunner in the development and manufacturing of primary equipment, ABB is able to create strong integration between the primary objects and related secondary technology.

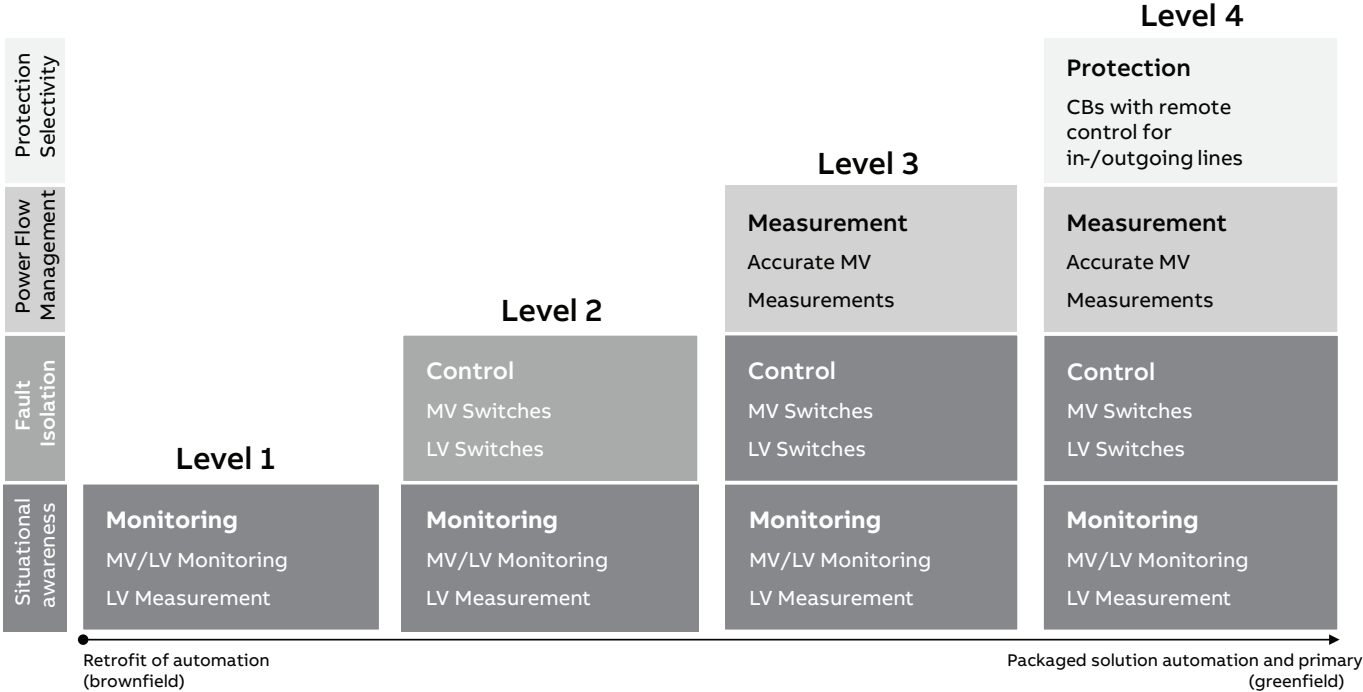
Distribution grid automation is a key contributor and a prerequisite to build the smart grids of the future. ABB's distribution grid automation solutions offer:

- Improved continuity of power supply
- Improved voltage quality
- Cost-effectiveness
- Integration of distributed energy resources
- Support for demand response / energy savings
- Support for e-mobility

With the strength and scope of products, ABB is able to provide effective solutions for network situations and operational goals.

Solutions for smart secondary distribution

The level and roll-out order of distribution grid automation tends to be prioritized differently in different grid sections, as supply criticality, the likelihood of faults, and the need for remote control varies. ABB's distribution grid automation solutions have implemented a flexible approach to meet this requirement (see image below). The available solutions are grouped based on their capabilities into four levels: (1) situational awareness, (2) fault isolation and power restoration, (3) power flow management and (4) protection selectivity. In most networks, a combination of all four levels of grid automation exists simultaneously.



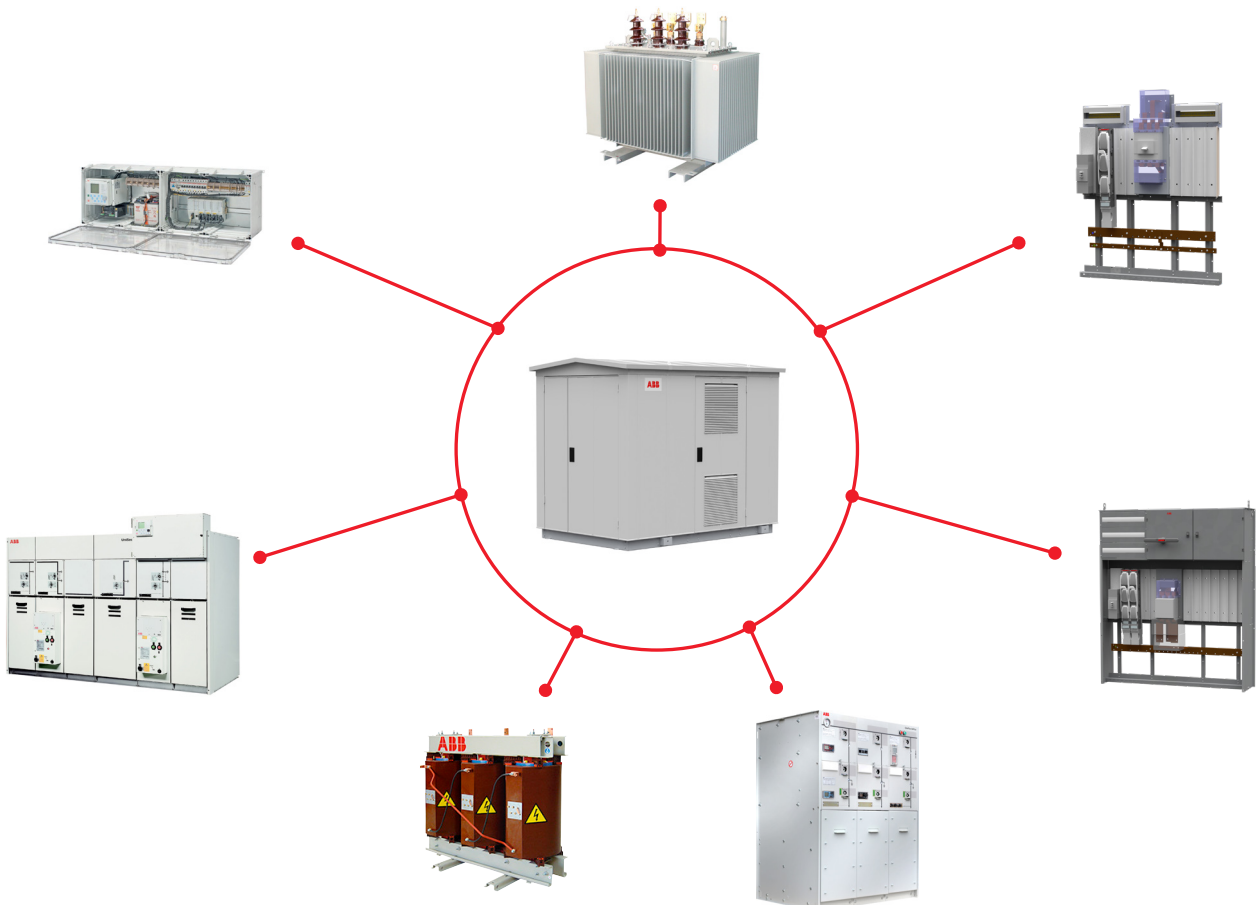
Equipment

Typically, CSS units includes medium voltage switchgear, a step down transformer and a low voltage switchboard. Very often, different substation configurations (eg, only MV switchgear) are used in the network.

Medium voltage switchgear protects transformer and provides network opening points for service and reconfigurations. Transformer protection ways are configured according local rules and transformer ratings. Smaller ratings are protected with fuses, while higher ratings are protected with circuit breakers. The most common switchgear in substation is SafeRing CCV or CCF. Also, air-insulated secondary switchgear like UniSec is used in compact substations.

Most of CSS applications are equipped with step down transformers, though distributed energy production has increased the portfolio of the step up applications. The main drivers to increase are wind and solar plant developments. Due to economic constraints, oil-filled transformers are used in substations. Dry type transformers are more common for special applications like industry and PV plants.

Low voltage switchboard have the biggest variation in complexity, as it serves a different number of functions. It has an incoming switch to protect the transformer from LV network faults, and vice versa. Outgoing feeders divide networks into different lines. Outgoing feeder protection can be done with fuses or MCCB-s. For low voltage auxiliary equipment, including measuring, metering, and surge protection, a number of different equipment options can be used.



Equipment

SafeRing/SafePlus

SafeRing is a ring main unit for the secondary distribution network. SafeRing can be supplied in 10 different configurations suitable for most switching applications in 12/24 kV distribution networks. It is extendible and combined with the SafePlus concept, which is ABB's flexible, modular compact switchgear, they represent a complete solution for 12/24 kV secondary distribution networks. SafeRing and SafePlus have identical user interfaces.

SafeRing is a completely sealed system with a stainless steel tank containing all the live parts and switching functions. A sealed steel tank with constant atmospheric conditions ensures a high level of reliability as well as personnel safety and a virtually maintenance-free system.

The SafeRing concept offers a choice of either a switch fuse combination or circuit breaker with relay for protection of the transformer. SafeRing can be supplied with an integrated remote control and monitoring unit.

SafeRing is supplied with the following standard equipment:

- Earthing switches
- Operating mechanisms with integral mechanical interlocking
- Operating handle
- Facilities for padlocks on all switching functions
- Bushings for cable connection in front with cable covers
- Lifting lugs for easy handling
- All 3- and 4-way units are designed for the subsequent fitting of an integral remote control and monitoring unit

Optional features

- Bushings for connection of external busbar on top of RMU
- Bushings for side connection (400A) (C-, F- and De- modules only)
- Bushings for cable testing, including earthing device (C- and De- modules only)
- Cable bushings (Interface A, B, C and D)
- Cable compartment front cover interlocked with earthing switch

- Interlocking of compartment for cable test bushings
- Arc suppressor with signal (1NO) wired to terminals (only one each SF6 tank)
- Signal (1NO) from internal pressure indicator wired to terminals (only one each SF6 tank)
- Latched single spring mechanism for ring cable switch

Optional features also available as retrofit

- Manometer for SF6 pressure monitoring (temperature compensated)
- Integrated control and monitoring unit (ICMU)
- Integrated battery and charger
- Motor operation
- Trip coil open
- Trip coil open and close
- Aux. switch for load break switch position 2NO + 2NC
- Aux. switch for vacuum circuit breaker position 2NO + 2NC
- Aux. switch for disconnected position 2NO + 2NC
- Aux. switch for earth switch position 2NO + 2NC
- Aux. switch for fuse blown 1NO
- Vacuum circuit breaker tripped signal 1NO
- Capacitive voltage indicating system
- Short circuit indicator
- Cable cover with window
- Cable cover for double T
- Arc proof cable compartments
- Extra base frame (h=450 mm or 290 mm)
- Top entry box
- Cable support bars, non-magnetic or adjustable
- Ronis interlocking system, EL 11 AP
- Current measuring
- Prepared for relay test equipment

Equipment

SafeRing/SafePlus

Available SafeRing modules

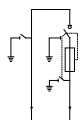
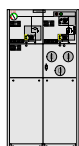
C	Cable switch
De	Direct cable connection with earthing switch
F	Switch fuse disconnecter
V	Vacuum circuit breaker

Available SafePlus modules

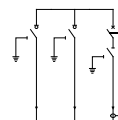
C	Cable switch
De	Direct cable connection with earthing
D	Direct cable connection
F	Switch fuse disconnecter
V	Vacuum circuit breaker
Be	Busbar earthing
Sl	Busbar sectionalizer, load break switch
Sv	Busbar sectionalizer, vacuum circuit breaker
CB	Circuit breaker module
M	Metering module
Mt	Metering tariff module

Equipment

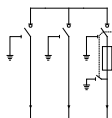
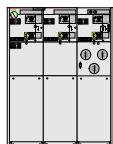
SafeRing/SafePlus

**DeF**

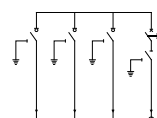
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Width: 696 mm
Height: 1336 mm

**CCV**

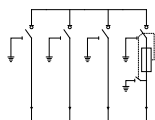
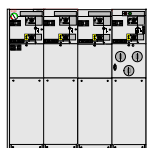
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**CCF**

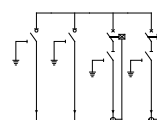
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Height: 1336 mm

**CCCV**

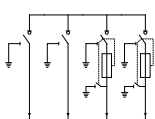
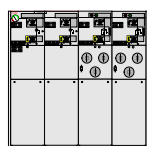
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Height: 1336 mm

**CCCF**

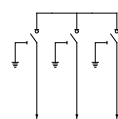
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Height: 1336 mm

**CCVV**

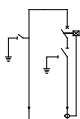
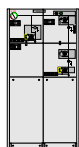
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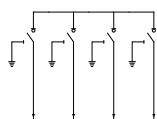
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Height: 1336 mm

**CCC**

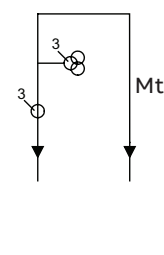
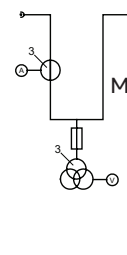
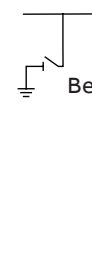
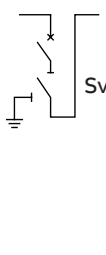
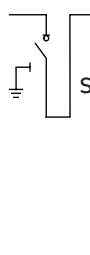
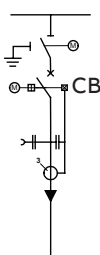
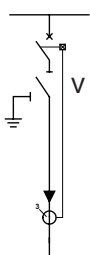
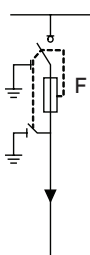
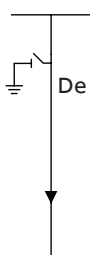
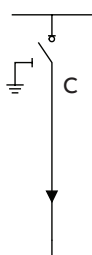
Depth: 765 mm
Width: 1346 mm
Height: 1336 mm

**DeV**

Depth: 765 mm
Width: 696 mm
Height: 1336 mm

**CCCC**

Depth: 765 mm
Width: 1346 mm
Height: 1336 mm



Equipment

SafeRing/SafePlus

SafeRing is tested according to IEC publications IEC 60265-1, IEC 6227-1, EC 62271-100, -102, -105, -200 and IEC 60529.



SafeRing	C-module		F-module		V-module	
	Switch disconnecter	Earthing switch	Switch-fuse disconnecter	Downstream earthing switch	Vacuum circuit breaker	Earthing switch/disconnector
Rated voltage	kV	12/15/17.5/24	12/15/17.5/24	12/17.5/24	12/17.5/24	12/15/17.5/24
Power frequency withstand voltage	kV	28/38/38/50	28/38/38/50	28/38/50	28/38/50	28/38/38/50
Lightning impulse withstand voltage	kV	95/95/95/125	95/95/95/125	95/95/125	95/95/125	95/95/95/125
Rated normal current	A	630/630/630/630		see ⁽¹⁾	200/200/200/200	
Breaking capacities:						
- active load	A	630/630/630/630				
- closed loop	A	630/630/630/630				
- off load cable charging	A	135/135/135/135				
- off load transformer	A			20/20/20		
- earth fault	A	200/150/150/150				
- earth fault cable charging	A	115/87/87/87				
- short-circuit breaking current	kA			see ⁽²⁾	16/16/16/16	
Making capacity	kA	52.5/52.5/40/40	52.5/52.5/40/40	see ⁽²⁾	12.5/12.5/12.5	40/40/40/40
Short time current 0.5 sec. ⁽³⁾	kA				16/16/16/16	
Short time current 1 sec. ⁽⁴⁾	kA	16/16/16		5/5/2005	16/16/16/16	
Short time current 3 sec. ⁽⁵⁾	kA	21/21/16/16	21/21/16/16		16/16/16/16	

(1) Depending on the current rating of the fuse-link

(2) Limited by high voltage fuse-links

(3) Maximum rating for bushings Interface A (200 series plug-in)

(4) Maximum rating for bushings Interface B (400 series plug-in)

(5) Maximum rating for bushings Interface C (400 series bolted)

Equipment

UniSec

UniSec is the ABB air-insulated switchgear, LS-C2A-PM for panels with switch-disconnector, in accordance with the loss of service continuity definitions and standard IEC 62271-200.

Each unit is constructed entirely using pre-galvanized metal sheets. Each unit consists of several compartments. The busbar compartment is placed along the entire length of the switchgear. Each unit has holes for fixing to the floor and is provided with bottom closure fitted with openings for medium voltage cable passage.

All the units fitted with a door have a mechanical interlock which only allows door opening under safe conditions.

There is a metal wiring duct in each unit to segregate the low voltage circuits from the medium voltage circuits.

UniSec offers the following features:

- Air insulation of all live parts
- SF₆ switch-disconnector
- Removable and withdrawable vacuum and SF6 circuit breakers
- Multi-function apparatus with integrated vacuum circuitbreaker and gas-insulated disconnector
- LSC2A service continuity classification
- Complete range of functional units and accessories
- Large selection of state-of-the-art protection relays, integrated on removable circuit breakers or separately mounted for protection, control and measurement functions

Available apparatus:

- GSec type gas switch-disconnector
- VD4/R-Sec removable and withdrawable vacuum circuit breakers
- HD4/R-Sec - HD4/RE-Sec removable and withdrawable SF6 gas circuit breakers
- HySec vacuum circuit breaker and SF6 disconnector integrated

Code	Description	Width				
		190 mm	375 mm	500 mm	600 mm	750 mm
SDC	Unit with switch-disconnector		•	•		•
SDS	Unit with switch-disconnector – isolation		•	•		•
SDD	Unit with double switch-disconnector					•
SDM	Isolating unit with measurement with switch-disconnector					•
UMP	Universal Metering Unit					•
DRC	Direct incoming unit with measurement and busbar earthing		•	•		
DRS	Riser unit – measurement		•	•		
SFV	Switch-disconnector with fuses – measurement			•		
SFC	Switch-disconnector with fuses		•	•		•
SFS	Switch-disconnector with fuses – isolation		•	•		
SBC	Circuit breaker with switch-disconnector					•
SBC-W	Circuit breaker-Withdrawable with switch-disconnector					•
SBS	Circuit breaker with switch-disconnector – isolation					•
SBS-W	Circuit breaker-Withdrawable with switch-disconnector – isolation					•
SBM	Isolating unit with measurements, circuit-breaker and double switch-disconnector					•
SBR	Reversed circuit-breaker unit					•
HBC	Unit with integrated circuit-breaker and disconnector			•		
RLC/ RRC	Lateral, left and right-hand cable riser	•				
WBC	Withdrawable frontal breaker unit				• (*)	• (**)
WBS	Withdrawable frontal breaker unit				• (*)	• (**)
BME	Busbar measuring and earthing unit				• (*)	

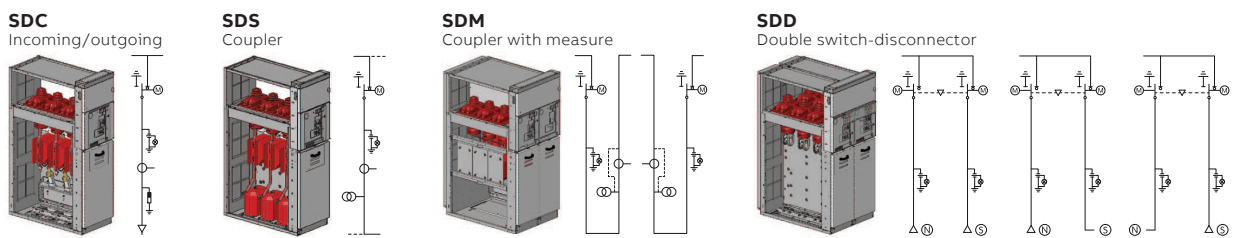
(*) 12-17.5 kV

(**) 24 kV

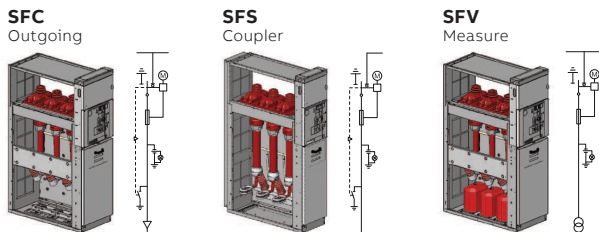
Equipment

UniSec

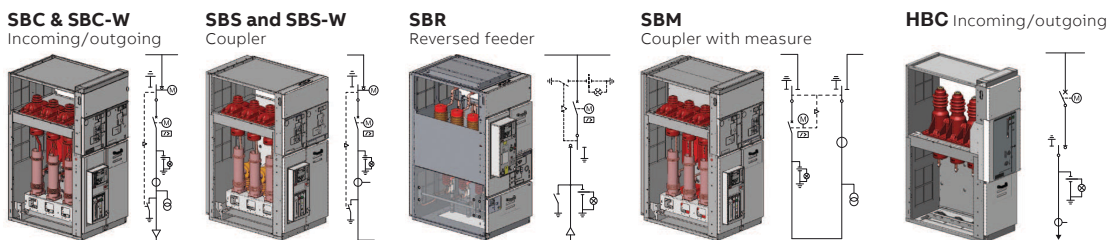
Units with switch-disconnector



Units with switch-disconnector and fuses

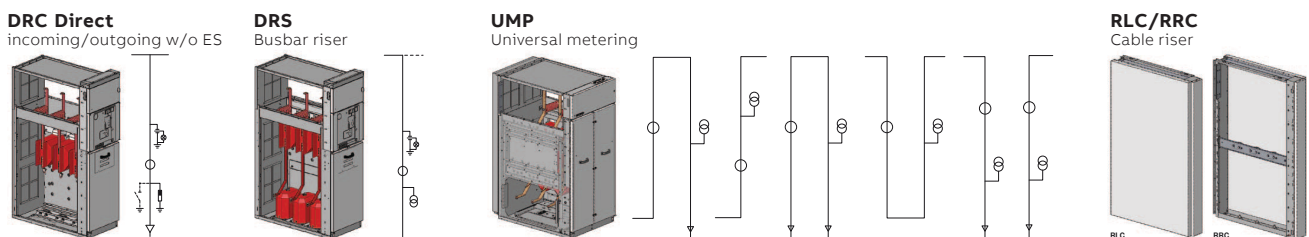


Units with switch-disconnector and removable or withdrawable circuit-breaker



Unit with circuit-breaker and disconnecter integrated

Other Units



Equipment

UniSec



Switchgear electrical characteristics

Rated voltage	kV	12	17.5	24
Test voltage (50-60 Hz x 1 min)	kV	28	38	50
Impulse withstand voltage	kV	75	95	125
Rated frequency	Hz	50-60	50-60	50-60
Rated main busbar current	A	630/800/1250	630/800/1250	630/1250
Rated current of apparatus:				
– VD4/R-Sec - HD4/R-Sec - HD4/RE-Sec removable circuit-breaker	A	630/800	630/800	630
– VD4/R-Sec - HD4/R-Sec withdrawable circuit-breaker	A	630	630	630
– HySec multi-function apparatus	A	630	630	630
– GSec gas switch-disconnector	A	630/800	630/800	630
– Vmax/Sec withdrawable circuit-breaker	A	630/1250	630/1250	–
– VD4/Sec withdrawable circuit-breaker	A	–	–	630/1250
– HD4/Sec withdrawable circuit-breaker	A	630/1250	630/1250	630/1250
– VSC/P withdrawable vacuum contactor	A	400	–	–
Rated short time withstand current	kA (3s)	16 ⁽⁴⁾ /20 ⁽³⁾ /25 ^{(1) (2)}	16 ⁽⁴⁾ /20 ⁽³⁾ /25 ⁽²⁾	16 ⁽⁴⁾ /20 ⁽³⁾
Peak current	kA	40 ⁽⁴⁾ /50 ⁽³⁾ /62.5	40 ⁽⁴⁾ /50 ⁽³⁾ /62.5	40 ⁽⁴⁾ /50 ⁽³⁾
Internal arc withstand current (up to IAC AFLR)	kA (1s)	12.5/16 ⁽⁴⁾ /21/25 ^{(2) (5)}	12.5/16 ⁽⁴⁾ /21/25 ⁽²⁾	12.5/16 ⁽⁴⁾ /21

(1) 25 kA 2s for LSC2A service continuity classification

(2) For LSC2B service continuity classification

(3) Contact ABB for 21 kA/52.5 kAp

(4) For HySec 16 kA(1s)/40 kAp

(5) For LSC2A unit with gas duct at 12kV, high 2000 mm and wide 750 mm (further details at page 96)

Equipment

Transformer

In the transformer room, one or two pieces of maximum 3500 kVA oil-insulated or dry-type transformers can be placed. The transformer is cooled by means of natural ventilation.

The dimensions of the transformer compartment for each standard layout are described in data tables in section layouts and maximal technical content.

Due to modular design, custom layouts can be offered and transformer with higher ratings and dimensions can be installed based on customer requirements. Maximum transformer ratings are up to 3500 kVA. Both, oil and dry type transformers are available for UniPack-G. Please note that the dimensions of transformers can vary and it should be checked if the desired type of transformer fits in the CSS, taking safety distances and ventilation into consideration.

The transformer compartment is equipped with an oil pit, to collect the transformer oil in case of leakage. The oil pit can contain 100% of the transformer oil.

The substation can be delivered without the transformer. Instructions to install the transformer on-site are described in section installation manual.



Equipment

LVS

General

As one of the key components inside CSS, a low voltage switchboard (LVS) can be highly customized to fit local requirements and local standards. LVS ratings and set up depends on segment and network place.

ABB low voltage switchboard concept for CSS is built up to fit into 3 different groups. For smaller ratings and customer needs (low end), LVS 1 is most suitable to offer basic incoming/outgoing options. For medium requirements, LVS 2 offers higher ratings and more advanced options for incoming protection and wider range of outgoing feeders (also a lim-

ited amount of auxiliary equipment). For high end range, LVS 3 is capable of handling high current and more sophisticated LV apparatus. Also, it is possible to equip the frame with an engineering compartment and DIN rails for more advanced auxiliary circuits.

All LVS boards are also to be considered for different busbar systems. The most common is 185 mm phase distance DIN busbar to fit Fuselist. For insulated busbar options, ABB can provide either Zewe (Z-busbar) busbar system or Kabeldon. Kabeldon busbars have a phase distance of 100 mm and Kabeldon fuselist can be used.

Busbar type	Unit	DIN	Kabeldon	Z-Busbar
Standard		IEC61439-1	IEC61439-1	IEC61439-1
Rated voltage U_e	V	690***	690	690
Rated current I_n	A	400 - 5000	400 - 5000	400 - 5000
Rated frequency	Hz	50 - 60	50 - 60	50 - 60
Degree of protection		IP2X*	IP2X	IP2X
Rated impulse withstand voltage U_{imp}	kV	>12	>12	>12
Rated insulation voltage U_i	kV	2.5	1	2.5
Withstand current $I_{cw} / (1 \text{ sec}) I_{pk}$				
- 400 A busbar	kA	-	21/55	-
- 630 A busbar	kA	-	23/55	50/105
- 1000 A busbar	kA	38/76	40/85**	-
- 1600 A busbar	kA	50/105	70	50/105
- 2500 A busbar	kA	50/105	65/148**	-
- 4000 A busbar	kA	66/146	-	-
- 5000 A busbar	kA	66/146	-	-

*Completely mounted

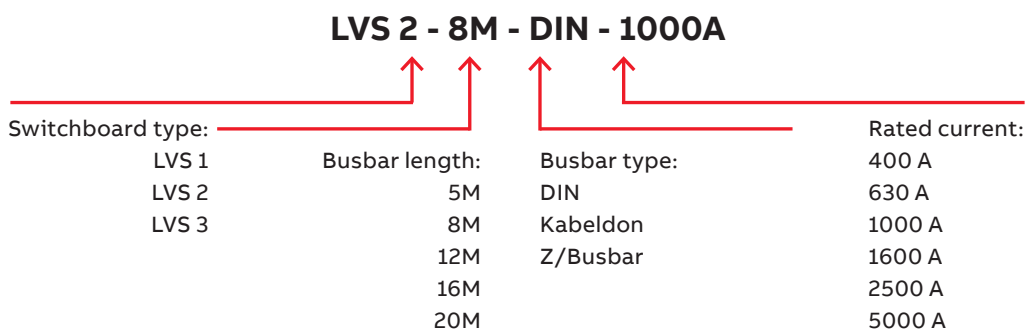
**1000 mm busbar without apparatus

***800V with limited configurations

LVS type designator

To simplify selection and ensure clear configuration, the following naming designator is used. The name consists of the

type of board, collection busbar length, busbar type, and rated power of busbar.



Equipment

LVS 1



General

LVS 1 low voltage switchboard mounts directly on the wall of the LV compartment. The switchboard consists of a base plate for mounting of feeders, as well as a plate for cable support and system earthing.

Busbars

The busbars are available in lengths of 5, 8, 12, 16 and 20 modules (1 module = 100 mm). The rated current depends on the type of busbar selected. In order to easily expand the switchboard with more outgoing feeders, the DIN normed busbars are mounted with insert nuts. More outgoing feeders are also easily mounted on Kabeldon and Z-busbars.

Incoming feeder

As standard for DIN and Z busbars, the incoming feeder is a fuselist disconnecter with a back connection at the middle of the busbar. The back connection minimizes the mechanical stress at cables and fuse lists. Direct connection is standard for Kabeldon busbars, where the cables are mounted on the busbar with clamps. This is also possible for Z-busbars. For DIN normed busbars, direct connection is made with a side connection. Furthermore, load break switch or MCCB with back connection can be selected as an incoming feeder for the DIN normed busbars.

Busbar	DIN	Kabeldon	Z-busbar
5M	400 A 1000 A 1600 A 2500 A	-	-
8M	400 A 1000 A 1600 A 2500 A	400 A	630 A
12M	1000 A 1600 A 2500 A	1000 A 1600 A	630 A 1600 A
16M	1000 A 1600 A 2500 A	1000 A 1600 A 2500 A	-
20M	1000 A 1600 A 2500 A	1600 A 2500 A	-

Outgoings

Switchboard outgoing apparatus can be configured to fit network and customer demand from the following components:

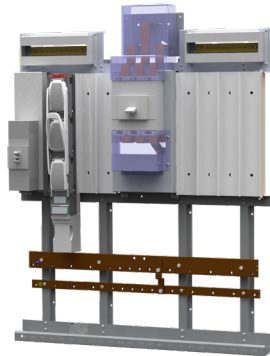
- Fuse switch disconnectors (63...630 A)
- Moulded case circuit breaker (Tmax series)

Add-ons

As an add-on, surge arresters can be selected to LVS 1 with InLine fuse lists on DIN busbars.

Equipment

LVS 2



General

LVS 2 is a freestanding low voltage switchboard, as it is designed with a framework. The switchboard consists of the frame made of 1.5 mm galvanized steel, a base plate with the busbars for fuse lists mounting, as well as a plate for cable support and system earthing. At the top of the switchboard, it is possible to mount measuring equipment and other apparatus at a DIN rail, which is covered by a 1.5 mm painted steel plate. The cover color is RAL 7035.

Busbars

The busbars are available in lengths of 5, 8, 12, 16 and 20 modules (1 module = 100 mm). The rated current depends on the type of busbar selected. In order to easily expand the switchboard with more outgoing feeders, the DIN normed busbars are mounted with insert nuts. More outgoing feeders are also easily mounted on Kabeldon and Z-busbars.

Incoming feeder

As standard for DIN and Z busbars, the incoming feeder is a fuselist disconnecter with a back connection at the middle of the busbar. The back connection minimizes the mechanical stress at cables and fuse lists. Direct connection is standard for Kabeldon busbars, where the cables are mounted on the busbar with clamps. This is also possible for Z-busbars. For DIN normed busbars direct connection is made with a side connection. Furthermore, load break switch or MCCB with back

Busbar	DIN	Kabeldon	Z-busbar
5M	400 A 1000 A 1600 A 2500 A	-	-
8M	400 A 1000 A 1600 A 2500 A	400 A	630 A
12M	1000 A 1600 A 2500 A	1000 A 1600 A	630 A 1600 A
16M	1000 A 1600 A 2500 A	1000 A 1600 A 2500 A	-
20M	1000 A 1600 A 2500 A	1600 A 2500 A	-

connection can be selected as incoming feeder for the DIN normed busbars.

Outgoings

Switchboard outgoing apparatus can be configured to fit network and customer demand from the following components:

- Fuse switch disconnectors (63...630 A)
- Moulded case circuit breaker (Tmax series)

Add-ons

As an add-on, surge arresters can be selected to LVS 2 with InLine DIN fuse lists.

At the DIN rail above the busbars, various types of apparatus can be mounted.

Equipment

LVS 3



General

LVS 3 is a freestanding low voltage switchboard, as it is designed with a framework. The switchboard consists of the frame made of 2 mm galvanized steel, a base plate with the busbars for fuse lists mounting, as well as a plate for cable support and system earthing. Furthermore, there is a top section with room for the incoming breaker, street lighting equipment, measuring equipment and other apparatus to be mounted at a DIN rail.

Busbars

The busbars are available in lengths of 12, 16 and 20 modules (1 module = 100 mm). The rated current depends on the type of busbar selected. In order to easily expand the switchboard with more fuse lists, the DIN normed busbars are mounted with insert nuts. The fuse lists are also easily mounted on Kabeldon and Z-busbars.

Incoming feeder

For LVS 3 the incoming feeder is placed above the busbars. Incoming apparatus can be configured from ACB (Emax, Emax 2), MCCB (Tmax), or LBS (OT) product. Apparatus ratings are configurable from 1000 A to 5000 A.

Busbar	DIN	Kabeldon	Z-busbar
12M	1000 A		1600 A
	1600 A	1000 A	2500 A
	2500 A	1600 A	
	4000 A		
	5000 A		
16M	1000 A	1000 A	-
	1600 A	1600 A	
	2500 A	2500 A	
	4000 A		
	5000 A		
20M	1000 A	1600 A	1600 A
	1600 A	2500 A	
	2500 A		
	4000 A		
	5000 A		

Outgoings

Switchboard outgoing apparatus can be configured to fit network and customer demand from the following components:

- Fuse switch disconnectors (63...630 A)
- Moulded case circuit breaker (Tmax series)

Add-ons

As an add-on, surge arresters can be selected to LVS 3 with InLine fuse lists.

At the DIN rails in the top section, various types of apparatus can be mounted.

Equipment

Tmax – molded case circuit breakers

General

Tmax family is available as a complete range of molded case circuit breakers, up to 1600A. All the circuit breakers, both three-pole and four-pole, are available in the fixed version, XT1, XT2, XT3, XT4 and T5 in the plug-in version and XT2, XT4, T5, T6 and T7 in the withdrawable one as well. Within the same frame size, the circuit breakers in the Tmax family are available with different breaking capacities and different rated uninterrupted currents.

Outstanding performance

The electric arc interruption system used on the Tmax circuitbreakers allows the short-circuit currents of very high value to be interrupted extremely rapidly. The considerable opening speed of the contacts notably limits the value of the specific let through energy I^2t and the current peak.

Remote control and supervision

Circuit breakers of the Tmax family can be remotely commanded in opening and closing, even by means of bus communication. All status, alarms and measurements performed by the breakers can be sent through local or system buses to supervising systems.



Equipment

Emax 2 - air circuit breakers

General

Emax 2 family is available as a complete range air circuit breakers, up to 6300A. All the circuit breakers, both three-pole and four-pole, are available in the fixed and withdrawable versions. All Emax 2 circuit breakers share the same accessories and the same trip units along all the four physical frame sizes.

Outstanding performance

The SACE Emax 2 enables switchgear of compact dimensions and high ratings to be built with bus-bars of reduced length and cross-section. The rating levels are updated and uniform throughout the sizes to meet the demands and needs of today's installations, from 42 kA to 200 kA, and to standardize switchgear projects. High short-time currents, together with the efficiency of the protection functions, guarantee complete selectivity in all situations.

Accurate design and choice of materials enable optimization of the overall dimensions of the circuit breaker. In this way switchgear of compact dimensions can be built, and outstanding savings at the same performance can be obtained.

Remote control and supervision

Emax 2 circuit-breakers can be equipped with communication units available for use with Modbus, Profibus, and DeviceNet protocols as well as the modern Modbus TCP, Profinet and EtherNet IP protocols. Furthermore, the integrated IEC61850 communication module enables connection to the substation automation world.



Equipment

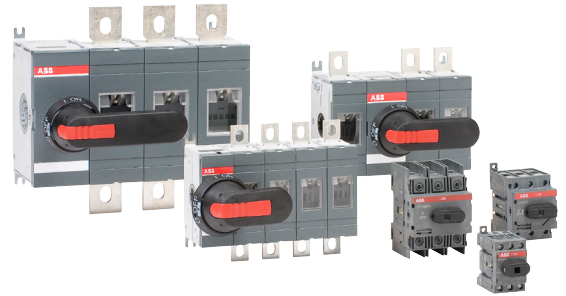
OT - switch disconnect

Optimal size, easy to install

OTs provide the most compact switch-disconnecting solution. This is possible thanks to a uniquely short current path that runs straight through the switch when in closed position. Also, the double-spring construction in the mechanism and double-openings in the power poles contribute to a uniquely simple, compact design. ABB's switches, therefore, have a small footprint area, taking less valuable space, and allow installation in confined spaces. Simple and compact, the OTs are straight forward and easy to install. Space savings mean savings in total cost, and easy installation saves valuable time.

Outstanding performance

Despite their compact size, the OT switch disconnectors are designed for high performance. Most of the OT AC switch disconnectors have full AC-23A current ratings for voltage levels up to 690 V, and even 1000 V ratings are provided. The powerful mechanism of ABB's switch disconnectors provide "quick-make, quick-break" operation that is independent from users operating speed. The full thermal-current ratings are sized for both open-air and use in enclosures, so there is no need for derating the switch or increasing the size of the enclosure or cabinet. The strong performance makes OT switches suitable for a diverse range of applications.



Equipment

InLine - vertical fusegear

General

The InLine family consist of fuse rails, single- and triple pole manually operated fuse switch disconnectors from 160 A up to 1250 A. In addition, the family consist of several types of incoming units to complete the product family for utility applications.

Outstanding performance

The InLine family of fuse switch disconnectors are made for DIN NH size fuses according to IEC 60269-1-2. Because the fuse elements operate inside a ceramic housing, and do not have any mechanism inside to be maintained, they are less affected by the surroundings. Consequently, InLine fuse switch disconnectors remain stable as short circuit and overload protection year after year. Another huge argument for InLine fuse switch disconnectors in utility networks is the easy and reliable selectivity calculation. Fuse links will assure selectivity in the installation if it is 1,6:1 difference inbetween the upstream/downstream currents. With this consideration, only the fuse nearby the fault will trip and the upstream fuses will still be live. If a fuse is blown inside an InLine product, only the fuse link has to be changed to restore the system. InLine and its material and functional constructions are made with the highest consideration regarding safe operation and easy for the operator to change a fuse that has blown without touching any live parts. The InLine product family is maintenance free.

Remote control and supervision

The InLine range is manually operated; however, with many options for supervision. Electronic Fuse Monitoring (EFM) with local indication via LEDs and an option for remote supervision. The EFM is self-supplied i.e no need for aux. power. Position indicators are available as accessories - both aux. switch and micro switches for the complete range. Current transformers can be mounted on either the rear side of the fuse base, or at cable connection area. Amp. meter housing can be fitted easily on top of each unit.



Equipment

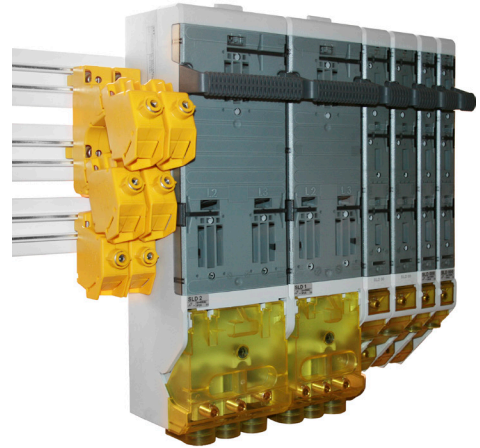
Kabeldon

General

ABB Kabeldon fusegear system is an advanced and unique system to provide customers additional values through increased safety, shorter assembly times and compact design. The fusegear system is attached to specially designed insulated busbar. The busbar system is available from 400 A up to 2500A. The ABB Kabeldon fusegear family includes a wide apparatus range to cover industry needs including:

- Connectors
- Disconnectors
- Switches
- Fuse switch disconnectors
- Fuse switches
- MCCBs

The combination of the above apparatus and ratings provide solutions to address complexity and flexibility. The product range is proven in the field and tested according to relevant standards.





Recycle/environment

The CSS range is produced in accordance with ABB's stringent quality and environmental procedures. ISO 9001 and ISO 14001 certification guarantees quality and environmental considerations.

ABB works to develop and supply products and solutions that do not have any unnecessary impact on the environment are safe to use and can be recycled, reused or disposed of safely. In our research and development we aim to produce sustainable technologies, systems and products.



Notes



Notes

abb.com/contact-centers
abb.com/mediumvoltage