PRODUCT CATALOG

UniPack-S

Steel Compact Secondary Substation

The UniPack-S provides a sustainable, flexible solution with a state-of-the-art design.

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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-S is a Compact Secondary Substation (CSS) suitable for harsh environment with robust design to offer different layouts as per 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 prefabricated 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-S CSS offers a type-tested solution with remote monitoring and switching for equipment protection and selectivity in predesigned 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-S can be delivered with wide variety of special equipment for railway, EV and e-Bus infrastructure.

CSS design evolution

The Compact Secondary Substation market was created when distribution utilities started to move from overhead to underground power lines. With cables underground, the traditional, large step-down substation (with its overhead lines) became impractical. Customers now require 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, 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 inter-nally 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 sig-nificant. 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 ex-pensive 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 impacting budgets. ABB recognized that customers needed a new steel CSS enclosure solution. Ideally, it would be robust enough to protect the inside equipment, while being lightweight enough to be easily transported, even to remote locations. To fulfill this need, ABB developed a robust and lightweight steel CSS platform. The platform is suitable not only for housing the CSS, but also for housing a wide range of other electrical equipment. In addition, effective ventilation design and different design options for IP classes make it appropriate for cold, as well as warm climates. Enclosure corrosion class up to C5 makes it suitable to install CSS in locations with different weather conditions. This product range is called UniPack-S, where S stands for steel.

UniPack-S
The UniPack-S design has been tested to the highest safety standards in the GB and IEC ranges for CSS applications. The standard CSS design has passed the internal arc classification (IAC-AB) test, which ensures that it provides highest level of safety for the public and operating personnel.

The supply of electricity to rural locations is a challenge to utilities. The UniPack- S makes it easier to supply, due to its robustness and light weight. Onsite installation and material handling efforts are also minimal. Additionally, the UniPack-S is easier to transport over longer distances and requires less lifting effort.

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 of equipment being as maintenance free as possible. 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.

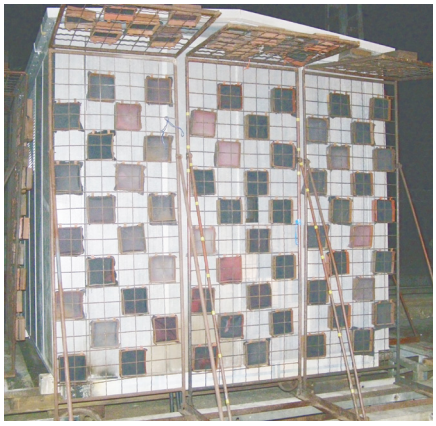
In 2001 a unification of standards related to switchgear started within the IEC. All of the standards, dealing in one way or another with medium voltage switchgear, adopted the numbering IEC 62271 with the addition of the different parts depending on the components in fact. In 2006, the standard for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

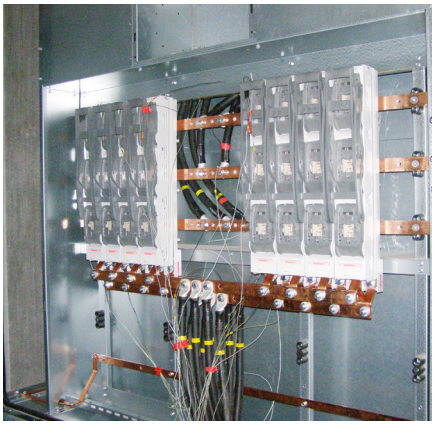
The IEC 62271-202 standard focuses on service conditions, rated characteristics, general structural requirements and test methods on MV/LV or LV/MV CSS units, which are cable-connected to the network and operated from both inside or outside. They are accessible to the general public and have a rated 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 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 expectance 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-S 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 the 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
Standard UniPack-S housing is made of galvanized sheet steel which ensures higher corrosion protection than painted black steel.

Galvanized metal parts are pre-treated and further coated to ensure maximum protection to different outdoor and harsh environments.

It is important to have a robust steel CSS housing to meet the outdoor environmental conditions and to ensure mechanical stability of housing in case of arc fault.

The building is painted with a coat of pure polyester powder coating. Corrosion tests show that the surface treatment of painted materials corresponds to corrosion category C4 H according to ISO 12944. Corrosion protection in the form of hot-dip galvanized sheet steel guarantees a long mechanical service life.

Ventilation
Natural and effective ventilation is provided by means of ventilation openings for air intake in doors and or ventilation wall elements.

Hot air gets extracted from the ventilation louvers provided on top side. Natural air circulation ensures sufficient cooling of the distribution transformer.

ABB has designed an efficient ventilation system which provides low temperature class of enclosure which reflects on the better performance, lifetime and effectiveness of the transformer usage based on limiting temperature rise of the transformer. Lower temperature class of enclosure is highly recommended in the very hot areas and CSS transformer which is continuously heavily loaded.

On request, ABB can perform thermal simulation for optimized lifetime of CSS intend to use for hot climatic condition and or complex application.

Roof
UniPack- S CSS provides a separate roof for the MV switchgear compartment, LV switchboard compartment and transformer compartment.

The transformer roof has a detachable facility which enables easy installation and transformer maintenance, ensuring easy handling of the roof during transformer installation. As the MV and LV compartment roofs are separated from the transformer roof, other equipment is not exposed to the climate, in cases when the transformer is being installed onsite.

The roof is available in two different slopes:
- Standard roof slope of 6 degrees
- Special slope of 18 degrees for heavy snow weather conditions

The roof is designed to support an equally distributed load of minimum 250 kg/m^2.

Doors
UniPack-S doors are made of pre-galvanized sheet steel. It's robust construction prevents unauthorized access, ensure protection of inside equipment by providing better IP class as well as protect general public in case of internal arc fault.

Doors as standard are equipped with stainless steel hinges to ensure high corrosion protection and rigidity to reduce bending.

CSS doors have 2 point locking or 3 point locking, depending on variants. 3 point locking provides better functionality and safety.

The UniPack-S 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 get the attention of the operator to follow safety measures, as well as to prevent accidental entry into the transformer compartment. The walk in CSS can be supplied with an internal door handle as well as a panic handle.

Compartmented design and layouts
The compact substation is divided into compartments, one for the MV switchgear, LV switchboard and distribution transformer. Walk-in type CSS can have MV and LV equipment in the same compartment with sufficient space to operate and maintain equipment from inside of the CSS. This operating space 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. Other transformer types (ie dry type) are available on request.

CSS types
The UniPack-S 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

CSS 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
- High safety design provides safety to equipment, personnel and environment
- UniPack-S layouts are internal arc tested according to IEC 62271-202
- Compartmented design and isolated compartment with padlocakable doors for easy access
- Complete factory-delivered solution with only external connection to be done at site, resulting in significantly reduced installation time
- Can be connected to SCADA system or be ready for smart grid networks
- Robust design, factory routine tested and type tested products so the performance and function will not be insensitive to variance
- Increased corrosion resistance
- Lightweight, optimized transportation allow for ease of installation
- Oil collection pit included, providing protection against oil pollution in case of transformer leakage
- Wide portfolio covering all the CSS applications, from generation level to secondary distribution kiosks, available in different arrangements

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01 Galvanized steel – requires separate oil pit

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

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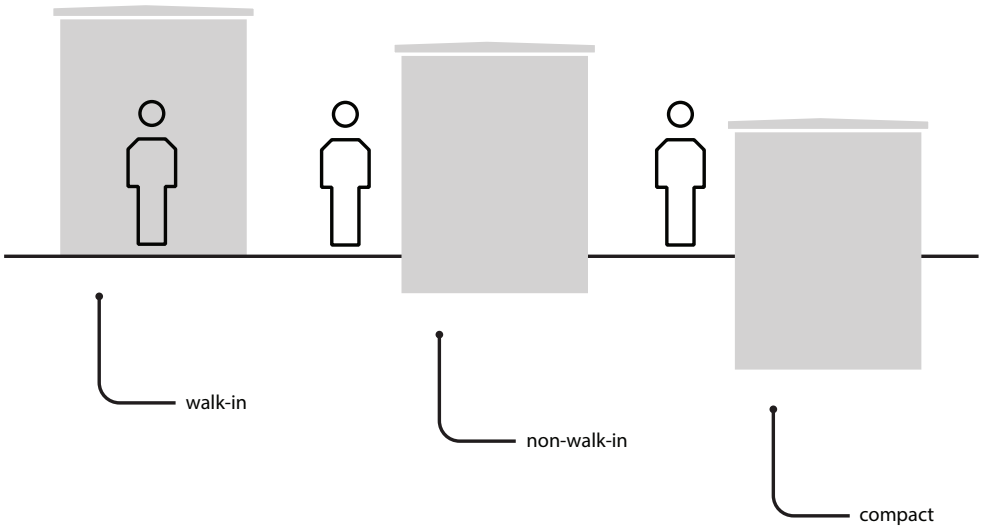
3 Compact – has integrated oil pit and can be mounted directly to ground

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.

Standard layouts

A Compact Secondary Substation is a type-tested assembly comprised of an enclosure containing medium voltage switchgear, a distribution transformer, a low voltage switchboard, connections, and auxiliary equipment to transform energy from medium to low voltage system.

Features

- High level of safety for equipment and personnel:
- Type tested as per the latest standard IEC 62271-202
- No access to live parts
- All equipment inside CSS is type tested as per their relevant standard
- Engineered footprint to meet the required clearance standards
- Oil collection pit underneath the transformer
- Can be lifted with the transformer installed
- Designed with natural cooling and smooth air flow
- Locking system for all doors prevent unauthorized entry of personnel
- Stainless steel hinges for corrosion resistance
- The enclosure has a compartmented design and the operation activities are done from outside the enclosure

Equipment description

The CSS is designed and manufactured to accommodate the medium voltage switchgear, distribution transformer and low voltage switchboard as per the following:

Medium voltage switchgear up to 36kV, with difference options from ABB's SF6 gas-insulated secondary switchgear type SafeRing or SafePlus,or SafeLink or air-insulated secondary switchgear type UniSec, or air load break switches type NAL/NALF.

The dry and oil type transformer can be installed inside the transformer compartment, the transformer rating for the oil type transformer is up to 3500kVA. The transformer compartment design provide smooth air flow and natural cooling in order to meet the temperature rise requirement as per IEC standard.

The low voltage switchboard is type tested as per latest IEC standard, and it is possible to use different types of switching devices, Breaker (ACB or MCCB) or fuse switches.

There are various numbers and ratings of low voltage feeders depending on transformer size and customer needs. Special LV equipment is also available upon request.

Optional equipment

- Devices for metering and control circuit are available
- The communication equipment and interfaces for easy connection to any SCADA system through the standard communication protocols
- Remote Terminal Unit (RTU) to monitor the CSS and store the data for operation, maintenance, and fault analysis
- Local and remote monitoring and commands are available

Installation

The delivered unit is a factory tested solution ready for installation so there is no complicated civil engineering job or task is needed, only a cast concrete foundation plinth should be ready at the installation site.

The factory tested solution is delivered directly to the installation site and the necessary lifting provision for moving the substation are also equipped with the CSS.

Only external connection to be done at site, resulting in significantly reduced installation time. For detailed information, please see the installation manual.

Standard layouts

Description	UniPack-S Standard Layouts (Mercury, Terra, Mars, Pluto, Saturn, Luna)
Max KVA	Up to 3500
Type of layout	Please check with feeder factory
Rated voltage (kV)	Up to 36 kV
Short circuit withstand current of internal earthing network	Up to 21kA/1s
Overall dimension of substation (LxWxH)	Please check available options with your local ABB contact person
Weight of substation excluding transformer (approximate)	Please check available options with your local ABB contact person
Transformer compartment dimension (LxWxH)	Please check available options with your local ABB contact person
Maximum transformer load losses/ No load losses to be installed	Please check available options with your local ABB contact person.
Transformer compartment IP protection degree (min/max)	IP 23D (Optional: up to IP 45)
MV/LV IP compartment protection (min/max)	IP43 / IP 54
CSS Enclosure Thermal class	10K, 20K
Maximum dimension of MV compartment	12/24/36 SafeRing, 12/24 SafeLink, NAL-12 kV SWG , UniSec
Maximum dimension of LV compartment	LVS3 - Up to 20M or equivalent
MV cabeling	The connecting cables can be from Al or Cu according to customer request. If not specified, than the cross section is selected to fulfill short circuit requirement of the arrangement.
MV terminations	The connecting cables can be equipped with pre-molded /cold shrink/ heat shrink cable heads upon customer request.
LV connection to transformer	Busbar sized according to the rated power of transformer.
Rated voltage of LVS panel	Up to 800 V
Rated current of LVS panel	Up to 5000 A
Rated short circuit withstand capacity of LV Busbar system	Up to 66 kA/1s

Standard layouts
Types of layouts

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01 Mercury
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02 Terra
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03 Pluto
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04 Mars
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05 Luna
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06 Saturn

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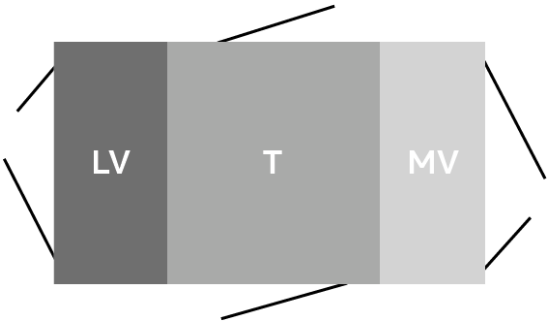

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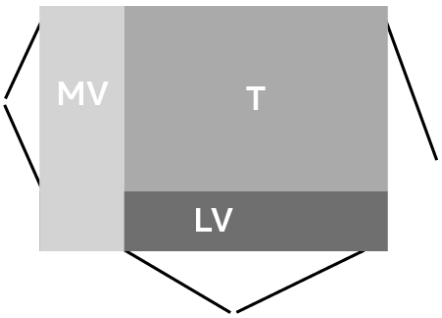

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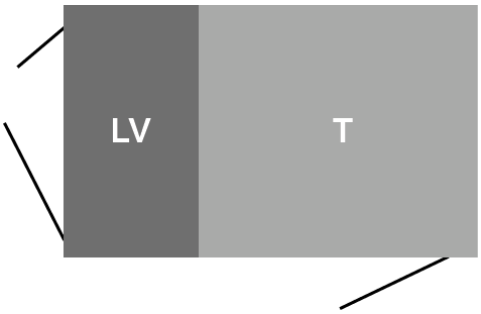

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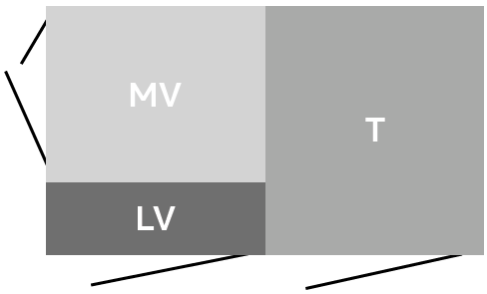

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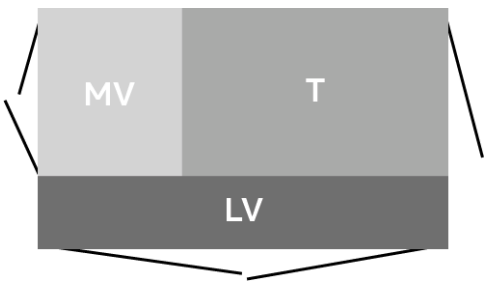


Enclosure add-ons

Protection degree
Medium voltage and low voltage compartments are rated with IP43 as the minimum. IP54 is offered as an add-on solution. The correct IP class will assure stable and controlled conditions inside The MV and LV compartments. The degree of protection of the transformer compartment, including doors and ventilation openings, is at least IP23D. Higher degrees of protection (IP35 or IP45) for transformer compartment can be provided on request, when better protection against ingress of insects, reptiles, etc., or horizontal rain driven by wind is needed.

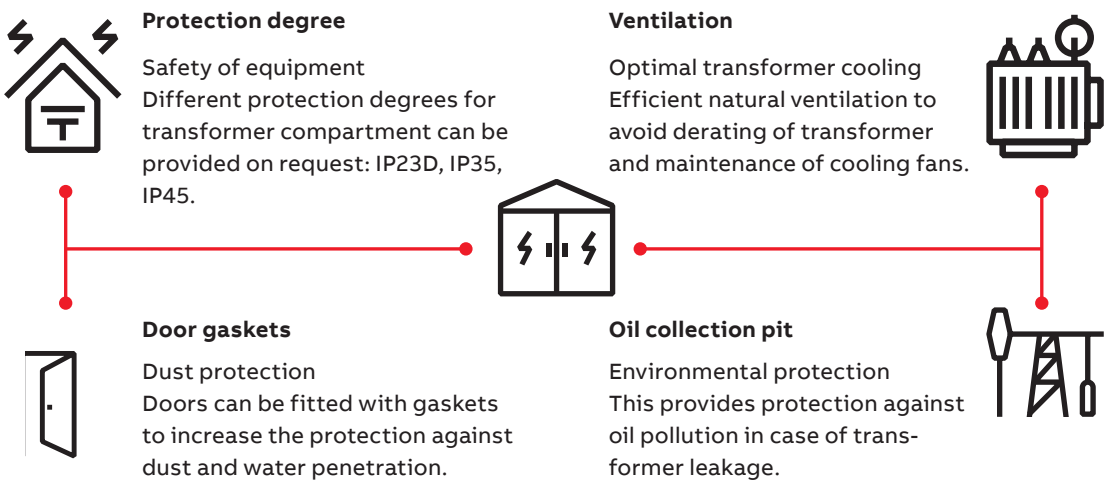
Ventilation
Natural ventilation is provided by means of ventilation louvers for air intake and extraction in the doors or ventilation wall elements. Natural air circulation ensures sufficient cooling of the transformer. As a standard, UniPack-S CSS is classified and type tested in accordance with temperature class 10K to 20K.

Door gaskets
To provide protection against dust being drawn into the MV and LV compartments, the doors can be fitted with gaskets that increase the degree of protection.

Oil collection pit
The 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 galvanized steel for non walk-in and walk-in stations can be supplied as an add on. The oil pit has sufficient capacity to collect transformer oil which ensures oil should not create spillage directly to the environment in case of transformer leakage.

As a standard, all concrete compact substations have an oil collection pit, which can accommodate a sufficient amount 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 transformers.



Smart Grid compatibility

Automating secondary substations can improve fault detection, isolation and restoration, voltage regulation, load balancing in the network through line switching, and protection of secondary substation assets and field personnel. ABB offers a range of solution levels (additive) from monitoring of MV switches to full protection of equipment.

Level 1 is the basic solution, including monitoring of the entire secondary substation and current and voltage and energy measurement on the low voltage side.

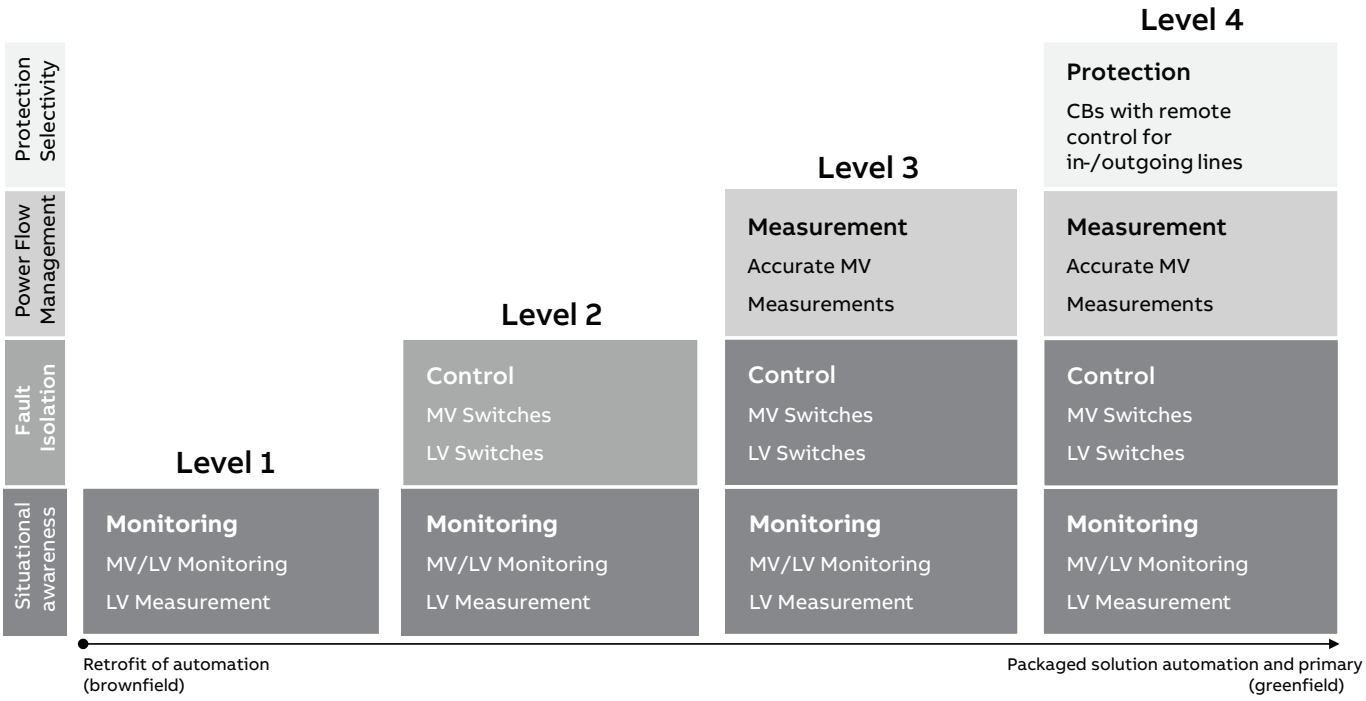
Level 2 comprises all functions of the level 1 with the additional control of medium and low voltage primary apparatus.

Level 3 rises all functions of the level 2 with the addition of accurate current, voltage & energy measurement on MV side.

Level 4 comprises all functions of the level 3 with the addition of protection functions with breakers in incoming and / or outgoing feeders. This is the most technically complete solution.

Additional benefits for utilities and energy consumers are:

1. Improved quality of the power supply
2. Less and shorter outages and improved voltage quality
3. Enhanced operational efficiency and network stability
4. Improved tools for the network operators and the field crews
5. Less need to travel to locations with difficult access



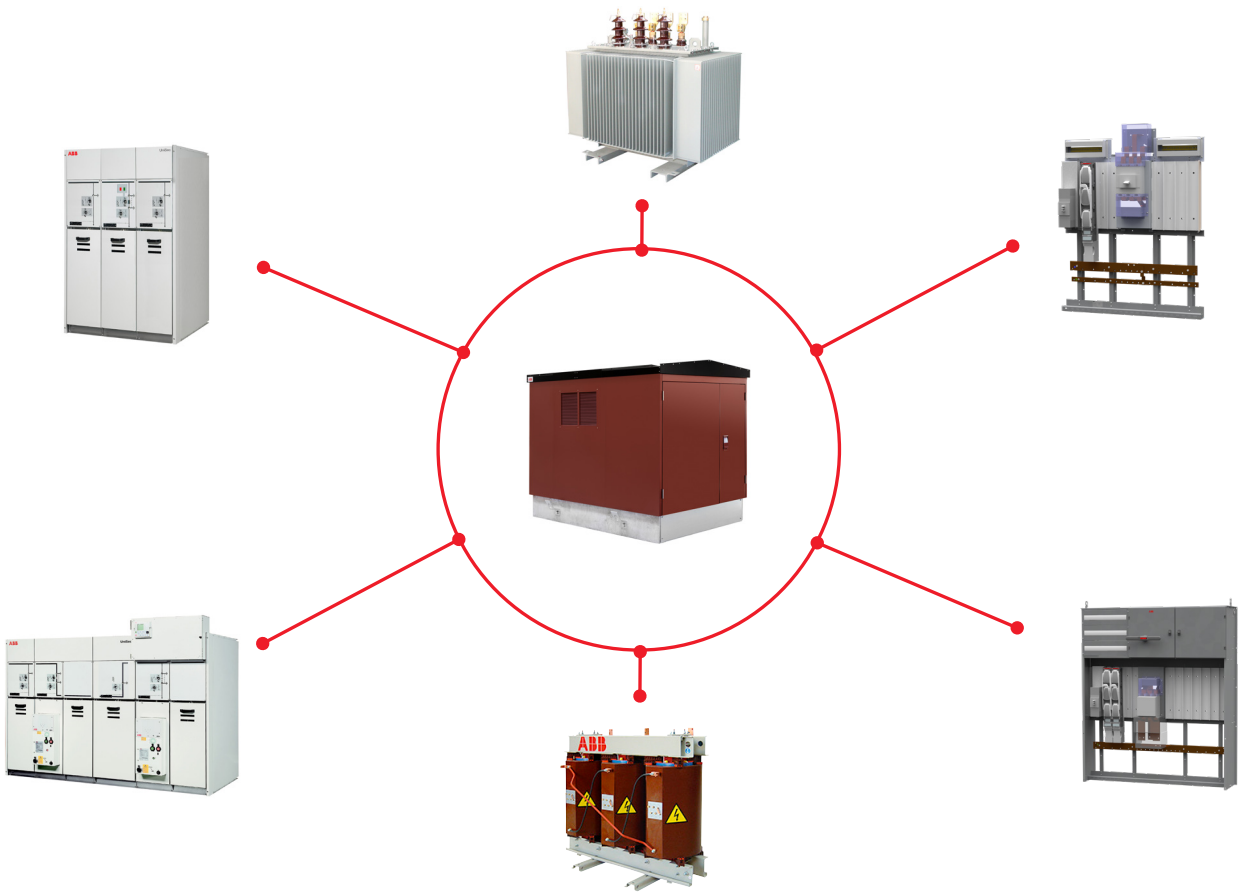
Equipment

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

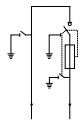
Available SafeRing modules

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

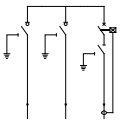
Available SafePlus modules

C	Cable switch
De	Direct cable connection with earthing
D	Direct cable connection
F	Switch fuse disconnector
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
Depth: 765 mm
Width: 696 mm
Height: 1336 mm

CCV
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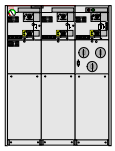
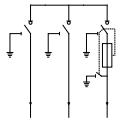
Height: 1336 mm

CCF
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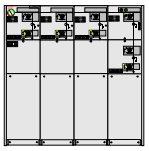
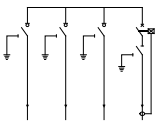
Width: 1021 mm
Height: 1336 mm

CCCV
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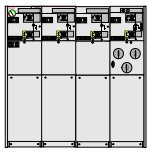
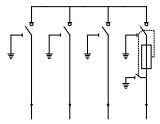
Width: 1346 mm
Height: 1336 mm

CCCF
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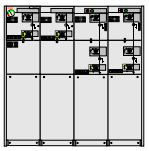
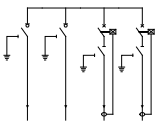
Width: 1346 mm
Height: 1336 mm

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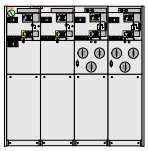
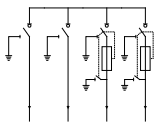
Height: 1336 mm

CCFF
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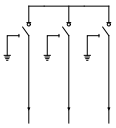
Width: 1346 mm
Height: 1336 mm

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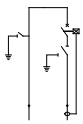

DeV
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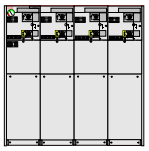
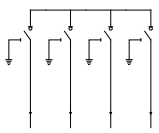
Width: 696 mm
Height: 1336 mm

CCCC
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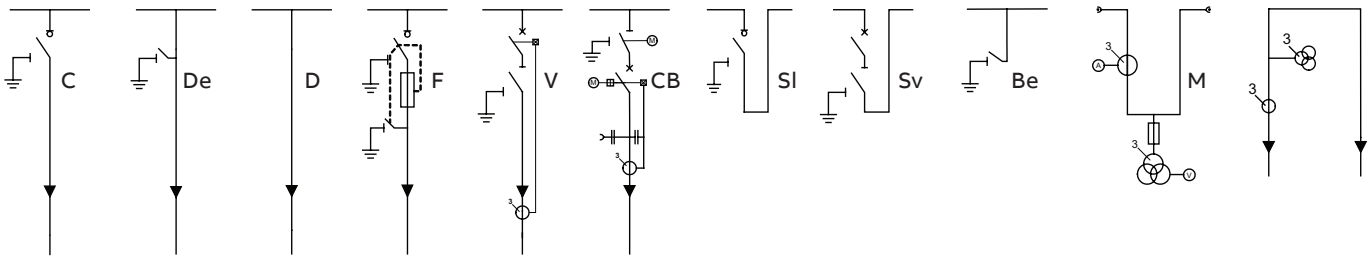
Height: 1336 mm



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 disconnector	Earthing switch	Switch-fuse disconnector	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	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	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	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	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	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
- SF_6 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

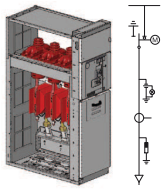
Code	Description	Width				
		190 mm	375 mm	500 mm	600 mm	750 mm
SDC	Unit with switch-disconnector		•	•		•
SDS	Unit with switch-disconnector – isolation		•	•		•
SDD	Unit with double switch-disconnector					•
SDM	Isolating unit with measurement with switch-disconnector					•
UMP	Universal Metering Unit					•
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

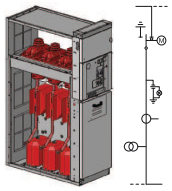
Equipment
UniSec

Units with switch-disconnector

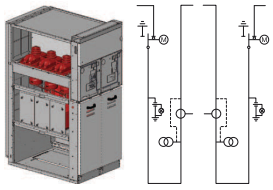
SDC
Incoming/outgoing



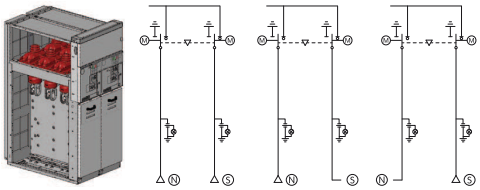
SDS
Coupler



SDM
Coupler with measure

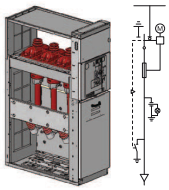


SDD
Double switch-disconnector

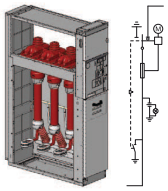


Units with switch-disconnector and fuses

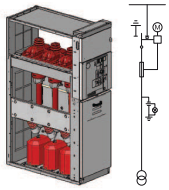
SFC
Outgoing



SFS
Coupler

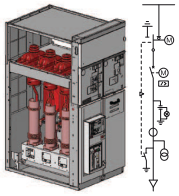


SFV
Measure

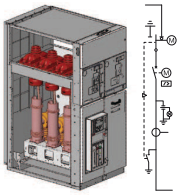


Units with switch-disconnector and removable or withdrawable circuit-breaker

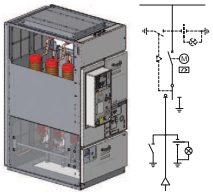
SBC & SBC-W
Incoming/outgoing



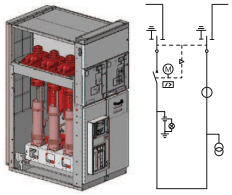
SBS and SBS-W
Coupler



SBR
Reversed feeder

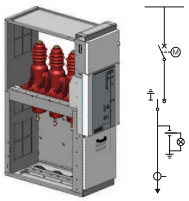


SBM
Coupler with measure



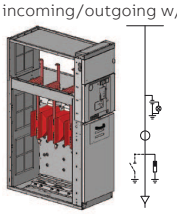
Unit with circuit-breaker and disconnector integrated

HBC Incoming/outgoing

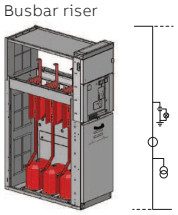


Other Units

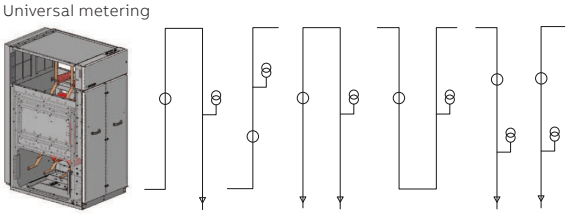
DRC Direct
incoming/outgoing w/o ES



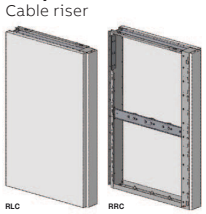
DRS
Busbar riser



UMP
Universal metering



RLC/RRC
Cable riser



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 limited 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	800	1000	690
Rated current I_n	A	1000 - 5000	400 - 1600	630 - 1900
Rated frequency	Hz	50 - 60	50 - 60	50 - 60
Degree of protection		-	IP2X	IP2X
Rated impulse withstand voltage U_{imp}	kV	>12	>12	>12
Rated insulation voltage U_i	kV	2.5	0.69	2.5
Rated peak withstand current I_{pk}	kA			
- 400 A busbar		-	55	-
- 630 A busbar		-	55	105
- 1000 A busbar		-	**50	-
- 1600 A busbar		*76	**85	-
- 1900 A busbar		-	-	105
- 2500 A busbar		*106	-	-
System earthing	TN-C: 4-wire system, earth connected PEN-bar			
	TN-C: 4-wire system, insulated PEN-bar			
	TN-S: 5-wire system, separate N- and PE-bars			

*800 mm busbars without fuse lists
**1000 mm busbars without fuse lists

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.

LVS 2 - 8M - DIN - 1000A

Switchboard type:
LVS 1
LVS 2
LVS 3

Busbar length:
5M
8M
12M
16M
20M

Busbar type:
DIN
Kabeldon
Z/Busbar

Rated current:
400
1000
1600
2500

Equipment
LVS 1

Busbar	DIN	Kabeldon	Z-busbar
5M	1000 A 1600 A	400 A 630 A 1000 A	630 A
8M	1000 A 1600 A	400 A 630 A	630 A
12M	1000 A 1600 A 2500 A	630 A 1000 A 1600 A	1900 A
16M	1000 A 1600 A 2500 A	1000 A 1600 A	1900 A
20M	1000 A 1600 A 2500 A	1600 A	1900 A

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.

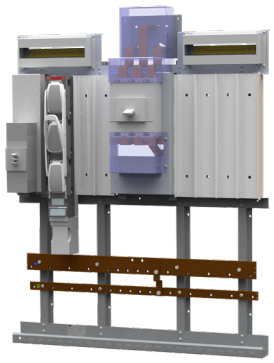
Busbars
The busbars are available in lengths of 5, 8, 12, 16 and 20 modules (1 module = 100 mm). The rated current depends on the type of busbar selected. In order to easily expand the switchboard with more outgoing feeders, the DIN normed busbars are mounted with insert nuts. More outgoing feeders are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

Incoming feeder
As standard for DIN and Z busbars, the incoming feeder is a fuselist disconnector 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 type OETL or MCCB type IsoMax with back connection can be selected as an 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)
- Air circuit breakers (Emax, Emax 2)
- 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



Busbar	DIN	Kabeldon	Z-busbar
5M	1000 A 1600 A 2500 A	-	630 A
8M	1000 A 1600 A 2500 A	400 A 630 A	630 A
12M	1000 A 1600 A 2500 A	630 A 1000 A 1600 A	1900 A
16M	1000 A 1600 A 2500 A	1000 A 1600 A	1900 A
20M	1000 A 1600 A 2500 A	1600 A	1900 A

General
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 disconnector 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 type OETL or MCCB type IsoMax with back 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)
- Air circuit breakers (Emax, Emax 2)
- 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.

In order to increase the personnel safety, a cover of the cables and system earthing can be selected. The cover is made of a 1.5 mm galvanized steel plate with two handles and guides.

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

Equipment
LVS 3

Busbar	DIN	Kabeldon	Z-busbar
12M	1600 A 2500 A 5000 A	1600 A	1900 A
16M	1600 A 2500 A 5000 A	1600 A	1900 A
20M	1600 A 2500 A 5000 A	1600 A	1900 A

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. The cover color of the top section is RAL 7035.

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 (OETL) product. Apparatus ratings are configurable from 1000 A to 3150 A.

Outgoings
Switchboard outgoing apparatus can be configured to fit network and customer demand from the following components:
- Fuse switch disconnectors (63…630 A)
- Air circuit breakers (Emax, Emax 2)
- Moulded case circuit breaker (Tmax series)

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

In order to increase the personnel safety, a cover of the cables and system earthing can be selected. The cover is made of a 1.5 mm galvanized steel plate with two handles and guides.

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.

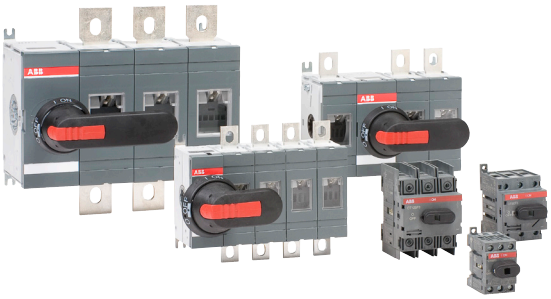
Outstanding performance
The SACE Emax 2 enables switchgear of compact dimensions and high ratings to be built with busbars of reduced length and cross-section. The rating levels are updated and uniform throughout the sizes to meet the demands and needs of today's installations, from 42 kA to 200 kA, 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 disconnector

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.

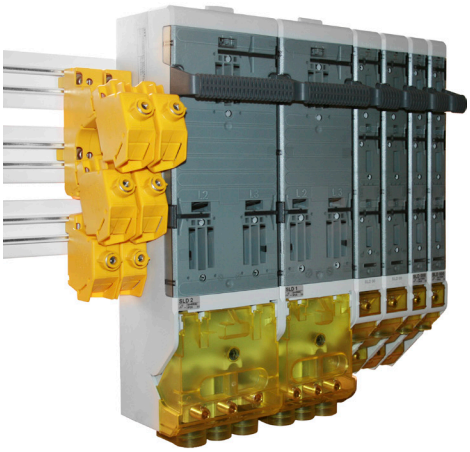
Remote control and supervision
The InLine range is manually operated; however, with many options for supervision. Electronic Fuse Monitoring (EFM) with local indication via LEDs and an option for remote supervision. The EFM is self-supplied i.e no need for aux. power. Position indicators are available 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

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

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