



Skid solutions

Product portfolio introduction

ELDS Packaging and Solutions



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Skid engineering solution

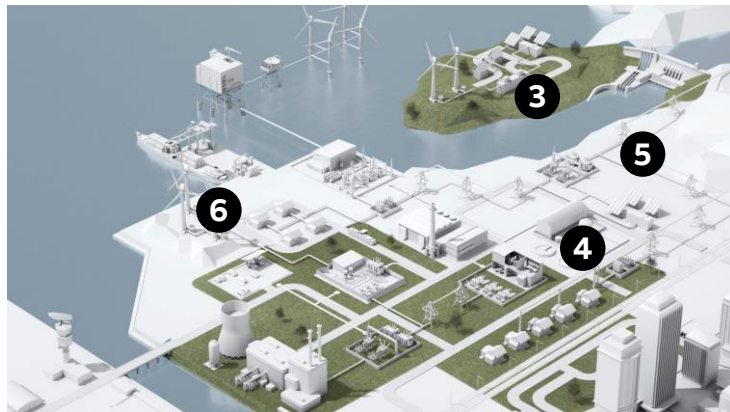
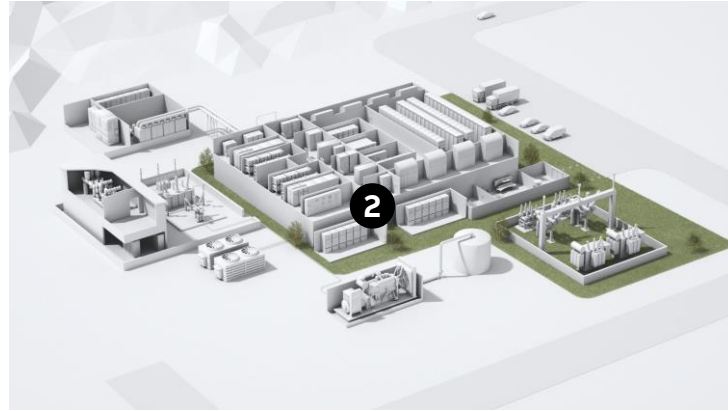
Resources



Landscape

Landscape

Skid solution



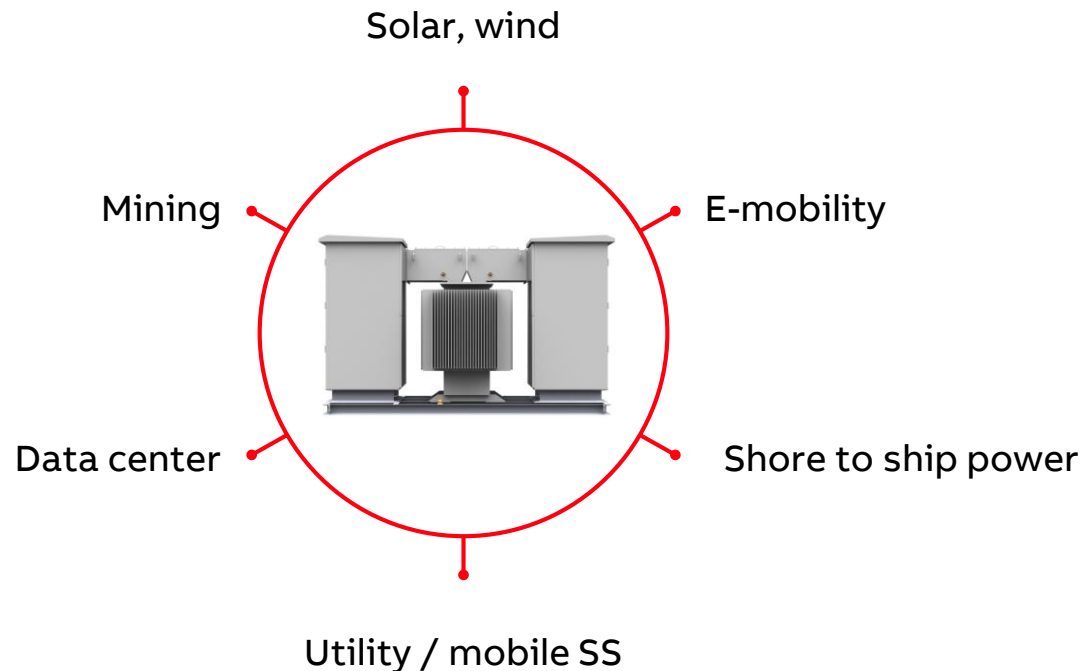
- ① Unit substation for mining
- ② Power module for data center
- ③ Unit substation for renewable
- ④ Energy storage module for microgrids
- ⑤ Unit substation for utility
- ⑥ Unit substation for shore to ship
- ⑦ Charging station for E-mobility



Skid application

Skid

Skids can be used in various applications



Outdoor skid

Prefabricated unit substation with power distribution components such as medium voltage, transformer, low voltage switchgear integrated **on the frame** for outdoor uses that are not environmentally controlled.

Indoor skid

Prefabricated unit substation with power distribution components such as medium voltage, transformer, low voltage switchgear, **on the frame**, for installation in a building.

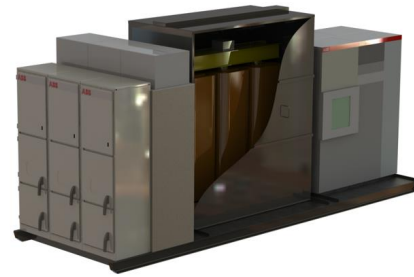
Skid

ABB Experience

Solar/wind



Data center



E-mobility



Mining



Oil and gas



Indoor skids for utility



Skid solutions

Solar

- Short project execution and short delivery time
- Projects are located in remote locations
- Solar plants are in places with high radiance
- Projects tends to be scalable

Segment challenges

-
- Standard offering
 - Factory assembled and routine tested
 - One piece delivery for minimized site works
 - Efficient cooling based an open air design with no additional HVAC required
 - No exposed live parts
 - Easy access for any repairs
 - Enabled with ABB Ability to provide predictive maintenance and remote management



Skid solutions

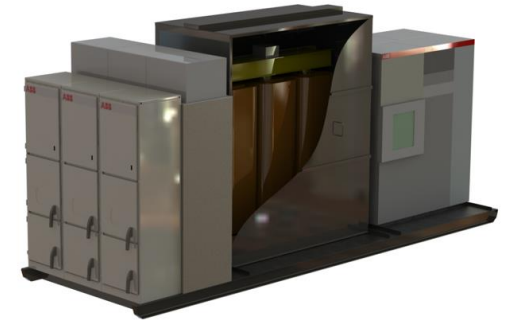
Data center

Segment challenges

- Extremely short project execution and short delivery time
- Customer preferred scalable electrical equipment to meet their various sizing needs
- Applications are constantly changing
- Need to understand how products interact with each other

How to address

-
- Skid unit is factory assembled and thoroughly tested - in a controlled atmosphere rather than on site
 - One piece delivery for minimized site works
 - Efficient cooling based on an open air design
 - Enabled with ABB Ability to provide predictive maintenance and remote management
 - Easy to move into place and install
 - Indoor or outdoor applications depending on data center design



Skid solutions

E-Mobility

Segment challenges

- Optimal to have the entire charging solution on a single skid
- Optimal to have a pre-engineered solution from MV to the charging plug
- Customer need to reduce installation time
- Design of substation and charging equipment has to adapt to existing parking spaces dimension
- Size, weight, dimension should provide ease of transportation and placement

How to address

- Lowest installation cost and time
- Enclosed solution for higher safety
- One piece delivery for quick and easy installation, including chargers
- It can be placed in a car parking space thanks to its compact dimensions
- Enabled with ABB Ability to provide predictive maintenance and remote management
- It can be equipped with either DC fast chargers or DC high power chargers





Skid components

What does a skid consist of?

Overview

Different components

The skid unit generally has these main components:

- MV switchgear - up to 40.5 kV
- Transformer - up to 5 MVA
- Low voltage switchgear or panels - Up to 1 kV
- Others - inverter, bus duct, EV charger, ESM

The equipment is designed and coordinated mechanically and electrically.

Electrical substation is mounted on skid which steps down/up to the useable voltage for customer system requirement.

Typical skid



What does a skid consist of?

Medium voltage

Different MV switchgear choices

The skid-mounted unit substation generally has:







Two MV switchgear categories

1. Primary class category
 - High power rating, 630 A-4000 A
 - High Short circuit rating, 25 kA-50 kA
2. Secondary class category
 - Lower power rating, 160-630 A
 - Lower short circuit rating, 16-25 kA

Insulating type

- A. Air-Insulated
- B. Gas-insulated
- C. Outdoor switches

Summary

| | A Air-insulated | B Gas-insulated | C Outdoor switches |
|--|--|---|---|
| 1 Primary class Up to 40.5 kV 630 A-4000 A 25 kA-50 kA | UniGear ZS series  | ZX series  | VersaRupter switch  |
| 2 Secondary class Up to 40.5 kV 160 A-4000 A 16-25 kA | UniSec series  | SafeRing/ SafePlus series  | LBOR switches  |

What does a skid consist of?

Transformers

Different transformer choices

The skid-mounted unit substation generally has several:

Transformer choices

1. Liquid filled transformers - oil-immersed, hermetically sealed, flexible corrugated tank walls or radiators
2. Dry type vacuum cast resin transformers - windings are epoxy resin casted under vacuum in avoids entry of moisture
3. RESIBLOC transformers - windings are hermetically wound ensure an even distribution of glass fiber rovings and epoxy resin without the use of a mold for maximum design flexibility.
4. Padmount transformers - oil-immersed, hermetically sealed, with either cable connection or with integrated LBOR switches suitable for ANSI installation

Photos

1



2



3



4



What does a skid consist of?

Low voltage switchgear and panel

Different LV switchgear and panel choices

The skid-mounted unit substation generally has several:

LV switchgear and panel choices

1. Power distribution panels - comes in various design and sizes, to satisfy requirements for reliable power distribution
2. ABB MNS low voltage switchgear and MCC - offers a plug-in, withdrawable unit technology. Arc flash protection provides operators the highest degree of safety
3. cESM - modular concept of a compact energy storage module (cESM) allows users to choose ratings in power and battery
4. GEIS Spectra Series® - NEMA3R style outdoor low voltage panelboard

Photos



What does a skid structure consist of?

Enclosure

Indoor/Outdoor enclosure

The skid-mounted unit substation generally has several:

Enclosure choices for electrical component

1. Indoor - electrical equipment can be supplied without enclosure with IP4x for indoor purpose, higher rating is available upon project requirement
2. Outdoor enclosure - electrical equipment can be supplied with general purpose enclosures which is suitable for outdoor environments
3. CSS - electrical equipment can be supplied in Compact Secondary Substation which is standardized and provides Internal Arc Classification (IAC-AB to IEC62271-202)
4. EcoFlex eHouse - electrical equipment can be supplied in EcoFlex which is a standardized modular solution. Robust and easily transported

Photos

1



3



2



4



What does a skid structure consist of?

Transportation facility

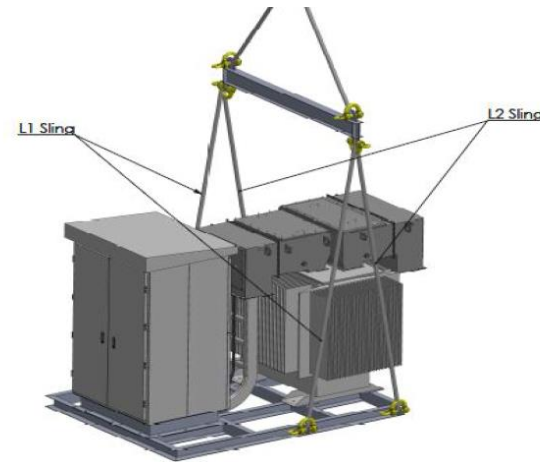
Different types of transportation

The skid has **two transportation methods**, depending on site operational requirements. The skid must be designed for the specific requirement:

1. The skid can be lifted and placed by crane on the concrete foundation. The substation is to be lifted from lifting brackets located as the base frame with the help of spreader and crane. The length of the four part lifting chain/sling is dependent on the actual size of the skid.
2. The skid can be dragged by tractor. Dragging is done by attaching the steel holding lines with hooks to the ends of the skids where the anchoring points are. Once the lines are attached the tractor moves the substation in to the other place in the pit. The surface is not even and conditioned. It is used in the open pit mining.

Summary of transportation choices

1 Lifting by crane



2 Dragging by tractor

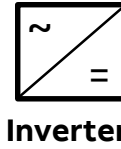
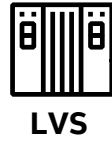




Offering

Offering overview

Scope (top level category)

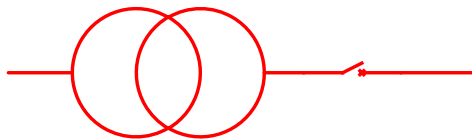
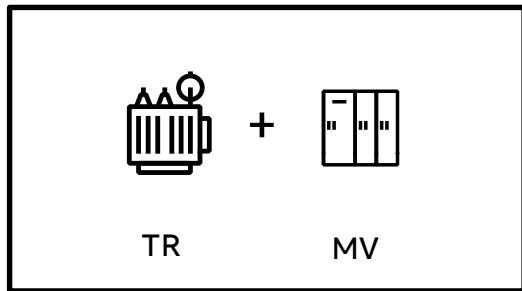


| | MV SWGR | Transformer | LVS | Inverter | cESM | CSS | EV charger | Special (free-issued) | IP ratings |
|-----------------------|---------|-------------|-----|----------|------|-----|------------|-----------------------|------------|
| A. SSU (MV station 1) | • | • | | | | | | | IP43/IP54 |
| B. SSU (MV station 2) | • | • | • | | | | | | IP43/IP54 |
| C. SSU (MV station 3) | • | • | • | • | | | | • | IP43/IP54 |
| D. SSU (MV station 4) | • | • | • | | • | | | | IP43/IP54 |
| E. SSU charger | | | | | | • | • | | IP43/IP54 |
| F. ISU | • | • | • | | | | | | IP4X |
| G. SSU ANSI | • | • | • | | | | | | NEM3R |

SSU MV station

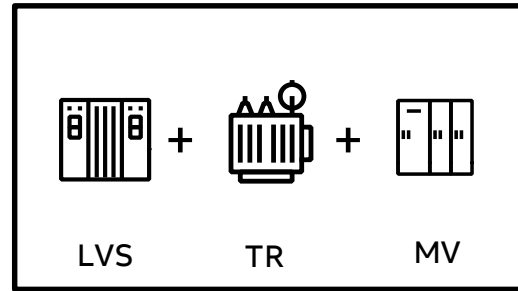
Detail portfolio and product description

1. SSU MV station



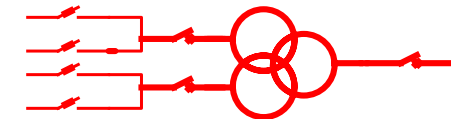
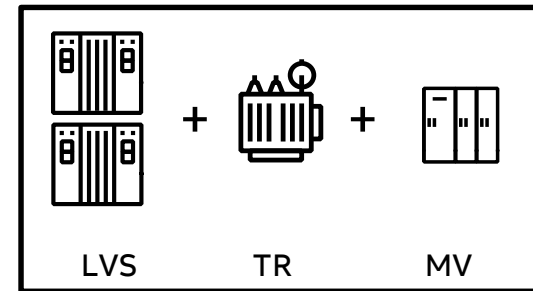
- RMU: 2.4 - 40.5 kV
- Trafo type: Oil/dry

2. SSU MV+LVS



- RMU: 2.4 - 40.5 kV
- LVS: 400-800 V
- Trafo type: Oil/dry

3. MV + 2 LVS

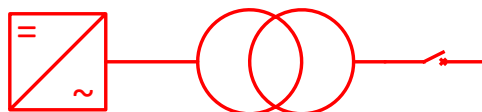
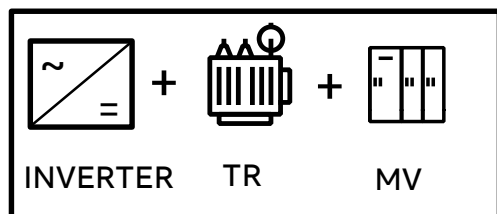


- RMU: 2.4 - 40.5 kV
- LVS: 400-800 V
- Trafo type: Oil/dry

SSU MV + INV

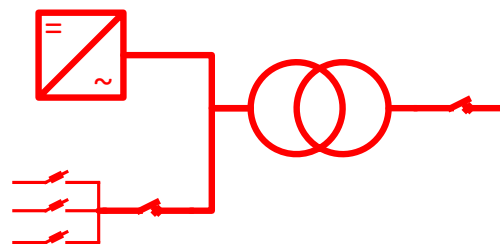
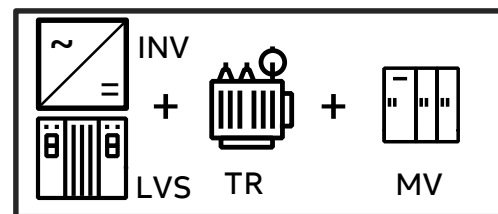
Detail portfolio and product description

4. MV + INV



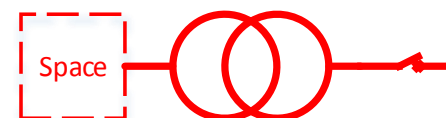
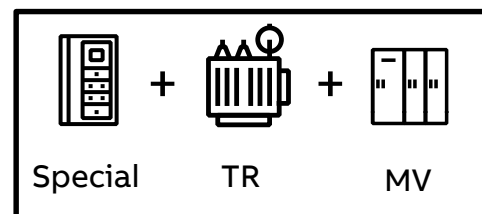
- RMU: 2.4 - 40.5 kV
- Trafo type: Oil/dry
- Inverter

5. MV + INV + LVS



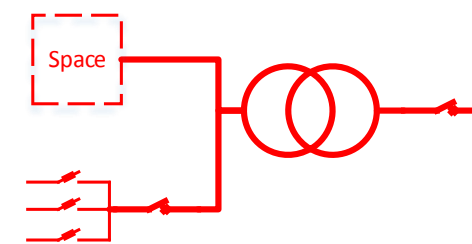
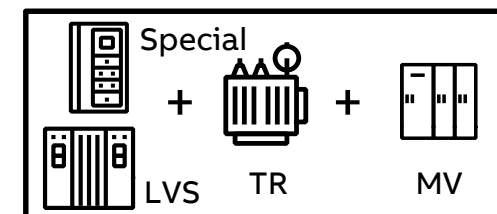
- RMU: 2.4 - 40.5 kV
- LVS: 400-800 V
- Inverter
- Trafo type: oil/dry

6. MV + SPACE



- RMU: 2.4 - 40.5 kV
- Space for free issued item
- Trafo type: Oil/dry

7. MV + LVS + SPACE

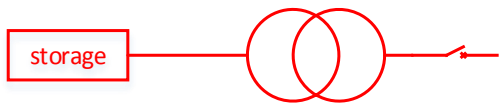
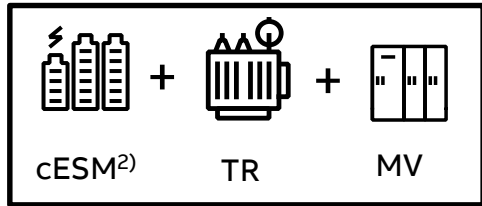


- RMU: 2.4 - 40.5 kV
- LVS: 400-800 V
- Space for free issued item
- Trafo type: oil/dry

SSU MV+ESM, charger

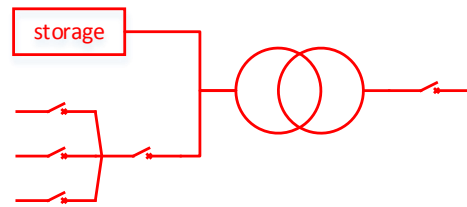
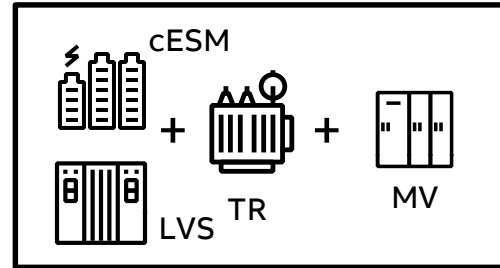
Detail portfolio and product description

8. MV + ESM¹⁾



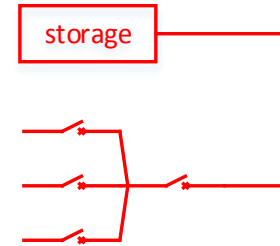
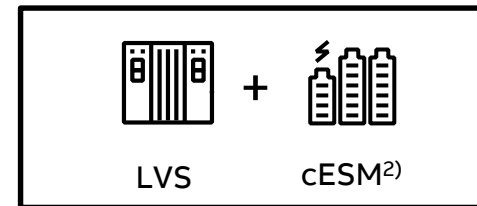
- RMU: 2.4 - 40.5 kV
- Trafo type: Oil/dry
- cESM: Compact energy storage module

9. MV + ESM + LVS



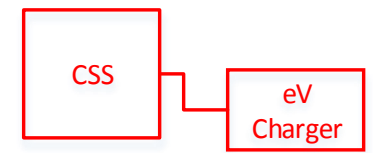
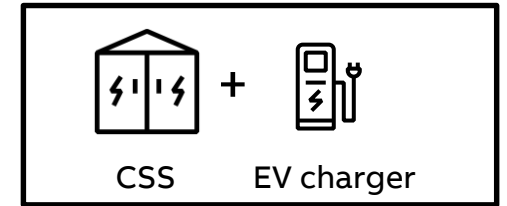
- RMU: 2.4 - 40.5 kV
- LVS: 400-800 V
- cESM: Energy storage module
- Trafo type: Oil/dry

10. LVS + ESM¹⁾



- LVS: 400-800V
- cESM: compact energy storage module

11. CSS + charger

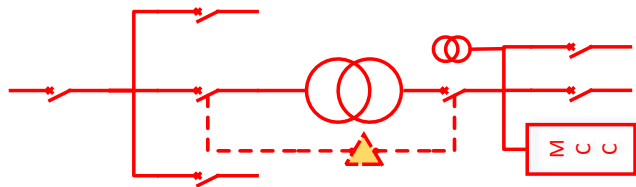
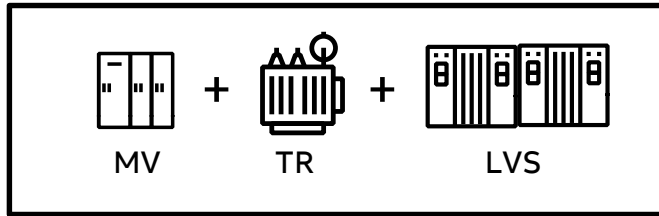


- CSS: compact secondary substation
- EV charger

ISU (Indoor Skid Unit)

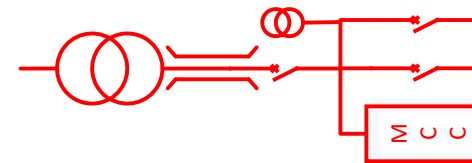
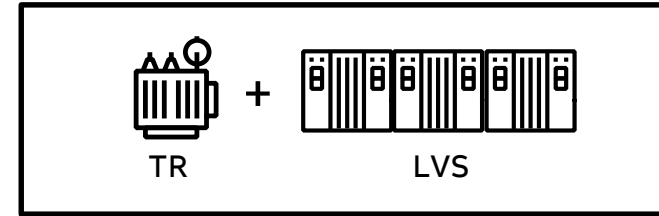
Detail portfolio and product description

12. ISU MV + TR + LV



- MV switchgear: up to 40.5 kV, 4000 A, 50 kA
- LV switchgear & MCC: 1 kV, 8000 A, 80 kA
- Dry type transformer
- Bus duct (option)

13. ISU TR + LV

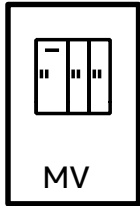


- LV switchgear & MCC: 1 kV, 8000 A, 80 kA
- Dry type transformer
- Bus duct (option)

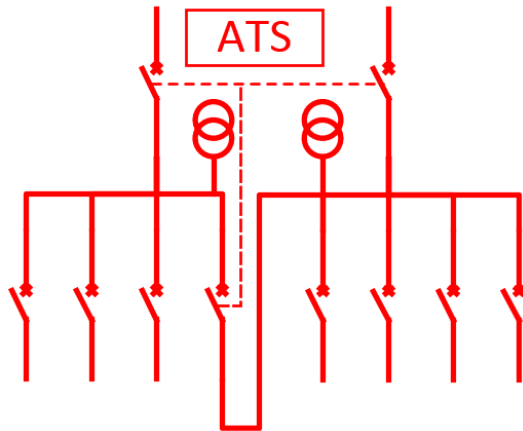
ISU (Indoor Skid Unit)

Detail portfolio and product description

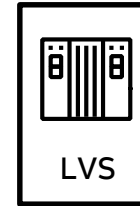
14. ISU MV



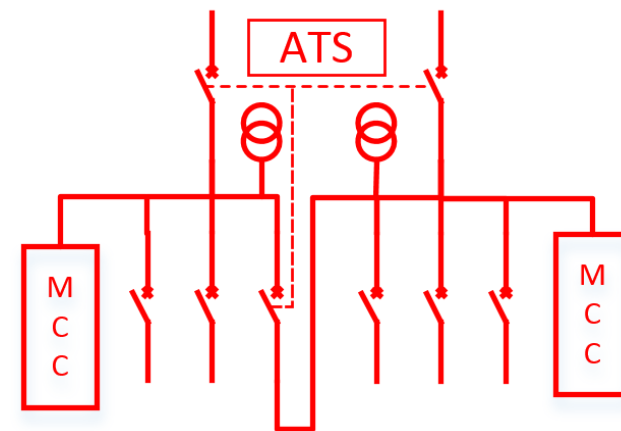
- MV SWGR: 3.6 kV – 24 kV, ~4000 A, 50 kA
- Full protection and communication
- Auto transfer system pre-tested



15. ISU LV

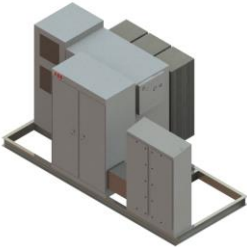


- LV SWGR and MCC
- Full protection and communication
- Auto transfer system pre-tested



SSU and ANSI-SSU

Values to customers



Simple and quick installation

Units are pre-designed, pre-tested and assembled at the factory, and shipped in one piece so it is simple to drop in place and connect cables. Open-air design allows easy access to equipment for quick installation procedures.

Pre-engineered products

Simple and modular concept with pre-engineered designs to be combined to meet project requirements. Pre-engineered units shorten design time, eliminating design errors.

One piece delivery

All electrical equipment installed in 1 frame to minimize site works and maximize pretesting and safety

Efficient cooling

Open-air design with natural air cooling allows maximum transformer cooling. There is no need to consider derating due to limited ventilation.

No exposed live parts

Although it is an open-air design, there are no exposed live parts. All live parts are covered to ensure safety against electrical shock.

Type tested

All electrical equipment contained within the SSU are type tested according to their relevant standards, ensuring quality of sub components.

Easy access

Open-air design provides easy access for visual inspection of equipment. Trained personnel can open covered parts for service.

ABB Ability™

ABB Ability provides predictive maintenance and remote management through, smart sensing and communication, internet based management, data historian and connected asset lifecycle management.

Homologation

Electrical equipment conforms to local regulations.

ISU

Values to customers



Simple and quick installation

Units are pre-designed, pre-tested and assembled at the factory, and shipped in one piece so it is simple to drop in place and connect cables. Open-air design allows easy access to equipment for quick installation procedures.

Prefabricated solution

Prefabricated and economic option with easy access to equipment which normally includes medium voltage, transformer, low-voltage equipment, full protection and communication and auto transfer system pre-tested.

No additional HVAC required

ISU can install inside building, vessel where all the safety and HVAC facilities are already installed.

One piece delivery

All electrical equipment installed in one frame to minimize site works and maximize pretesting and safety.

Type tested

All electrical equipment contained within the ISU are type tested according to their relevant standards, ensuring quality of sub components.

ABB Ability™

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