TECHNICAL INFO

# MNS 3.0 Low Voltage Switchgear

## Marine & Offshore Application

• Electric. Digital. Connected

# Contents

# 01. General Product Description

**Scope of Application**

ABB Xiamen Low Voltage Equipment Co., Ltd. is the only MNS3.0 Low Voltage Switchgear manufactory in China authorized by ABB group. It introduces one of the most advanced technology, MNS3.0 modular low voltage switchgear system from ABB German Schltanlaagentechnik GmbH. MNS3.0 modular low voltage switchgear is suitable for applications in fields relating to power generation, power distribution and power utilization, including marine, oil drilling platforms.


**Feature of MNS® Systems**

The Modular Low Voltage Switchgear System has been proved for its worth after several years' utility on global market. At the same time, it constitutes a safe investment for the future due to its continuous further development.

The high flexibility of the MNS® system results from a framework construction with maintenance free bolted connections which can be equipped as required with standardized components and can be perfectly adapted to each application.The consistent application of the modular principle both in electrical and mechanical design permits optional selection of the structural design, interior arrangement and degree of protection according to the operating and environmental conditions.

The design and material used for the MNS® system largely prevent the occurrence of electric arcs, or provide for arc quenching within a short time. The System complies with the requirements laid down in IEC 298, and was furthermore subjected to extensive accidental arc tests by an independent institute. Type test certificates are available. In these test, the effect of the striking accidental arcs were limited to their place of occurrence, the operation of neighbouring withdrawable module compartments was not affected.

After cleaning, the withdrawable module compartments were fully operation again, mechanically interlocked withdrawable module remained firmly within the Cubicle and even in isolating position, none of the substance indicators located in front of the Cubicle were ignited All plastic parts used in the MNS® system are free of CFC's and halogen, they are flame-retardant and self-extinguishing.

**The MNS® system offers the user many alternative solutions and notable advantages in comparison with conventional-type installations:**
Compact, space-saving design; Back to back arrangement; Economic energy distribution in the cubicles; Easy project and detail engineering through standardized components; Modular design;Comprehensive range of standardized types; Various design levels depending on operating and environmental conditions; Easy combination of the different equipment systems, such as removable and withdrawable modules, in a single cubicle; Arc-proof design; Earthquake-, vibration- and shock-proof design possible; Easy conversion and retrofit; Maintenance-free busbar and frame construction; High operational reliability and availability; Optimum personal protection.

**Technical Standards**

The MNS® system is a type-tested switchgear assembly (TTA), in accordance with : IEC 61439-1/-2, EN 61439-1/-2, VDE0660 Part 500,BS5486 Part 1 and UTE 63-412,GB 7251,12-2013. The erection and connection of the switchgear system is governed by IEC364 and DIN VDE 0100.

**Operating and Environmental Conditions**
MNS® type switchgear is suitable for installation in closed location for electrical equipment and other operating facilities in compliance with the switchgear degree of protection (up to IP54).

**Ambient Temperature**

| | |
|---|---|
| Short-time maximum value | +50℃ |
| Maximum mean value over a 24hour period | +45℃ |
| Minimum value | -5℃ |

For meter, measuring instrument and protection relay, etc., the manufacturer's special instruction must be observed.

**Atmospheric Condition**
Normal climatic service conditions to IEC61439-1/-2, EN61439-1/-2, VDE0600 Part 500, Relative humidity 50% at 40℃.

It must be ensured that indoor condition is maintained for the place of installation. Moisture condensation on the switchgear components must be prevented by suitable measures such as heating or ventilation.

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**Table 1 Technical Data**

| | | | | |
|---|---|---|---|---|
| **Standards** | Low Voltage Switchgear and Controlgear Assemblies – Verification by testing* | | | GB 7251.1/12-2013, IEC 61439-1/2 , EN 61439-1/2 , DIN_VDE 0660 , Patr 500 of BS 5486 , UTE 63-412 |
| **Test certificates** | ASTA, Great-Britain (resist. to accidental arcs acc. to IEC 61641 and IEC 60298, Appendix AA) | | | |
| | DLR German Research Institute for Aerospace e. V. Jülich, Earthquake Test for Security Areas in Nuclear Power Stations | | | |
| | IABG Industrieanlagen Betriebsgesellschaft, Vibration and shock tests | | | |
| | Complying with Germanischer Lloyd, Hamburg | | | |
| **Electrical data** | **Rated voltages** | Rated insulation voltage Ui | | 1000 V3~, 1500 V~** |
| | | Rated operating voltage Ue | | 690 V3~, 750 V~** |
| | | Rated impulse withstand voltage Uimp | | 6/8/12 kV** |
| | | Overvoltage category | | II/III/IV** |
| | | Degree of pollution | | 3 |
| | | Rated frequency | | up to 60 Hz |
| | **Rated current** | Copper Busbars: | Rated current Ie | up to 6300 A |
| | | | Rated peak withstand current Ipk | up to 250k A |
| | | | Rated short-time withstand current Icw | up to 100 kA |
| | | Copper Distribution bars: | Rated current Ie | up to 2000 A |
| | | | Rated peak withstand current Ipk | up to 176 kA |
| | | | Rated short-time withstand current Icw | up to 100 kA |
| | **Arc Fault Containment** | Rated operational voltage | | up to 690 V |
| | | Prospective short-circuit current | | up to 100 kA |
| | | Duration | | 300 ms |
| | | Criteria (IEC 61641) | | 1 to 7 |
| | **Forms of separation** | | | up to Form 4 |
| **Mechanical characteristics** | **Dimensions** | Cubicles and frame | | DIN41488 |
| | | Recommended height | | 2200 mm |
| | | Recommended width | | 400, 600, 800, 1000, 1200 mm |
| | | Recommended depth | | 400, 600, 800, 1000, 1200 mm |
| | | Basic grid size | | E = 25 mm acc. to DIN 43660 |
| | **Degrees of Protection** | According to IEC 60529 | | External from IP 30 to IP 54 |
| | | | | nternal from IP 2X |
| | **Steel components** | Frame, incl. internal subdivisions | | 20/25 mm |
| | | Cladding, internal | | 1.5/20 mm |
| | | Cladding, external | | 1.5 mm |
| | **Surface protection/ Paint** | Frame, incl. internal subdivisions | | Zinc or Alu-zinc coated |
| | | Cladding, internal | | Zinc or Alu-zinc coated |
| | | Cladding, external | | Zinc or Alu-zinc coated and Powder coated RAL 7035 (light grey) |
| | **Plastic components** | Halogen-free, self-extinguishing, flame retardant, CFC-free | | IEC 60707, DIN VDE 0304 part 3 |
| **Optional Extras, available request** | **Busbar system** | Busbars | | Fully insulated with heat onshrinkable sleeving |
| | | | | Silver plating |
| | | | | Tin plating |
| | **Special qualification** | Test certificates | | See test certificates listed above |
| | **Paint** | Enclosure | | Special colours on reques |

* Design verification by testing: Where an Assembly has previously been tested , and the results fulfil the requirements of IEC 61439-1/-2,the verification of these tests need not be repeated.

** Depending on the electrical equipment

# 02. Class Certification

Lloyd's Register

Lloyd's Register

Germanischer Lloyd

ABS PACIFIC DIVISION

American Bureau of Shipping

DNV

Det Norske Veritas

1828

Bureau Veritas

CHINA CLASSIFICATION SOCIETY

China Classification Society

# 03. Performance and Application

**Deepwater Semi-submersible Platform**
1 ship
Shipowner: Etesco
Shipyard: CSIC
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2016

**Deepwater Semi-submer sible Drilling Platform**
1 ship (Hai Yang Shi You 981)
Shipowner: CNOOC
Shipyard: Shanghai Waigaoqiao Shipbuilding Co., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2012-2013

**Working Offershore Platform**
1 ships
Shipowner: CNOOC
Shipyard: Offshore Oil Engineering Co., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2003-2004

**Jack-up Rig**
2 ships: 936 & 937
Shipowner: China Oilfield Services Limited
Shipyard:
China Merchants Heavy Industry (Shenzhen) Co., Ltd.
Dalian Shipbuilding Industry Offshore Co., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2009

2 ships
Shipowner: Bestford
Shipyard: China Merchants Heavy Industry (Shenzhen) Co., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2013

1 ship
Shipowner: BK Marine
Shipyard: China Merchants Heavy Industry (Shenzhen) Co., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2014


**Offshore floating production storage unit**
1 ship
Shipowner: Avantgarde Shipping
Shipyard:China Merchants Group
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2015

**Offshore wind power booster**
1 ship
Shipowner: CGN
Shipyard: ZPMC
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2016

**Other Application for Offshore Platform**

| Owner | Project Name | Delivery Time |
|---|---|---|
| CNPC Baoji Oilfield Machinery Co.,Ltd. | Korea ocean arte sian well platform | 2011 |
| Tyco Thermal Controls (Shanghai) Co.,Ltd. | Tyco EDC SPD DPB platform | 2010 |
| CNPC Offshore Engineering Company Limited | CPOE Rig 33 | 2008 |
| | CPOE Rig 5/6/7/8/9/10 | 2007 |
| CNPC Offshore Engineering Company Limited | Baoji Drilling Platform I/II | 2007 |
| Kerr-McGee China Petroleum Ltd | KMG CED 11-6 platform | 2006 |
| National Oil well electrical control (Shanghai) Company Limited | OSL Rig3/4 | 2006 |
| Devon Energy China Company Limited | Devon Panyu 4-2/5-1 | 2005 |
| National Oil well electrical control (Shanghai) Company Limited | National Oilwell | 2004 |


**Platform Supply Vessel**
18 ships
Shipowner: Surf Groupe Bourbon,France
Shipyard: Zhejiang shipyard
Scope of Supply:
2*Low Voltage Main Switchboard & MCCs (440/220 V)
2*Low Voltage Emergency Switchboard (440/220 v)
Delivery Time: 2004-2008

20 ships
Shipowner: Bourbon
Shipyard: Ningbo shipyard
Scope of Supply:
Low Voltage Main Switchboard & MCCs (440V/220 V)
Low Voltage Emergency Switchboard Control Box
Delivery Time: 2012-2013

2 ships
Shipyard: Shinan Heavy Industries
Scope of Supply:
Low Voltage Main Switchboard (690 V)
Delivery Time: 2012

**AHTS**
4 ships
Shipowner: Russia Shipping Company
Shipyard: Zhejiang Shipbuilding
Scope of Supply : MNS3.0 Low Voltage Switchgear
Delivery Time : 2014

**SWATH 2500 Small Water Plane Area Twin-hull Ship**
1 ship
Shipowner: Chinese Academy of Sciences
Shipyard: Bohai Shipbuilding Heavy Industry Co., Ltd
Scope of Supply:
Low Voltage Main Switchboard (690 V)
Delivery Time: 2012-2013

**Chemical Tanker**
1 ship
Shipowner: Donso Tanker.Sweden
Shipyard: Edward Shanghai shipyard
Scope of Supply: 1*Low Voltage Main Switchboard
Delivery Time: 2006


**Ocean Surveillance Ship**
2 ship (first batch)
Shipowner: State Oceanic Administration People's Republic of China
Shipyard: Jiangnan Shipyard
Scope of Supply:
1*Low Voltage Main Switchboard (690 V)
Delivery Time: 2004

10 Ship (Second batch)
Shipowner: State Oceanic Administrator
Shipyard: Wuchang Shipyard
Scope of Supply:
1*Low Voltage Main Switchboard (690 V)
Delivery Time: 2009

**Scientific Investigation Ship**
1 ship
Shipowner: Shanghai Ocean University
Scope of supply: MNS3.0 Low Voltage Swithgear
Delivery Time: 2016

1 ship
Shipowner: College of Ocean and Earth Sciences, Xiamen University
Shipyard: Guangzhou Shipyard International Compay Limited
Scope of supply: MNS3.0 Low Voltage Swithgear (690 V/440 V/380 V/220 V)
Delivery Time: 2015

**Fishing Admin Vessel**
1 ship
Shipowner: China's ministry of agriculture fishery administration
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2013-2014

**Well Test Service Vessel**
2 ships
Shipowner: Shanghai Marine Diesel Engine Research Institute
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2014

**Floating Production Storage and Offloading**
1 ships
Shipowner: DANA
Shipyard: COSCO
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2014

**Jack-up Life Platform**
2 ships
Shipyard:
Dalian Shipbuilding Industry Offshore Co ., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2014

**Floating Dry Dock**
1 ship
Shipowner:
Shanghai Zhenhua Port Machinery Co., Ltd.
Shipyard: Daoda Marine Heavy Industry Co., Ltd.
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2013

**Open-Top Container Ship**
2 ships
Shipowner: Shanghai Marine Diesel Engine Research Institute
Scope of Supply: MNS3.0 Low Voltage Switchgear
Delivery Time: 2014

**Training Ship**
1 Ships
Shipowner : Dalian Maritime University
Shipyard : COSCO (Dalian) Shipyard
Scope of Supply :
MNS3.0 Low Voltage Swithgear (440 V)
Delivery Time: 2015

**Supply Ship**
1 Ship
Shipowner: Shanghai Waterway Bureau
Shipyard: Guangzhou Wenchong Shipyard
Scope of Supply: Motor Control Center
Delivery Time: 2008

**Dredger**
1 Ship
Shipowner: Shanghai Waterway Bureau
Shipyard: Guangzhou Wenchong Shipyard
Scope of Supply: Motor Control Center
Delivery Time: 2008

2 Ships
Shipowner: Tianjin Waterway Bureau
Shipyard: Qingdao Qianjin Shipyard
Scope of Supply: Low Voltage Main Switchboard & Emergency Switchboard (690 V/440 V)
Delivery Time: 2008

**Bulk Carrier**
3 Ships
Shipowner : Fairstar
Shipyard : GSI
Scope of Supply : Low Voltage Main Switchboard (440 V/220 V) & Emergency Switchboard
Delivery Time: 2011

1 Ship
Shipowner: MV“TRANSIT”
Shipyard: COSCO Nantong Shipyard Co., Ltd.
Scope of Supply: Low Voltage Main Switchboard & Emergency Switchboard (440 V/220 V)
Delivery Time: 2005

# 04. Application of Switchgear


—
01 Emergency Switchboard

—
02 Emergency Switchboard

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03 PMS (Power Management System)
PMS cubicle is specifically designed for marine and offshore platform projects. The PMS cubicle is of compact structure, convenient access, which improves the reliability and appearance of switchgears.

—
04 Motor Control Center
Motor starters are configurated according to ABB standard solution. Multi-function separator introduced from Germany is implemented between equipment compartment and busbar compartment, which improves the reliability and appearance of the switchgears.

—
05 Generator Cubicle
Powerful Unit, usually integrated with ABB Emax series air circuit breakers, protection devices, meters and indication components.


—
06 Synchronizing Cubicle
Mainly equipped with generator synchronizing components and/or power management system; protection relays, controllers, meters and control switch for monitoring and manual operation can also be installed in the switchboard.

—
07 Synchronizing Cubicle
Mainly equipped with generator synchronizing components and/or power management system; protection relays, controllers, meters and control switch for monitoring and manual operation can also be installed in the switchboard.

—
08 Cubicle with Back to Back Arrangement
A cubicle with back to back arrangement applies to limited electrical room. Circuits can be arranged on both sides and the common busbar in the middle.

—
09 Distribution Cubicle
Emax feeder cubicle or compact MCCB feeder cubicle will be used, depending on the actual consumer rating. The feeder cubicles are of compact structure, symmetrical layout and convenient customer access.

# 05. General Structure

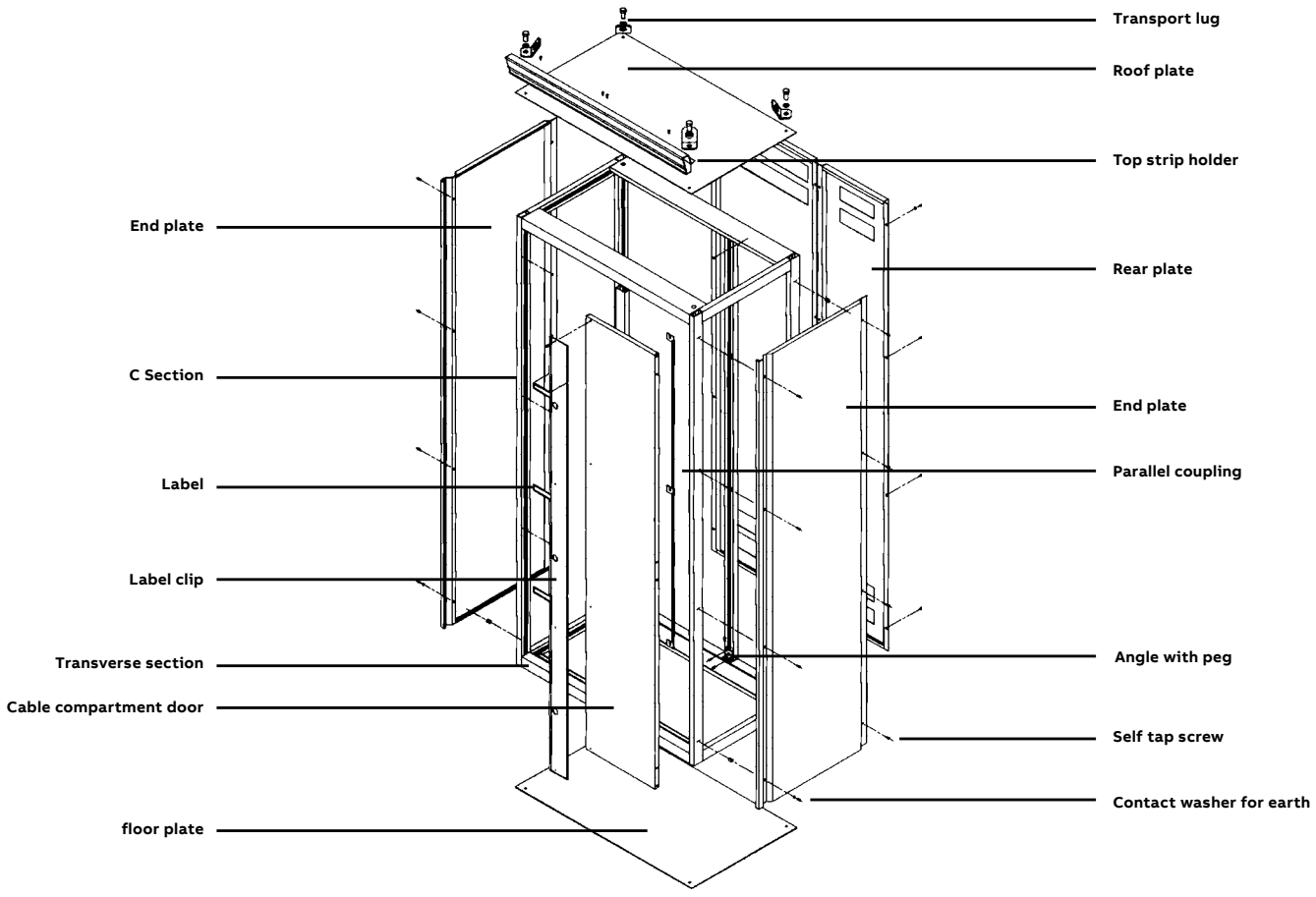
**Frame**
The basic elements of the frame are “C” shaped steel profiles with holes at 25 mm intervals according to DIN43660. All frame parts are secured maintenance-free with tapping screws or ESLOK-saved screws.

Based on the basic grid size of 25 mm frames can be constructed for the various Cubicle type without any special tools, Such as: single or multi-Cubicle switchgear assemblies for front or front and rear operations are possible.

**Enclosure**
Different designs have been defined for the enclosure of the equipment: ranging from the open design with a protective rod as a front-sided closure, optionally with rear and/or side panels, over the dead-front assembly (front IP 30) up to the totally enclosed cubicle design with degree of protection IP 54.

The hinged frame is designed to accommodate electronic components and instrument plates, may also used as equipment frame. The mounting area of the hinged frame can be covered with an additional door with or without a window. The bottom side of the cubicle can be provided with flanged plates, with the aid of flanged plates, cable ducts can be provided to suit all requirements.

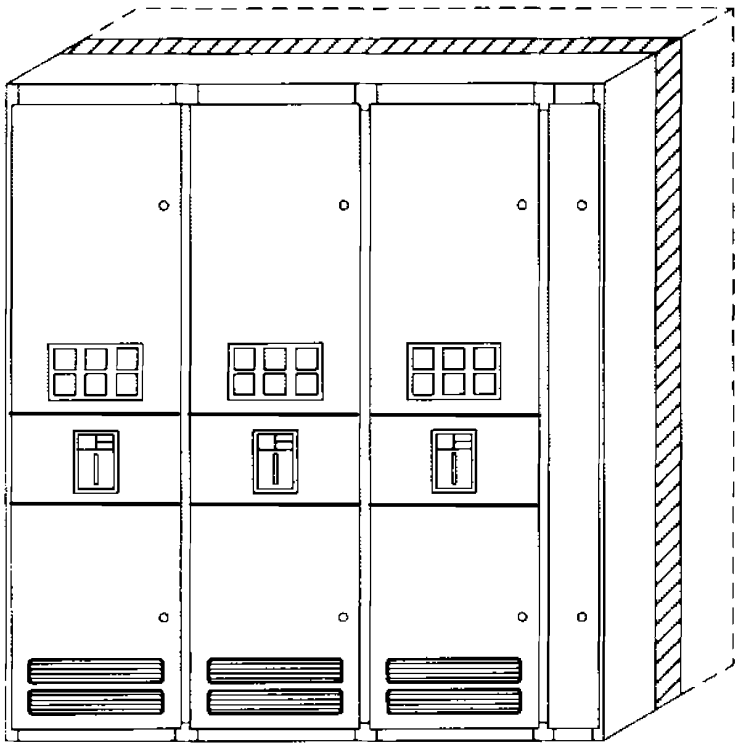
Doors and cladding can be provided with one or more ventilating louver, Roof plates can be completely ventilated (valid for IP30 and IP 40).



**Genneral Structure**
MNS® cubicle is subdivided into equipment compartment, busbar compartment and cable compartment; their size (HXWXD )is 2200 mmX400/600/800/1000/1200 mm×600/800/1000 mm. Depending on the size of the switchgear used, Cubicles with air circuit breaker up to 2000 A can be built in narrow design (W=400 mm). It is possible to interconnect cubicles to form shipping units with a maximum width of 2600 mm.

All incoming feeder, outgoing feeder and bus couple cubicles include one switch device. These devices may be fixed-mounted switch disconnectors, fixed-mounted or withdrawable air circuit breaker or moulded-case circuit breaker

In the MNS® system, components belonging to one function group are assembled to form a simple mechanical and electrical module. Power and control modules are available.



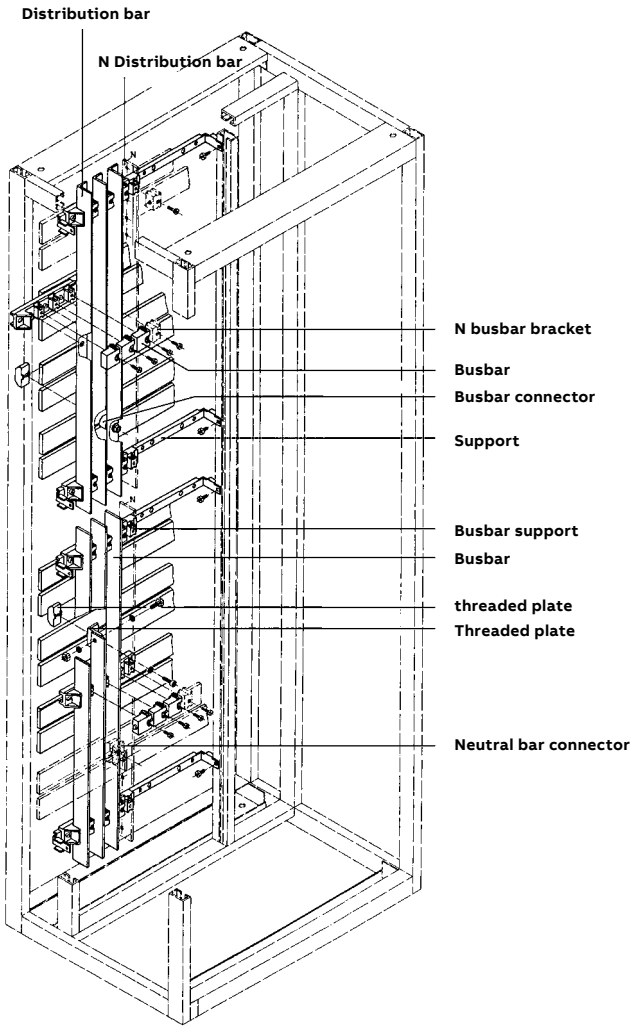
—
11 Switchgear cubicles for air circuit breaker with device compartment, busbar compartment and busbar connection compartment

**Busbars**

The MNS® main busbars are arranged in the rear section (busbar compartment) of the switchgear cubicle horizontally in two selectable levels. Double busbar systems are located at the upper and lower level, while single busbar systems are arranged either at the upper or lower level. The busbars of both levels can be of the same or different cross-section. Separate,parallel or coupled operation is possible. Depending on the current, 2 or 4 conductor elements are installed per phase, cubicles for front and rear operation have a common busbar system. The busbars are divided into sections corresponding to the sizes of the switchgear shipping units. The busbar are made of copper (Cu) with conductor cross-section 30X10 mm, 40X10 mm, 60X10 mm, Units having busbars of different cross-sections can be coupled together.

**Distribution Bar**

Distribution bars provide the connection link between the busbar and module , they are arranged vertically in the busbar compartment. A maximum of two three-or four-pole distribution bar system can be installed in a cubicle. The busbar can be arranged over the entire cubicle height, or over partial height, or can be interrupted. Distribution bars are single busbar with a rectangular cross-section of 50X5 mm or an angular cross-section 50x30x5 m. The distribution bars are made of copper (Cu).

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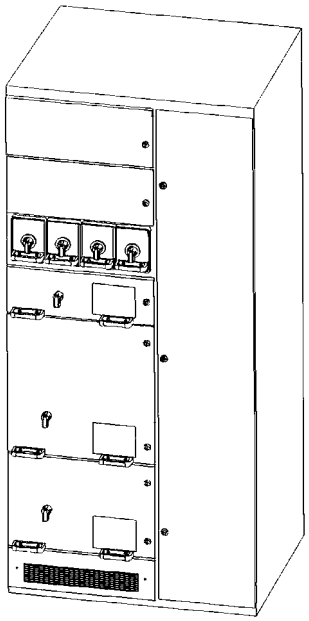
12 Frame with main busbar and distribution bar

# 06. Structure of Withdrawable Unit

**Structure of Withdrawable Unit**
Cubicle with withdrawable units is subdivided into equipment compartment、busbar compartment and cable compartment, their size (HXWXD) is 2200 mm×1000 mm×600/800/1000/1200 mm. the withdrawable unit comprises withdrawable module itself and frame-mounted module compartments, the standardized sizes of withdrawable units are 8E/4、8E/2、8E、12E、16E、20E、24E, power and control module are available as withdrawable type. Four 8E/4 modules or two 8E/2 modules can be arranged at a common equipment compartment with 600mm width and 200 mm height . Withdrawable modules size 8E、12E、16E、20E and 24E require the entire equipment compartment width of 600 mm per modules, The size designation also specifies the vertical space requirement .The withdrawable modules can be withdrawn when connected to mains. It will be without any danger when doing the conversion of withdrawable module without disconnecting the neighbouring modules.

**Multi-function Separator**
For cubicles in withdrawable design, fixed-mounted design, or in combines fixed-mounted and withdrawable design, distribution bars (angular section 50X30X5 mm) are embedded into the multi-function wall separator. Shock hazard protection (IP20) with respect to the entire busbar is thus ensured without a shutter.

The multi-function separator is resistant to accident arcs and thus constitutes a partition between the equipment compartment and the busbar compartment.



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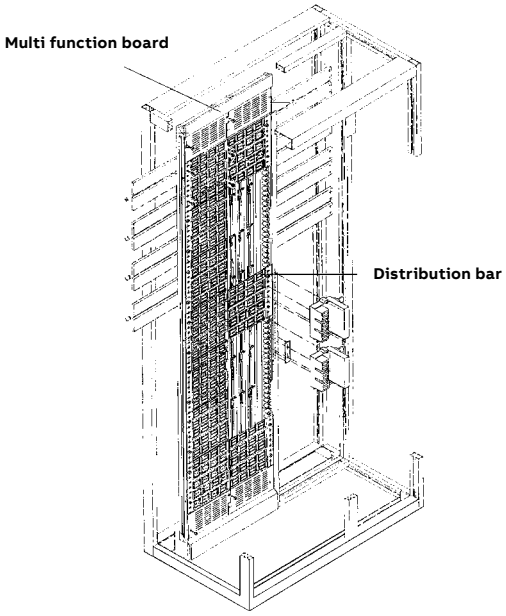
13 Cubicle with withdrawable units is divided into equipment compartment, Cable compartment and busbar compartment.

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14 Distribution bars embedded in multi-function separator

**Device compartments with size 8E/4 and 8E/2**
Device compartment with size 8E/4 and 8E/2 consist of a compartment bottom plate, a module condapter, guide rails and front posts.

The module condapter provides the connection of the power and control circuit with the distribution bar, the module and the cable compartment.

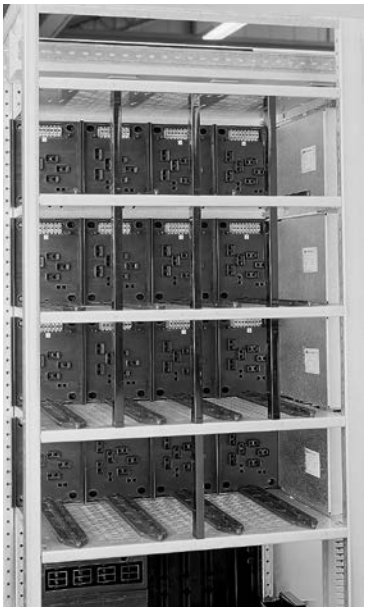
The withdrawable module condapter is designed for a current up to 125 A and can hold 2 module size 8E/2 up to 63A or 4 module size 8E/4 up to 45 A. It comprises a 20-pole control connector for each module size 8E/4 and one or two 20-pole control connector for each modules size 8E/2.

The connection between the incoming and outgoing side are arranged inside the with drawable module condapter and are protected against accident arcs.

**Device compartments with size 8E……24E**
Device compartments with size 8E……24E consist of a compartment bottom plate, guide rails and a sheet side wall with outgoing control connector.

Withdrawable modules feeder connection to the distribution bars in the multi-function separators is made by means of one-pole segregate contact units, outgoing power cables are connected via cable connector (main circuit), control cable connection are established via 16 or 32-pole by the 8E module for 16 or 32-pole control connectors (auxiliary circuit).

The power cable connectors are fastened to the multi-function separator.



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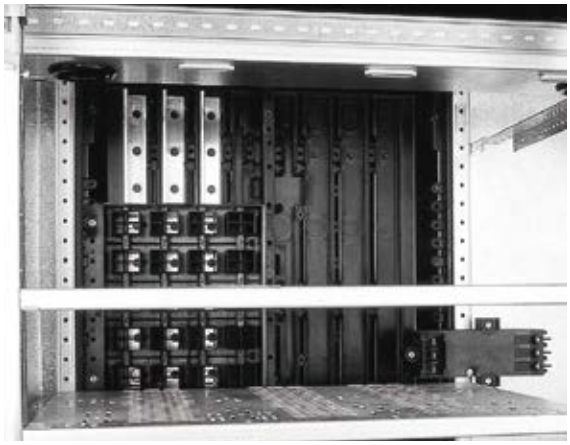
15 Withdrawable module compartment size 8E/4 and 8E/2



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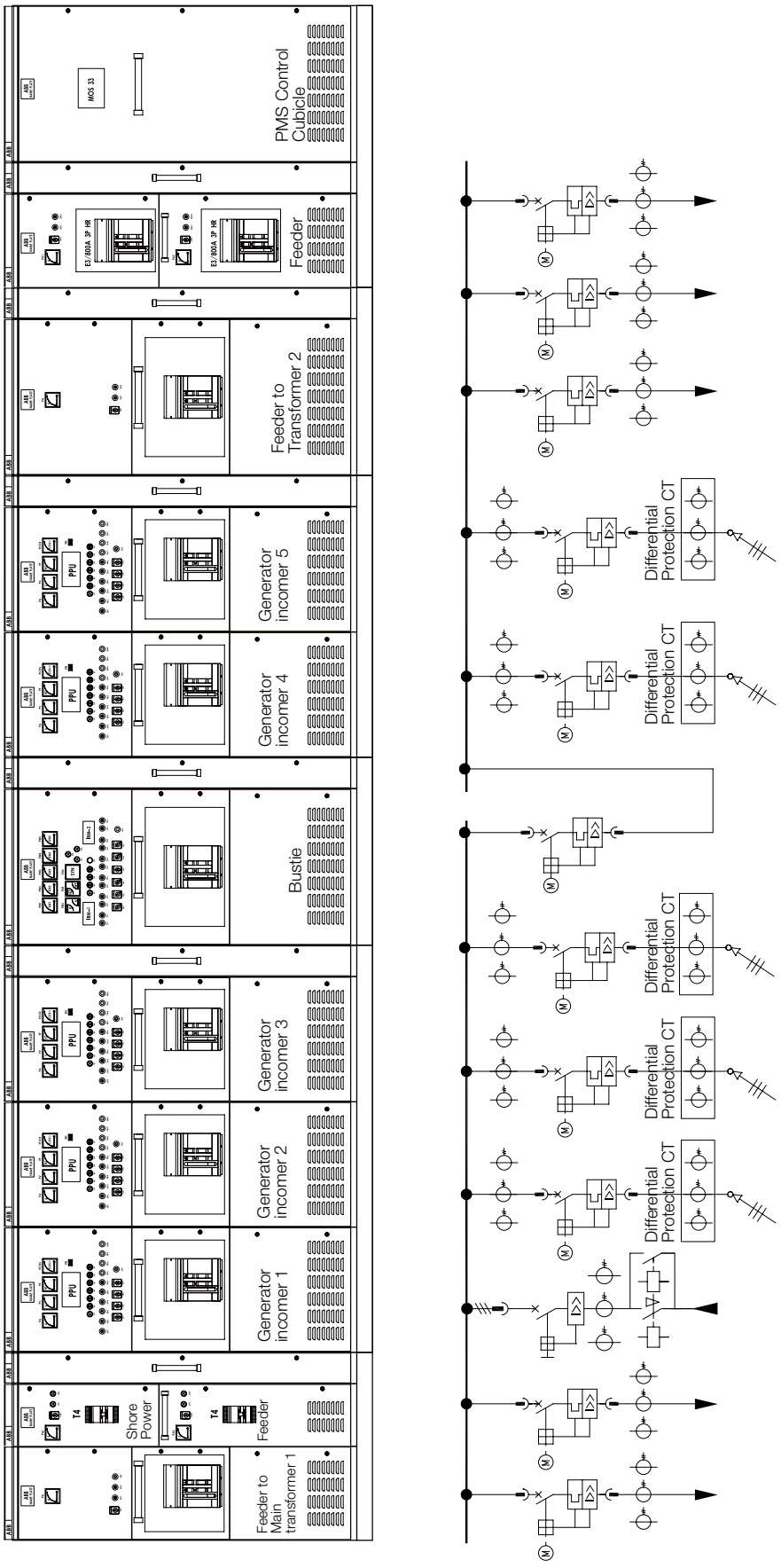
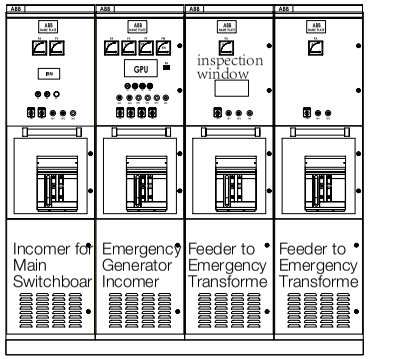
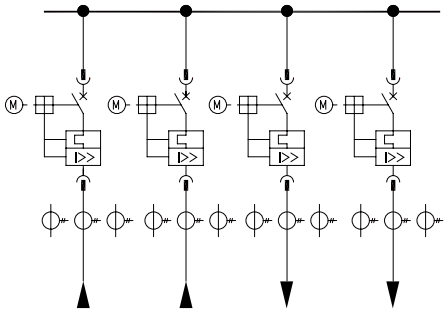
16 Deviec compartments with size 8E……24E

**Main Switchboard**

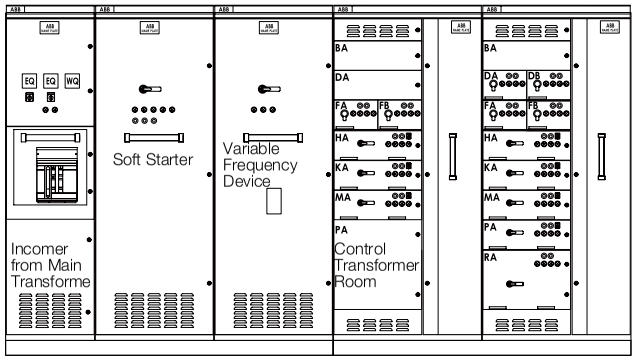


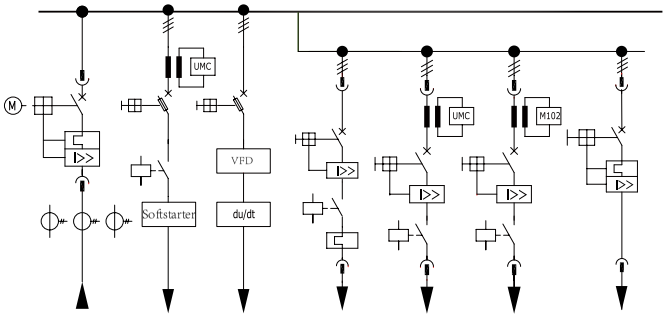
## Emergency Switchboard



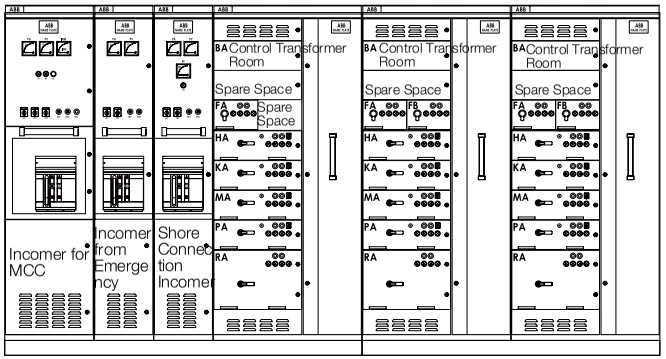



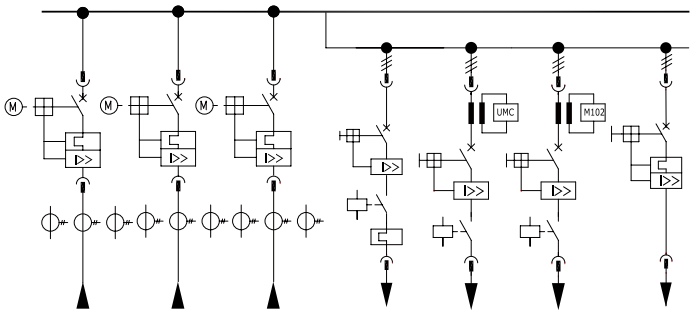
## MCC Cubicles




## Emergency MCC Cubicle



# 07. Structure of Switchgear

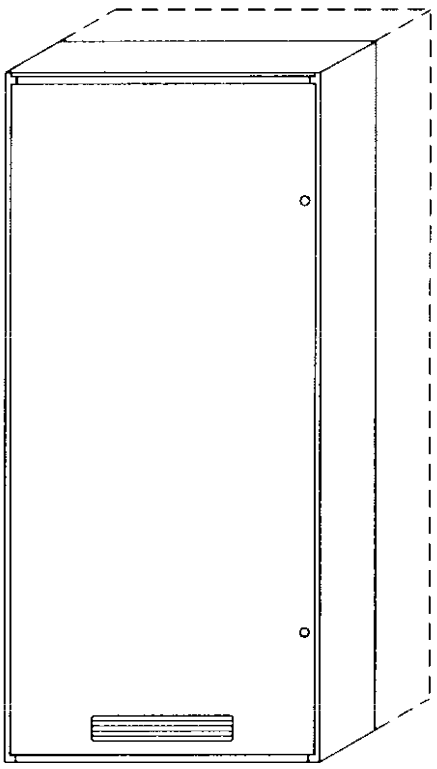
**Standardized Cubicle**
Standardized empty cubicles are provided in the MNS® system, the sizes of the standardized empty cubicle are 2200 mm×800/1000 mm×600…1200 mm.

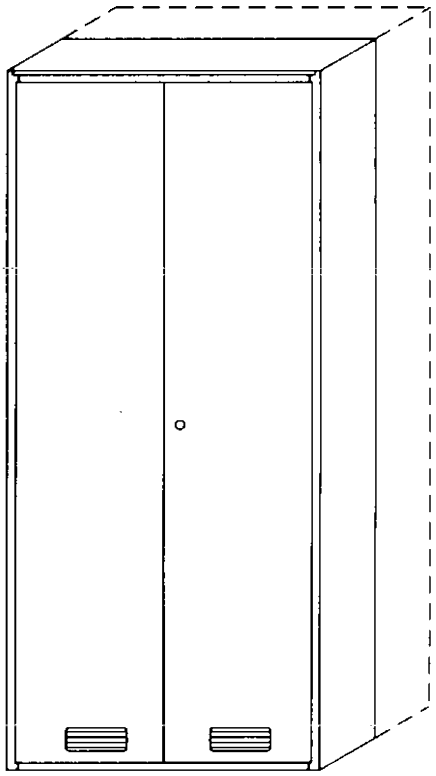
**Cubicle Depth Selection**
Standard depth is recommended and all the cubicles should be aligned with the incoming cubicle in both sides; busbar transfer cubicle should be provided for busbar connection when only single side aligned is applied.

**Table 2**

| Type | Cubicle width (mm) | Cubicle depth (mm) |
|---|---|---|
| **Incoming Cubicle、Bustie Cubicle** | 600, 800, 1000 | 600, 800, 1000, 1200 |
| **Outgoing Cubicle** | 600, 800, 1000 | 600, 800, 1000, 1200 |
| **IP54 Cubicle** | | |
| **-Incoming Cubicle** | 1000 | 600, 800, 1000, 1200 |
| **-Outgoing Cubicle** | 1000 | 600, 800, 1000, 1200 |
| **Duplex Cubicle** | | |
| **-Control Cubicle** | 800, 1000 | 800, 1000 |
| **-Outgoing Cubicle** | 800, 1000 | 800, 1000 |
| **-Busbar Transfer Cubicle** | 200, 400 | 400, 600, 800, 1000, 1200 |

* Cubicle without cable compartment





# 08. Operation and Installation

**Transportation and Installation**
The cubicles will be packed and transported only after fully assembled and quality checked.The shipping units can be one Cubicle,two Cubicles ,three Cubicles,four Cubicles. The maximum width of shipping unit is 2600 mm, to reduce the busbar connection, one cubicle in a shipping unit should be avoided.

On arrival at site, the package completeness should be checked firstly. If the switchgear is not used at once, the switchboards must be conserved in dry and cleaning environment.

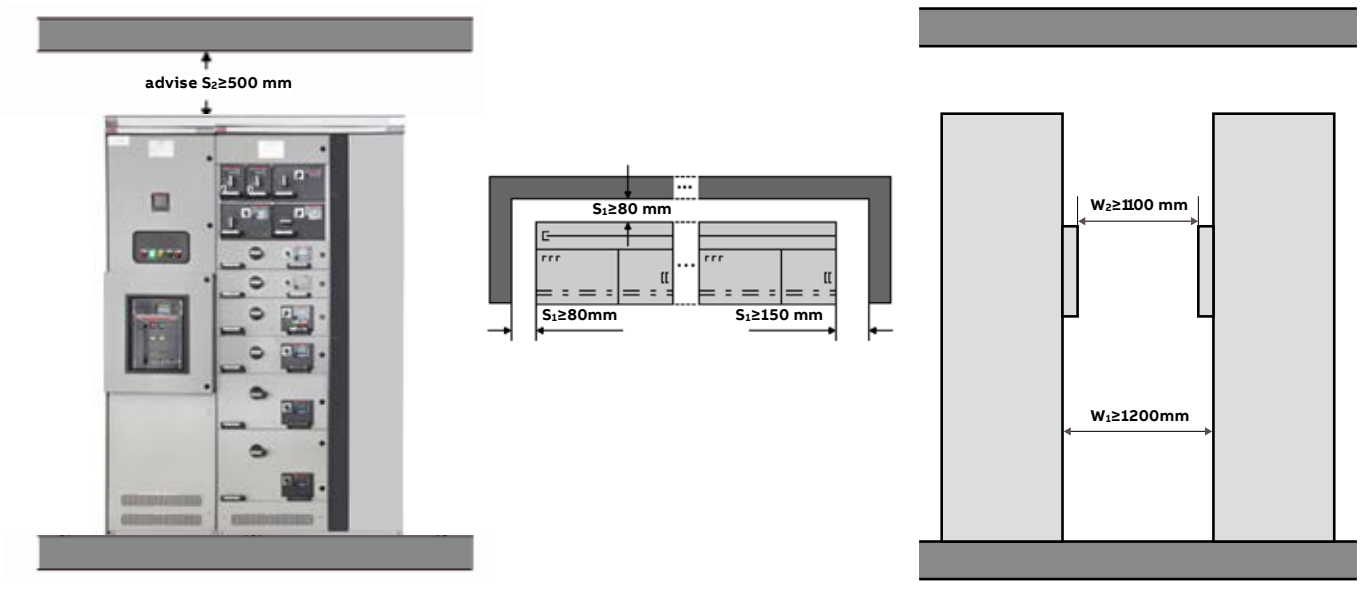
The switchgears must be installed based on the general arrangement diagram. When carry out the connection of busbars, drawings must be followed and the surface of busbar should be well cleaned, afterward connection point will be fasten tightly by bolts and connection cable will be distributed. the connection points of the busbars should be fastened tightly by bolts when couple the Cubicles.

**The Space Requirement for**

**Power Distribution Room**
Installation dimension
The cubicles have to be erected vertically. When the switchgear is installed against the wall, the distance in-between should be at least 80 mm to satisfy the heat dissipation requirement.

**Check Before Operation**
- Check the busbar connections at the shipping unit divisions).
- Check the frame connections at the transport divisions.
- Check the floor fastening (to foundation or false floor).
- Check the realization of the required degree of protection, particularly with regard to the bottom plates.
- General visual check: appearance,completeness,
- markings, foreign parts in the switchgear, dirt.
- Check for correct and complete cable
- connections and wiring as far as installed on site.
- Check for barriers in place
- Check for correct and complete protective
- conductor connections.

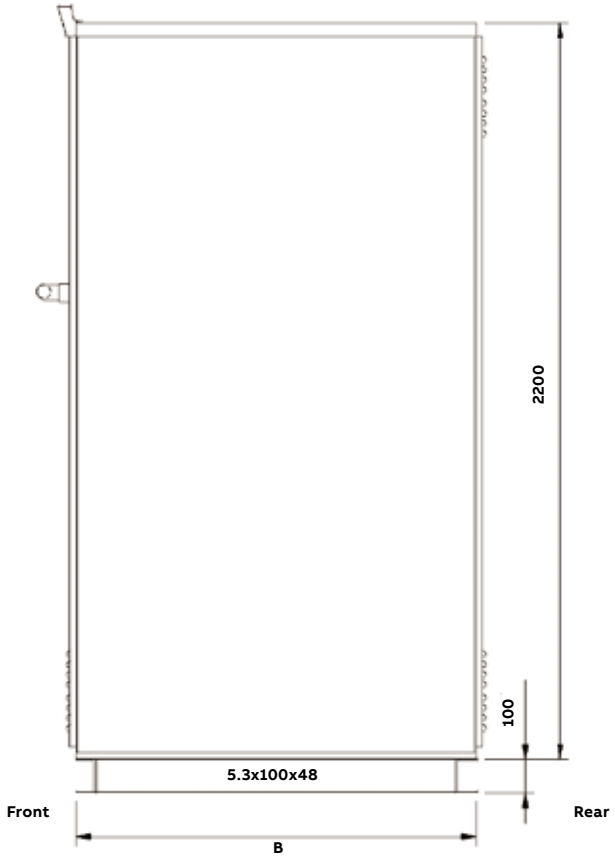
**The Complete Set of Products**
The switchgears will be accompanied with packing list, product certification, product instruction manual and drawings. Other accessories like listed spare part and door key will also be attached.



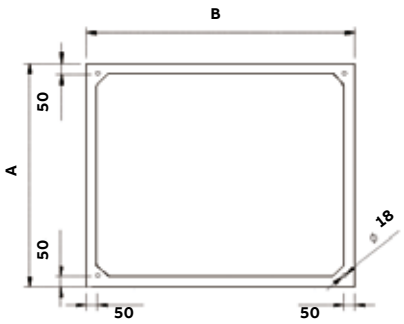

The space requirement for cubicles installation and operation

**Foundation Drawing**
A: Cubicle width
B: Cubicle depth

**Remark: (the unit of dimension below is mm) the dimension of top incoming will be confirmed by actual situation**




Side view

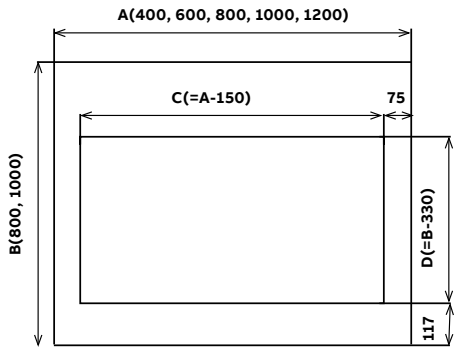



Bottom view

**Cut-outs Drawing**
A: Cubicle width
B: Cubicle depth
C=A-150
D=B-330

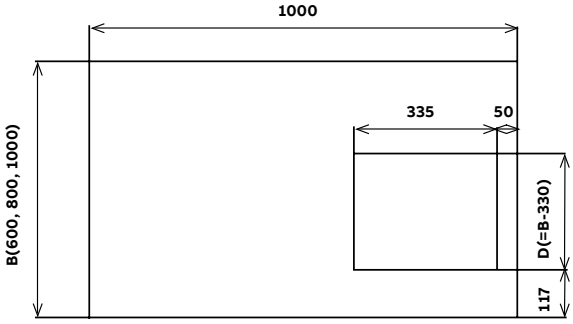
**Remark: (the unit of dimension below is mm) the dimension of top incoming will be confirmed by actual situation**

Rear side



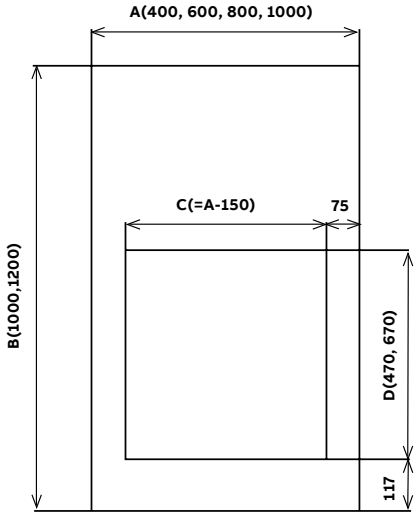

Front side (1)Incoming Cubicle (side outgoing line)

Rear side



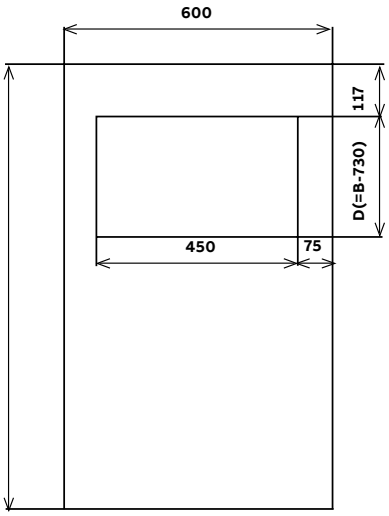

Front side (2)Outgoing Cubicle (side outgoing line)

Rear side




Front side (3)Incoming Cubicle (rear outgoing line)

Rear side




Front side (4)Outgoing Cubicle (rear outgoing line)

# 09. ABB Marine Sales, Production & Service Distribution In China

● **Location of Marine Sales/Service Branch**
● Location of Marine Manufacturer

**Beijing**
● **ABB (China) Headquarters**
● ABB (China) Engineering Company Ltd.
● ABB Beijing LV Installation Materials Co., Ltd.
● ABB Beijing Drive System Co., Ltd.

**Shanghai**
● ABB Shanghai Transformer Co., Ltd.
● ABB Shanghai Engineering Co., Ltd.
● ABB Shanghai Motors Co., Ltd.
● ABB Electrical Machines Co., Ltd.
● Shanghai Branch of ABB Jiangjin Turbo System Co., Ltd.

**Chongqing**
● ABB Chongqing Transformer Co., Ltd.
● ABB Jiangjin Turbo System Co., Ltd.

**Guangzhou**
● **ABB (China) Engineering and Automation Service Central**
● Guangzhou Branch of ABB Jiangjin Turbo System Co., Ltd.

**Xi'an**
● ABB Xi'an High Power Rectifier Co., Ltd.
● ABB Xi'an Power Capacitor Company Co., Ltd.

**Hongkong**
● ABB Hongkong Turbo System Co., Ltd.

**Xinhui**
● ABB Xinhui Low Voltage Switchgear Co., Ltd.

**Zhongshan**
● ABB Zhongshan Transformer Co., Ltd.

**Hefei**
● ABB Hefei Transformer Co., Ltd.

**Dalian**
● Dalian Branch of ABB Jiangjin Turbo System Co., Ltd.

**Nanchang**
● ABB TellHow Generators Ltd.

**Tianjin**
● Guangzhou Branch of ABB Jiangjin Turbo System Co., Ltd.

**Xiamen**
● ABB Xiamen Switchgear Co., Ltd.
● **ABB Xiamen Low Voltage Equipment Co., Ltd.**


Ha'erbin
Changchun
Shenyang
Urumqi
Dalian
Beijing
Huhehaote
Tianjian
Yantai
Shijiazhuang
Zibo
Qingdao
Jinan
Lanzhou
Zhengzhou
Taiyuan
Hefei
Nanjing
Xi'an
Wuxi
Shanghai
Suzhou
Wuhan
Chengdu
Hangzhou
Ningbo
Chongqing
Nanchang
Wenzhou
Fuzhou
Changsha
Guiyang
Xiamen
Guangzhou
Dongguan
Shenzhen
Kunming
Xinhui
Hongkong
Nanning
Zhongshan

# 10. ABB Marine Global Service Network Center

- Helsinki, Finland
- Oslo, Norway
- Rotterdam, Nederland
- Miami, USA
- Singapore
- Hamburg, Germany
- Odense, Denmark
- Genoa, Italy
- Busan, South Korea
- Barcelona, Spain
- Aberdeen Scotland
- Osasco, Brazil
- Wellington, New Zealand
- Athens, Greece
- Murmansk, Russia
- Tokyo, Japan
- Marseille, France
- Abu Dhabi, United Arab
- Emirates
- Taipei, Taiwan
- South Africa
- **Shanghai, China**

# Appendix

## List of figures

# Appendix

## List of tables

# ABB Connect

## The digital assistant for all your electrification needs

ABB Connect helps you to find product information and stay connected to the latest news and tools. It’s a digital assistant that enables customers to connect to the broadest range of electrification solutions in one place.

- Easy to find what you need by search
- Get all information about our products, applications, selection guides, installation manuals, service, certificates, and engineering tools, etc.
- Saving documents locally, updating automatically.
- Receive your expected massages
- Online customer service

**You can use ABB Connect on iOS, Android and Windows 10 device**

Scanning QR code
to enter ABB Connect

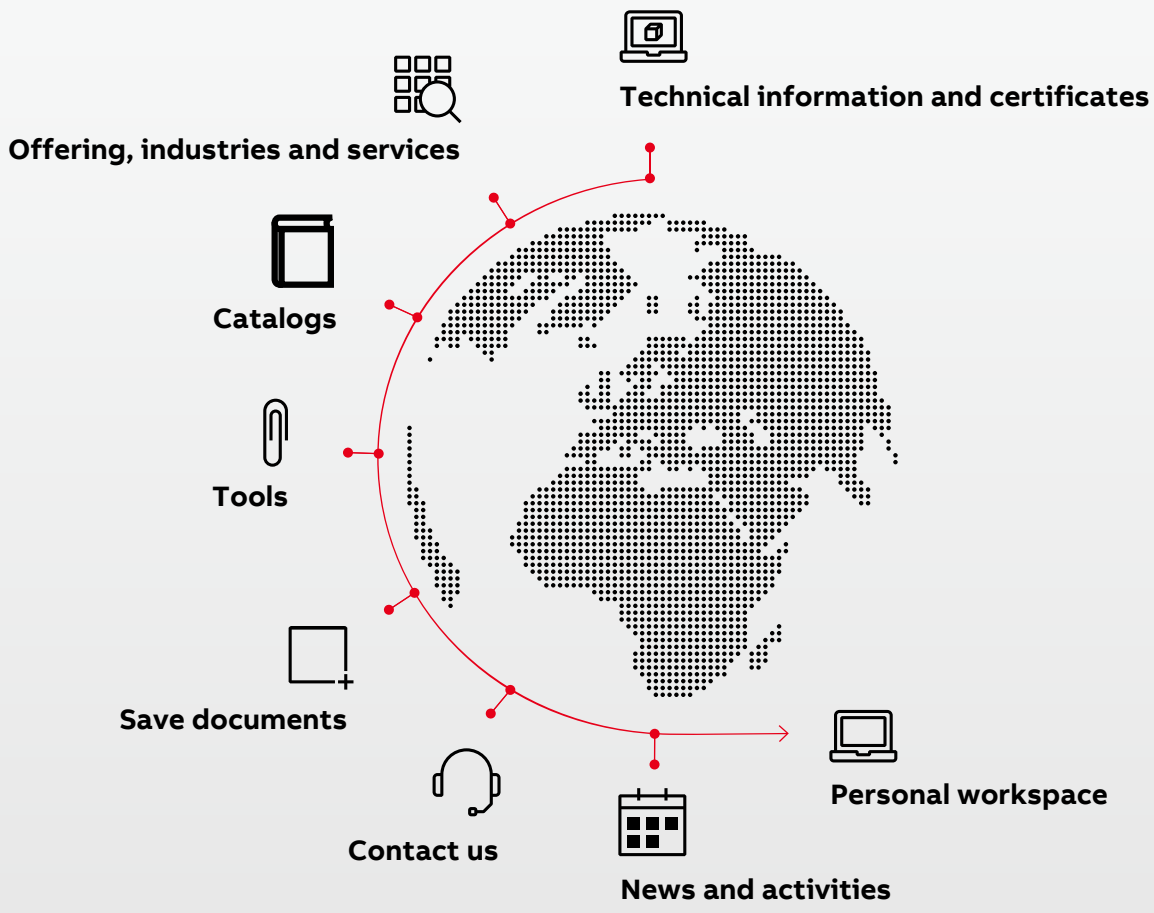


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ABB China Customer Contact Center

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