

TECHNICAL CATALOGUE

MNS® Low Voltage Switchgear



- Higher safety
- Smart and intelligent
- More value to customers

The MNS platform has been evolving for over 50 years. Since its inception, the MNS design has been based upon on the fundamental principles of safety, reliability, availability.

MNS utilizes the IEC standards as the baseline for the performance required. Verification testing is performed over and above the IEC requirements.

This coupled with its modularity and scalability makes the MNS system the definitive solution for low-voltage energy distribution and process control applications.

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1. MNS Switchgear Overview

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1.1 Switchgear Evolution

ABB is the global leader for low voltage switchgear with about 1,7 million MNS cubicles delivered world-wide since the inception of this system in 1973. ABB's history in switchgear can be traced back even further, to the 1890's when we first manufactured switchgear systems in Sweden.

With these credentials it is no surprise that the MNS system is the benchmark for operational safety, reliability and quality.

ABB draws on this wealth of background knowledge in designing and manufacturing low voltage switchgear for its global and local customers. This together with the global service

and support network established in 11 manufacturing locations and numerous service centers worldwide it is ensured that the choice of MNS will be the right decision.

The evolution includes:

- Maintenance free frames and bus bar
- Modular switchgear
- Segregation through multifunction wall and withdrawable design
- Exceeding arc testing standards
- Safety and reliability in build
- Temperature and environment condition monitoring
- Switchgear condition monitoring and predictive maintenance on-premises



1.2 Features & Applications

The ABB MNS system is a low voltage switchgear assembly. Its design is tested and verified in accordance with IEC 61439-1/-2. The consistent application of the modular principle both in electrical and mechanical design as well as the use of standardized components allows it to be flexible and compact. Depending on operating and environmental conditions different design levels are available.

Notable system advantages about design aspects:

- Optimum protection for personnel and plant.
- Design verified by testing including arc fault containment.
- High operational reliability and availability.
- Earthquake-, vibration- and shock-proof.
- Maintenance-free busbar and frame construction.
- Simple retrofitting procedures.
- Compact, space-saving design.
- Simplified project implementation utilizing ABB's dedicated engineering tool.
- Online temperature and switchgear condition monitoring with ABB Ability™

Thus, MNS proves to have the approved solution for the following process industries:

- Oil & Gas, on and offshore
- Chemical / Petrochemical
- Pharmaceutical
- Power generation
- Paper
- Water treatment
- Metals and Mining
- Food & Beverages
- Marine

as well as for infrastructure requirements:

- Data centers
- Airports
- Office buildings
- Shopping centers
- Hospitals
- Rail and Tunnel systems





ABB's worldwide competence is second to none. This is possible due to the globally available MNS switchgear platform, and our local ABB manufacturing facilities.

ABB ensures conformance to IEC 61439-1/-2 throughout these locations with a proprietary switchgear engineering tool. This tool provides a comprehensive database with predefined

engineering solutions for MNS. The database is then utilized with minimal engineering effort to provide customer specific solutions, thus meeting local specifications.

Where specific solutions are required on a global basis, these can easily be deployed throughout the ABB manufacturing facilities network, thus significantly reducing project lead times.



1.3 Product Conformity

The ABB MNS system is verified in accordance with IEC 61439-1/-2 and comply with the following EC directives:

- 2014/35/EU
Low Voltage Directives (LVS)
- 2014/30/EU
Electromagnetic Compatibility Directive (EMC)

In line with the Safety Plus statement, the MNS System is tested to withstand an internal arc. This test is covered by IEC TR 61641 Ed. 3 for low-voltage switchgear.

All tests to which MNS is subjected are accompanied by an independent and authorized partner.

A DEKRA / ASTA quality test certificate means that the product is subjected to a complete sequence of tests prescribed by IEC 61439-1/2 as well as IEC TR 61641 and demonstrates full compliance to the standards.

The written evidence of DEKRA / ASTA testing and certification enables ABB to demonstrate a certified switchgear in line with the specified standards.



1.4 Sustainability Leadership

Sustainability leadership with ABB MNS® Low Voltage Switchgear

ABB is going the extra mile by using third party verified Type III EPDs that follow strict international standards.

ABB uses Type III EPDs for MNS switchgear to make environmental performance transparent. These EPDs provide verified information about its environmental impact throughout its lifecycle, helping customers make informed decisions and achieve sustainability goals.

ABB MNS

All MNS Type III EPDs are publicly available in PEP Ecopassport Program Operator web* and covers the entire lifecycle from “Cradle to Grave”, providing detailed environmental information including the manufacturing site where it is produced. Furthermore, most components used in MNS are as well covered by its own Type III EPDs.

ABB MNS Digital

Enables real-time monitoring and analysis of energy consumption and overall conditions, helping make sustainable decisions and reducing the CO₂ footprint. Detailed data maximize energy efficiency and reduce operating costs, offered with extended lifetime of services.

ABB Ability™

Uses data analysis to increase energy efficiency and recommend predictive maintenance, extending equipment lifespan and minimizing downtime.

*PEP Ecopassport® (pep-ecopassport.org)



Going the extra mile with Type III EPDs

An Environmental Product Declaration (EPD) is a globally recognized environmental document which provides comprehensive, transparent information about the environmental impact of a product throughout its life cycle. EPDs follow international standards and may be verified by independent third parties, which increases their credibility and comparability.

For Type III EPDs the rules for an environmental program are published by a Program Operator. Those consists of Product Category Rules (PCR) and Product Specific Rules (PSR). Program Operators are entities that besides publishing rules accredit third-party independent verifiers to support the certification and publication of EPDs. A successfully verified type III EPD will always carry the logo of the Program Operator.

The program operator responsibilities include:

- **Definition of the rules:**
Based on other standards that are used to regulate LCAs, the Program Operator defines Product Category Rules (PCRs) for the study.
- **Publication of validated EPDs:**
Once validated, the Program Operator publishes the EPD on their portal, making it a third party verified document.
- **Release EPD for use:**
After validation and publication, the product is considered EPD certified. ABB EPDs are publicly available to view in the ABB library. EPDs and are valid for five years.





EPDs are becoming a license to operate

Customers, partners, investors and regulatory bodies increasingly require evidence of the impact our products have on the environment. EPDs are an important tool to provide transparency on the environmental impact of our product portfolio to these stakeholders. Despite the growing relevance of EPDs, comparing them is not effective. The use of different Program Operators or LCA databases or even the mix of energy sources in the LCA would lead to different results. Among all, the most important element is the definition and specifications of the functional unit that is subject to study, which will differ greatly between alternatives. For those reasons, comparing EPDs may generate misleading results.



EPDs versus self declared environmental claims

Manufacturers or retailers can communicate individual environmental aspects of their products and/or services in different ways.

- Type I environmental labels (in compliance with ISO 14024) focus on certifying a product based on a multiple-criteria third party program, but not providing detailed breakdown environmental impacts of the product.
- Type II environmental labels (in compliance with ISO 14021) are self-declared environmental claims, independent third-party audits are not mandatory. Usually, they are only supported by internal verification of the data.
- Type III EPDs (in compliance with ISO 14025) rely on a life cycle assessment (LCA) study which has been certified by an independent third party through a dedicated audit process.





Type III EPDs, certified by an independent Program Operator, provide a comprehensive, third-party verified analysis of a product's environmental impacts across its lifecycle, this ensures that the data presented is accurate. The involvement of an independent Program Operator in Type III EPDs adds credibility - making them a valuable tool for stakeholders looking to make informed, sustainable decisions.

1.5 MNS Switchgear Service

ABB's goal is to ensure the assets' maximum performance and availability. ABB has supplied about 1,7 million MNS cubicles from its worldwide manufacturing locations. Beyond each of these locations, ABB Electrification Service operates with After Sales and Service teams around the globe, offering unparalleled global support.

On completion of commissioning, the switchgear is at the peak of its performance. To maintain this condition, it is essential to adopt a service and maintenance plan for this asset. If the switchgear does not receive maintenance, this could result in downtime. In production the availability of the switchgear ensures productivity, and any down time is a lost opportunity for profit. The length of the down time can be attributed to the following maintenance practices.

- Reactive maintenance is costly for both production and unplanned downtime and must be avoided.
- Preventive or continuous maintenance, is usually performed on a regular basis, requires a scheduled shutdown.
- By evaluating information from the smart devices in the switchgear and online condition monitoring, it is possible to adopt a predictive maintenance schedule with ABB Ability™ CMES to eliminate unnecessary shutdown time.

Regular Services

ABB Service offers comprehensive service and support during the whole lifetime of the switchgear:

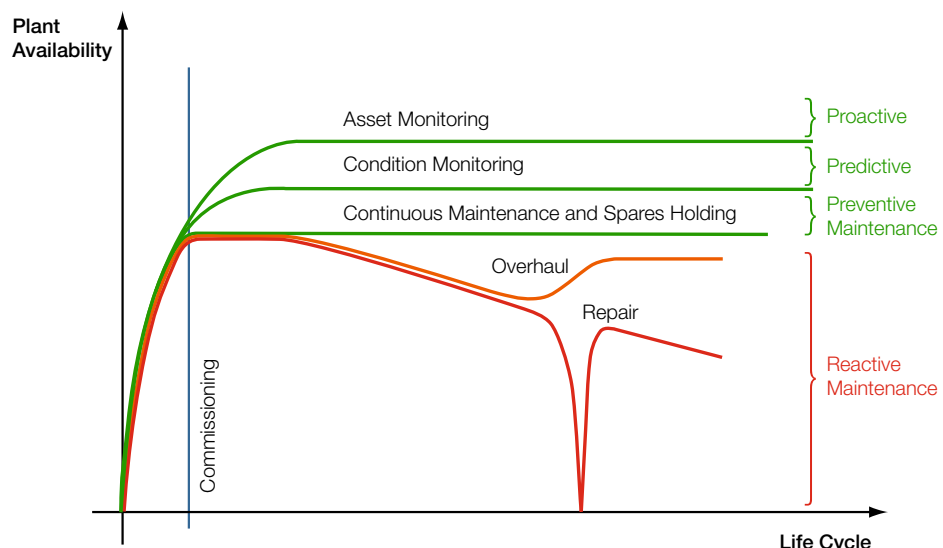
- Engineering assistance
- Product training
- Spares holding
- Installation and commissioning
- Service activities planning
- Hardware and software support
- Upgrades, expansions and modifications

Contract Services

ABB can offer comprehensive maintenance contracts designed specifically for each particular process. Through preventive maintenance programs unscheduled outages can be reduced and maintenance workflows are streamlined.

Utilization of ABB Ability CMES enables the maintenance to be taken into an even predictive maintenance practice, where information available from the switchgear can further assist with maintenance workflow.

The CMES analyzes the data and provides various means to inform the operator, including notification by email or smart message on mobile phones to act quickly and guided on any condition change detected.





2 Operational Safety

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2.1 Product Conformity

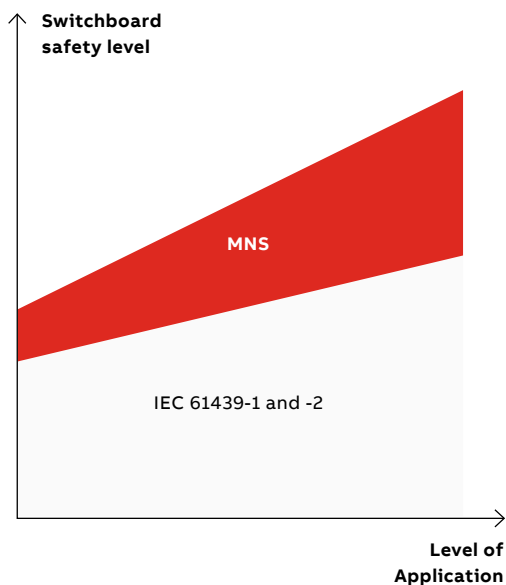
Basic Safety by Design

The fulfillment of all instructions of the relevant standard for Low Voltage switchgear and control-gear assemblies assure a basic level for personal and system protection. With MNS, ABB exceeds these levels as a standard. This has been proven by design verification by test in accordance with IEC 61439-1 and -2. ABB goes beyond these standards with the proven Safety "Plus" for Operators and Plants and additionally in cases where a high degree of exposure is anticipated, or specific risks (e.g. earthquake risk) have to be observed.

The MNS low voltage switchgear system has been subjected to verification by testing in compliance with the standards. To ensure the highest possible degree of safety, ABB continues to conduct tests as per a continuous development program. These tests are based on the most critical representative applications of the entire product or performance range of the switchgear with respect to the test standard.

Rule to achieve a high safety level

High protection of persons without compromise to the protection of the system.



Priority 1:

The occurrence of a failure is avoided.

Priority 2:

If a failure should occur it is limited to its place of occurrence, damage due to an arc is minimized.

Arc fault containment

In addition to the above specifications ABB adopted as a standard IEC 61641 for testing under conditions of arcing due to an internal fault.

To meet the requirements of IEC 61641, the switchgear is connected and supplied corresponding to the normal service arrangement. An arc is then initiated within the switchgear, the point of ignition is chosen to produce the most stress on the assembly.

There are five criteria observed for the test of **personal protection**. In line with its 'Safety Plus' statement ABB ensures that all five are met. In addition to these five criteria ABB also meets the additional **plant protection** criteria as detailed in IEC 61641 (criteria 6 and 7).



Temperature monitoring

Highest operational availability and safety are the utmost priority in any switchgear operation.

ABB MNS system enables temperature monitoring of critical electrical connections as well as environmental conditions in switchgear and switch room to determine the condition of the switchgear.

A sudden and unwanted occurrence of an electrical failure due to connection problems can lead to production losses, damage of the electrical installation and in worse cases affect human lives. Temperature sensors, together with the ABB Ability™ CMES condition monitoring where the temperature data are analyzed, prevent such situations and detect any abnormal temperature change early and notify the operator.

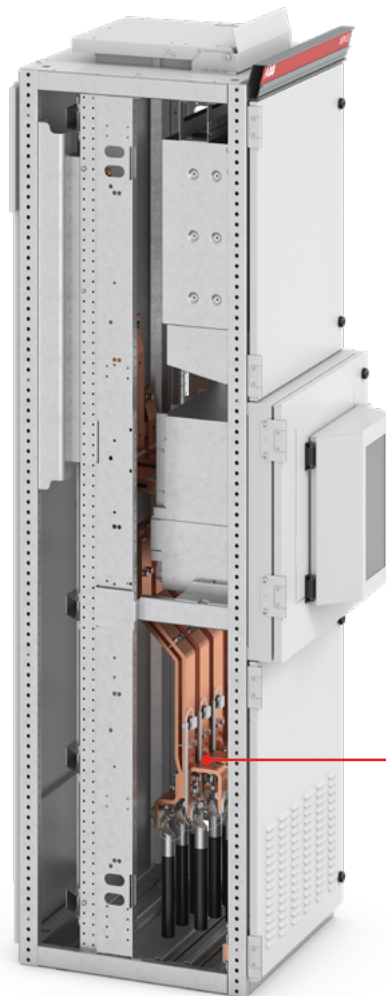
By adding temperature sensors to critical connections, such as cable or busway, the occurrence of an arc can be prevented.

Condition monitoring

ABB Ability™ CMES condition monitoring offers functions on premises to monitor the condition of the entire MNS switchgear assembly such as circuit breaker, load feeder and motor starter modules and other electrical equipment even beyond the switchgear such as motors or loads.

Understanding the switchgear condition allows to change from common preventive maintenance practices into condition based and predictive maintenance practices. This helps to increase operational safety and reduce costs as maintenance are done when and where necessary.

CMES is the basis for condition based and predictive maintenance as outlined in IEC TR 63482 supporting category B and C.



2.2 Design- and Routine Verification

IEC 61439-1 and -2 classify tests which verify the characteristics of an assembly into:

- design verification acc. paragraph 10
- routine verification acc. paragraph 11

Design verification by test

Design verification is intended to verify compliance of the design of an ASSEMBLY or ASSEMBLY system with the requirements of this series of standards. The tests shall be carried out on a representative sample of an ASSEMBLY in a clean and new condition (IEC 61439-1 paragraph 10.1).

An ASSEMBLY which is verified in accordance with IEC 61439 by an original manufacturer and manufactured or assembled by another does not require the original design verifications to be repeated if all the requirements and instructions specified and provided by the original manufacturer are met in full. Where the ASSEMBLY manufacturer incorporates own arrangements not included in the original manufacturer's verification, the ASSEMBLY manufacturer is deemed to be the original manufacturer in respect of these arrangements.

The MNS low-voltage switchgear system is subjected to extensive design verifications and tests in compliance with the standards in order to ensure the highest possible degree of safety.

These tests are based on the most critical representative applications of the entire product or performance range of the switchgear with respect to the test standard. The results are documented in engineering guidelines and the ABB engineering tool used by local ABB organizations worldwide, applicable to the various low-voltage switchgear and control gear assemblies

(in accordance with IEC 61439-1 and -2).

The safety level of the standard as well as a homogeneous quality are ensured in the way that the corresponding design and engineering documents as well as the manufacturing instructions are strictly followed.

Design verification by test (related section of IEC 61439-1)	Safety profit for operator and plant
Verification of temperature-rise (10.10)	Extended life cycle of the switchboard and equipment. Prevention of fire risks.
Verification of the dielectric properties (10.9)	Avoidance of damage caused by over-voltage.
Verification of the short-circuit withstand strength (10.11)	External influence can cause a short circuit. The switchboard arrangement can withstand the mechanical force of the short circuit. Limits the short circuit to the place of initiation. Prevention of fire risks.
Verification of protection against electric shock and integrity of the protective circuit (10.5)	Avoidance of fatal voltage at exposed conductive parts. Protection of personnel in case non current carrying parts accidentally become live. Protection against the consequences of faults in external circuits supplied through the ASSEMBLY.
Verification of clearances and creepage distances (10.4)	Environment influences can reduce the isolation quality (e.g. polluted area). MNS can be used in severe atmosphere.
Verification of mechanical operation (10.13)	Extended lifetime for moving components and equipments. MNS far exceeds the standard requirements.
Verification of the degree of protection (10.3)	Protection against live parts. Protection against penetration of liquid and solid elements. Ensures safe operation.
Verification of strength of materials and parts (10.2)	Protection against corrosion. Protection of insulating materials against abnormal heat and fire and ultra-violet radiation. Ensures safety regarding mechanical impacts and during lifting.

Routine verification during production

Routine verification is intended to detect faults in materials and workmanship and to ascertain proper functioning of the manufactured ASSEMBLY (IEC 61439-1 paragraph 11.1)

Routine verification is performed on every new ASSEMBLY/ shipping section following the defined manufacturing process.

Routine verification carried out consequently in the factory ensures the quality of ASSEMBLY, material and manufacturing. Guidelines such as inspection instructions and workshop checklists take into consideration all relevant mechanical and electrical properties. If required, additional routine verification can take place after erection.

Routine verification shall comprise the following categories acc. to IEC 61439-1:

- Construction paragraph 11.2 to 11.8
- Performance paragraph 11.9 and 11.10

Routine verification (related section of IEC 61439-1)	Safety profit for operator and plant
Verification of degree of protection of enclosures (11.2)	Ensures safety during operation.
Verification of clearance and creepage distances (11.3)	Ensures lifelong performance of the ASSEMBLY.
Verification of protection against electric shock and integrity of protective circuit (11.4)	Assures personal safety of operating personnel.
Verification of built-in components (11.5)	Ensures correct installation and identification of built-in components acc. to the ASSEMBLY manufacturer instructions.
Verification of internal electrical circuits and connections (11.6)	Ensures lifelong performance of the ASSEMBLY.
Verification of terminals for external conductors (11.7)	Ensures easy erection and installation.
Verification of mechanical operation (11.8)	Ensures correct mechanical function of mechanical actuating elements, interlocks, locks, removable parts etc.
Verification of dielectric properties (11.9)	Assures reliable operation and personal safety of operating personnel.
Verification of wiring, operational performance and function (11.10)	Ensures correct operation of the defined electrical functions incl. interlockings and sequence control facilities if applicable.



2.3 Arc Fault Protection

Arc fault mitigation solutions

Arc fault mitigation solutions reduce damage to equipment, limiting downtime as less time is required for repairs and keeping costs to a minimum. In addition, the safety of personnel is enhanced.

There are three design philosophies which protect operator and equipment in the event of an arc flash incident, one or more may be adopted within the same switchgear.

Passive arc flash protection solutions

Switchgear designed and tested to mechanically withstand the electric arc. Protection is afforded by the containment of the arc within the switchgear and the means to direct the arc gases and debris to a safe area. Passive solutions also include advanced switchgear design features to reduce the probability of an arc flash occurring, such as segregation between compartments and creation of arc ignition protected zones (AIPZ).

Active arc flash mitigation solutions

Switchgear equipped with devices and solutions to limit the arc incident energy. The amount of thermal energy generated during an electric arc event and consequently limit the damage to the equipment.

Preventive arc flash protection solutions

Switchgear equipped for remote operation, so that standard operations such as switching, diagnostic and operational monitoring, racking in/out, etc. can be conducted outside of the dangerous arc flash exposure area. Preventive solutions also include the predictive maintenance of assets, which enables a reduction in the number of live equipment interactions to only the most necessary and targeted actions as identified by analysis of the data provided by these systems. This not only minimizes human-equipment interactions but also improves equipment reliability and reduces maintenance costs.

Passive solutions

The principle of passive arc flash protection is based on the mechanical design. Robust design reduces the risk that a person, standing in front of switchgear with closed and latched doors, will be injured in the event of an arcing current event inside the equipment.

MNS exceed the standards, as they are always designed and tested to withstand an internal arc. This test is covered by IEC TR 61641 Ed. 3 for low-voltage switchgear.

The testing is not a compulsory requirement in all conditions, but ABB's commitment to personnel safety is a key driver.

Design

Arc resistant switchgear usually have the following characteristics:

- Reinforced mechanical structure able to withstand the stresses (overpressure) caused by internal arcing.
- A preferential path inside the assembly for the discharge of hot gases and debris created by arcing.
- An arc ignition protected zone (AIPZ) to avoid the occurrence of an arc.
- Segregation between compartments to inhibit the propagation of the arc.

Considerations

Passive solutions contain the arc within the switchgear, the first level of protection is to protect nearby personnel. The next levels contain the arc in the area where it was initiated, and the highest level enables emergency re-use of the equipment following cleaning of the affected areas.

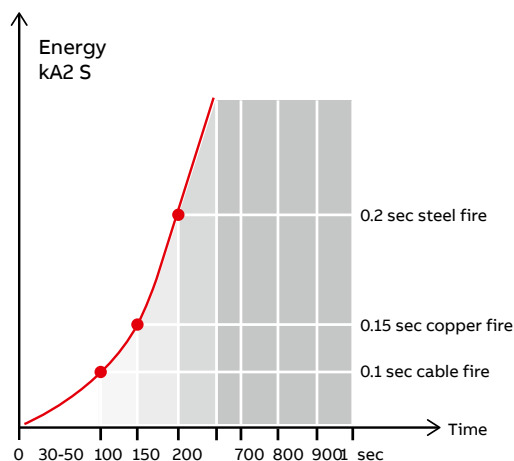
Active solutions

The main parameter of the electric arc, which characterizes its destructive ability, is incident energy. This is directly proportional to the arc duration and arc current.

The arcing fault is usually interrupted by a circuit breaker and relay/trip unit or fuses. Without any active arc flash mitigation solutions in place, the arc clearing time (which is the total time between the beginning of a specified overcurrent and the final interruption of the circuit¹) may vary from 0.01 to 0.3 seconds. However, within this short time, steel, copper and cable can burn, melt and vaporize, as shown in the diagram.

Reducing the arc clearing time

In order to reduce the negative effects of an arc event, the arc clearing time must be reduced. This is the role of active arc flash mitigation solutions.



Optical-based internal arc-detection devices

Relays that detect the arc flashlight and current (optional). When the arc flash is detected, it sends the tripping signal to the circuit breaker.

If active solutions are specified, the Arc Guard System™ TVOC-2 is used in MNS.

Preventive solutions

An electric arc can occur for several reasons, for example human error or contamination. Electrical maintenance, trouble-shooting personnel and operators are always exposed to these risks when working in the switchgear room. Maintaining a safe distance between personnel and equipment during operations provides the most effective means of avoiding injury. Preventive solutions limit risk by reducing maintenance activity to only the most necessary and targeted actions.

A safer remote operating environment

Remote operation and circuit breaker racking provide a safer operating environment for personnel by increasing the distance between the operator and potential arc flash incident energy from the switchgear. Enhanced switchgear operability preventing human errors can be achieved by embedded plant supervision with metering capabilities and communication protocols to provide status information.

Condition monitoring and diagnostics

Asset condition monitoring and diagnostics provide information on the mechanical and electrical health conditions for switchgear and assets, so personnel do not have to approach the switchgear to obtain this information. Furthermore, temperature sensors at critical joints reduce the risk of failure and increase safety. The information, available in ABB Ability™ CMES, can be used to schedule more targeted and safer condition-based maintenance, which also reduces costs and can improve overall reliability.



Passive solutions acc. to IEC 61641

This technical report applies to enclosed low-voltage switchgear and controlgear assemblies manufactured according to IEC 61439-1 and -2. This test is subject to an agreement between manufacturer and user. It is not considered to be a part of the standard design verification.

The sole purpose of this test is to assess the ability to the ASSEMBLY to limit the risk of personal injury and limit the risk of a damage of the ASSEMBLY resulting from an internal arcing fault.

Despite the ever-growing experience of the manufacturers and operators of switchgear and control gear systems, there is some residual risk of internal arc generation.

Internal arcs may be the result of:

- external influences, e.g., tools forgotten inside the system, or any remaining material residues after maintenance or conversion work.
- conductive deposits on isolating supporting elements under unfavorable environmental conditions.

If the gases and decomposition products resulting from the faults described are capable of bridging the gap between two neighboring phases, an arc will be ignited with current intensity of several thousand amperes and temperatures up to 20'000 °C. These conditions will result in a strong pressure build up inside the switchgear

The resistance to internal arcs refers to two different aspects:

- Personal protection for the operator and maintenance personnel.
- ASSEMBLY protection in order to limit the damage within the system and to quench the internal arc within specific areas and functional compartments.

The following criteria specified in IEC 61641 are valid for:

Personal protection:

1. Doors do not open
2. Parts >60g do not fly off
3. Arcing does not cause holes below 2m
4. Indicators do not ignite
5. Protective circuit is still effective

ASSEMBLY protection:

6. Criteria 1-5 plus

The arc must be limited to the defined area where it ignited and must not re-ignite in the adjacent areas.

7. Criteria 1-6 plus

Emergency operation is possible, after clearing of the fault. This requirement must be evidenced by an insulation test carried out at 1.5 times the rated operating voltage for 1 min.

Priorities for MNS

Priority 1

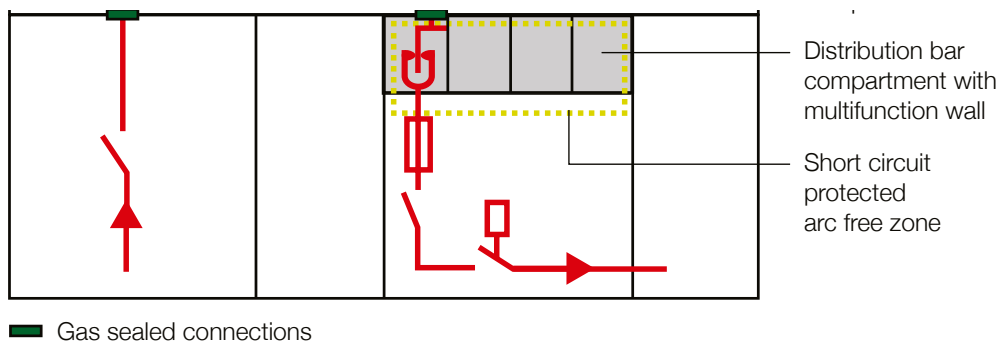
The basic ABB MNS principle is that an arc fault should be prevented from occurring in the first place by designing and dimensioning the equipment to reduce this probability.

Priority 2

Limiting of the arc to the compartment where it occurs. This minimizes the consequences of an arc if it should occur.

Design measures to achieve optimized arc fault protection

Subject	IEC	Specific solution in MNS assuring high protection for Personnel and System
Compartments for: - Busbars - Distribution bars - Functional units These compartments are defined areas according to IEC 61641, paragraph 5. The internal arc is restricted to these defined areas. For functional units that are part of one compartment (i.e. 8E/4, 8E/2, 6E/4, and 6E/2 withdrawable modules), the arc is restricted to the individual compartment for rated voltages > 500V.		Common compartment for the main busbars system. A separate compartment for the distribution bars embedded in the MNS Multi-Functional Wall (MFW), providing single-phase isolation of distribution bars. For functional units that are directly connected to busbars, such as ACBs, MNS utilizes a rigid arc barrier with gas-sealed connections between busbars and connection bars to provide a separate compartment.
Busbars: When forms of separation are required: - Protection against contact with hazardous parts - Protection against the passage of solid foreign bodies	Busbars are to be protected by internal separation: The required degree of protection shall be at least IP2X (or alternatively IPXXB). Note: IEC 61439-2 paragraph 8.101 states that Forms of internal separation IP2X covers IPXXB.	The minimum degree of protection for internal separation is IP20.
Fully single-phase insulated busbars provide an arc-free zone according to IEC 61641 paragraph 3.7.		Option for maximum protection: The busbars are fully single-phase insulated.
		Maintenance-free design by using thread locking bolts and conical spring washers. Gas-sealed connection between: - Busbars and distribution bars - Busbars and bars of other functional units - Busbars and connection bars to devices such as ACBs
Busbar fastening and connections	The IEC 61439-1 and -2 do not specify requirements regarding maintenance and sealing of busbar fastening and connections.	
	The IEC 61439-1 and -2 do not specify requirements regarding: - Single-phase encapsulation - Main contact design	Single-phase isolated contacts. The contact housing provides a rigid single-phase isolation prior to connecting the contacts to the distribution bar.
Main contact system		



IEC 61641**Test Criteria 1-5 for personal protection:****Criterion No.**

- | | |
|---|--|
| 1 | Whether correctly secured doors, covers, etc., do not open. |
| 2 | Whether parts (of the assembly), which may cause a hazard, do not fly off. |
| 3 | Whether arcing does not cause holes to develop in the freely accessible external parts of the enclosure as a result of paint or stickers burning or other effects. |
| 4 | Whether the indicators arranged vertically do not ignite (indicators ignited as a result of paint or stickers burning are excluded from this assessment). |
| 5 | Whether the equipotential bonding arrangement for accessible parts of the enclosure is still effective. |

Test criteria 6-7 for ASSEMBLY protection including system function protection:

- | | |
|---|---|
| 6 | The arc must be limited to the defined area and must not re-ignite in the adjacent areas. |
| 7 | An emergency operation of the switchgear and control gear assembly must be possible when the fault has been repaired and/or the functional units of the defined area have been isolated or removed. This requirement must be evidenced by an insulation test carried out at 1.5 times the rated operating voltage for 1 minute. |

Test execution and results for MNS

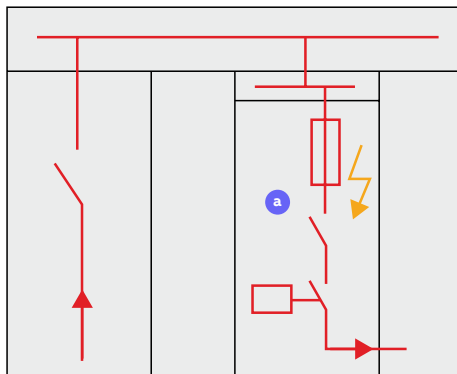
The required values for the arc fault withstand are verified through rated voltage, short-circuit withstand and short-circuit tripping time and are to be selected for the equipment which must be able to withstand. The permissible arc duration is 0.3 s.

- Test criteria 1-5 for personal protection are fulfilled
- Test criteria 6-7 for ASSEMBLY protection are fulfilled together with the use of Multi-Functional Wall for functional units connected to distribution bars and rigid arc-barriers for functional units directly connected to busbars, all in combination with gas-sealed connections.

Note from IEC 61641 about the duration of the tests: When the assembly is intended to be fed from a transformer, the permissible arc duration of the incoming switching device should in general be 0.3 s to allow the operation of the high-voltage protective equipment.



Point of arc fault ignition



a Ignition point

Outgoing side of the SCPD of the withdrawable module (fuse or MCCB short circuit limiting breaker). The power is switched off within the breaking time of the ACB of 0.3 s. In tests the time was between 2 -10 ms. The arc is self-extinguishing. The switchboard remains in operation

b Ignition point

Incoming side of the SCPD of the withdrawable module (short circuit current not limited by the SCPD). The components are tested to resist an arc fault duration of 0.3 s.

c Ignition point

Distribution bars embedded in the Multi-Functional Wall. The components are tested to resist an arc fault duration of 0.3 s. The fault arc is self-extinguishing.

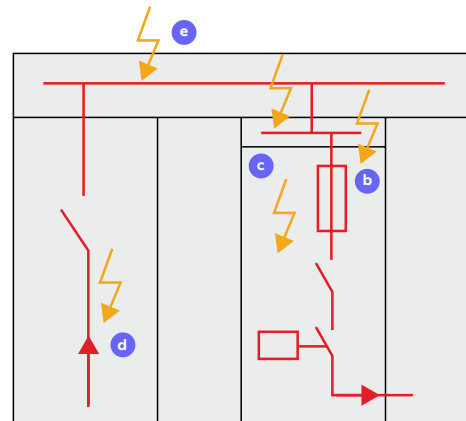
d Ignition point

Incomer cubicle - before the ACB
The time for the duration of the fault arc is limited by the "test set up" (source) to 0.3 s. To reduce damage, MNS is designed as follows:

Case d1)

Tests have confirmed the following philosophy:
There is no fault arc barrier between the incoming and outgoing contacts of the ACB. A fault arc ignited on the incoming side (not protected side) of the ACB moves to the outgoing side (protected side) of the ACB.

The current is instantaneously switched off by the ACB within adjusted tripping time (less than 0.3 s) of the ACB. The fault arc is self-extinguishing. The damage is limited to a low level.



Case d2)

The fault arc is not limited by the ACB. The fault arc ignited on the incoming side (not protected side) of the ACB. The fault arc is inhibited to move to the outgoing side (protected side) of the ACB. The components resist the fault arc at a duration of 0.3 s. The current is switched off by the test setup after 0.3 s. The fault arc is self-extinguishing.

e Ignition point

Main busbars

Case 1 - Fully insulated busbars

Fully insulated busbars, no root point: it is not possible to ignite an arc fault.

Case 2 - Non-insulated busbars

During this test the ACB in the incomer cubicle is mechanically prevented to trip. The fault arc runs to the end of the busbars. The power switches off after max. 0.3 s. The fault arc is self-extinguishing at the end of the switchgear.

Case 3 - Connection bars to ACB

During this test the ACB in the incomer cubicle is limiting the short circuit current. The current is instantaneously switched off by the ACB within the adjusted tripping time of the ACB in less than 0.3 s. The fault arc is self-extinguishing. The damage is limited to a low level

Note: Arc fault test at ignition point b) and c) is not required as they are located in the Arc Free Zone. Refer to IEC 61439-1 Paragraph 8.6.4. However, MNS is fully tested to meet these criteria.

2.4 Degrees of Protection (IP Code)

The degree of protection provided by any assembly against contact with live parts, ingress of solid foreign bodies and liquid is indicated by the designation IP... according to IEC 60529.

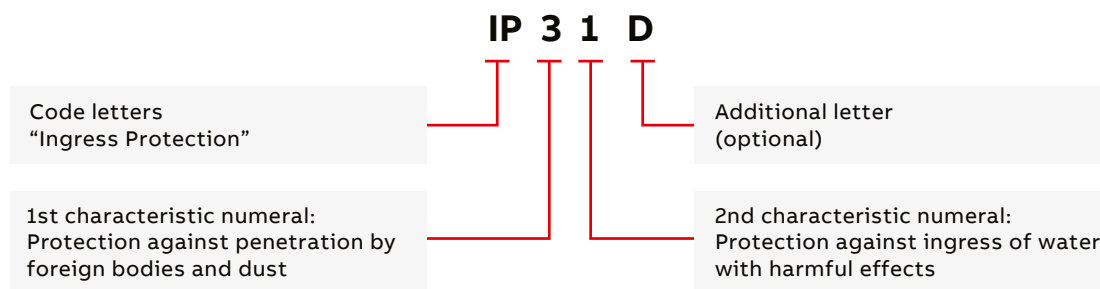
The degree of protection is also a criteria for design verification (IEC 61439-1 paragraph 10.3). It is subject to agreement between the manufacturer and user (IEC 61439-2 Annex BB).

Definitions

Degrees of protection provided by enclosures of electrical equipment in accordance with IEC 60529:

- Protection of persons against access to hazardous parts inside the enclosure.
- Protection of the equipment inside the enclosure against ingress of solid foreign objects.
- Protection of the equipment inside the enclosure against harmful effects due to the ingress of water.

Designation for the degrees of protection

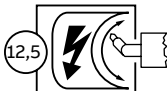
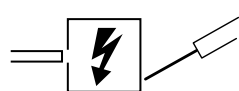
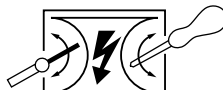


Remark: Where a characteristic numeral is not required to be specified, it shall be replaced by the letter "X" ("XX" if both numerals are omitted).

MNS – Available standard degrees of protection

As MNS is designed for indoor applications, no IP degrees covering water jetting and total water immersion are foreseen.

Ventilated		Non-ventilated
Ventilation grids in: Doors, covers and roof plate		Sealed; no ventilation openings
IP30	IP40	
IP31	IP41	
IP32	IP42	
	IP43	
		IP54
Maximum heat dissipation (by air convection)		Low heat dissipation (heat emission via enclosure only)

Subject	Protection of equipment	Protection of persons	
First characteristic numeral	Protection against ingress of solid foreign objects	Protection against access to hazardous parts with:	
2		≥ 12.5 mm Diameter	Finger
3		≥ 2.5 mm Diameter	Tool
4		≥ 1.0 mm Diameter	Wire
5		dust-protected	Wire
Second characteristic numeral	Protection against ingress of water with harmful effects		
0		No Protection	
1		Water vertically dripping (e. g. condensation water)	
2		Water vertical dripping. The enclosure is tilted at any angle up to 15° on either side of the vertical	
3		Water sprayed at an angle up to 60° on either side of the vertical	
4		Water splashed against the enclosure from any direction	
Additional Letter (Optional)		Protection against access to hazardous parts with:	
A		Back of the hand ≥ 50 mm diameter	
B		Finger / Tool ≥ 12.5 mm diameter, 80 mm length	
C		Tool / Wire ≥ 2.5 mm diameter, 100 mm length	
D		Tool / Wire ≥ 1.0 mm diameter, 100 mm length	

2.5 Internal Separation

The internal separation is subject to agreement between the manufacturer and user acc. to IEC 61439-2 paragraph 8.101, ANNEX AA Internal separation of PSC-ASSEMBLIES. If customer specifications require internal separation according to BS EN 61439-1, project specific solutions may be offered. Please contact your local responsible unit.

Assemblies are divided by means of partitions or barriers (metallic or non-metallic) into separate compartments or enclosed protected spaces.

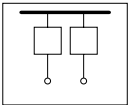
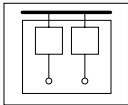
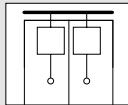
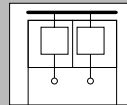
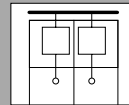
Aim:

Whenever access to a functional unit is required for extensions or maintenance it should be possible without de-energizing the entire Low Voltage assembly.

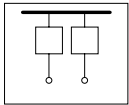
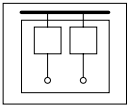
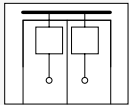
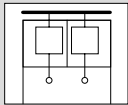
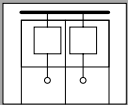
Solution:

The internal separation increases the safety for the personnel and the plant. Protection against direct contact can be obtained by appropriate constructional measures on the assembly itself. The risk to cause an internal arc failure is minimized.

Forms of internal separation

	Form 1	Form 2b	Form 4a	Form 3b	Form 4b
					
Internal Separation	No separation				Terminals not in the same compartment as associated unit: Form 4b Separation of terminals for external conductors from the functional units: Forms 3b, 4b Separation of all functional units from another: Forms 4a, 3b, 4b Separation of busbars including distribution bars from the functional units and terminals for external conductors: Forms 2b, 4a, 3b, 4b
	No protection when doors are open				Protection to terminals of the neighbouring functional units: Form 4b Additional protection during work on the terminals for external conductors: Forms 3b, 4b Persons are protected against touch of neighbouring functional units during work on a functional unit: Forms 4a, 3b, 4b Persons are protected against touch of busbars and distribution bars during work on the functional units: Forms 2b, 4a, 3b, 4b
	No internal protection				Protection against ingress of foreign objects between single terminal compartments: Form 4b Protection against ingress of foreign objects between functional units and common terminal compartment: Forms 3b, 4b Protection against ingress of foreign objects into any neighbouring functional unit: Forms 4a, 3b, 4b Protection against ingress of foreign objects between functional unit into the bus bar compartment: Forms 2b, 4a, 3b, 4b
Protection of Persons					
Protection of Equipment					

MNS available forms of separation

MNS solution	Form 1 	Form 2b 	Form 4a 	Form 3b 	Form 4b 
	On behalf of safety, MNS is only available with higher protection	In addition MNS provides a separate compartment also for the distribution bars by the MNS Multi Function Wall	MNS provides a separate cubicle for functional units with direct connection to main busbars	Each phase isolated as Form 4b	At MNS withdrawable modules each phase at the terminals for external conductors is isolated.

Special measures in MNS exceeding IEC regulations
All separation solutions fulfill the requirements of the degree of protection IP20.

Form 2b through 4b for functional units connected to distribution bars
If internal separation is required for functional units connected to distribution bars MNS offers additional safety by the use of the Multi-Functional Wall (MFW). The MFW is a separate compartment for the distribution bars. It provides a single-phase isolation of distribution bars and a “gas-sealed” connection between the main busbars and the distribution bars.

The degree of protection between the distribution bars and equipment compartment (functional unit) using the MFW is IP20 without the necessity of moving parts (shutters etc.).

Form 2b and 4b for functional units which are directly connected to busbars
Switchboards with functional units which are directly connected to busbars. Mainly used for incomers, bus-ties and outgoing feeders utilizing MNS rigid arc-barriers for a higher degree of internal separation.

Form 3b and 4b for withdrawable functional units connected to distribution bars
For switchboards with withdrawable modules with individual module compartments separated by compartment bottom plates.

2.6 Service conditions

Service conditions & operating environment

MNS switchgear is designed to operate under the environmental conditions as described in IEC 61439-1. It is essential to keep the installation & operation environment surrounding the switchboard to the design as described in IEC standard. MNS 3.0 low voltage switchgear is a type tested switchgear assemblies suitable for indoor installation. Its enclosure protection degree can be as high as IP54 under normal service conditions.

Ambient air temperature for indoor installations

Highest temperature in short-term +40 °C

The highest average temperature in 24 hours +35 °C

The lowest temperature 5 °C

MNS switchgear assemblies are intended for use under the normal ambient air temperature conditions described above. Under certain indoor installation conditions, MNS switchgear can operate at higher temperatures. In this case, derating factor shall be taken into consideration for the performance of switchgear.

Vendor's instructions shall be followed with regards to the service conditions for measuring and metering instruments as well as protection relays.

Humidity conditions for indoor installations

As per GB/T 7251.1/12, IEC 61439-1/2, EN 61439-1/2 and Part 500 of VDE 0660, the relative humidity of the air does not exceed 50% at a maximum temperature of +40 °C under normal service conditions.

Where condensation may occur, anti-condensation measures such as ventilation or anti-condensation heater shall be taken into consideration

Altitude

Under certain installation conditions, MNS switchgear can operate at an altitude above

2000m. In this case, derating factor shall be taken into consideration for the performance of switchgear.

Switchgear for other special applications

The surface of the tropical type of switchgear has to be coated with special paint.

The MNS 3.0 standard solutions is tested acc. to IEC 62271-2 and IEC 60068-3-3 up to an acceleration of 2g.

With accessories and enhanced structural design, MNS 3.0 system can meet the safety requirements for switchgear in earthquake zones.

Standard type MNS 3.0 low voltage switchgear has been tested and certified based on marine standards of German Lloyd's Register of Shipping with resistance against shock of 5-100 Hz

Special operating environment designs are available for

- Tropical zones
- The earthquake zone
- Shelter
- Marine & Offshore

Ambient condition monitoring

Using environmental sensors inside of the switchgear assembly and in the switch room, connected to ABB Ability CMES, enables remote monitoring of the operating condition and can be used to determine maintenance and inspections needs.



3. Condition Monitoring and Connectivity

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3.1 MNS Digitalization

Integration into plant wide monitoring and control systems and condition monitoring

MNS is a truly digitalized and integrated switchgear system, not only from the electrical and safety point of view but with the high capability for condition monitoring and easy and reliable information distribution.

The digitalized MNS (also MNS Digital) switchgear provides various options for process operators, electrical and maintenance teams, and plant managers to access essential information to run their process efficiently and sustainably with lower maintenance costs.

Plant automation and control system

In infrastructure and process industry, control applications often require different systems to work together with low voltage switchgear and motor control centers. This need arises from specific customer preferences for control operations or the necessity for information at various operator locations.

MNS Digital effectively meets these needs by supporting a range of industry-standard communication interfaces and applications.

Electrical network monitoring /SCADA

As the demand for continuous plant operation increases, so does the need for data on energy consumption and switchgear condition monitoring. Providing timely information is crucial for the profitable operation of a plant, and this capability is a key feature of MNS Digital.

To access electrical data, MNS Digital includes a standard Ethernet interface that supports Modbus TCP and OPC UA. This open interface allows easy and secure access to various data types, including:

- Measurement values
- Device status and diagnostics
- Condition monitoring data
- Time-stamped alarms, events
- And notifications as a result of analytics

Enhanced safety and availability

Ensuring 24/7 availability of electrical energy is crucial in any electrical distribution system. MNS Digital enhances safety by using temperature sensors at critical connections to detect changes early, regardless of the load level.

Additionally, environmental sensors within the switchgear and switch room monitor conditions and alert users to any abnormalities. The switchgear operation is also monitored through smart circuit breaker and protection relays ensuring smooth operation.

ABB Ability CMES Condition Monitoring

Maintenance costs can be significant in infrastructure and industry process plants. MNS Digital, equipped with CMES (Condition Monitoring and Evaluation System), supports a structured maintenance approach, helping to reduce costs through predictive maintenance.

The system continuously monitors and analyzes any changes in the switchgear, transforming the data into valuable insights, such as:

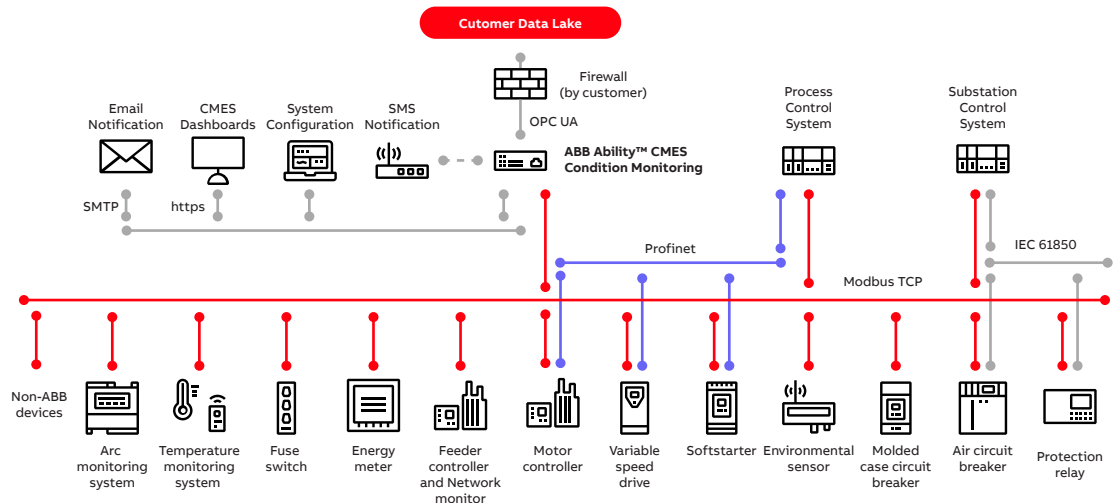
- What is the problem?
- Where is the problem located?
- What is the severity of the issue?
- What caused the problem?
- What actions are needed to resolve it?

Engineering and maintenance

The Windows-based engineering tool, MNavigate, offers a user-friendly way to configure all system parameters over a network connection. The Ethernet interface allows full access to all system parameters and settings, provided the user has the necessary access rights.

3.2 Overview

System topology and communications



Graphic shows various options and logical connections. Actual configuration based on required options and protocols may differ, Profinet and IEC 61850 shown as example only.

MNS Digital direct device communication

Electrical device integration

The MNS Digital switchgear integrates smart devices such as the Emax 2 / Emax 3 and Tmax XT circuit breakers, which feature the Ekip communication interface. It also connects protection relays, motor controllers, and sensors that monitor temperature and environmental conditions. These devices communicate over an internal network within the switchgear using Modbus RTU and Modbus TCP protocols.

Modbus is known for its reliability in monitoring systems, making it an excellent choice for connecting the devices while also accommodating older models, such as those from the Tmax series.

Users have the option to utilize communication directly from the devices to higher-level systems or to use a Digital Gateway as a data concentrator. The Digital Gateway approach optimizes data communication, ensuring efficient and effective information flow.

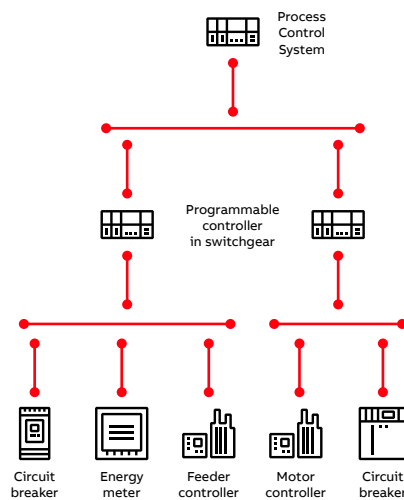
Interface to other systems

The MNS Digital switchgear connects to plant-wide monitoring systems using various communication protocols in addition to Modbus. These include Profibus, Profinet, Ethernet IP, and IEC 61850. The availability of protocol depends on the specific smart relays, controllers, and devices selected for the system.

Direct communication

Direct communication interfaces from smart relays and devices provide flexibility and scalability. However, they require extensive programming and configuration in higher-level systems, as each device is connected directly to the control network.

To facilitate direct communication, multiple communication master and cross-network communication are required. Additionally, suitable network equipment, such as switches, must be implemented and configured. This aspect typically falls outside the scope of MNS Digital.



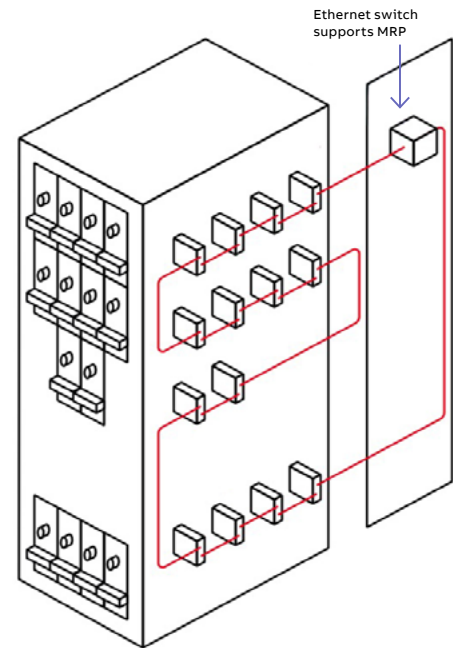
Direct communication

High availability / redundant communication

The MNS Digital switchgear utilizes an Ethernet communication system that features a ring network structure. This design simplifies the overall network architecture and enhances reliability by enabling redundant communication through a protocol known as Media Redundancy Protocol (MRP).

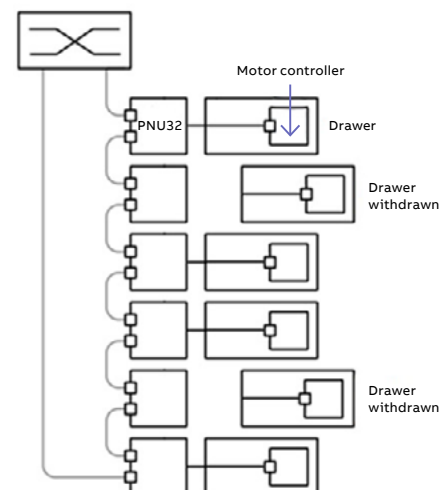
In a traditional network setup, if a single connection fails, it can disrupt communication between devices. However, with a ring network, multiple paths exist for data to travel. If one path is interrupted, the network can automatically reroute the data through an alternative path, ensuring continuous communication. This redundancy is critical for maintaining the operational integrity of the plant, especially in environments where downtime can lead to significant losses.

The Ethernet interface is housed within the MNS cable compartment, designed to ensure that communication remains operational even if one or more modules are withdrawn from the switchgear. This means that maintenance or upgrades can be performed without disrupting the entire network's communication capabilities. The ability to maintain connectivity during module changes is essential for ensuring the reliability and availability of electrical systems in a plant.

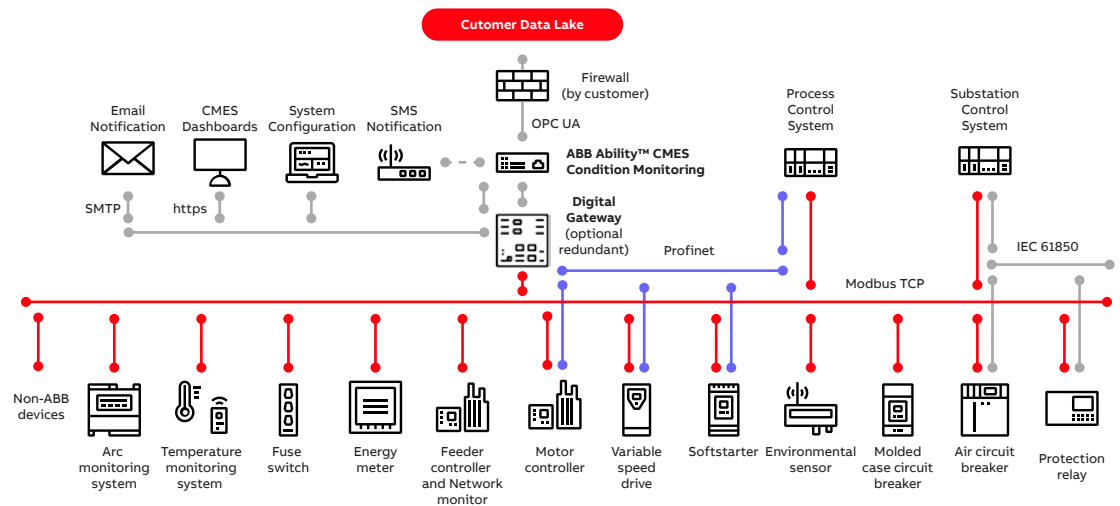


Ethernet wiring in MNS cable compartment

Overall, the combination of Ethernet communication and a ring network structure not only simplifies the network setup but also provides a robust solution for maintaining uninterrupted communication in critical applications.



Ethernet ring MRP structure



Graphic shows various options and logical connections. Actual configuration based on required options and protocols may differ, Profinet and IEC 61850 shown as example only.

Digital Gateway option

The Digital Gateway in the MNS Digital switchgear simplifies communication between the MNS motor control center or switchgear and process control systems, removing the need for additional programmable devices or PLCs.

It can connect to up to 128 devices, including circuit breakers, motor starters, and feeder controllers, offering a single interface that reduces the complexity and number of required communication interfaces. This simplification improves efficiency and lowers installation and maintenance efforts.

In integrated motor control systems (IMCS), the Digital Gateway serves as a data concentrator, enabling remote configuration of motor starters. It stores all parameter settings, allowing for easy downloads from the MView Human-Machine Interface (HMI) during motor starter replacements, saving time and minimizing configuration errors. Overall, the Digital Gateway enhances the functionality and efficiency of the MNS Digital switchgear.

High availability / redundant communication

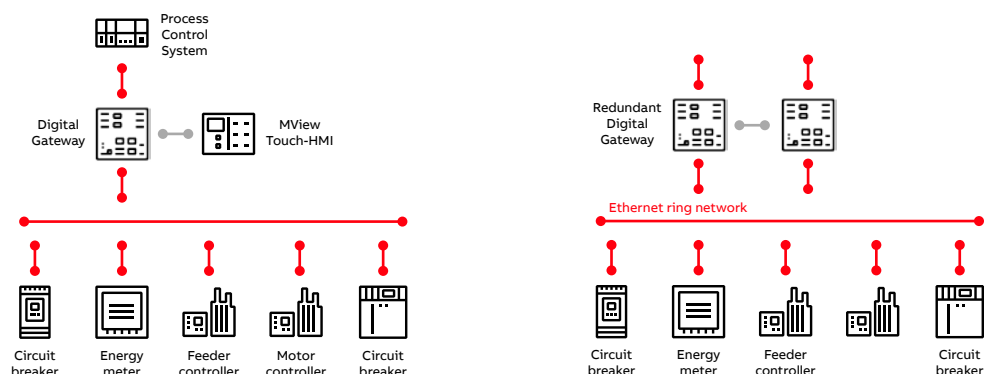
The Digital Gateway can be configured for dual redundant communication. This allows for communication via two independent data paths from the switchgear to control systems.

In normal operation both controllers can read all data available from both the primary and backup gateway. However, only the primary gateway is enabled to process the switching commands from the control system.



Digital Gateway

If a changeover is initiated the primary gateway passes switching command permission to the backup gateway, via the 'redundant link'. This ensures no communication is lost and a 'bumpless' changeover is performed.



Time synchronization

MNS Digital supports easy time synchronization, typically utilizing a single time server to provide a synchronization signal for the entire installation. This signal is then distributed throughout the network to the Digital Gateway and ABB Ability CMES.

When an alarm or event occurs within the system, this information, along with a timestamp, is made available via the OPC UA Server. It's important to note that timestamped messages are not transmitted through the serial fieldbus interfaces in MNS.

The Digital Gateway receives accurate time via the Network Time Protocol (NTP) over standard Ethernet from a time server within the switchgear control network. Alternatively, one Digital Gateway can be configured to function as a time server.

Option 1

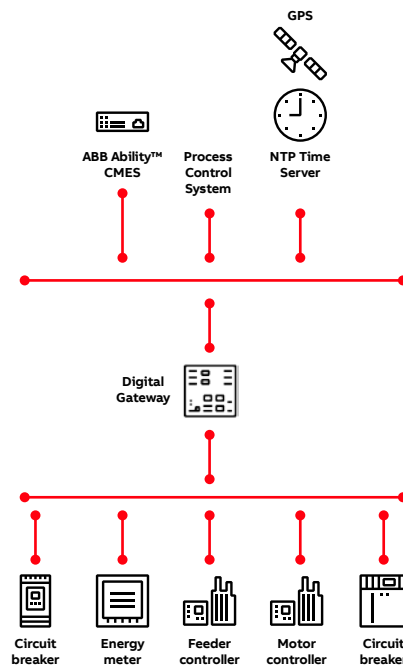
A time server is either integrated into or accessible through the switchgear network. Its time signal is received by all Digital Gateways and CMES. Third-party products allow the connectivity to a GPS receiver for highly accurate time synchronization across the plant.

Option 2

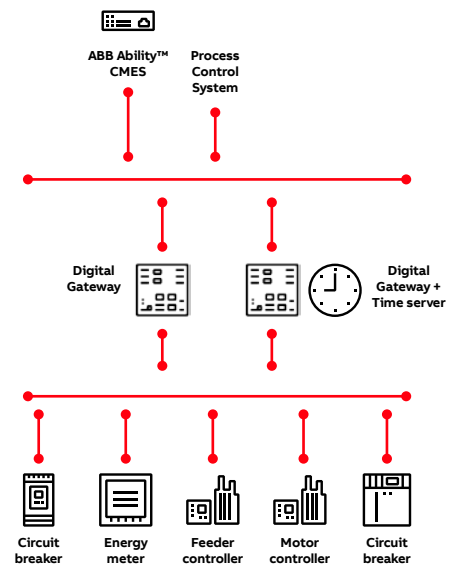
If no time server is available, one Digital Gateway can be configured to act as the time server. It will send the time signal to all other Digital Gateways and CMES on the switchgear network.

GPS – Global positioning system

The Global Positioning System (GPS) provides precise time, frequency, and position information worldwide. Each satellite contains an atomic clock that continuously transmits time data along with orbital information. A GPS receiver collects data from up to six satellites and uses this information to calculate its position and time. This data is then utilized by a time server, which



Time sync Option 1



Time sync Option 2

3.3 Operation

User interrogation and operation

MView

The functionality of the MView is based on user intuitive and simple web browser based operation to access data of a web server. The web server runs as an application in MNS Digital Gateway and can be accessed by any standard PC running web browser software.

As a standard solution the MView is available as an industry standard touch panel PC mounted directly on the switchgear. ABB's plant wide information philosophy is fully applicable here, as a further possibility exists. The MView web interface can be accessed by any Windows standard PC within the switchgear control network.



MView touch panel

The MView function provides the user with the following options, based upon availability from the smart relay or circuit breaker and with sufficient user access rights:

Control:

- Stop/Start/Reset.

Engineering:

- Interrogation of control and protection parameters
- Download of configuration and protection parameters to motor controller

Process information:

- Current in Amps
- Current in %
- Thermal image
- Time to trip
- Time to reset
- Active, reactive and apparent power

Status and diagnostics:

- Available/Stopped
- Running
- Tripped
- Alarms and events

Maintenance:

- Module insertion cycles
- Motor/Feeder operation cycles
- Motor running hours



Web interface examples

3.4 Engineering

Parameterization and engineering

MNavigate

MNavigate is a multifunctional engineering tool utilized both by ABB and end customers. The tool is utilized over the complete lifecycle of the switchgear, from the engineering and project department through factory acceptance tests, to commissioning assistance and start up. Following on from this it then becomes the tool used by the operations and maintenance departments for any tuning of the system during the life cycle including any service and maintenance schedules.

MNavigate is based upon Microsoft Windows. Utilizing the familiar Windows environment it enables engineers to configure, parameterize, and maintain the system from anywhere in the switchgear control network, providing user access rights are granted. MNavigate enables the user to parameterize and configure the MNS Digital system:

Switchgear configuration:

- Online help file
- Setting of motor protection parameters
- Configuration of the connected I/O (auxiliary circuits)
- Configuration of logic blocks for e.g. field interlocking (based on smart relay type)

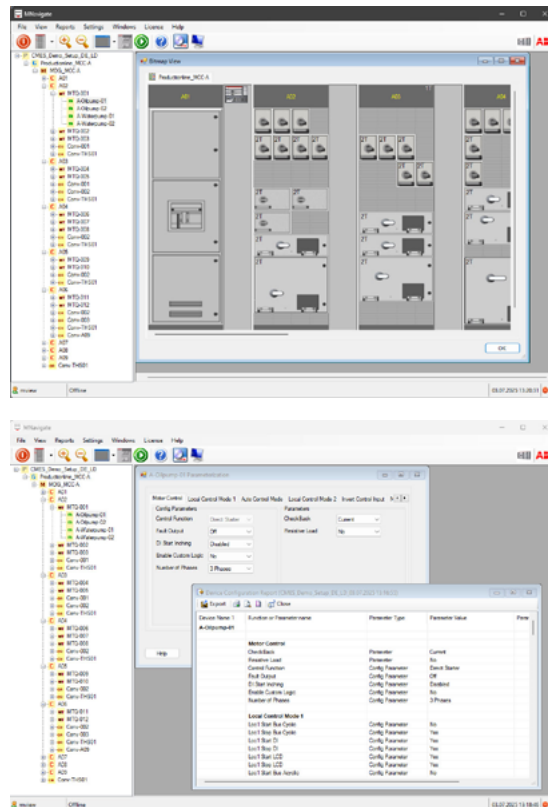
Communications setup:

- Fieldbus configuration
- Failsafe configuration
- Switchgear network configuration
- Time synchronization setting
- Download and configuration of fieldbus data mapping

Administrative functions:

- User access rights
- Activity reports
- Parameterization reports
- Archive/restore of the projects
- Generation of the following reports to .csv format:

- Digital Gateway configuration
- Motor controller configuration
- Switchgear configuration
- Switchgear network configuration



MNavigate examples

3.5 Components

Connected devices

Air circuit breaker Emax 2 / Emax 3

ABB's renowned all-in-one solution for power and motor control center with inbuilt protection and monitoring functionality. The Emax 2 / Emax 3 circuit breaker also monitors its condition to determine maintenance needs.



Molded case circuit breaker Tmax XT

MCCBs are used in various application in energy distribution and motor control center to protect electrical equipment. Beside protection, the smart Tmax XT circuit breaker solutions are monitoring its operation and provide the data to the condition monitoring system.



Fuse switch OT and Slimline XRG with ITS2

The integrated monitoring device ITS2 monitors the switch position and operation. Together with electrical values and temperature data, condition monitoring of those feeder is possible



ArcGuard TVOC2

Active arc monitoring enables to identify the occurrence of an arc in the electrical assembly and trips the incoming circuit breaker.



UMC100.3 Motor Controller

Scalable motor controller with selectable communication options and programmable logic functions.



M10x Motor Controller

All-in-one motor controller designed for MNS including protection and monitoring functions for motor starter and motor.



Variable speed drive ACS880

All-in-one variable speed drive for energy efficient motor starting and operation option.

**Softstarter PSTX**

Motor starting solution for specific operation requirements, reducing inrush and startup current.

**Feeder controller and monitoring FC610**

Feeder controller monitoring energy, harmonics and electrical parameter. It includes further control and condition monitoring function for the MNS feeder module.

**Power Quality Management FC810**

Highly accurate power quality management device for energy and power quality for distribution feeder monitoring. It adds condition monitoring of the MNS module.

**Feeder protection and control FC710**

Feeder protection device including control and condition monitoring function for the MNS feeder module.

**Energy meter M4M series**

Multifunction meter monitoring the electrical distribution and power quality including tariff metering. The data are utilized in condition monitoring to determine load dependent conditions.

**Temperature monitoring MT567 with wireless sensors STX31x**

Wireless temperature sensors STX31x are installed at critical joints throughout the MNS assembly to monitor temperature rise and provide early warning to eliminate safety risks.

**Environment sensor SNX series**

Monitoring ambient conditions within and outside of the MNS assembly ensures that the operator can act if condition changes to ensure longest operational life. Can even control anti-condensation heater.

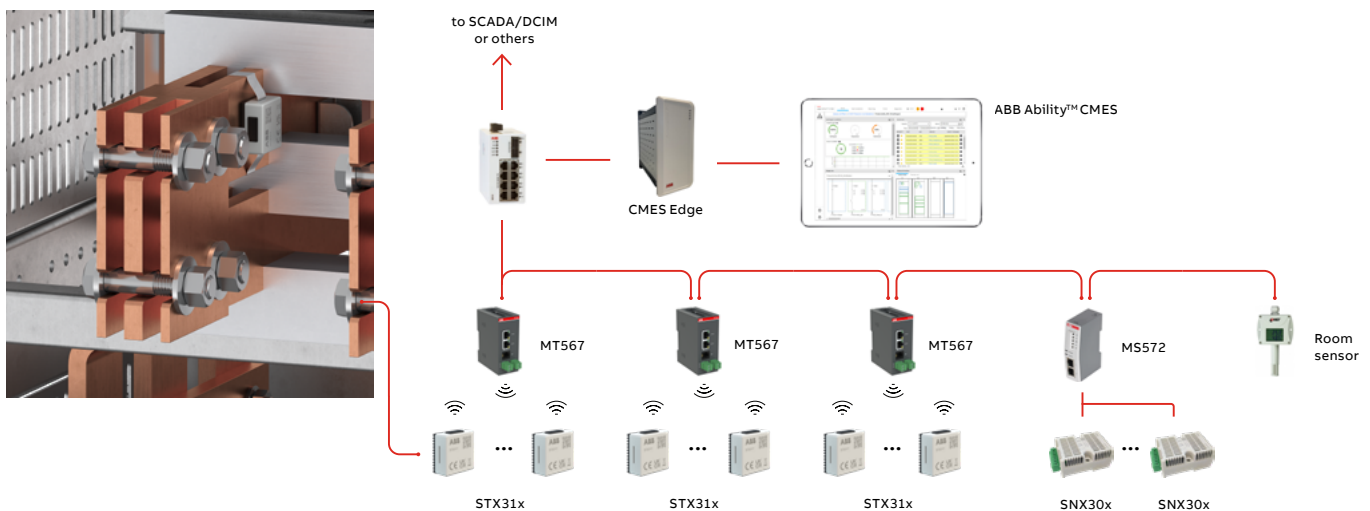


For further details on the devices above see the corresponding product manuals. MNS Digital system is open to integrate and monitor any smart device or sensor through Modbus RTU or TCP. Contact ABB for further clarification.

3.6 Wireless temperature monitoring

Switchgear safety enhanced

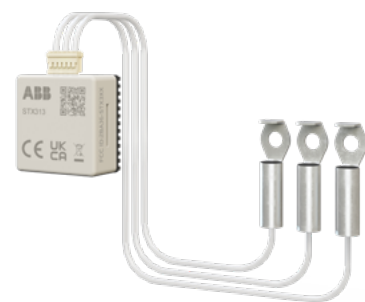
Temperature increase at critical electrical connection is the early sign of a problem. With wireless temperature sensors installed at those points, collected and analyzed with ABB Ability CMES, the MNS switchgear safety is enhanced and user get notified at the earliest about condition changes.



Wireless temperature sensors STX 31x series

The STX wireless and battery-less temperature sensors ensure continuous temperature monitoring of electrical connection throughout the MNS Low Voltage Switchgear. It is the simplest and most efficient way to improve safety conditions, providing thermal data of critical joints without the need to enter switch rooms or use sophisticated camera equipment.

STX311 is a single sensor for busbar and cable connection, STX313 is a sensor with up to three measuring points for cable connection and modules.



STX313



STX311

Wireless temperature monitoring receiver MT567

The receiver module MT567 can communicate to up to 60 STX series sensors through ZigBee green power communication. The receiver unit communicates through Modbus TCP and supports MRP ring redundancy for simpler network architecture. It integrates seamlessly into MNS switchgear.



Wireless receiver MT567

Environmental condition sensor SNX31x series

Monitoring environmental conditions such as temperature and humidity ensure that the MNS switchgear is operated under its designed conditions. Deviation from the condition can indicate issues in the substation or switch room. The integrated dew point calculation provides early warning to operators to prevent condensation and mold.

SNX301 Temperature and humidity sensor, dew point calculation
SNX302 as above with additional anti-condensation heater control and monitoring



SNX302

Your benefits with temperature and environment condition monitoring:



Protecting people and equipment

Safeguard lives and equipment by continuously monitoring critical electrical joints to permanently eliminate the risk of equipment failures and eradicate fire hazards. Slash costs by saying farewell to routine control room checks.



Keeping business running

Get the most out of switchgear performance in standard conditions to find deviations early, anticipate issues, and prevent downtime proactively.



Predictability

Control temperature and operational parameters to stay ahead of switchgear malfunctions through early abnormalities detection. Forget about human errors and inaccurate readouts with online temperature tracking for spot-on data.



Sustainability

Eliminate unnecessary maintenance tasks or visits to substations, predict upcoming maintenance to plan in advance and reduce impact on CO2 footprint.

3.7 Condition monitoring

ABB Ability™ CMES

ABB Ability™ Condition Monitoring for Electrical Systems (CMES) is an advanced on-premises solution designed to monitor the health and performance of MNS switchgear and motor control centers. It provides real-time data on electrical parameters, environmental conditions, and equipment status, facilitating predictive maintenance and enhancing operational efficiency. By continuously monitoring critical systems, CMES helps prevent unexpected failures, reduces downtime, and optimizes energy usage, leading to more reliable and sustainable operations.



The ABB Ability™ CMES is an innovative on-premises switchgear condition monitoring platform. It allows switchgear operators and plant maintenance managers to monitor and manage MNS distribution systems, motor control centers, and connected loads in real-time, either from a desktop computer or a touch panel HMI in the switch room. This capability helps prevent issues, predict conditions, and monitor energy consumption from anywhere in the plant. Installed as an integral part of the MNS switchgear assembly, CMES monitors the entire lifecycle of the switchgear—from Factory Acceptance Testing (FAT) at the manufacturer's site, through commissioning and startup, to operational life.

Monitoring switchgear conditions such as temperature, current levels, energy consumption, warning levels. The data are collected and stored for further analysis, and enable user to make right decision at right time.

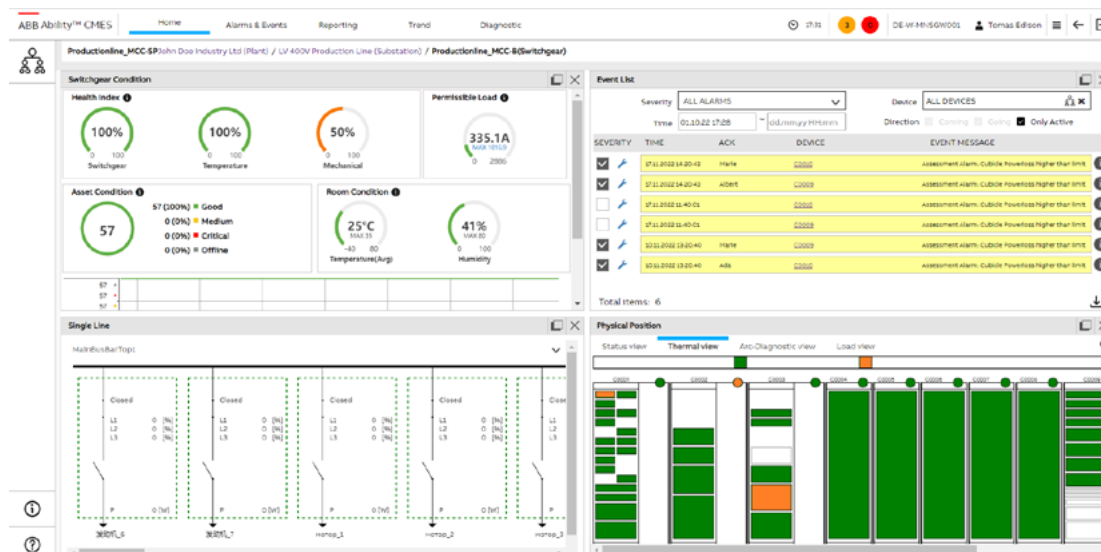
Analytical algorithms are implemented to evaluate multiple data points without requiring human input. These algorithms can determine whether a temperature increase is critical or simply a normal response to increased load demand.

Predictive maintenance is facilitated by monitoring conditions and tracking repetitive activities, such as the removal and insertion of withdrawable functional units in a switchgear assembly. This data can suggest optimal timing for the next maintenance cycle.

Optimizing unusual levels of energy consumption, even from smaller loads, CMES can significantly influence total plant operational costs. Identifying these situations enables process optimization on a new scale.

Connect the CMES to upper-level maintenance management systems, SCADA, Data Center Infrastructure Management (DCIM), or other control and monitoring solutions, including private cloud-based applications, using the OPC-UA option.

Informs through automated notifications via email or SMS the right users about condition changes, delivering timely and relevant information on what the issue is, where it occurred, when it happened, and how to resolve it.



Summary dashboards

Substation dashboard (multiple or single switchgear) and health index summary display to easily identify total status. Color codes highlight severity enabling user to select required information and action fast.

Alarm and Event list with automatically filtered lists based on selected switchgear level. Includes detailed description and knowledge base for each item to provide user guidance.

Single Line view contains well known switchgear representation with life data and color codes for status. Device selection by simply selecting the electrical device on screen.

Panel and Thermal view provide a traffic light visualization of device status, temperatures, and other conditions in switchgear assembly.

Device dashboard and widgets

The device dashboard offers an overview of each connected electrical device within the switchgear, including sensors and other components. It provides easy access to health status, condition, and data analysis results.

The dashboard features specific widgets for displaying data, trends, filtered alarms, events, and device-specific predictive maintenance information. CMES delivers fully integrated and user-configurable trending support for all data within the system, eliminating the need for additional software.

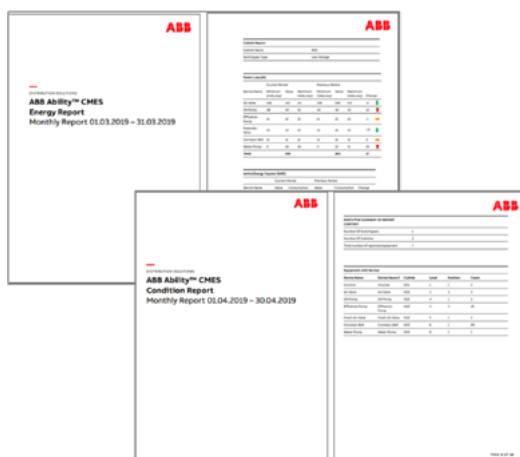
Connected devices

- Air circuit breaker Emax 2 / Emax 3 with Ekip Touch/ HiTouch or Ekip Up
- Load feeder modules with power meter, molded case circuit breaker Tmax XT or fuse etc.
- Motor starter modules with motor control and protection device, contactor, and sensors etc.
- Softstarter and variable speed drives
- Protection devices i.e. REF615
- Temperature and ambient condition sensors in switchgear and modules
- Arc monitoring solution using ArcGuard TVOC2

User reports

Condition reports enable a full switchgear healthcare summary view at few clicks. Daily or monthly reports contain summary and detail view of switchgear sections, installed module as and devices including statistics and data analytics.

Energy reports provide the unique option to monitor energy consumption on individual device level at low-voltage switchgear. The values are analyzed and automatically compared to the previous energy report which provides an easy-to-read difference report.



3.8 Predictive maintenance

Make the switch

Traditionally, low voltage switchgear maintenance has relied on prescribed tasks and time schedules, commonly referred to as preventive maintenance. MNS Digital allows operators and maintenance personnel to transition to a more efficient predictive maintenance practice.



Predict

CMES enables predictive maintenance by monitoring operational activities over time. For example, it tracks the removal and insertion of withdrawable functional units or modules in the MNS switchgear. This data is used to calculate the optimal timing for the next maintenance cycle, such as greasing contacts or performing other necessary maintenance tasks. By leveraging this information, CMES helps ensure that maintenance is performed proactively, reducing the risk of unexpected failures and enhancing overall system reliability.



Sustainability

CMES enhances sustainability by eliminating unnecessary maintenance tasks and visits to substations. By predicting upcoming maintenance needs, it allows for advanced planning, which reduces the overall impact on the CO2 footprint. This proactive approach minimizes travel and resource use, contributing to more environmentally friendly operations.



Plan

Predictive maintenance with CMES moves beyond traditional scheduled practices by informing you about upcoming tasks based on suggested maintenance intervals, predicted lifecycle data, and operational factors. This proactive approach enables maintenance teams to plan effectively, reducing downtime and minimizing operational disruptions. By receiving timely alerts, organizations can allocate resources efficiently, schedule maintenance during off-peak hours, and address issues before they escalate.



Optimize

Conducting maintenance when needed, detecting unusual levels of temperatures even of smaller loads, or find abnormalities in operation can influence total plant operational costs. Identifying such and similar situations enable process optimization at a new scale. Ultimately, predictive maintenance enhances operational efficiency, extends equipment lifespan, and lowers overall maintenance costs.

4. Switchgear Design

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4.1 Switchgear Structure

MNS 3.0 Front Access

Functional Compartments and Separation

The assembly is divided into compartments thus separating different functional areas.

Structure of circuit breaker section

1 Equipment compartment

The equipment compartment is divided into sub sections, each sub section having its own door.

The center sub section accommodates the circuit breaker and associated equipment in fixed or withdrawable design.

It is possible to install one or two circuit breakers, placed one above the other, in one section.

Depending upon the option for cable entry, for example with top entry solution access to incoming connections is via the door in the upper sub section, the auxiliary compartment is then located behind the door in the lower sub section.

For bottom entry the configuration is vice versa.

2 Busbar compartment

Contains the MNS main busbar system. Connection to the main bus is via a 'Partition Plate' with gas sealed connections.

Structure of outgoing section

1 Equipment compartment

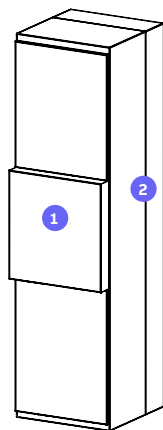
All equipment, like motor starter or energy distribution modules in withdrawable, plug-in or fixed design, is situated therein. The compartment can be divided into horizontal and vertical sub compartments.

2 Busbar compartment

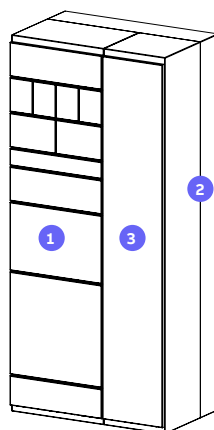
Contains the MNS main busbar system. The distribution bars are embedded in the multifunction separator (MFS) which is located between the equipment compartment and the busbar compartment (MFS is not applicable for fixed design).

3 Cable compartment

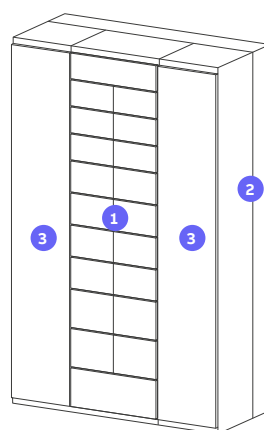
Contains control cables and terminals, as well as power cables and connection units. Cable entry may be top or bottom.



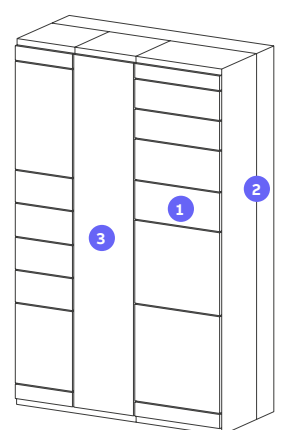
Circuit breaker section



Outgoing section



Outgoing section
Compact



Outgoing section
Fixed Optional

MNS Rear Access

Functional Compartments and Separation

The assembly is divided into compartments thus separating different functional areas.

Structure of circuit breaker section

1 Equipment compartment

The equipment compartment is divided into sub sections and accommodates ACB in withdrawable design.

It is possible to install one, two, three or four circuit breakers, placed one above the other, in one section.

The auxiliary compartment is located on the top/bottom and/or on the right side of the equipment compartment.

2 Busbar compartment

Located at the top and contains the MNS main busbar system.

3 Cable compartment

Located at the rear and houses the control cables and terminals, as well as power cables and connection units. Cable entry may be top or bottom.

Structure of outgoing section

1 Equipment compartment

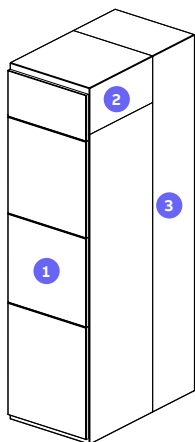
All equipment, like motor starter or energy distribution modules in withdrawable, is situated therein. The compartment can be divided into horizontal and vertical sub compartments.

2 Busbar compartment

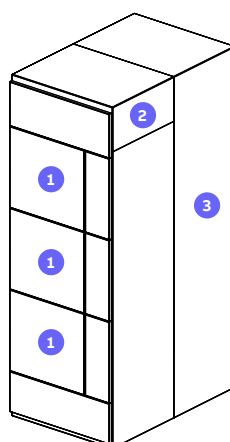
Contains the MNS main busbar system. The distribution bars are embedded in the multifunction separator (MFS) which is located between the equipment compartment and the cable compartment.

3 Cable compartment

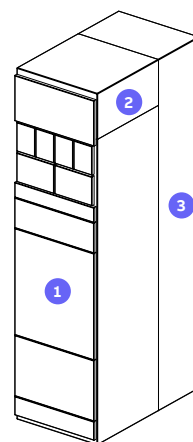
Contains control cables and terminals, as well as power cables and connection units. Cable entry may be top or bottom.



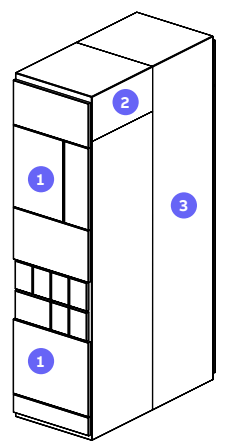
Circuit breaker section



Stacked Circuit breaker section (sample with 3 ACB's)



Outgoing section



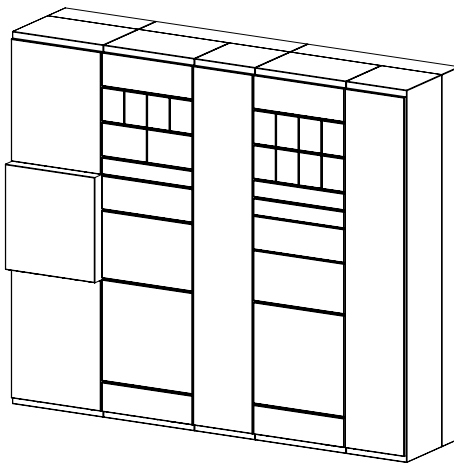
Outgoing section combined with ACB

4.2 Switchgear Arrangement

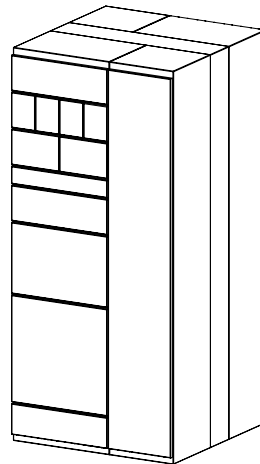
MNS 3.0 Front Access

MNS sections can be arranged in the following configurations:

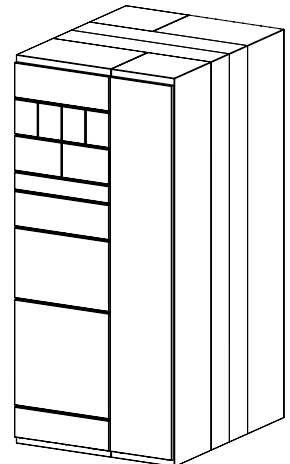
1. Standard arrangement as free standing or back to wall
2. Duplex arrangement with a common main busbar area
3. Back-to-back arrangement with two main busbar areas



Standard arrangement



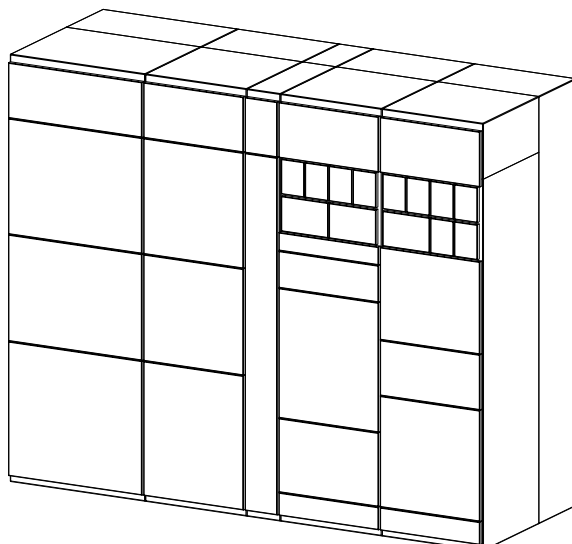
Duplex arrangement



Back-to-back arrangement

MNS Rear Access

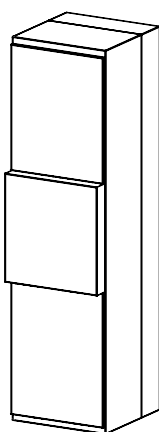
MNS Rear sections are arranged as a free standing, access is required both front and rear side.



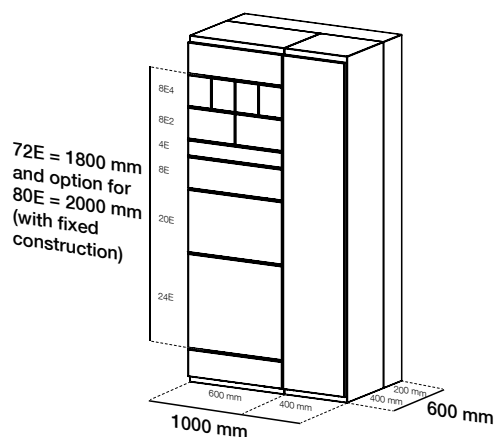
4.3 Switchgear Dimensions

MNS 3.0 Front Access

The following dimensions are applicable to the MNS sections with standard arrangement as free-standing solution or back to wall.



Circuit breaker section



Outgoing section

Circuit breaker section					Outgoing section				
Height [mm]	Width * [mm]	Depth* Equip. comp. [mm]	Depth Busbar comp. [mm]	Depth Total [mm]	Height [mm]	Width * [mm]	Depth* Equip. comp. [mm]	Depth Busbar comp. [mm]	Depth Total [mm]
2000	400	400	200	600	2200	800	400	200	600
	600	400	400	800		1000	400	400	800
	800	600	200	1000		1200	600	200	1000
	1000	600	400	1000			600	400	1000
	1200	800	400	1200			800	400	1200

Outgoing section Compact					Outgoing section with combined cable comp. (Fixed Modules)				
Height [mm]	Width * [mm]	Depth* Equip. comp. [mm]	Depth Busbar comp. [mm]	Depth Total [mm]	Height [mm]	Width * [mm]	Depth* Equip. comp. [mm]	Depth Busbar comp. [mm]	Depth Total [mm]
2200	1400	400	200	600	2200	1200	400	200	600
	1600	400	400	800		1400	400	400	800
	1800	600	200	1000		1600	600	200	1000
		600	400	1000			600	400	1000
		800	400	1200			800	400	1200

* Details see primary circuit solution, chapter 7.1

The following dimensions are applicable to the MNS Rear sections.



* Details see primary circuit solution, chapter 7.1

Circuit breaker section					Outgoing section / Outgoing Section combined with ACB				
Height [mm]	Width * [mm]	Depth* Equip. comp. [mm]	Depth Busbar comp. [mm]	Depth Total [mm]	Height [mm]	Width * [mm]	Depth* Equip. comp. [mm]	Depth Busbar comp. [mm]	Depth Total [mm]
2300	400	600	400	1000	2300	600	600	400	1000
	600	800	400	1200			800	400	1200
	800	800	600	1400			800	600	1400
	1000								
	1200								

When calculating the section footprint, additional dimensions need to be considered.

MNS 3.0 Front Access

Segment	Description	Dimension [mm]
Walls	Rear wall with punched louvers	34
	Side wall, left or right	20
Front	Door without ventilation	27
	Door with punched louvers	36
	ACB door with instrument panel	46
	ACB door with pagoda	90
	ACB door with IP cover	136
	ACB door with pagoda & IP cover	200
	Withdrawable module cover with handle, size 8E4, 8E2	75
	Withdrawable module door with handle, size $\geq 4E$	85
	Slimline module ON, folded handle	90
Roof	Mesh roof with strip holder	50
	Pressure relief roof with strip holder	110
	Raised roof with strip holder	110
	Raised roof IP41 and IP42, front and back overlap	120
	Raised roof IP43, front and back overlap	300
	Closed roof with strip holder	50
Length	IP 41 and above sealing tape must be added between sections	1

MNS Rear Access

Segment	Description	Dimension [mm]
Walls	Side wall, left or right	20
Front	Door without ventilation	27
	Door with punched louvers	36
	ACB door with instrument panel	46
	ACB door with handle	84
	ACB door with IP cover	136
	Withdrawable module cover with handle, size 8E4, 8E2	75
	Withdrawable module door with handle, size $\geq 4E$	85
Rear	Rear door with punched louvers	36
Roof	Mesh roof with strip holder	50
	Raised roof with strip holder	110
	Pressure relief roof with strip holder	110
	Closed roof with strip holder	50
Length	IP 41 and above sealing tape must be added between sections	1

4.4 Frame, Enclosure

Frame

The basic elements of the MNS frame construction are “C” shaped steel profiles with a 25 mm hole pitch according to DIN 43660. This 25 mm equals the dimension of 1E used in MNS to define the area usage within the switchgear.

Each section is precision constructed by bolting horizontal and vertical profiles together, to form a rigid modular structure. The assembly is maintenance free as a result of the construction method utilizing a combination of thread locking ESLOK screws with bolted pressure plates and thread forming screws.

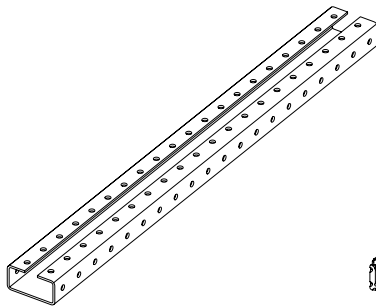
The profiles are galvanic protected (Zn or Al/Zn) against corrosion.

Enclosure

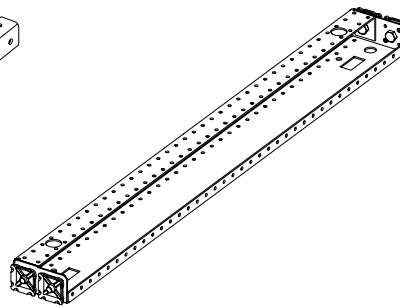
MNS switchboard enclosure is made of sheet steel protected by galvanic coating and powder coating for maximum durability.

The fixing of the enclosure with respect to doors, roof plates, rear and side walls is achieved with thread forming screws. Final construction varies depending upon the required degree of protection.

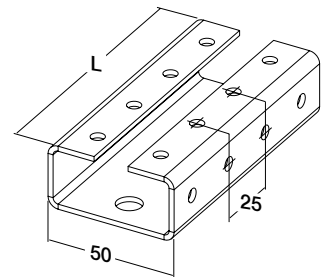
In accordance with the general safety philosophy followed with MNS, each compartment and sub-compartment which requires access for commissioning, operation or maintenance, has its own door



“C” shaped steel profile

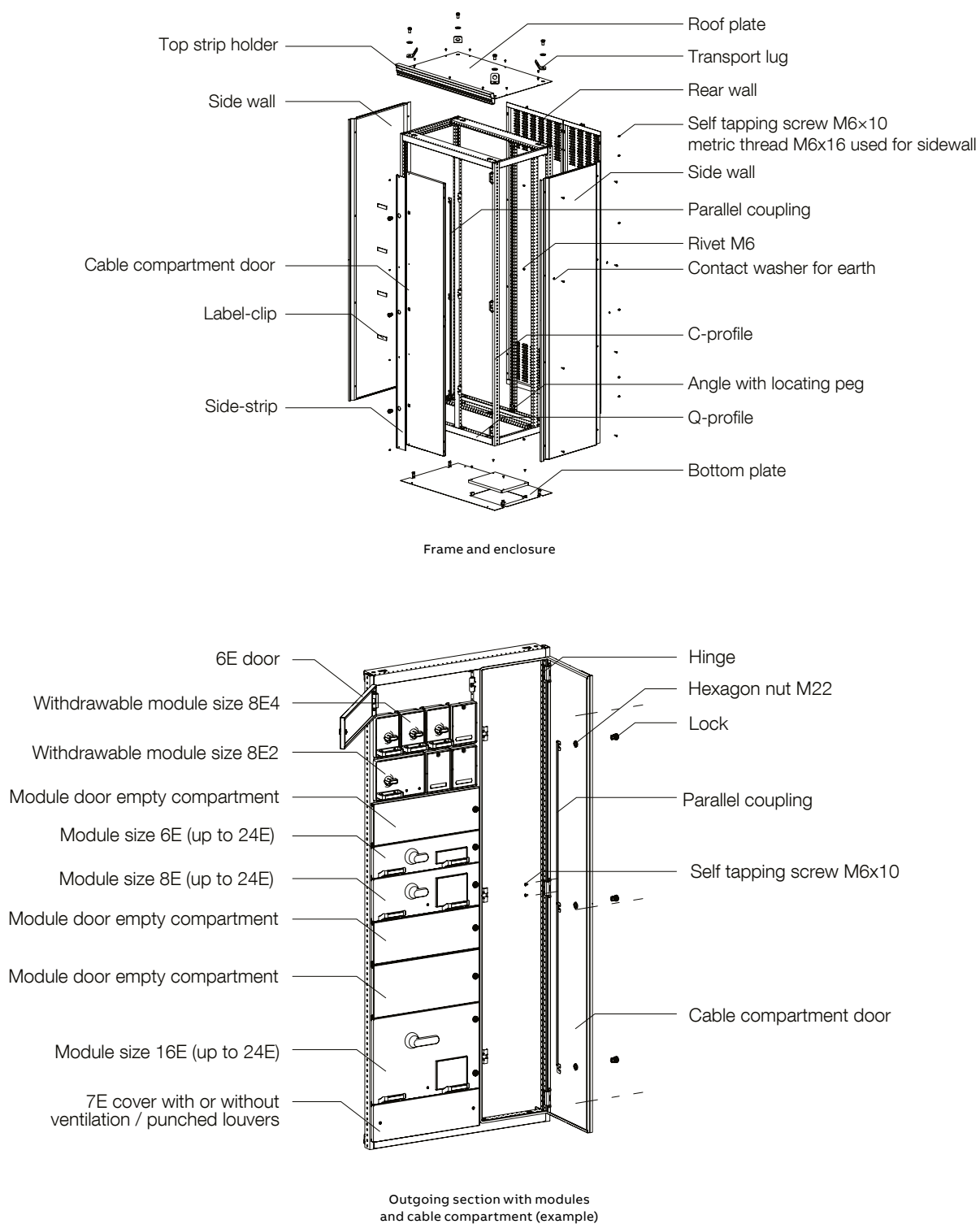


“Q” shaped profile

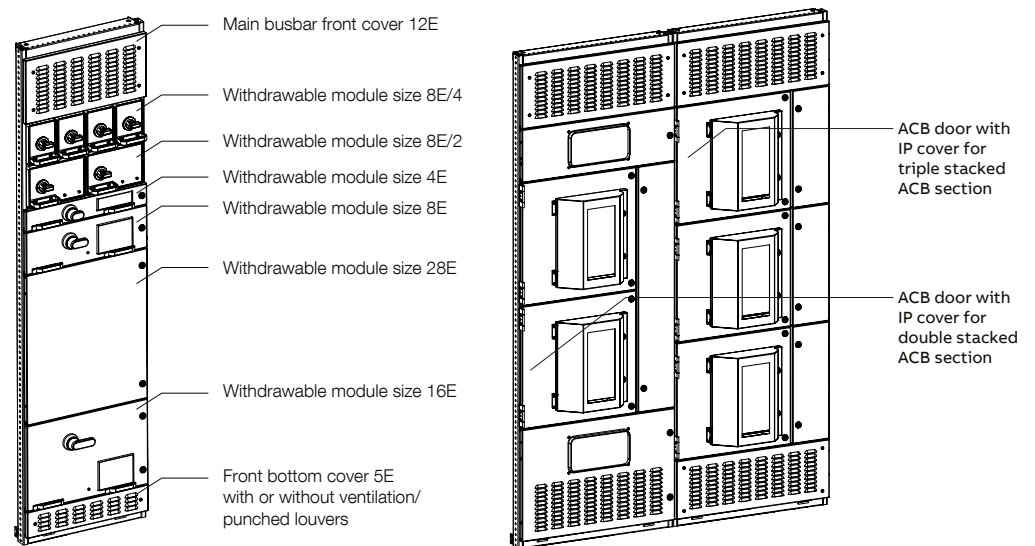
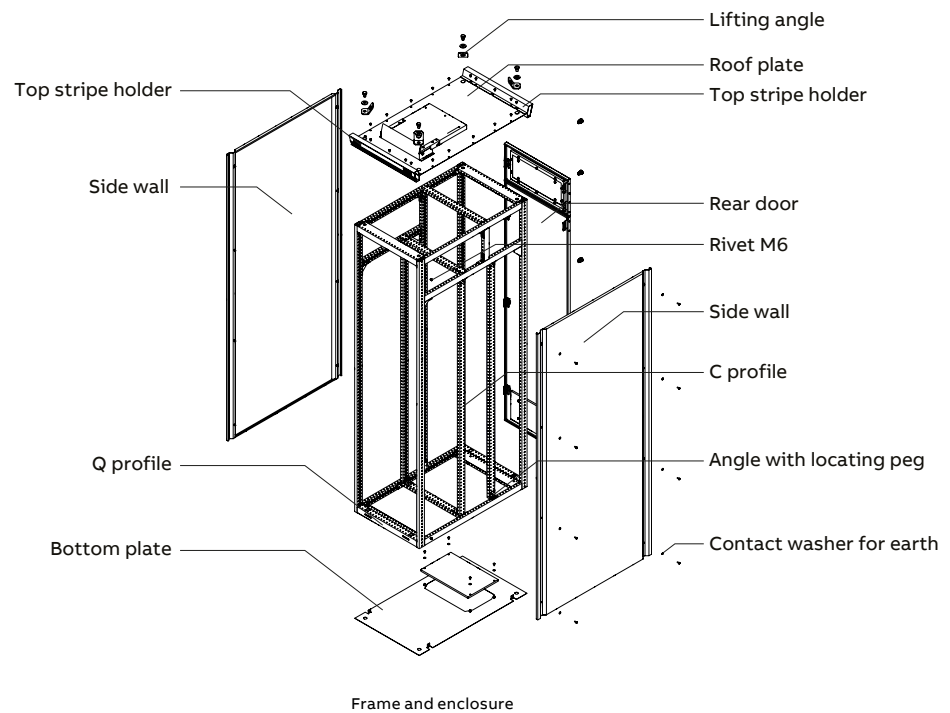


“C” shaped steel profile detailed

MNS 3.0 Front Access



MNS Rear Access



Outgoing section with modules (example)

Circuit breaker section (example)

4.5 Busbar Systems

MNS 3.0 Front Access

Main busbar

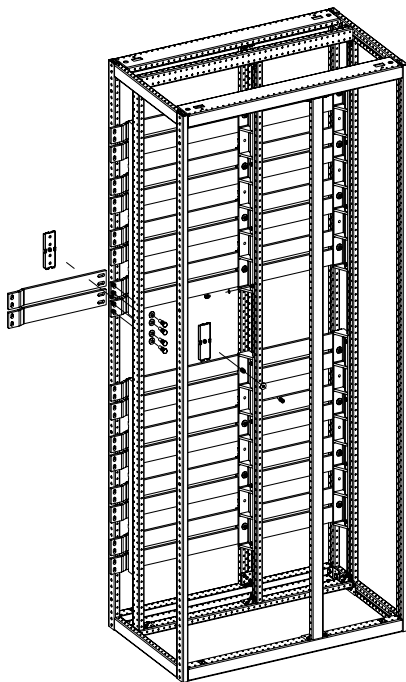
The MNS main busbar system is arranged in the rear of the switchgear. This assures a maximum distance between the busbars and the operator and maintenance staff. The main busbar system is fully separated from the equipment compartment as well as from the cable compartment.

The busbar system is a maintenance free construction as a result of utilizing thread locking ESLOK screws together with conical spring washers. This technology remains relatively unchanged since the introduction of MNS and has been extensively supplied into the most demanding industries.

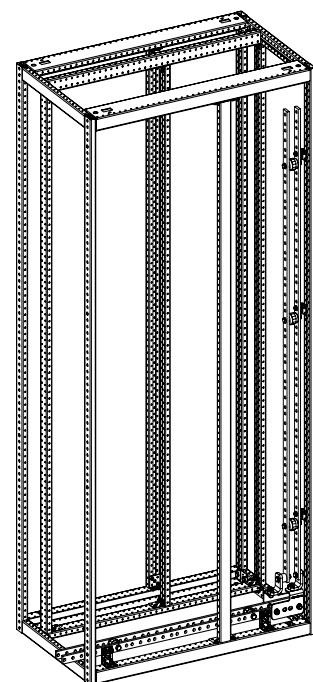
The busbar system and all associated parts are manufactured from copper or as an alternative in aluminum. Options are available for silver plating and/or a fully insulated solution utilizing heat shrinkable sleeving

MNS provides the option to configure the main bus in either upper or lower position or both, this enables separate, parallel or coupled operation. Conductor sizes are rated based upon project requirements.

Protective earth and neutral bars run horizontally within the front of the switchboard just above the base. The PE bar is fastened to the frame to assure electrical continuity. Within the cable compartment it runs vertically and located on the front right-hand side of the compartment. For applications where a 100% neutral size is required due to unbalance or harmonic distortion as well as for 4 pole switching, the neutral conductor can be arranged within the busbar compartment running in parallel with the main busbars at the rear.



Main busbar arrangement



PE/N/PEN arrangement

MNS Rear Access

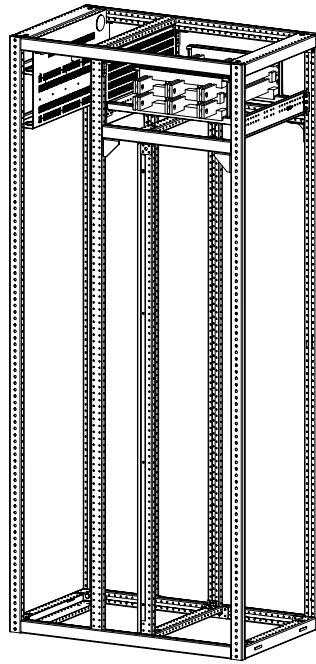
Main busbar

The MNS main busbar system is located at the top front position of the switchgear. The main busbar system is fully separated from the equipment compartment as well as from the cable compartment.

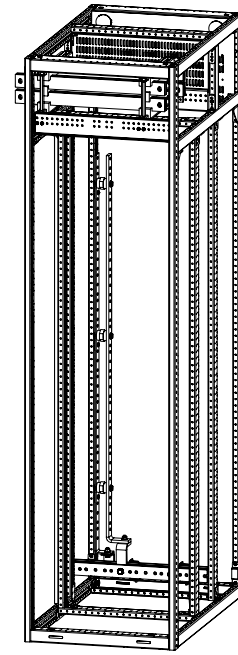
The busbar system is a maintenance free construction as a result of utilizing thread locking ESLOK screws together with conical spring washers. This technology remains relatively unchanged since the introduction of MNS and has been extensively supplied into the most demanding industries.

Conductor sizes are rated based upon project requirements.

Protective earth and neutral bars run horizontally within the rear of the switchboard just above the base. The PE bar is fastened to the frame to assure electrical continuity. Within the cable compartment it runs vertically and located on the front right-hand side of the compartment. For applications where a 100% neutral size is required due to unbalance or harmonic distortion as well as for 4 pole switching, the neutral conductor can be arranged within the busbar compartment running in parallel with the main busbars at the top.



Main busbar arrangement



PE/N/PEN arrangement

MNS 3.0 Front and Rear Access

Distribution busbar

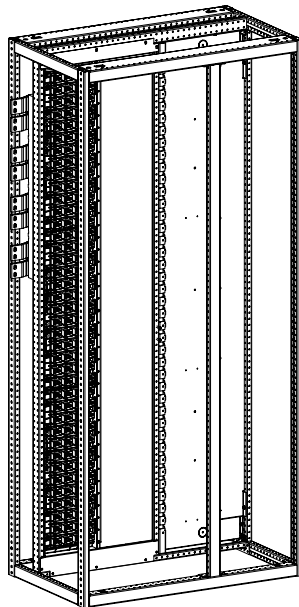
The vertical distribution bars provide the connection from the main busbars to the modules.

The distribution bars are Cu L-shaped for improved rigidity and silver plated as standard.

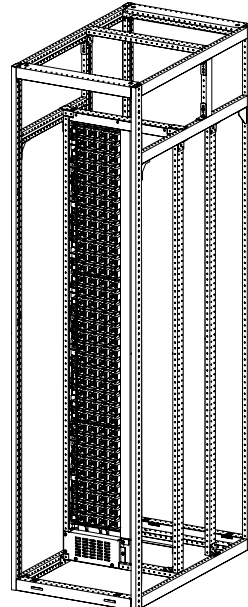
The Multifunction Separator (MFS) with the embedded distribution bars is a unique MNS design. It constitutes a complete barrier between the main busbars and the equipment compartment.

With the use of MNS specific power contact housings full single-phase segregation is assured prior to the connection of the power contacts to the distribution bars

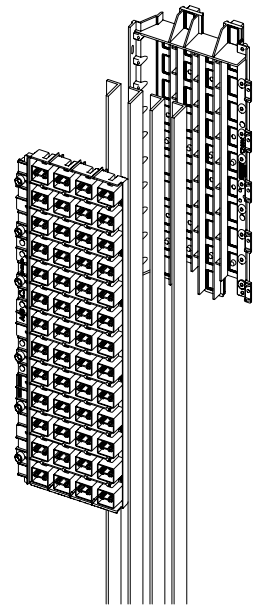
The distribution bars are fully phase segregated and insulated. This design makes it virtually impossible for an arc to pass between distribution bar phases or between main busbars and equipment compartment. The insulation material is CFC and halogen free, it is also flame-retardant and self-extinguishing. The distribution bars are silver plated as standard.



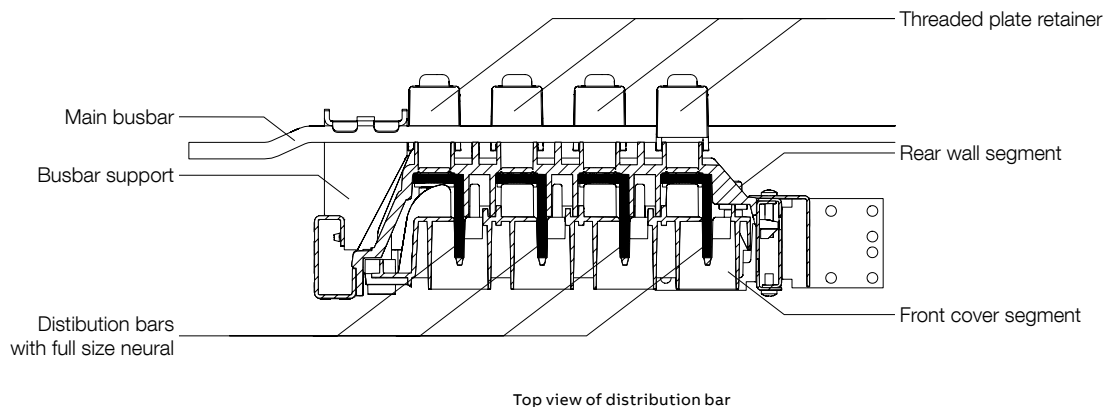
MNS 3.0 Front Access



MNS Rear access



Exploded view



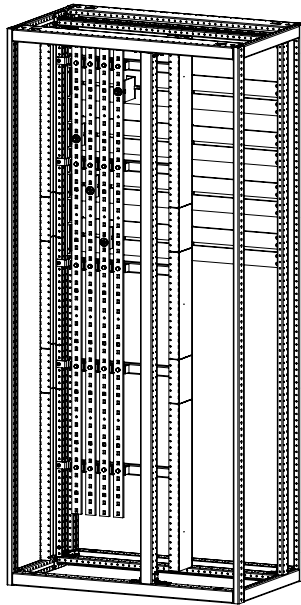
Contact openings are finger proof (IP 2X) so that personal safety is guaranteed even when modules are removed

MNS 3.0 Front and Rear Access – Fixed version

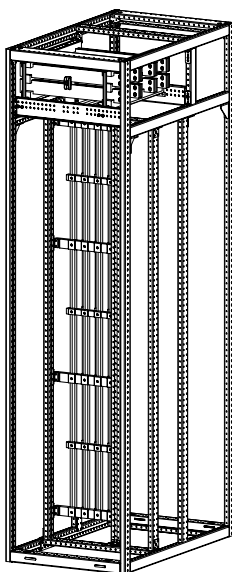
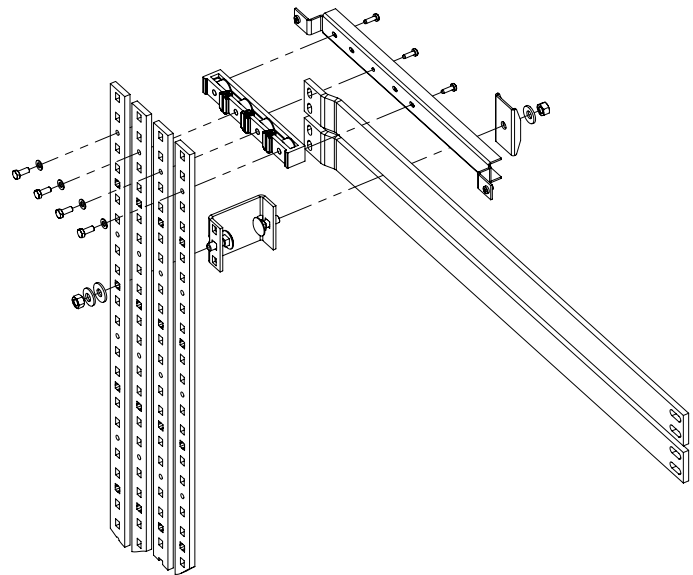
Distribution busbar

The vertical distribution bars provide the connection from the main busbars to the modules.

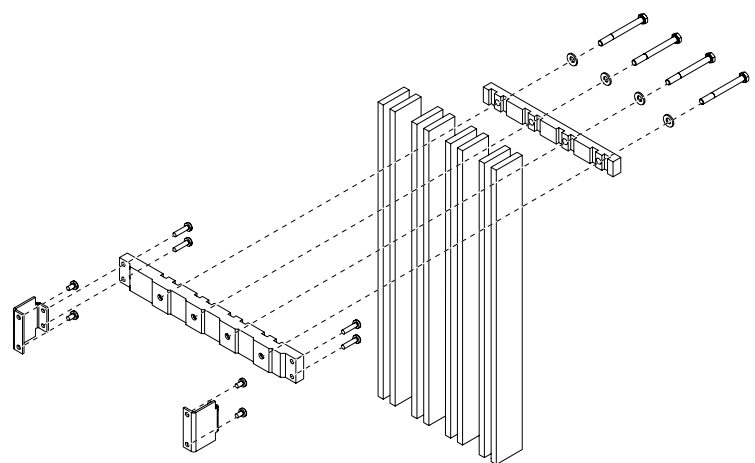
Conductor sizes are rated based upon project requirements.



MNS 3.0 Front Access



MNS Rear Access



MNS 3.0 Front Access - main busbar

Dimension [mm]	Busbar area [mm]	Material	Rated Current I_n up to [A]			Rated short-time withstand current I_{cw} (1sec.) [kA]	Rated peak withstand current I_{pk} [kA]
			IP30/40 [A]	IP31/43 [A]	IP54 [A]		
L1-L3							
2x30x10	200	Cu	1650	1600	1350	50	105
2x40x10	200	Cu	1900	1900	1600	80	176
2x60x10	200	Cu	2100	2000	1700	80	176
4x30x10	200	Cu	2700	2700	2100	80	176
4x40x10	200	Cu	3100	3100	2100	80	176
4x60x10	200	Cu	3100	3100	2200	100	220
2x2x60x10	200	Cu	3800	3700	2850	80	176
2x4x30x10	200	Cu	5150	4950	4250	80	176
2x4x40x10	200	Cu	6030	5810	4550	100	220
2//4x30x10	400	Cu	5200	5200	4080	100	220
2//4x40x10	400	Cu	6000	5800	4800	100	220
2//4x60x10	400	Cu	6600	6600	5300	120	264
2x60x10	200	Al	1800	1800	1450	50	105
4x40x10	200	Al	2360	2360	1820	65	143
4x60x10	200	Al	2700	2700	2000	100	220
2x4x40x10	200	Al	4430	4430	3700	100	220
2x2x60x10	200	Al	3600	3600	2900	100	220
2x4x60x10	200	Al	5400	5400	4000	100	220
2//4x60x10	400	Al	5000	5000	3800	100	220

MNS 3.0 Front Access - distribution busbar (DBB)

Dimension [mm]	Busbar area [mm]	Material	Rated Current			Rated short-time withstand current I_{cw} (1sec.) [kA]	Rated peak withstand current I_{pk} [kA]
			I_n up to [A]	I_n up to [A]	I_n up to [A]		
L1-L3			IP30/40 [A]	IP31/43 [A]	IP54 [A]		
DBB for withdrawable and plug-in modules/Multifunction Separator							
50x30x5		Cu	750	750	600	65	143
50x30x5+ 1x30x10		Cu	1500	1500	1150	100	220
DBB for plug-in modules/open DBB							
50x5		Cu	750	750	550	35	74
50x30x5		Cu	1000	1000	750	50	105
50x30x5+ 1x30x10		Cu	2000	2000	1500	60	132
50x30x5+ 2x30x10		Cu	2000	2000	1500	75	165
DBB for fixed modules/open DBB							
1x40x10		Cu	1000	1000	850	50	105
2x40x10		Cu	1400	1400	1200	65	143
3x40x10		Cu	1600	1600	1400	65	143
1x40x10		Al	760	760	650	40	84
2x40x10		Al	1100	1100	950	50	105
3x40x10		Al	1330	1330	1330	65	143

MNS Rear Access - main busbar

Dimension [mm]	Busbar area [mm]	Material	Rated Current I_n up to [A]			Rated short-time withstand current I_{cw} (1sec.) [kA]	Rated peak withstand current I_{pk} [kA]
			IP30/40 [A]	IP31/43 [A]	IP54 [A]		
L1-L3							
2x20x10	600	Cu	1250	1250	1100	50	105
2x30x10	600	Cu	1600	1600	1350	85	187
2x40x10	600	Cu	2100	2100	1700	85	187
2x50x10	600	Cu	2500	2500	2200	85	187
4x30x10	600	Cu	3100	3100	2550	85	187
4x40x10	600	Cu	3350	3350	2800	85	187
4x50x10	600	Cu	3650	3650	3000	100	220
4x60x10	600	Cu	4000	4000	3200	100	220
6x40x10	800	Cu	4300	4300	3700	100	220
6x50x10	800	Cu	4650	4650	3750	100	220
6x60x10	800	Cu	5250	5250	3800	100	220
2x4x40x10	800	Cu	6300	6300	5200	100	220
2x6x40x10	800	Cu	7300	7300	6000	100	220

MNS Rear Access - distribution busbar (DBB)

Dimension [mm]	Busbar area [mm]	Material	Rated Current I_n up to [A]			Rated short-time withstand current I_{cw} (1sec.) [kA]	Rated peak withstand current I_{pk} [kA]
			IP30/40 [A]	IP31/43 [A]	IP54 [A]		
L1-L3							
DBB for withdrawable and plug-in modules/Multifunction Separator							
50x30x5		Cu	750	750	600	65	143
50x30x5+ 1x30x5		Cu	1000	1000	800	65	143
50x30x5+ 1x30x8		Cu	1250	1250	950	85	187
50x30x5+ 1x30x10		Cu	1500	1500	1200	100	220
DBB for fixed modules/open DBB							
2x20x10		Cu	1250	1250	-	50	105
2x30x10		Cu	1600	1600	-	65	143
2x50x10		Cu	2000	2000	-	65	143

4.6 Power Contacts

Power Contact

When using plug-in and/or withdrawable type modules, the distribution bar is connected to the precision engineered MNS power contact.

The power contact is characterized by a turn able bearing, thus decoupling cable stress and electrical contact. Consequently, any cable bending forces do not affect the stability of the power contact.

The mechanical stabilization is achieved by the supporting plate and the contact spring where the contact fingers ensure positive electrical contact. Contact fingers are silver plated as standard.

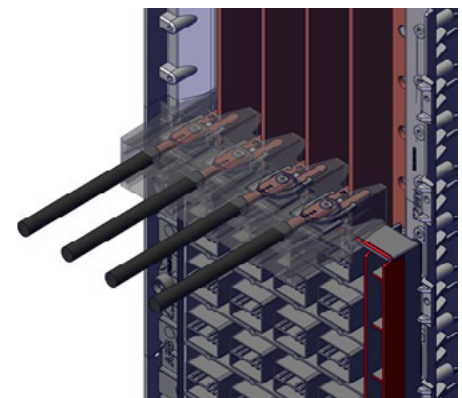
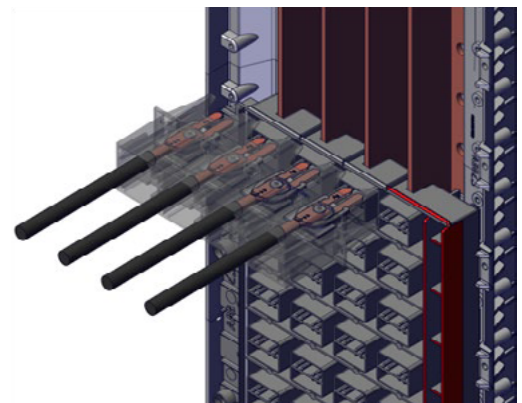
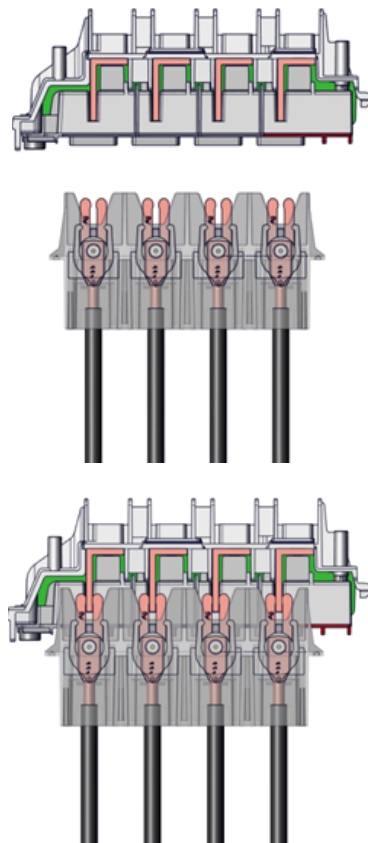
The contact has been independently verified in order to provide a life cycle up to 1000 insertions, exceeding the requirements of IEC 61439-1.

Tests

- Design verification acc. IEC 61439-1/-2
- Corrosion test acc. DIN 50017 and IEC 60068-2-60
- Crimping quality check acc. IEC 61238-1
- Vibration and shock test acc. IEC 60068-2-6 and IEC 60068-2-27

System Highlights

- Operational life cycle up to 1000 insertions (independently certified)
- Bearing construction eliminating cable stress
- Full single-phase segregation assured prior to the connection of the power contacts to the distribution busbar
- Optional temperature sensors to monitor the contact quality through ABB Ability CMES



4.7 Technical data

Standards	Enclosed low-voltage switchgear and controlgear assemblies	General rules	IEC 61439 - 1
		Power switchgear and controlgear assemblies	IEC 61439 - 2
		Testing under conditions of arcing due to internal fault (internal arc)	IEC TR 61641
	Seismic	Recommended practices for nuclear generating station	IEC 60980
	Vibration	Environmental testing Test Fc: Vibration (sinusoidal)	IEC 60068-2-6
	Shock	Environmental testing Test Ea and guidance: Shock	IEC 60068-2-27
Test certificates	Protection against electric shock	Common aspects for installation and equipment	IEC 61140
		General rules	IEC 61439-1
Approvals		ASTA / United Kingdom DEKRA / Netherlands Germanischer Lloyd, Hamburg / Germany IPH, Institut für Prüffeld- und Hochspannungstechnik, Berlin / Germany High Power Laboratory, ABB AG, Ratingen / Germany Technology center laboratory, ABB s.r.o, Brno / Czech Republic	
		Design and engineering practice	Shell
Electrical data	Rated voltages	Rated insulation voltage U_i	up to 1 000 V 3~, 1 500 V-
		Rated operating voltage U_e	up to 690 V 3~, 750 V-
		Rated impulse withstand voltage U_{imp}	6 / 8 / 12 kV, depending on equipment
		Overvoltage category	II / III / IV
		Degree of pollution	3
		Rated frequency	up to 60 Hz
	Rated currents	Main busbar	
		Rated current I_e	up to 7 300 A ^{*)}
		Rated peak withstand current I_{pk}	up to 220 kA
		Rated short-time withstand current I_{cw}	up to 100 kA
		Distribution bars	
		Rated current I_e	up to 2 000 A
Mechanical characteristics	Arc fault containment	Rated peak withstand current I_{pk}	up to 220 kA
		Rated short-time withstand current I_{cw}	up to 100 kA
		Rated operational voltage	up to 690 V
		Prospective short-circuit current	up to 100 kA
		Duration	300/500 ms
		Criteria (IEC TR 61641)	1 to 7
	Dimensions	Sections and frames	ISO 2768
		Recommended height	2 200 mm ^{*)}
		Recommended width	400, 600, 800, 1 000, 1 200, 1 400 mm
	Surface protection	Recommended depth	400, 600, 800, 1 000, 1 200 mm, 1400 mm for MNS Rear
		Basic grid size	E = 25 mm acc. to DIN 43660
		Frame incl. Internal subdivision	Zinc or Alu-zinc coated ^{**)}
Extras	Degree of protection	Cladding, internal, roof and bottom plate	Zinc or Alu-zinc coated
		Cladding, external, front, rear and side	Zinc or Alu-zinc coated and powder coated RAL 7035 (light grey)
		According to IEC 60529	External from IP 30 to IP 54 Internal from IP XXB
	External mechanical impact (IK)		up to IK10
	Plastic components	Halogen-free, self-extinguishing, flame retardant, CFC-free	IEC 60707, DIN VDE 0304 part 3
	Steel components	Frame incl. internal subdivisions 2,0 / 2,5 mm Cladding, internal 1,5 / 2,0 mm; external 1,5 mm	
	Forms of separation	up to Form 4	
	Internal subdivision	Equipment compartment Busbar compartment Cable compartment	
	Paint finish	Enclosure	Special colours (standard RAL 7035, other colours on request)
	Busbar system	Busbars	Bare copper Insulated with heat shrinkable sleeving Silver or tin plating Aluminium busbar systems
	Optional	Project specific solutions available on request	

Table 2-01 Technical data of MNS 3.0 switchgear *) 2 300 mm for MNS Rear **) As alternative coatings Magnelis or MagiZinc may be utilized. ***) 6 300 A for MNS 3.0

4.8 Section and Module Weights

MNS 3.0 Front Access - Sections

Approximate weight of a section without CB					
Type of section	Type of CB	Section width [mm]	Weight of CB [kg]	Standard (EQ400, EQ600)	High current (EQ800)
Incoming feeder, 3 pole	E1.2 – up to 1600 A	400	20	250	–
Incoming feeder, 3 pole	E2.2 – up to 2000 A	400	53	300	–
Incoming feeder, 3 pole	E2.2 – up to 2500 A	600	53	350	–
Incoming feeder, 3 pole	E4.2 – up to 2500 A	800	67	400	700
Incoming feeder, 3 pole	E4.2 – up to 4000 A	800	67	500	700
Incoming feeder, 3 pole	E6.2 – up to 6300 A	1000 – 1200	129	750	1000
Coupler, 3 pole	E1.2 – up to 1600 A	400	20	250	–
Coupler, 3 pole	E2.2 – up to 2500 A	600	53	350	–
Coupler, 3 pole	E4.2 – up to 4000 A	800	67	500	700
Coupler, 3 pole	E6.2 – up to 6300 A	1200	129	750	1000
Incoming feeder, 4 pole	E1.2 – up to 1600 A	600	23	300	–
Incoming feeder, 4 pole	E2.2 – up to 2000 A	600	60	350	–
Incoming feeder, 4 pole	E2.2 – up to 2500 A	800	60	400	–
Incoming feeder, 4 pole	E4.2 – up to 2500 A	1000	81	500	800
Incoming feeder, 4 pole	E4.2 – up to 4000 A	1000	81	600	800
Incoming feeder, 4 pole	E6.2 – up to 6300 A	1200	143	900	1200
Coupler, 4 pole	E1.2 – up to 1600 A	600	23	300	–
Coupler, 4 pole	E2.2 – up to 2500 A	800	60	500	–
Coupler, 4 pole	E4.2 – up to 4000 A	1000	81	600	800
Coupler, 4 pole	E6.2 – up to 6300 A	1200	143	900	1200
Empty module section	–	1000	–	300	–

All weights for incoming feeders based on:

- IP30-IP40 internal protection with bottom plate
- EQ400 / EQ600 contains 200 mm main busbar area
- EQ800 contains 400 mm main busbar area
- With all possible CTs (measuring and protection), REF relay and SPD
- Do not contain control devices and wiring, except CTs, REF, SPD
- Do not contain side walls and main busbar end covers

All weights for couplers based on:

- Do not contain control devices (except CTs and REF) and wiring
- Do not contain side walls and main busbar end cover
- The type of coupler with CTs utilizes different angle set (with more copper) to create place for CTs. If you use coupler without CTs, the overall weight might be significantly lower

MNS Rear Access - Section

Approximate weight of a section without CB

Type of section	Type of CB	Section width [mm]	Weight of CB [kg]	Section with CB fixed part [kg]		
				main busbar compartment of depth 600mm	main busbar compartment of depth 800mm and height 250mm	main busbar compartment of depth 800mm and height 450mm
Incomer / feeder, 3 pole	E1.2 - up to 1600 A	400	20	315	330	370
Incomer / feeder, 3 pole	E1.2 - up to 1600 A	600	20	355	385	435
Incomer / feeder, 3 pole	E2.2 - up to 2000 A	400	53	325	350	390
Incomer / feeder, 3 pole	E2.2 - up to 2500 A	600	53	445	475	530
Incomer / feeder, 3 pole	E4.2 - up to 3200 A	600	67	535	570	630
Incomer / feeder, 3 pole	E4.2 - up to 4000 A	800	67	795	800	875
Incomer / feeder, 3 pole	E6.2 - up to 4000 A	1000	129	815	845	965
Incomer / feeder, 3 pole	E6.2 - up to 5000 A	1000	129	-	1025	1125
Incomer / feeder, 3 pole	E6.2 - up to 6300 A	1200	129	-	-	1380
Incomer / feeder with tubular copper bar, 3 pole	E4.2 - up to 3200 A	600	67	470	-	-
Incomer / feeder with tubular copper bar, 3 pole	E4.2 - up to 4000 A	800	67	580	-	-
Incomer / feeder with tubular copper bar, 3 pole	E6.2 - up to 4000 A	1000	129	640	-	-
Incomer / feeder with WavePro-II busway flange end, 3 pole	E2.2 - up to 2000A	400	53	435	-	-
Incomer / feeder with WavePro-II busway flange end, 3 pole	E2.2 - up to 2500A	600	53	490	-	-
Incomer / feeder with WavePro-II busway flange end, 3 pole	E4.2 - up to 3200A	600	67	770	-	-
Incomer / feeder with WavePro-II busway flange end, 3 pole	E4.2 - up to 4000A	800	67	885	-	-
Coupler, 3 pole	E1.2 - up to 1600 A	600	20	360	-	-
Coupler, 3 pole	E2.2 - up to 2500 A	600	53	460	-	-
Coupler, 3 pole	E4.2 - up to 3200 A	800	67	610	640	-
Coupler, 3 pole	E4.2 - up to 4000 A	1000	67	970	960	1035
Coupler, 3 pole	E6.2 - up to 4000 A	1200	129	965	1005	1105
Coupler, 3 pole	E6.2 - up to 5000 A	1200	129	-	1200	1295
Coupler, 3 pole	E6.2 - up to 6300 A	1200	129	-	-	1510
Incomer / feeder, 4 pole	E1.2 - up to 1600 A	600	23	405	465	510
Incomer / feeder, 4 pole	E2.2 - up to 2500 A	600	60	510	610	655
Incomer / feeder, 4 pole	E4.2 - up to 3200 A	800	81	660	705	755
Incomer / feeder, 4 pole	E4.2 - up to 4000 A	1000	81	1030	1035	1100
Incomer / feeder, 4 pole	E6.2 - up to 4000 A	1200	143	935	995	1080
Incomer / feeder, 4 pole	E6.2 - up to 5000 A	1200	143	-	1245	1320
Incomer / feeder, 4 pole	E6.2 - up to 6300 A	1200	143	-	-	1580
Incomer / feeder with tubular copper bar, 4 pole	E4.2 - up to 3200 A	800	81	590	-	-
Incomer / feeder with tubular copper bar, 4 pole	E4.2 - up to 4000 A	1000	81	715	-	-
Incomer / feeder with tubular copper bar, 4 pole	E6.2 - up to 4000 A	1200	143	815	-	-
Coupler, 4 pole	E1.2 - up to 1600 A	600	23	410	-	-
Coupler, 4 pole	E2.2 - up to 2500 A	600	60	535	-	-
Coupler, 4 pole	E4.2 - up to 3200 A	800	81	705	765	-
Coupler, 4 pole	E4.2 - up to 4000 A	1000	81	1170	1180	1280
Coupler, 4 pole	E6.2 - up to 4000 A	1200	143	1125	1185	1265
Coupler, 4 pole	E6.2 - up to 5000 A	1200	143	-	1460	1580
Coupler, 4 pole	E6.2 - up to 6300 A	1200	143	-	-	1885
Double stacked ACB, 3 pole	E1.2 - up to 1600 A	600	20*2	530	580	595

Approximate weight of a section without CB

Type of section	Type of CB	Section width [mm]	Weight of CB [kg]	Section with CB fixed part [kg]		
				main busbar compartment of depth 600mm	main busbar compartment of depth 800mm and height 250mm	main busbar compartment of depth 800mm and height 450mm
Double stacked ACB, 3 pole	E2.2 - up to 2000 A	600	53*2	580	630	645
Double stacked ACB, 3 pole	E2.2 - up to 2500 A	800	53*2	730	790	815
Double stacked ACB, 3 pole	E4.2 - up to 4000 A	800	67*2	-	885	920
Triple stacked ACB, 3 pole	E1.2 - up to 1250 A	600	20*3	585	630	645
Triple stacked ACB, 3 pole	E2.2 - up to 1250 A	600	53*3	625	665	680
Triple stacked ACB, 3 pole	E1.2 - up to 1600 A	600	20*3	-	715	735
Triple stacked ACB, 3 pole	E2.2 - up to 1600 A	600	53*3	-	760	780
Quadruple stacked CB, 3 pole (MBB, 4 pole)	E1.2 - up to 1250 A	600	20*4	660	720	-
Quadruple stacked CB, 3 pole (MBB, 4 pole)	XT7 - up to 1250 A	600	22*4	665	725	-
Combined ACB and withdrawable modules, 3 pole	E1.2 - up to 1600A	600	20	430	465	490
Combined ACB and withdrawable modules, 3 pole	E2.2 - up to 2000A	600	53	450	485	510
Double stacked ACB, 4 pole	E1.2 - up to 1600 A	800	23*2	635	710	770
Double stacked ACB, 4 pole	E2.2 - up to 2500 A	800	60*2	790	860	925
Double stacked ACB, 4 pole	E4.2 - up to 4000 A	1000	81*2	-	1060	1155
Triple stacked ACB, 4 pole	E1.2 - up to 1250 A	800	23*3	700	755	815
Triple stacked ACB, 4 pole	E2.2 - up to 1250 A	800	60*3	750	805	865
Triple stacked ACB, 4 pole	E1.2 - up to 1600 A	800	23*3	-	865	930
Triple stacked ACB, 4 pole	E2.2 - up to 1600 A	800	60*3	-	925	990
ombined ACB and withdrawable modules, 4 pole	E1.2 - up to 1600A	800	23	520	575	645
ombined ACB and withdrawable modules, 4 pole	E2.2 - up to 2000A	800	60	545	600	675
Empty withdrawable module section, 3 pole	-	600	-	310	315	320
Empty withdrawable module section, 4 pole	-	600	-	340	350	390
Empty fixed module section, 3 pole	-	600	-	330	360	-
Empty fixed module section, 4 pole	-	600	-	350	385	-

All weights for MNS Rear sections are based on:

- IP30-IP40 internal protection with bottom plate, except IP41 for quadruple stacked CB section
- Main busbar compartment of depth 600 mm
- Main busbar compartment of depth 800 mm and height 250mm
- Main busbar compartment of depth 800 mm and height 450mm
- With 4 measuring CTs + 3 protective CTs for single ACB section

- With 3 measuring CTs + 3 protective CTs for single ACB section with tubular copper bar
- With 3 measuring CTs for each CB unit in stacked section
- With IO set for busway from top, for IO set with cable, the overall weight might be lower
- For stacked section are defined with IO set for cable connection
- Do not contain control devices and wiring, except CTs
- Do not contain side walls and main busbar end covers
- Combined ACB and withdrawable modules section, section weight does not contain modules

MNS Front and Rear Access - Modules

Approximate weight of module acc. size		
Module type	Module size	Approximate weight [kg]
Withdrawable modules	8E / 4	4
	8E / 2	7
	4E	8
	6E	14
	8E	18
	12E	25
	16E	35
	24E	65
Plugin modules	6E	8
	8E	15
	12E	16
	16E	31
Fixed modules	24E	36
	6E	18
	8E	18
	12E	26
	16E	35

5. Incoming Solutions

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5.1 Incoming Options

All of the MNS incoming solutions are verified in accordance with IEC 61439-1/-2, in addition to IEC 60947-1 required for the individual apparatus and engineered to meet the requirements of IEC 61641. This ensures ABB's offering of 'Proven Safety Plus' for operators and plant.

In order to satisfy all requirements, there are three main switch incoming options:

- Air circuit breakers (ACBs)
- Moulded case circuit breakers (MCCBs)
- Switch disconnectors

ACB Incoming Options

All ACBs have as a minimum the following features:

- Manual charging lever and 'Charged' indication
- Manual Open/Close push buttons
- Mechanical 'Open'/'Closed' indication
- Mechanical signaling of 'Overcurrent' release
- 4 auxiliary contacts

Project Specific Options

- 3 or 4 pole solutions
- Withdrawable/fixed configuration
- Top or bottom cable entry/bus duct
- 50% or 100% neutral
- Shunt opening/closing release
- Undervoltage release
- Electrical signalization of ACB status
- Key locking facilities
- Shutter locking facilities
- Mechanical indication 'Racked In'/'Racked Out'/'Test Isolated' position
- Locking in 'Racked In'/'Racked Out'/'Test Isolated' position
- Switch disconnector option
- ACB handling truck
- Configuration and test unit



ACB Withdrawable Options

In a withdrawable solution the ACB assembly consists of two components, the fixed part (cassette) and the moving part (ACB). This enables the ACB to be located in 3 positions:

CONNECTED: The moving part is fully inserted into the fixed part with the connection of both, the power terminals and the auxiliary contacts. The circuit breaker is operational and the mechanical indicator shows 'CONNECTED'.

TEST/ISOLATED: The moving part is inserted into the fixed part without the connection of the power terminals, but with connection of the auxiliary terminals. The circuit breaker may be operated for offline tests. The mechanical indicator shows 'TEST ISOLATED'.

DISCONNECTED: The moving part is inserted into the fixed part without any connection of the power and auxiliary terminals. In this position all electrical operation of the ACB is prevented. The mechanical indicator shows 'DISCONNECTED'. The switchgear compartment door can remain closed, therefore not compromising the IP rating of the switchgear.

The ACB cassette (fixed part) has shutters which are positively driven closed during the racking out process to prevent the possibility of contact with live parts.

Temperature Monitoring

Temperature monitoring solutions to monitor the connection of cables or busducts to the incoming or outgoing ACB ensure safe operation and high availability. Sensors, connected to the ABB Ability CMES, enable to detect unwanted temperature rise on electrical connections and warn the operator

Environment Sensors

Environment sensors in the switchgear assembly or in the switch room monitor the ambient conditions and ensure that the switchgear is operated under designed conditions to ensure long operational life. Any change in condition is informed through the ABB Ability CMES system

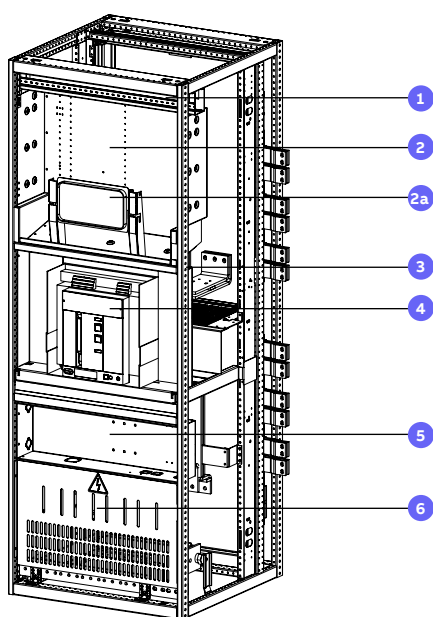
5.2 Single ACB

The ACB's are directly connected to the main busbars. The ACB sections can be configured for either top or bottom entry. The surge protection device (SPD) compartment is provided as an option to accommodate SPD or other devices within ACB section.

MNS 3.0 Front Access

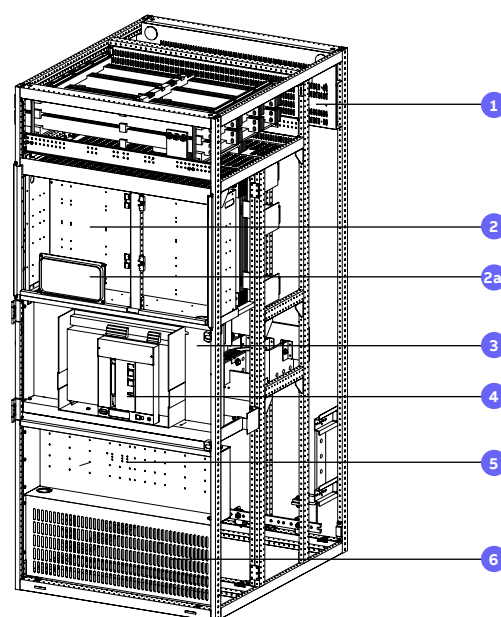
Depending on the top or bottom entry, the position of the auxiliary recess and surge protection device (SPD) varies as shown below.

Designs are available for both fixed and withdrawable ACB's.



MNS Rear Access

The position of auxiliary recess and surge protective device (SPD) compartment are showed below.



No	Description
1	Horizontal wiring duct for internal / external cabling top and bottom cable entry with different type of wiring duct
2	Auxiliary recess with optional instrument panel 2a (instrument panel possible only for cable bottom entry section)
3	ACB compartment
4	ACB – Air Circuit Breaker
5	SPD compartment (optional, possible for top and bottom cable entry)
6	IP20 touch protection

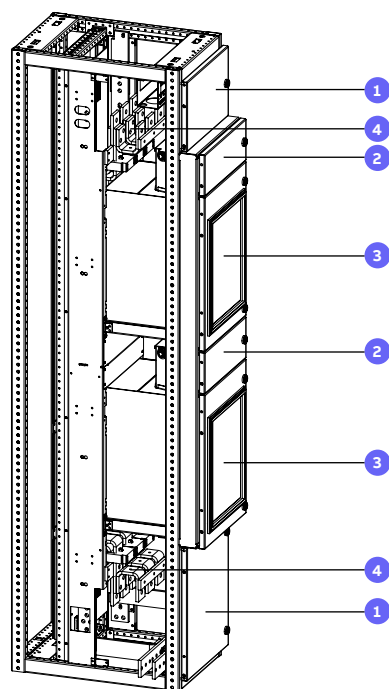
5.3 Stacked ACB

MNS sections with stacked ACB's are designed to provide the most compact solution and reduce the switchgear footprint. It is possible to install two, three or four circuit breakers, placed one above the other, in one section. All ACB's in one section have the same number of poles.

MNS 3.0 Front Access

Depending on the top or bottom entry, an additional cable compartment may be required for routing the power cables.

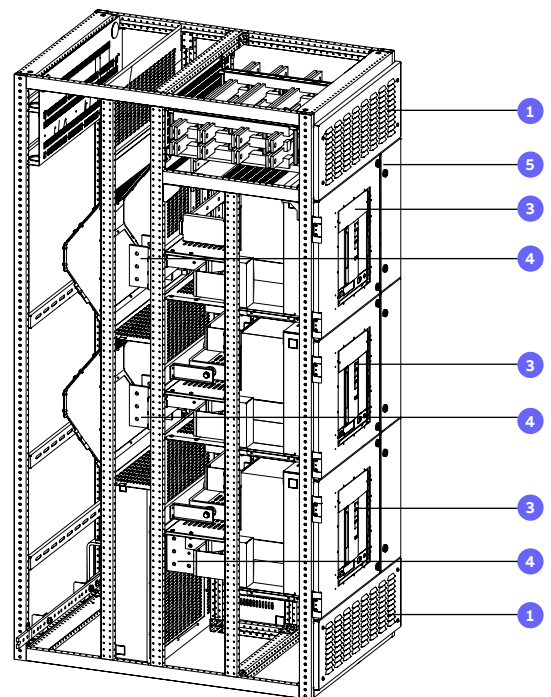
The design is available for two stacked withdrawable ACB's only.



MNS Rear Access

The ACB's upper terminals are always connected to the MBB. The lower terminals are for incoming or outgoing top or bottom. All ACB's in a stacked section have the same incoming/outgoing direction (top or bottom).

The design is available for two, three or four stacked withdrawable ACB's.



sample with 3 ACB's

No	Description
1	Ventilation
2	Auxiliary recess
3	ACB – Air Circuit Breaker
4	ACB cable connection area
5	Side auxiliary recess



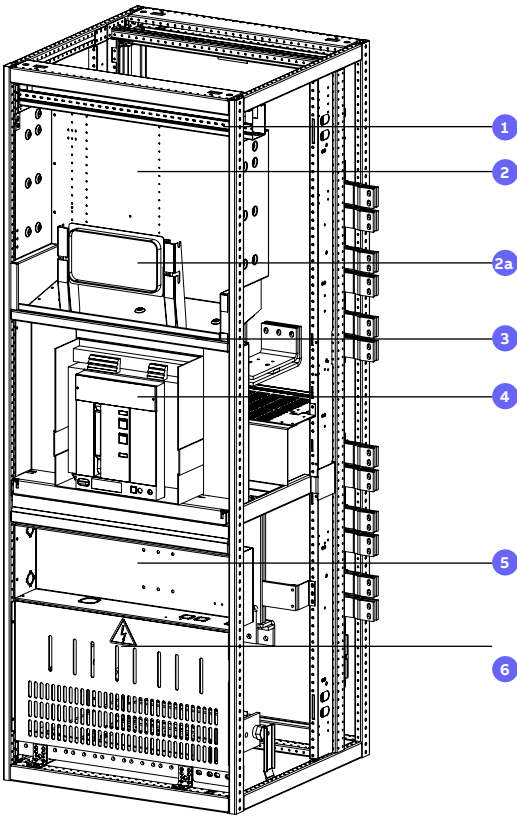
5.4 Single MCCB

MNS 3.0 Front Access

The MCCB's are directly connected to the main busbars. The MCCB sections can be configured for either top or bottom entry.

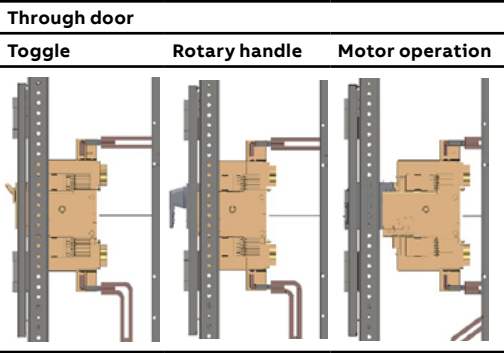
Depending on the top or bottom entry, the position of the auxiliary recess and surge protection device (SPD) varies as shown below.

Designs are available for both fixed and withdrawable MCCB's.

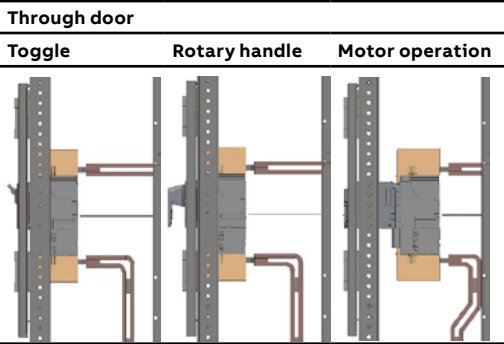
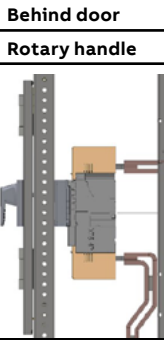


Operation:
Different variants are available to meet the customer expectations in terms of safety and operation.

Withdrawable MCCB:



Fixed MCCB:



No	Description
1	Horizontal wiring duct for internal / external cabling top and bottom cable entry with different type of wiring duct
2	Auxiliary recess with optional instrument panel 2a (instrument panel possible only for cable bottom entry section)
3	ACB compartment
4	ACB – Air Circuit Breaker
5	SPD compartment (optional, possible for top and bottom cable entry)
6	IP20 touch protection

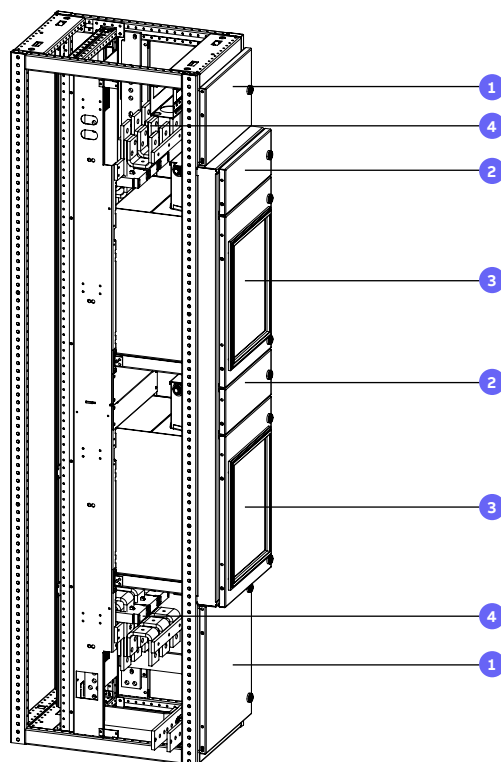
5.5 Stacked MCCB

MNS sections with stacked MCCB's are designed to provide the most compact solution and reduce the switchgear footprint. It is possible to install two or four circuit breakers, placed one above the other, in one section. All MCCB's in one section have the same number of poles.

MNS 3.0 Front Access

Depending on the top or bottom entry, an additional cable compartment may be required for routing the power cables.

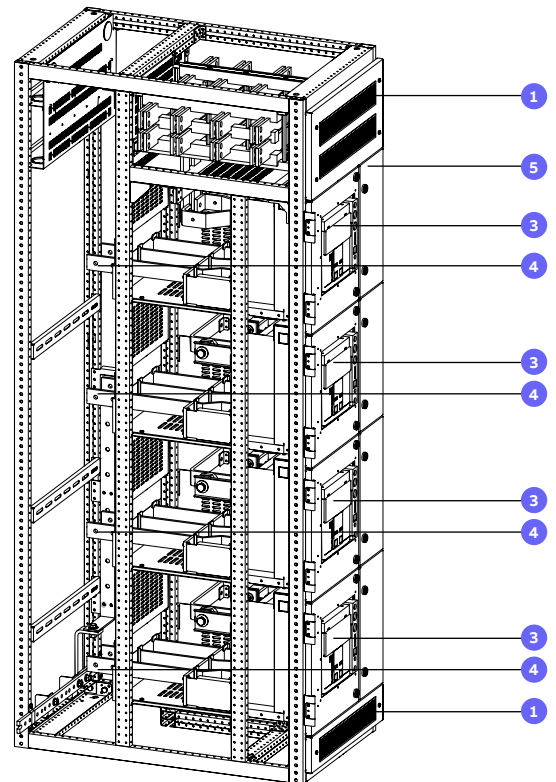
The design is available for two stacked withdrawable MCCB's.



MNS Rear Access

The MCCB's upper terminals are always connected to the MBB. The lower terminals are for incoming or outgoing top or bottom. All MCCB's in a stacked section have the same incoming/outgoing direction (top or bottom).

The design is available for four stacked withdrawable MCCB's.



No	Description
1	Ventilation
2	Auxiliary recess
3	MCCB – Molded Case Circuit Breaker
4	MCCB cable connection area
5	Side auxiliary recess

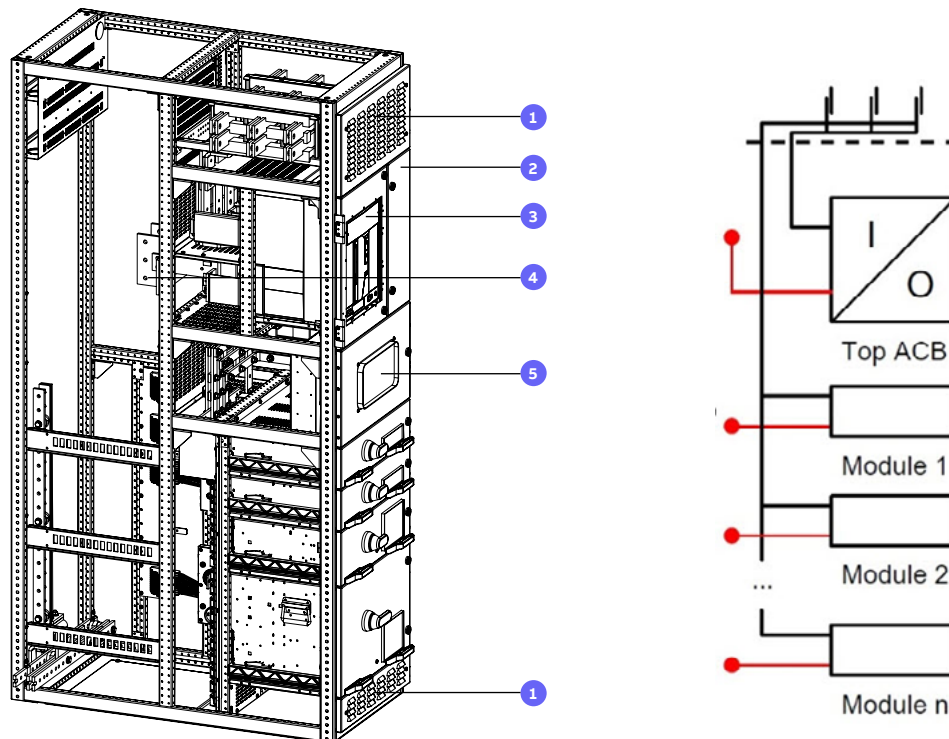
5.6 Single ACB and modules

MNS Rear Access

To reduce the footprint of MNS Rear switchgear and provide the space for some rest modules, a single ACB and module section is developed. At the bottom part of the section, space is provided for standard withdrawable modules. To reduce the design variants, the top ACB design is similar like the standard ACB top position.

For the single ACB and module section, ACB's upper terminals are always connect to the MBB. The lower terminals are for incoming top or incoming bottom. Standard design is with I/O cable, no busduct or tie solutions are available.

Withdrawable modules can be placed in the lower area of the section. The available space for the withdrawable modules depends on the dimensions of the main busbar. This means, that 32E or 36E are available.



No	Description
1	Ventilation
2	Side auxiliary recess
3	Upper ACB
4	Upper ACB cable connection
5	Measuring recess

The withdrawable modules are connected to the standard 3- or 4-pole distribution bare. The distribution busbar is connected to the main busbar system.

5.7 Single ACB with earthing switch

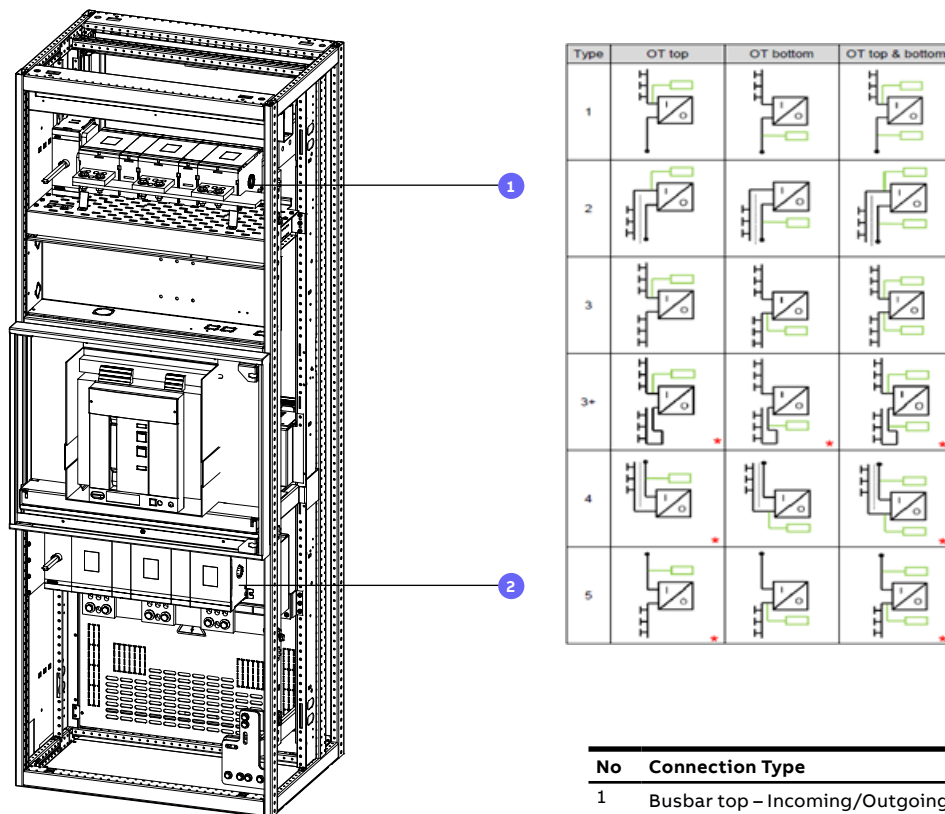
MNS 3.0 Front Access

The main purpose of using design with stationary earthing switch device is to ensure safe workplace for operator during the maintenance works. The purpose of earthing switch device is to initiate the 3-phases short circuit what results MSD contacts opening in a time no longer than set-up of short-circuit release device in case of its unauthorized contacts close. Based on this, the MNS 3.0 with OT earthing switch is available with 3 poles earthing switches short-circuiting L1 / L2 / L3 phases into the PE system. The OT earthing switches comprises short-circuiting and earthing.

MNS provides an option where it is possible to configure up to two earthing in a single ACB section, to meet operational safety procedures

Earthing switch operating is made by using dedicated handle mounted directly on the doors and connected with the earthing switch by the shaft. The earthing switches handle has option for padlocks

Several connection types with earthing switches arrangements are possible. These refer to the possible variants of connecting the ACB with earthing switch placements in the MNS section.



No	Description
1	Position shown for upper earthing switch
2	Position shown for lower earthing switch

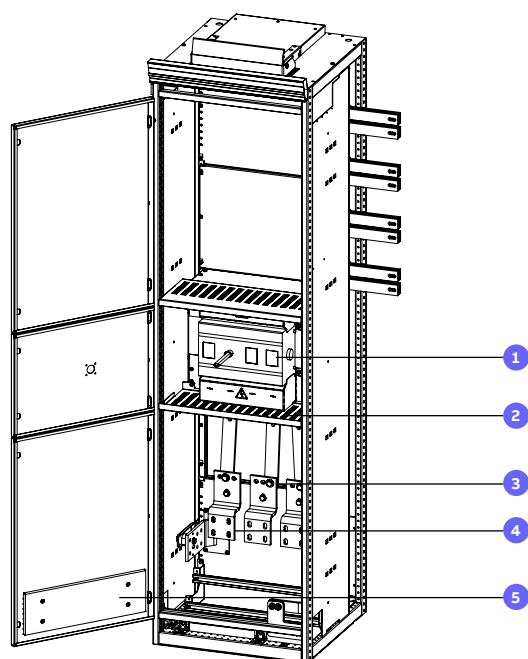
No	Connection Type
1	Busbar top – Incoming/Outgoing bottom
2	Busbar bottom – Incoming/Outgoing bottom
3	Busbar top – Busbar bottom (bustie)
3+	Busbar top – Busbar bottom (bustie with CT)
4	Busbar top – Incoming/Outgoing top
5	Busbar bottom – Incoming/Outgoing top

5.8 Switch-disconnector

MNS 3.0 Front Access

Switch-disconnector

The Switch-disconnector is directly connected to the main busbar. The fixed design is available for either top or bottom entry.



No	Description
1	Switch-disconnector compartment
2	Switch -disconnector
3	IP20 touch protection
4	Cable connection
5	Ventilation

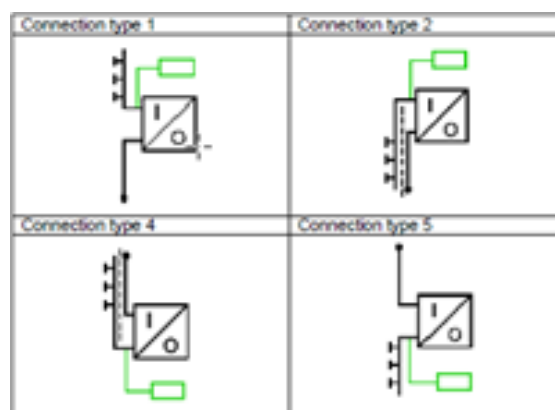
Switch-disconnector with earthing switch

In addition to the main breaker, MNS provides an option where it is possible to configure an earthing switch to meet operational safety procedures

The OT earthing switches comprises short-circuiting and earthing. Several connection types with earthing switches arrangements are possible.

These refer to the possible variants of connecting the switch-disconnector with the earthing switch placements in the MNS section.

Earthing switch operating is made by using dedicated handle mounted directly on the doors and connected with the earthing switch by the shaft. The earthing switches handle has option for padlocks



No	Connection Type
1	Busbar top – Incoming/Outgoing bottom
2	Busbar bottom – Incoming/Outgoing bottom
3	Busbar top – Incoming/Outgoing top
5	Busbar bottom – Incoming/Outgoing top

6. Outgoing Solutions

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6.1 MNS Module Types

As previously described, the MNS platform is a modular construction enabling flexible configuration of the assembly in accordance with project requirements, the modular assembly comprises:

- Sections
- Functional units

A section is a full height construction based upon the “C” profile frame construction. A functional unit is a sub-assembly contained within the section. The MNS system enables the following solutions to be configured

F – Fixed connection
P – Plug-in connection
W – Withdrawable

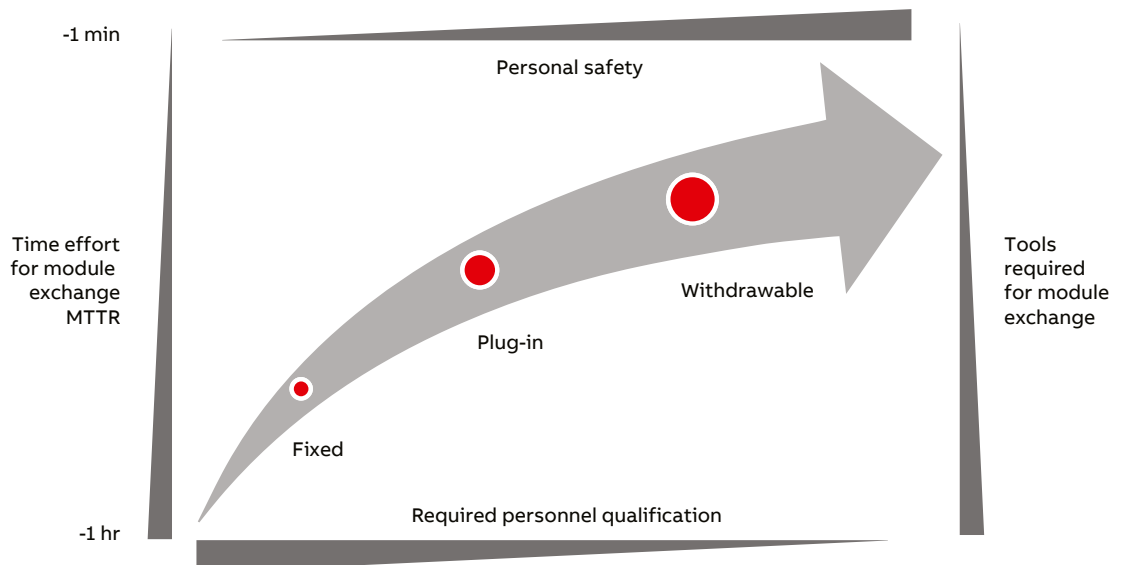
MNS offers users the scalability they need to take advantage of the customized solutions. The figure below details the scalability of the system from Fixed to Withdrawable and operational aspects associated with the different functional unit designs. Where high process availability is essential and minimal time is required for module exchange the withdrawable solution has proved to be the optimal choice.

When a longer MTTR (mean time to repair) is allowed, the fixed solution could be a good choice providing more reliable and flexible connections for outgoing units, easily connecting the modules to the supporting frame with screws at any height allowed.

Plug-in design takes advantage of both unique power contact technology of withdrawable solution and flexible component arrangement of fixed solution, therefore plug-in outgoing units could be widely used across a range of industries.

Withdrawable design, fixed design and plug-in design are perfectly compatible to suit various operational requirements with best space utilization.

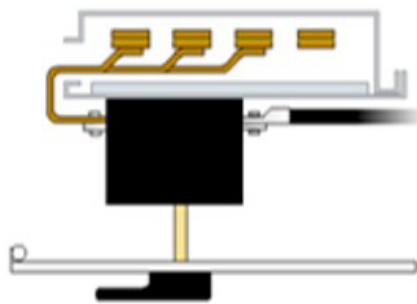
Depending upon the types of outgoing modules selected, the skill sets required for related personnel may differ, but no personnel could work on any electrical apparatus until approval has been granted by the responsible authority and the working environment has been classified as safe.



* Plug-in solutions are available for MNS 3.0 Front Access only

Electrical connections of functional units

A functional unit can have the same or different types of electrical connection for incoming and outgoing supplies; for example, a withdrawable connection can be used for the incoming and fixed for the outgoing.



The types of electrical connections of functional units can be denoted by a three-letter code:

- first letter = main incoming circuit
- second letter = main outgoing circuit
- third letter = auxiliary circuit

The following letter shall be used:

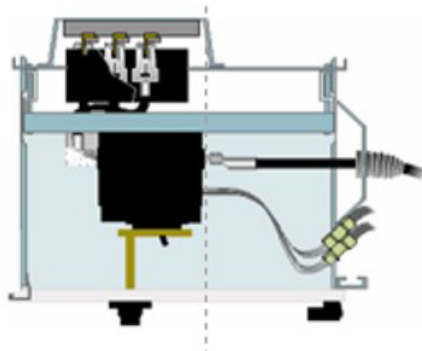
- F for fixed connections
- D for disconnectable connections
- W for withdrawable connections

Fixed modules

Main incoming circuit	Fixed
Main outgoing circuit	Fixed
Auxiliary circuit	Fixed

Long MTTR

Switchgear must be switched off for maintenance.

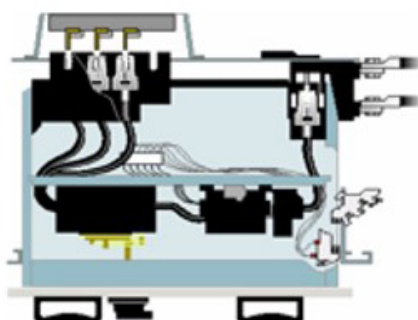


Plug-in modules

Main incoming circuit	Withdrawable
Main outgoing circuit	Fixed
Auxiliary circuit	Fixed / Disconnectable

Medium MTTR

switchgear can remain live, but area of work must be secured according to safety instruction.



Withdrawable modules

Main incoming circuit	Withdrawable
Main outgoing circuit	Withdrawable
Auxiliary circuit	Fixed

Short MTTR

Remove drawer for maintenance from live switchgear.

6.2 Withdrawable Modules

Design of Withdrawable Modules

The withdrawable technique of MNS 3.0 system has been proved to be the appropriate solution for industrial applications where requirements for high availability are a must particularly in Motor Control Centers (MCCs) and energy distribution with high demands.

The withdrawable design enables the replacement of functional units without the necessity of shut-ting off the power supply, minimizing any loss from an unexpected downtime.

Meanwhile modules can be easily exchanged under service condition thus assuring maximum flexibility.

Small modules

Withdrawable technique is distinguished by its compact design. The module size 8E/4 and 8E/2 are available.

With the smallest 8E/4 module it is possible to physically define a maximum of 36 modules in the equipment compartment. This modularity enables the assembly to maximize the usage of the available space, which in turn reduces the overall foot-print of the switchgear.

The front panel is provided with knockouts for mounting measuring, operating and indicating instruments. The operation of the main switch is achieved by the handle installed on the panel which is furnished with the function of electrical and me-chanical interlocking.

System Highlights

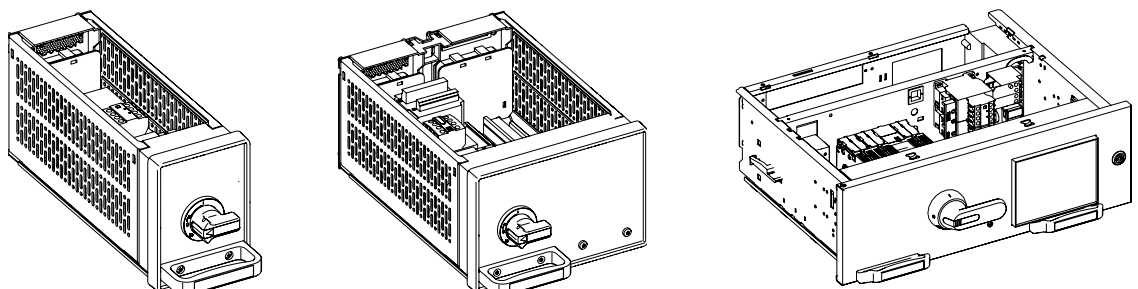
- High stacking density, resulting in a reduced footprint
- Complete phase isolation of main power contact prior to connection to the distribution bars
- Full module functionality with external operation
- Module replacement possible in less than 1 minute, no tools required
- Module operation monitoring, e.g. rack-in/rack-out, is available through smart devices connected with the ABB Ability CMES

Full width module

These modules are available ranging from 4E to 24E in physical sizes. The construction of the full modules differs slightly from that of the small modules in utilizing a full width hinged door which is mechanically interlocked to the isolator.

All operation procedures for the modules are possible without the need to open the door of the module.

The withdrawable unit of standard arrangement can be equipped with an instrument panel made of insulating material for the installation of measuring, operating and indicating instruments. The hinged instrument panel is mounted to the withdrawable unit and is visible via a door cut out. This panel remains in position when the front cover is opened



Design of Withdrawable Compartments

SMALL MODULES

For withdrawable module design there are condaptors to be used to connect the small withdrawable.

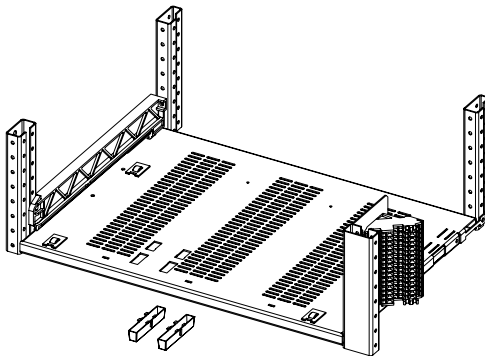
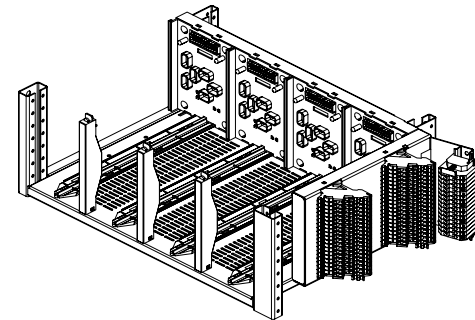
modules to the distribution bars, which allows 2 modules (8E/2) or 4 modules (8E/4) to be located adjacently on the same horizontal position inside the switchgear. Condaptors are available in 3 or 4 pole options. Cable connections for main and auxiliary circuits are integrated into the condaptors and are accessible from the cable compartment.

Full width module

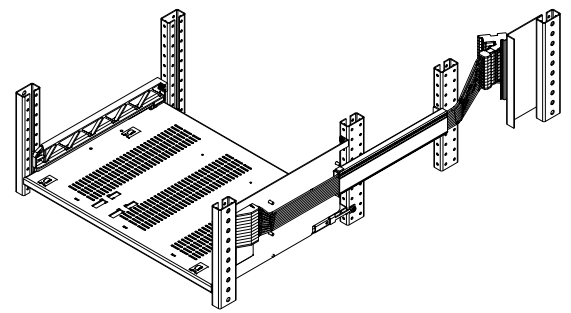
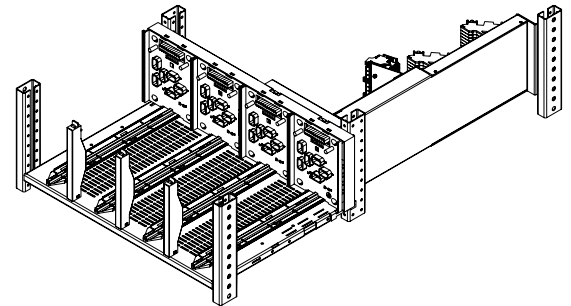
These modules are available ranging from 4E to 24E in physical sizes. The construction of the full modules differs slightly from that of the small modules in utilizing a full width hinged door which is mechanically interlocked to the isolator.

All operation procedures for the modules are possible without the need to open the door of the module.

MNS 3.0 Front Access

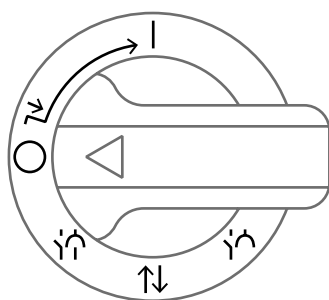


MNS Rear Access



Module operation

Small modules



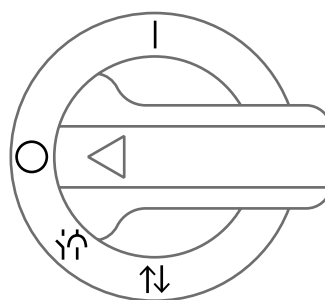
	ON position – Main and control circuitts are closed. Module is locked.
	OFF posttion – Main ctrcutt are disconnected, the control circuits are closed. Module is locked.
	TEST posttion – Main ctrcutt are disconnected, the control circuitts are closed. Modulle is locked.
	MOVE position – Main and control circuitts are disconnected.
	ISOLATED position – The module is 30 mm drawn out of the section. Main and control ciircuitts are disconnected and the isolating distance is fulfilled.

The switch handle can be moved from position “OFF” to position “ON” only after the handle has been depressed (push-to-turn feature).

The switch handle can be locked in “OFF” / “TEST” / “ISOLATED” position respectively with up to three padlocks.

Switch handles of withdrawable units that are not used must be in position “OFF” or “ISOLATED”.

Full width module



	ON position – Main and control circuitts are closed. Module is locked.
	OFF position – Main circuitt are disconnected, the control circuitts are closed. Module is locked.
	TEST position – Main circuit are disconnected, the control circuitts are closed. Module is locked. Can be locked with 3 padlocks.
	MOVE position – Main and control circuitts are disconnected.
	ISOLATED position – The module is 30 mm drawn out of the section. Main and control circuitts are disconnected and the isolatiing distance is fulfilled. Can be locked with 3 padlocks.

The main switch is operated by the operating handle which is also used for the mechanical/ electrical interlocking. Two micro switches with 1 × NO and 1 × NC contacts is provided for electrical interlocking.

6.3 Plug-in Modules

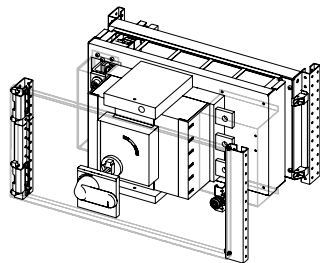
Standard Plug-in Modules

MNS offer numerous alternatives for plug-in modules. When utilizing the multifunction separator, all modules have the ability to be exchanged without de-energizing the switchgear, should maintenance procedures allow.

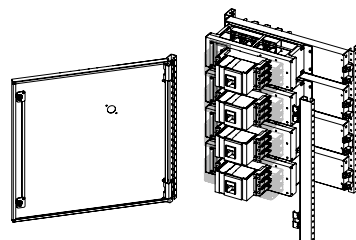
The flexibility of the system allows power distribution and motor control.

The following options are available:

- Outside operation
- Inside operation with individual door or common door
- Module width 400mm or 600mm MNS Compact



Outside operation



Inside operation with common door

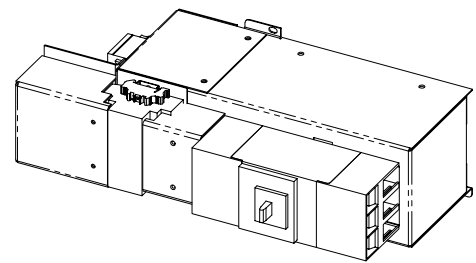
MNS Compact Plug-in Modules

MNS Compact offers a fuseless option for power distribution. Up to 36 power modules are possible in a single section.

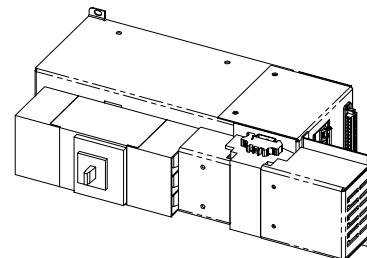
The portfolio covers 3 pole and 4 pole modules up to 500A. As an option, several measuring variants are available.

All digital application may be integrated that enable condition monitoring and seamless integration into the ABB Ability digital portfolio.

The operation is inside, behind the door.



Left side mounting



Right side mounting

Slimline Switch Disconnect

The Slimline switch disconnect offers ABB's most compact form of fused energy distribution and is available in 3 or 4 pole options. This design is available in standard modules sizes with a maximum rating of 630 A.

It is connected to the distribution bars directly via its internal main contact or using main contact ex-tension module. Utilizing the direct connection method, it is possible to reduce the section depth of the assembly.

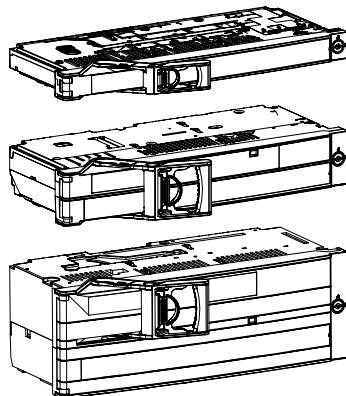
Operation is performed via the handle on the front of the module which has an inbuilt padlocking facility and mechanical open/closed indication.

The following options are available:

- Ammeter
- Auxiliary contacts
- Fuse blown indication

The Slimline is also available as Intelligent Tier Switch enabling the following information to be sent via its fieldbus connection:

- Switch status
- Fuse indication
- Current
- Voltage
- Power & Power Consumption
- Power factor
- Temperature

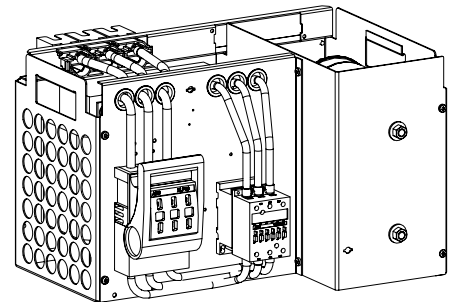


Reactive Power compensation

The reactive power compensation modules are 600 mm wide modules connected directly to the distribution bars via the MNS main contacts, thus reducing the requirements for additional external cubicles.

Multiple modules may be configured in a single section with a full-sized door. Options exist for natural or forced ventilation and integration with MNS Digital.

The modular design offers highest flexibility to adjust the compensation power to changes of the load connected to the network.



Plug-in Modules for Motor Starter

In this module technology, MNS offers two options of motor starter solutions:

- Soft Starter with PSTX
- Variable Speed Drive with ACS880

Soft Starter

Like direct-on-line starter, soft starters are used to start and stop motors in full-speed applications. It eliminates common problems associated with motor starting and stopping, including electrical surges, spikes and high inrush currents. Because it offers soft starting and stopping, a soft starter is the optimal compromise between a direct-on-line starter and a variable speed drive in many full-speed motor applications.

The PSTX soft starter offers complete motor protection in only one unit and is able to handle both load and network irregularities.

When reaching full speed, the PSTX will activate its bypass. This saves energy while reducing the soft starter's heat generation. The fact that the soft starter's thyristors are not continuously switching at full speed prolongs the product life. On the PSTX, the bypass is built in and verified by ABB.

The PSTX features many application-enhancing features, including torque control — the most efficient way to start and stop pumps. The pump cleaning feature can reverse pump flow and clean out pipes, boosting uptime of your pump system.

Main benefits

- Secure motor reliability
- Improve installation efficiency
- Increase application productivity

Main features

- Three-phase controlled
- Rated operational current: 30...1250 A
- Coated circuit boards
- Torque control for excellent control of pumps
- Integrated control transformer

The plug-in modules with soft starter PSTX are 600 mm wide modules connected directly to the distribution bars via the MNS main contacts.

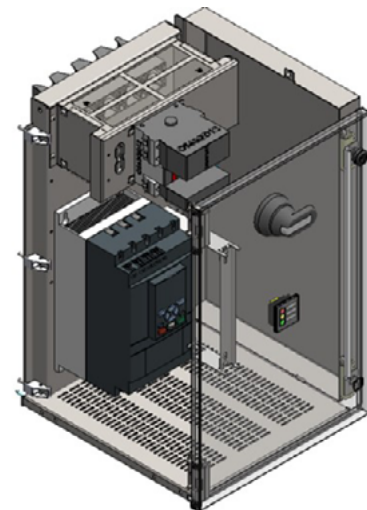
To optimize the switchgear layout, multiple modules may be configured in a single section with an individual module door, mixed with other plug-in solutions.

Each soft starter has an individual isolator. Options are available for local control devices in the front door.

Plug-in modules with PSTX are available up to 132 kW at 690V.

Full size sections are also available for soft starter with PSTX, these are, however, of the fixed technique.

Fixed modules are available with 400mm or 600mm wide for the smaller power rating, full size sections are available soft starter solution up to 1100 kW at 690V.



Variable Speed Drive

Like a soft starter, a variable speed drive (VSD) can perform soft motor starting and stopping. However, the VSD is designed primarily to control motor speed, resulting in energy-efficient motor operation in variable speed applications.

Variable speed drives are designed to provide customers across industries and applications with un-precedented levels of compatibility and flexibility. They are customized to meet the precise needs of industries such as oil and gas, mining, metals, chemicals, cement, power plants, material handling, pulp and paper, sawmills, marine, water and wastewater, food and beverage and automotive.

VSD's can control a wide range of applications, including cranes, extruders, winches, winders, conveyors, mixers, compressors, centrifuges, test benches, elevators, extruders, pumps and fans.

The ACS880-01 comes in one compact package for easy installation and commissioning. ACS880-01 drives have all the essential features built-in. These features include as standard a choke for harmonic filtering as well as options like a brake chopper, EMC filter and communication protocol adapter, functional safety and I/O extension modules.

As the standard, the ACS880 drive has a control panel with built-in Bluetooth interface, which enables wireless connection with the ABB Drivetune mobile app and with the entry-level Drive Composer PC tool for startup, commissioning, maintenance, and remote support. Control panel has built-in USB port, which enables PC connection using the Drive Composer software for comprehensive commissioning and maintenance.

Drive Composer is designed for the daily operation of the ACS880 drives. It provides extensive drive monitoring capabilities and quick access to drive settings, as well as features like a graphical interface for configuring safety functions, visual control diagrams, and direct

links to user manuals.

The plug-in modules with VSD's are 600 mm wide modules connected directly to the distribution bars via the MNS main contacts.

Multiple modules may be configured in a single section with an individual module door. In addition, the VSD modules can also be used together with all other plug-in solutions in the same section to achieve maximum options in terms of space optimization in the switchgear.

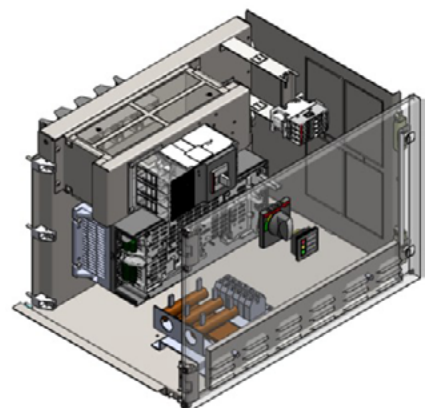
Each compartment has an individual isolator, options are available for filters to be installed and for the drive control panel to be door mounted to enable interrogation and parameterization without the need to open the door.

Plug-in modules with ACS880-01 are available up to 30 kW.

However, VSD solution in fixed module technique, enabling MNS to offer the complete range of variable speed drives.

Fixed modules are available with 400mm or 600mm wide for the smaller power rating, full size sections are also available for VSD solution up to 250 kW.

If the customer's requirements can already be met with the variable speed drive ACS580, the project-specific solution may be clarified with the responsible local unit.



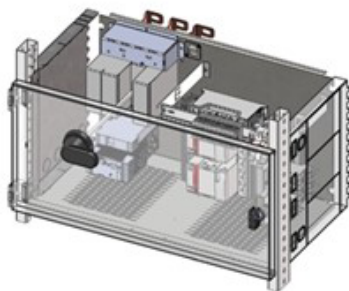
6.4 Fixed Modules

ABB's unique fixed switchgear could provide more reliable and flexible connections for outgoing units, easily connecting the modules to the supporting frame with screws at any height allowed.

MNS 3.0 Front Access

The fixed front access switchgear offers innovative space-saving design hence enables great footprint reduction compared with other solutions by means of:

- Space saving on the outgoing section width for energy distribution solutions. Fixed modules width of 400mm and 600mm are available.
- Increased height option to use full 80E within an outgoing section. Standard equipment height is 72E.
- Shared cable compartment option to reduce overall space further.



There are various solutions available:

- Energy distribution with circuit breaker or fuses
- Motor starter modules with different motor protection relays like EOL, UMC or M10x
- Soft starter modules
- Modules with variable speed drive

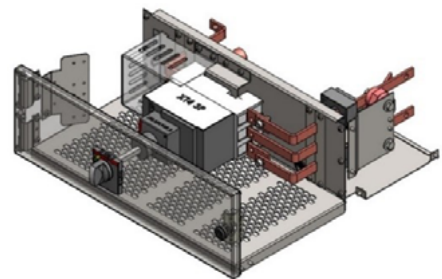
With the most advanced digital technology, digital options could be seamlessly integrated into MNS fixed solution while keeping the cost-effectiveness of switchgear as a basis.

MNS Rear Access

The MNS Rear Access offers, similar to the MNS 3.0 Front Access, a cost-efficient solution with fixed modules for energy distribution modules with circuit breakers.

The space saving design enables a footprint reduction compared to the alternative withdrawable modules.

This makes these modules ideal for light processes, infrastructure and food & beverage industries, utilities and data centers.



For MNS Rear Access, energy distribution modules with circuit breakers are available.

6.5 Remote Power Panel (RPP)

The main use of these solutions is in AC Datacenter segment where they are typically called PDU's or RPP's and belong to a complete Datacenter pack-age based on MNS.

The abbreviations PDU & RPP are used interchange-ably across the globe, however, the standard de-scription is as follows:

- PDU (Power Distribution Unit) - Transformer based distribution with combinations of large and small branch circuit breakers.
- RPP (Remote Power Panel) - Transformer-less distribution with combinations of large and small branch circuit breakers.

The MNS RPP/iRPP can monitor up to 168 branch circuits and also monitors the incoming power mains to provide information on a complete RPP. Full alarm capabilities ensure that potential issues are dealt with before they become problems.

The MNS iRPP can be connected to ABB PLC ACS500 or any 3rd party control system.

SMISLINE TP – Touch Proof socket system is used as distribution chassis, it provides IPXXB protection for the branch MCB'S & facilitate 'hot swap' of circuits.

Section layout

Stand alone section or configuration with MNS 3.0 Front access, connected to main busbar system. Top or bottom cable entry.

Dimensions:

Height 2200 mm
Width 600/800/1000 mm
Depth 400 mm stand alone
600 mm with main busbar area

Incomer

ABB MCCB 250A and 400A

Outgoing

2 independent branches with up to 168 MCB's.

MNS RPP

The BCM (branch circuit management) module is used to measure the parameters such as kW, kWh, % load etc., for each branch.

Following are the main components.

- SMISLINE-TP, to be mounted vertically
- SMISLINE MCB'S
- BCM & MFCM module (measuring)
- Local display unit as an option

MNS iRPP

The CMS (current measurement system) is used to measure the current in each BCM and an energy analyzer is used to obtain reference voltage, cos phi & frequency. Data from CMS control unit & the meter are fed into PLC AC500, which then calculates parameters such as kW, kWh, % load etc., for each branch.

Following are the main components:

- SMISLINE-TP, to be mounted vertically
- SMISLINE MCB'S
- CMS – Sensors + Strip cable + Control unit
- Energy analyzer – A44 Platinum
- PLC AC500
- Signal list





7. Primary Circuit Solutions

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7.1 Incoming Solutions

MNS 3.0 Front Access

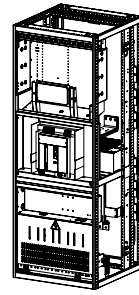
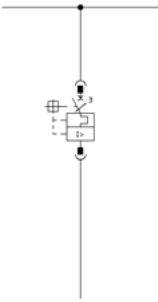
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MNS Rear Access

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7.1.1 MNS 3.0 Front Access, Single ACB – Emax 2 / Emax 3

Single line



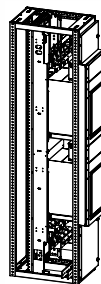
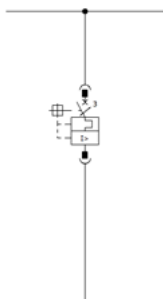
Application Incomer, feeder, Bus tie

Main switching device	ACB Type	Angle set Mat.	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Width [mm]		Depth Equip. Comp. [mm]	Height
			IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole		
E1.x 630	w/f	Cu	630	630	630	66	50	50	400/600	600	400/600	85E
E1.x 800	w/f	Cu	800	800	800	66	50	50	400/600	600	400/600	85E
E1.x 1000	w/f	Cu	1000	1000	1000	66	50	50	400/600	600	400/600	85E
E1.x 1250	w/f	Cu	1250	1250	1250	66	50	50	400/600	600	400/600	85E
E1.x 1600	w/f	Cu	1600	1600	1300	66	50	50	400/600	600	400/600	85E
E2.x 800A	w/f	Cu	800	800	800	100	85	85	400/600	600	400/600	85E
E2.x 1000	w/f	Cu	1000	1000	1000	100	85	85	400/600	600	400/600	85E
E2.x 1250	w/f	Cu	1250	1250	1250	100	85	85	400/600	600	400/600	85E
E2.x 1600	w/f	Cu	1600	1600	1600	100	85	85	400/600	600	400/600	85E
E2.x 2000	w/f	Cu	2000	2000	1600	100	85	85	400/600	600	400/600	85E
E2.x 2500	w/f	Cu	2500	2500	1960	100	85	85	600	800	400/600	85E
E4.x 3200	w/f	Cu	2900	2900	2450	100	100	100	800	1000	400/600	85E
E4.x 4000	w/f	Cu	2900	2900	2450	100	100	100	800	1000	400/600	85E
E6.x 4000	w	Cu	4000	4000	3100	100	100	100	1000	1200	400/600	85E
E6.x 5000	w	Cu	5000	5000	3500	100	100	100	1200	1200	400/600	85E
E1.x 630	f	Al	600	600	575	66	50	50	400/600	600	400/600	85E
E1.x 800	f	Al	600	600	575	66	50	50	400/600	600	400/600	85E
E1.x 1000	f	Al	1000	1000	1000	66	50	50	400/600	600	400/600	85E
E1.x 1250	f	Al	1225	1225	1150	66	50	50	400/600	600	400/600	85E
E1.x 1600	f	Al	1225	1225	1150	66	50	50	400/600	600	400/600	85E
E2.x 800A	f	Al	725	725	700	100	85	85	400/600	600	400/600	85E
E2.x 1000	f	Al	1000	1000	1000	100	85	85	400/600	600	400/600	85E
E2.x 1250	f	Al	1250	1250	1250	100	85	85	400/600	600	400/600	85E
E2.x 1600	f	Al	1450	1450	1450	100	85	85	400/600	600	400/600	85E
	w	Al	1600	1600	1400	65	-	-	400/600	600	400/600	85E
E2.x 2000	f	Al	1450	1450	1400	100	85	85	400/600	600	400/600	85E
	w	Al	2000	2000	1650	65	-	-	600	600	400/600	85E
E2.x 2500	f	Al	2200	2200	1850	100	85	85	600	800	400/600	85E
E4.x 3200	f	Al	2370	2370	2370	100	100	100	800	1000	400/600	85E
High performance												
E4.x 3200	w	Cu	3200	3200	3000	100	100	100	800	1000	400/600	85E
E4.x 4000	w	Cu	3600	3650	3000	100	100	100	800	1000	400/600	85E
E4.x 3200	w	Cu	3200	3200	2500	100	100	100	800	1000	800	85E
E4.x 4000	w	Cu	3650	3650	2500	100	100	100	800	1000	800	85E
E6.x 4000	w	Cu	4000	4000	3500	100	100	100	1000	1200	800	85E
E6.x 5000	w	Cu	5000	5000	3500	100	100	100	1000	1200	800	85E
E6.x 6300	w	Cu	5850	5600	4000	100	100	100	1200	1200	800	85E

E1.x = Emax E1.2 / Emax E1.3 | E2.x = Emax E2.2 / Emax E2.3 | E4.x = Emax E4.2 / Emax E4.3 | E6.x = Emax E6.2 / Emax E6.3

7.1.2 MNS 3.0 Front Access, Stacked ACB – Emax 2 / Emax 3

Single line



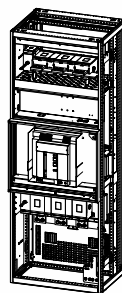
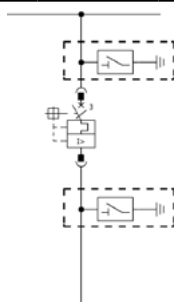
Application Incomer, feeder, Bus tie												
Main switching device	ACB Type	Angle set Mat.	Rated current Inc (up to)* [A]			Short-circuit breaking capacity Icu (up to) [kA]			Width [mm]		Depth Equip. Comp. [mm]	Height
			IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole		
2 x E1.x 630	w	Cu	630	630	630	66	50	50	400/600	600/800	400/600	85E
2 x E1.x 800	w	Cu	800	800	800	66	50	50	400/600	600/800	400/600	85E
2 x E1.x 1000	w	Cu	1000	1000	1000	66	50	50	400/600	600/800	400/600	85E
2 x E1.x 1250	w	Cu	1250	1250	1000	66	50	50	400/600	600/800	400/600	85E
2 x E1.x 1600	w	Cu	1250	1250	1000	66	50	50	400/600	600/800	400/600	85E
2 x E2.x 800	w	Cu	800	800	800	100	85	85	400/600	600/800	400/600	85E
2 x E2.x 1000	w	Cu	1000	1000	1000	100	85	85	400/600	600/800	400/600	85E
2 x E2.x 1250	w	Cu	1250	1250	1250	100	85	85	400/600	600/800	400/600	85E
2 x E2.x 1600	w	Cu	1500	1500	1425	100	85	85	400/600	600/800	400/600	85E
2 x E2.x 2000	w	Cu	1500	1500	1425	100	85	85	400/600	600/800	400/600	85E

* both ACB's operate simultaneously, Ing value for bottom ACB

E1.x = Emax E1.2 / Emax E1.3 | E2.x = Emax E2.2 / Emax E2.3

7.1.3 MNS 3.0 Front Access, Single ACB with earthing switch

Single line



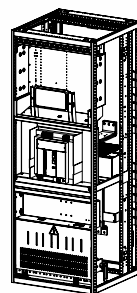
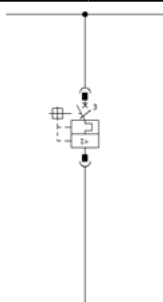
Application Incomer, feeder, Bus tie

Main switching device	ACB Type	Angle set Mat.	Earthing Switch		Short-circuit breaking capacity Icu (up to) [kA]	Width [mm]		Depth Equip. Comp. [mm]	Height
			Type	Pole		3-pole	4-pole		
E2.x 800	w	Cu	OT 1000	3	50	600	600	400/600	85E
E2.x 1000	w	Cu	OT 1000	3	50	600	600	400/600	85E
E2.x 1250	w	Cu	OT 1000	3	50	600	600	400/600	85E
E2.x 1600	w	Cu	OT 1000	3	50	600	600	400/600	85E
E2.x 2000	w	Cu	OT 1000	3	50	600	600	400/600	85E
			OT 2000	3	55				
E2.x 2500	w	Cu	OT 1000	3	50	600	800	400/600	85E
			OT 2000	3	55				
E4.x 3200	w	Cu	OT 1250	3	50	800	1000	400/600	85E
			OT 2500	3	55				
			OT 4000	3	80				
E4.x 4000	w	Cu	OT 1250	3	50	800	1000	400/600	85E
			OT 2500	3	55				
			OT 4000	3	80				
E6.x 4000	w	Cu	OT 2500	3	55	1000	1200	400/600	85E
			OT 4000	3	80				
E6.x 5000	w	Cu	OT 2500	3	55	1200	1200	400/600	85E
			OT 4000	3	80				
High performance									
E4.x 3200	w	Cu	OT 1000	3	50	800	1000	400/600	85E
			OT 2000	3	55				
			OT 3200	3	65				
			OT 4000	3	80				
E4.x 4000	w	Cu	OT 1000	3	50	800	1000	400/600	85E
			OT 2000	3	55				
			OT 3200	3	65				
			OT 4000	3	80				

E2.x = Emax E2.2 / Emax E2.3 | E4.x = Emax E4.2 / Emax E4.3 | E6.x = Emax E6.2 / Emax E6.3

7.1.4 MNS 3.0 Front Access, Single and Stacked MCCB – Tmax XT

Single line

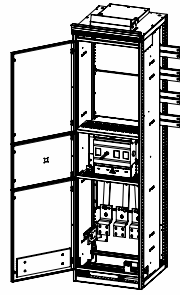
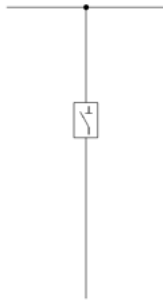


Application Incomer, feeder, Bus tie												
Main switching device	MCCB Type	Angle set Mat.	Rated current Inc (up to)* [A]			Short-circuit breaking capacity Icu (up to) [kA]			Width [mm]		Depth Equip. Comp. [mm]	Height
			IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole		
XT5 400	w/f	Cu	400	400	400	100	65	65	400	400	400/600	85E
XT5 630	w	Cu	600	600	500	100	65	65	400	400	400/600	85E
	f	Cu	630	630	550	100	65	65	400	400	400/600	85E
XT6 800	w	Cu	800	800	750	65	50	-	400/600	600	400/600	85E
	f	Cu	800	800	800	65	50	-	400/600	600	400/600	85E
XT6 1000	f	Cu	910	910	800	65	50	-	400/600	600	400/600	85E
XT7 800	w/f	Cu	800	800	-	100	65	50	400/600	600	400/600	85E
XT7 1000	w/f	Cu	1000	1000	-	100	65	50	400/600	600	400/600	85E
XT7 1250	w/f	Cu	1250	1250	-	100	65	50	400/600	600	400/600	85E
XT7 1600	w/f	Cu	1600	1600	-	100	65	50	400/600	600	400/600	85E
XT7 1600	w	Cu	1600	1600	-	65	-	-	-	400	600	85E
2 x XT5 400	w	Cu	400	400	400	100	65	65	400	400	400/600	85E
2 x XT5 630	w	Cu	600	600	571	100	65	65	400	400	400/600	85E
2 x XT6 800	w	Cu	800	800	800	65	50	-	400	600	400/600	85E
2 x XT7 800	w	Cu	800	800	-	100	65	50	400	600	400/600	85E
2 x XT7 1000	w	Cu	1000	1000	-	100	65	50	400	600	400/600	85E
2 x XT7 1250	w	Cu	1250	1250	-	100	65	50	400	600	400/600	85E
2 x XT7 1600	w	Cu	1280	1280	-	100	65	50	400	600	400/600	85E
2 x XT7 1600	w	Cu	1600	1600	-	65	-	-	-	400	600	85E
XT5 400	w/f	Al	400	400	400	100	65	65	400	400	400/600	85E
XT5 630	w	Al	600	600	550	100	65	65	400	400	400/600	85E
	f	Al	630	630	570	100	65	65	400	400	400/600	85E
XT6 800	w	Al	800	800	740	65	50	-	400/600	600	400/600	85E
	f	Al	800	800	800	65	50	-	400/600	600	400/600	85E
XT6 1000	f	Al	890	890	830	65	50	-	400/600	600	400/600	85E
2 x XT5 400	w	Al	400	400	400	100	65	65	400	400	400/600	85E
2 x XT5 630	w	Al	600	600	559	100	65	65	400	400	400/600	85E

* both MCCB's operate simultaneously, Ing value for bottom MCCB

7.1.5 MNS 3.0 Front Access, Switch-disconnector

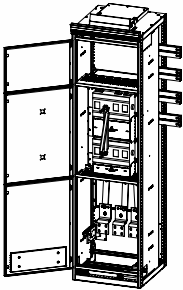
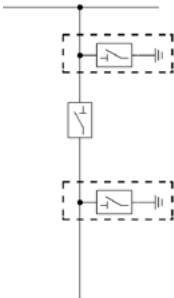
Single line



Application												
Incomer, feeder, Bus tie												
Main switching device	ACB Type	Angle set Mat.	Rated current Inc (up to) [A]			Short-circuit capacity [kA/1sec.]			Width [mm]		Depth Equip. Comp. [mm]	Height
			IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole		
OT 1000	f	Cu	1000	1000	700	50	50	50	600	600	400/600	85E
OT 1250	f	Cu	1170	1170	1000	50	50	50	600	600	400/600	85E
OT 1600	f	Cu	1460	1460	1200	50	50	50	600	600	400/600	85E
OT 2000	f	Cu	1880	1880	1510	55	55	55	600	800	400/600	85E
OT 2500	f	Cu	1880	1880	1510	55	55	55	600	800	400/600	85E

7.1.6 MNS 3.0 Front Access, Switch-disconnector with earthing switch

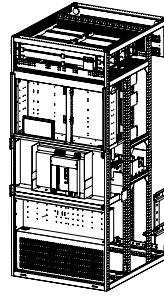
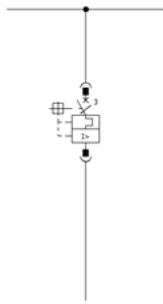
Single line



Application		Incomer, feeder							
Main switching device	ACB Type	Angle set Mat.	Earthing Switch		Short-circuit capacity earthing-sw. [kA/1sec.]	Width [mm]		Depth Equip. Comp. [mm]	Height
			Type	Pole			3-pole	4-pole	
OT 1000	f	Cu	OT 1000	3	50	600	600	400/600	85E
OT 1250	f	Cu	OT 1250	3	50	600	600	400/600	85E
OT 1600	f	Cu	OT 1600	3	50	600	600	400/600	85E
OT 2000	f	Cu	OT 2000	3	55	600	800	400/600	85E
OT 2500	f	Cu	OT 2500	3	55	600	800	400/600	85E

7.1.7 MNS Rear Access, Single ACB – Emax 2 / Emax 3

Single line



Application Incomer, feeder, Bus tie

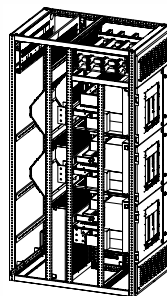
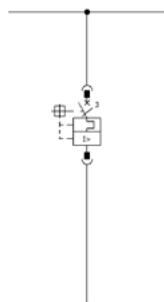
Main switching device	ACB Type	Angle set Mat.	Rated current Inc (up to)* [A]		Short-circuit breaking capacity Icu (up to) [kA]			Width [mm]		Depth section [mm]	Height
			IP30-43	IP54	400V	500V	690V	3-pole	4-pole		
E1.x 630	w	Cu	630	630	66	50	50	400/600	600	1000-1400	89E
E1.x 800	w	Cu	800	800	66	50	50	400/600	600	1000-1400	89E
E1.x 1000	w	Cu	1000	1000	66	50	50	400/600	600	1000-1400	89E
E1.x 1250	w	Cu	1150	1100	66	50	50	400/600	600	1000-1400	89E
E1.x 1600	w	Cu	1450	1250	66	50	50	400/600	600	1000-1400	89E
E2.x 800	w	Cu	800	800	100	85	85	400/600	600	1000-1400	89E
E2.x 1000	w	Cu	1000	1000	100	85	85	400/600	600	1000-1400	89E
E2.x 1250	w	Cu	1250	1250	100	85	85	400/600	600	1000-1400	89E
E2.x 1600	w	Cu	1600	1600	100	85	85	400/600	600	1000-1400	89E
E2.x 2000	w	Cu	2000	1700	100	85	85	400/600	600	1000-1400	89E
E2.x 2500	w	Cu	2400	2200	100	85	85	600	600	1000-1400	89E
E4.x 3200	w	Cu	3200	2800	100	85	85	600	800	1000-1400	89E
E4.x 4000	w	Cu	3650	3200	100	100	100	800	1000	1000-1400	89E
E6.x 4000	w	Cu	4000	3300	100	100	100	1000	1200	1000-1400	89E
E6.x 5000	w	Cu	4850	3500	100	100	100	1000	1200	1200/1400	89E
E6.x 6300	w	Cu	5800	5000	100	100	100	1200	1200	1400	89E
ACB with WavePro-II busway flange											
E2.x 2000	w	Cu	1900	1650	65	65	65	400	-	1000	89E
E2.x 2500	w	Cu	2350	2100	65	65	65	600	-	1000	89E
E4.x 3200	w	Cu	3000	2350	85	85	85	600	-	1000	89E
E4.x 4000	w	Cu	3650	3200	85	85	85	800	-	1200	89E
ACB with forced ventilation											
E4.x 4000	w	Cu	4000 *	-	85	-	-	800	1000	1000/1200	89E
ACB with tubular copper bar											
E1.x 1600	w	Cu	1450*	-	66	-	-	400/600	600	1000	89E
E2.x 1600	w	Cu	1600*	-	85	-	-	400/600	600	1000	89E
E2.x 2000	w	Cu	2000*	-	85	-	-	400/600	600	1000	89E
E2.x 2500	w	Cu	2500*	-	85	-	-	600	600	1000	89E
E4.x 3200	w	Cu	3200 *	-	85	-	-	600	800	1000	89E
E4.x 4000	w	Cu	3650 *	-	85	-	-	800	1000	1000	89E
E6.x 4000	w	Cu	4000 *	-	85	-	-	1000	1200	1000	89E

* up to IP41

E1.x = Emax E1.2 / Emax E1.3 | E2.x = Emax E2.2 / Emax E2.3 | E4.x = Emax E4.2 / Emax E4.3 | E6.x = Emax E6.2 / Emax E6.3

7.1.8 MNS Rear Access, Stacked ACB – Emax 2 / Emax 3, MCCB – Tmax XT

Single line



Application		Feeder									
Main switching device	ACB Type	Angle set Mat.	Rated current Inc (up to)* [A]		Short-circuit breaking capacity Icu (up to) [kA]			Width [mm]		Depth section [mm]	Height
			IP30-43	IP54	400V	500V	690V	3-pole	4-pole		
2 x E1.x 630	w	Cu	630	630	66	50	50	600	800	1000-1400	89E
2 x E1.x 800	w	Cu	800	800	66	50	50	600	800	1000-1400	89E
2 x E1.x 1000	w	Cu	1000	900	66	50	50	600	800	1000-1400	89E
2 x E1.x 1250	w	Cu	1050	900	66	50	50	600	800	1000-1400	89E
2 x E1.x 1600	w	Cu	1350	1100	66	50	50	600	800	1000-1400	89E
2 x E2.x 800	w	Cu	800	800	100	85	85	600	800	1000-1400	89E
2 x E2.x 1000	w	Cu	1000	1000	100	85	85	600	800	1000-1400	89E
2 x E2.x 1250	w	Cu	1250	1150	100	85	85	600	800	1000-1400	89E
2 x E2.x 1600	w	Cu	1600	1450	100	85	85	600	800	1000-1400	89E
2 x E2.x 2000	w	Cu	1700	1450	100	85	85	600	800	1000-1400	89E
2 x E2.x 2500	w	Cu	2100	1800	100	85	85	800	800	1000-1400	89E
2 x E4.x 3200	w	Cu	2500	2150	100	85	85	800	1000	1000-1400	89E
2 x E4.x 4000	w	Cu	2650	2250	100	85	85	800	1000	1000-1400	89E
3 x E1.x 630	w	Cu	630	630	66	50	50	600	800	1000-1400	89E
3 x E1.x 800	w	Cu	800	800	66	50	50	600	800	1000-1400	89E
3 x E1.x 1000	w	Cu	1000	900	66	50	50	600	800	1000-1400	89E
3 x E1.x 1250	w	Cu	1050	900	66	50	50	600	800	1000-1400	89E
3 x E1.x 1600	w	Cu	1150	1000	66	50	50	600	800	1000-1400	89E
3 x E2.x 800	w	Cu	800	800	100	85	85	600	800	1000-1400	89E
3 x E2.x 1000	w	Cu	1000	1000	100	85	85	600	800	1000-1400	89E
3 x E2.x 1250	w	Cu	1200	1000	100	85	85	600	800	1000-1400	89E
3 x E2.x 1600	w	Cu	1400	1100	100	85	85	600	800	1000-1400	89E
4 x E1.x 630	w	Cu	630 **	-	66	-	-	600	-	1000-1400	89E
4 x E1.x 800	w	Cu	800 **	-	66	-	-	600	-	1000-1400	89E
4 x E1.x 1000	w	Cu	1000 **	-	66	-	-	600	-	1000-1400	89E
4 x E1.x 1250	w	Cu	1000 **	-	66	-	-	600	-	1000-1400	89E
4 x XT7 800	w	Cu	800 **	-	100	-	-	600	-	1000-1400	89E
4 x XT7 1000	w	Cu	1000 **	-	100	-	-	600	-	1000-1400	89E
4 x XT7 1250	w	Cu	1000 **	-	100	-	-	600	-	1000-1400	89E

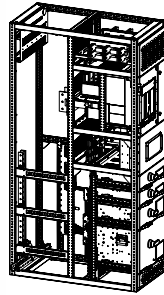
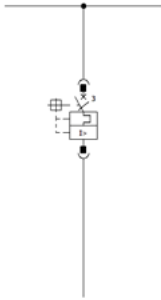
* all CB's operate simultaneously

** up to IP41

E1.x = Emax E1.2 / Emax E1.3 | E2.x = Emax E2.2 / Emax E2.3 | E4.x = Emax E4.2 / Emax E4.3

7.1.9 MNS Rear Access, Single ACB with withdrawable modules

Single line



Application		Incomer, feeder									
Main switching device	ACB Type	Angle set Mat.	Rated current Inc (up to)* [A]		Short-circuit breaking capacity Icu (up to) [kA]			Width [mm]		Depth section [mm]	Height
			IP30-43	IP54	400V	500V	690V	3-pole	4-pole		
E1.x 630	w	Cu	630	630	66	50	50	600	800	1000-1400	36E
E1.x 800	w	Cu	800	800	66	50	50	600	800	1000-1400	36E
E1.x 1000	w	Cu	1000	900	66	50	50	600	800	1000-1400	36E
E1.x 1250	w	Cu	1050	900	66	50	50	600	800	1000-1400	36E
E1.x 1600	w	Cu	1350	1250	66	50	50	600	800	1000-1400	36E
E2.x 800	w	Cu	800	800	100	85	85	600	800	1000-1400	36E
E2.x 1000	w	Cu	1000	1000	100	85	85	600	800	1000-1400	36E
E2.x 1250	w	Cu	1250	1150	100	85	85	600	800	1000-1400	36E
E2.x 1600	w	Cu	1600	1450	100	85	85	600	800	1000-1400	36E
E2.x 2000	w	Cu	1800	1450	100	85	85	600	800	1000-1400	36E

E1.x = Emax E1.2 / Emax E1.3 | E2.x = Emax E2.2 / Emax E2.3

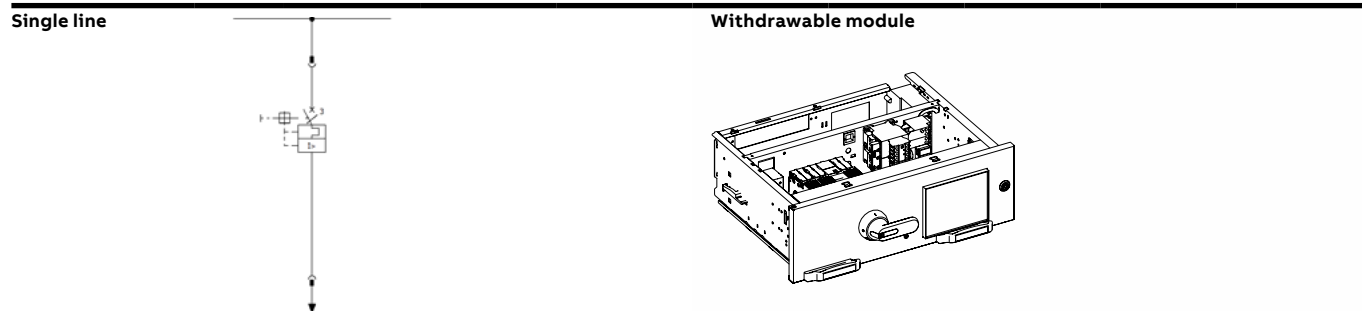
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7.2.1.1 ED with Tmax XT with thermal magnetic trip

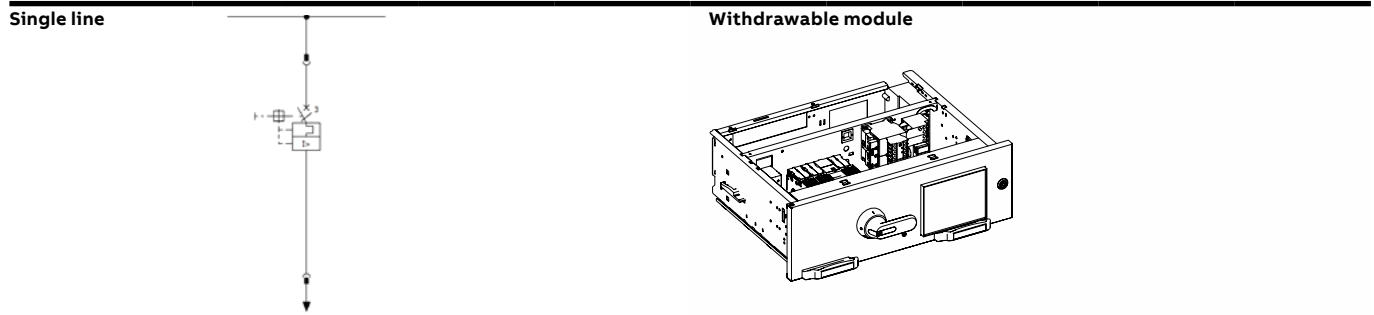
Feeder modules with MCCB Tmax XT (Thermal magnetic trip unit)



Application		Feeder							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size hand operated	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT2 160 TMD10	f	10	10	10	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMD12.5	f	12.5	12.5	12.5	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMD16	f	16	16	16	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMD20	f	20	20	20	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMD25	f	25	25	25	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMD32	f	32	32	32	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMA40	f	40	40	40	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 TMA50	f	50	50	50	100	65	-	8E/2	8E/2
XT2 160 TMA63	f	63	63	63	100	65	-	8E/2	8E/2
XT2 160 TMA80	f	80	80	80	100	65	-	6E, 8E	6E, 8E
XT2 160 TMA100	f	100	100	100	100	65	-	6E, 8E	6E, 8E
XT2 160 TMA125	f	120	113	105	100	65	-	6E, 8E	6E, 8E
XT2 160 TMA160	f	135	135	130	100	65	-	6E, 8E	6E, 8E
XT4 160 TMD16	f	16	16	16	-	80	-	8E	8E
XT4 160 TMD20	f	20	20	20	-	80	-	8E	8E
XT4 160 TMD25	f	25	25	25	-	80	-	8E	8E
XT4 160 TMD32	f	32	32	32	-	80	80	8E	8E
XT4 160 TMA40	f	40	40	40	-	80	80	8E	8E
XT4 160 TMA50	f	50	50	50	-	80	80	8E	8E
XT4 160 TMA63	f	63	63	63	-	80	80	8E	8E
XT4 160 TMA80	f	80	80	80	-	80	80	8E	8E
XT4 160 TMA100	f	100	100	100	-	80	80	8E	8E
XT4 160 TMA125	f	125	125	125	-	80	80	8E	8E
XT4 160 TMA160	f	160	160	160	100	80	80	8E	8E
XT4 250 TMA200	f	200	200	200	100	80	80	8E, 12E	8E, 12E
XT4 250 TMA250	f	250	250	225	100	80	80	8E, 12E	8E, 12E

7.2.1.2 ED with MCCB Tmax XT, electronic trip unit

Feeder modules with MCCB Tmax XT (electronic trip unit)

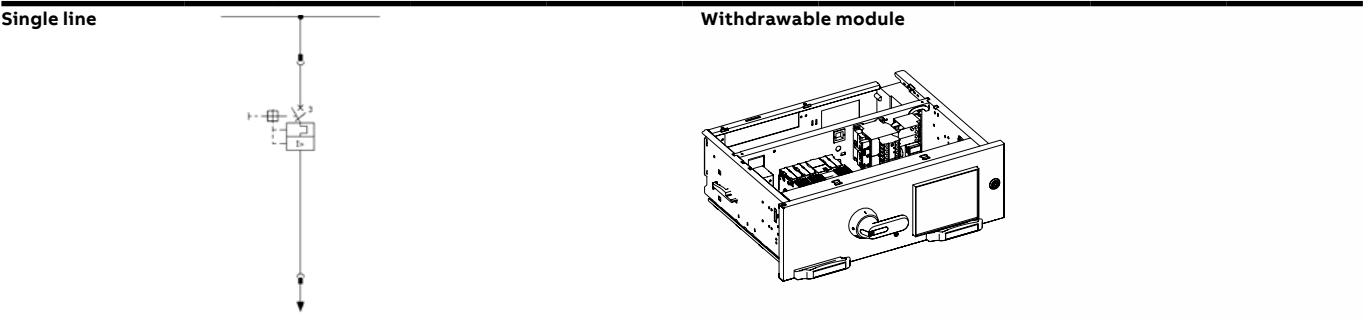


Application		Feeder							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size hand operated	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT2 160 Ekip 10	f	10	10	10	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 Ekip 25	f	25	25	25	100	65	-	8E/4, 8E/2	8E/4, 8E/2
XT2 160 Ekip 63	f	63	63	63	100	65	-	8E/2	8E/2
XT2 160 Ekip 100	f	100	100	100	100	65	-	6E, 8E	6E, 8E
XT2 160 Ekip 160	f	160	160	160	100	65	-	6E, 8E	6E, 8E
XT4 160 Ekip 40	f	40	40	40	-	80	80	8E	8E
XT4 160 Ekip 63	f	63	63	63	-	80	80	8E	8E
XT4 160 Ekip 100	f	100	100	100	-	80	80	8E	8E
XT4 160 Ekip 160	f	160	160	160	100	80	80	8E	8E
XT4 250 Ekip 250	f	250	250	225	100	80	80	8E	8E/12E
XT5 400 Ekip 320	f	320	320	320	100	80	80	8E, 12E	16E
XT5 400 Ekip 400	f	400	400	400	100	80	80	8E, 12E	16E
XT5 630 Ekip 630	f	500	500	500	100	80	80	16E	16E, 24E
XT6 800 Ekip 630	f	580	580	580	65	50	-	16E	24E

—

7.2.1.3 ED with MCCB Tmax XT, electronic trip unit

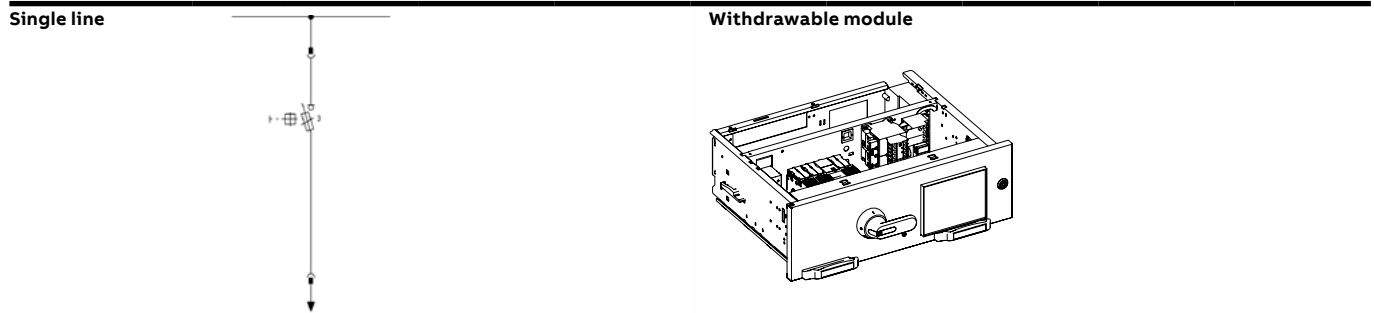
Incomer modules with MCCB Tmax XT (electronic trip unit)



Application		Incomer							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size hand operated	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT5 400 Ekip 400	f	400	400	400	100	-	-	12E	16E
XT5 630 Ekip 630	f	500	500	500	100	-	-	16E	16E, 24E
XT6 800 Ekip 630	f	580	580	580	65	-	-	16E	24E

7.2.1.4 ED with fuse switch

Feeder modules with fuse switch OS/OT

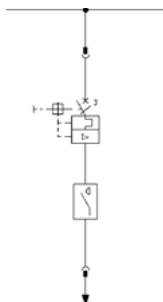


Application		Feeder							
Main switching device	Fuse rating [A]	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size hand operated	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
OS63G/OT125	10	10	10	10	100	100	80	8E/4, 4E	8E/4
OS63G/OT125	16	16	16	16	100	100	80	8E/4, 4E	8E/4
OS63G/OT125	20	20	20	20	100	100	80	8E/4, 4E	8E/4
OS63G/OT125	25	25	25	25	100	100	80	8E/4, 4E	8E/4
OS63G/OT125	32	32	32	32	100	100	80	8E/4, 4E	8E/4
OS63G/OT125	40	40	40	40	100	100	80	8E/4, 4E	8E/4
OS63G	50	50	50	48	100	100	80	8E/2	8E/2
OT125	50	50	47	47	100	100	80	4E	-
OS63G	63	63	54	51	100	100	80	8E/2	8E/2
OT125	63	52	50	50	100	100	80	4E	-
OS160G	80	80	80	80	100	100	80	8E	8E
OS160G	100	100	100	100	100	100	80	8E	8E
OS160G	125	125	125	116	100	100	-	8E	8E
OS250	160	160	160	160	100	100	80	12E	16E
OS250	200	200	200	200	100	100	80	12E	16E
OS250	250	210	210	210	100	100	-	12E	16E
OS400	315	315	315	315	100	100	80	12E	16E
OS400	400	380	380	340	100	100	-	12E	16E
OS630	500	500	500	500	100	100	80	16E	24E
OS630	630	570	520	520	100	100	-	16E	24E

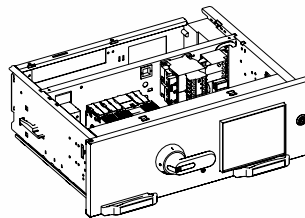
7.2.1.5 CF with MCCB Tmax XT, thermal magnetic trip unit

Contactor Feeder modules with MCCB Tmax XT (thermal magnetic trip unit)

Single line



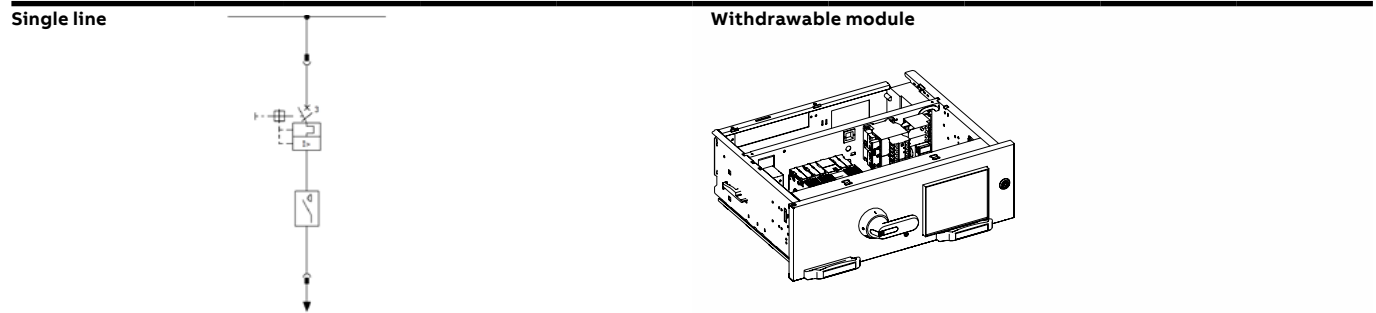
Withdrawable module



Application		Contactor Feeder							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT2 160 TMD10	f	9	9	9	80	-	-	8E/2	8E/2
XT2 160 TMD16	f	14	14	14	80	-	-	8E/2	8E/2
XT2 160 TMD20	f	18	18	18	80	-	-	8E/2	8E/2
XT2 160 TMD25	f	22	22	22	80	-	-	8E/2	8E/2
XT2 160 TMD32	f	28	28	28	80	-	-	8E/2	8E/2
XT2 160 TMA40	f	32	32	32	100	-	-	8E/2	8E/2
XT2 160 TMA50	f	45	45	40	100	-	-	8E/2	8E/2
XT2 160 TMA63	f	50	50	48	100	-	-	6E	8E/2
XT2 160 TMA80	f	72	72	72	100	-	-	6E	8E
XT2 160 TMA100	f	80	80	80	100	-	-	6E	8E
XT2 160 TMA125	f	100	100	100	100	-	-	6E	8E
XT2 160 TMA160	f	132	132	132	100	-	-	12E	16E
XT4 250 TMA200	f	165	165	165	100	-	-	12E	16E

7.2.1.6 CF with MCCB Tmax XT, electronic trip unit

Contactor Feeder modules with MCCB Tmax XT (electronic trip unit)

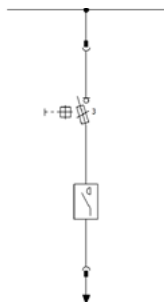


Application		Contractor Feeder							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT2 160 Ekip 10	f	10	10	10	100	-	-	8E/2	8E/2
XT2 160 Ekip 25	f	25	25	25	100	-	-	8E/2	8E/2
XT2 160 Ekip 63	f	63	63	63	100	-	-	8E/2, 6E	8E/2, 8E
XT2 160 Ekip 100	f	100	100	100	100	-	-	6E	8E
XT2 160 Ekip 160	f	160	160	160	100	-	-	12E	16E
XT4 250 Ekip 250	f	250	250	250	100	-	-	16E	16E
XT5 400 Ekip 320	f	290	290	290	100	-	-	16E	24E
XT5 400 Ekip 400	f	380	380	380	100	-	-	24E	-
XT5 630 Ekip 630	f	430	430	430	100	-	-	24E	-
XT6 800 Ekip 630	f	480	480	480	80	-	-	24E	-

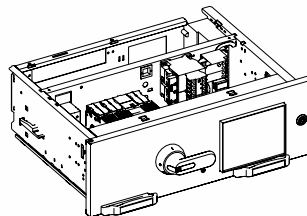
7.2.1.7 CF with fuse switch

Contactor Feeder modules with fuse switch OS

Single line



Withdrawable module

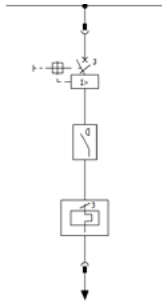


Application									
Contactor Feeder									
Main switching device	Fuse rating [A]	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
OS63G	10	10	10	10	100	100	80	8E/4	-
OS63G	16	16	16	16	100	100	80	8E/4	-
OS63G	20	20	20	20	100	100	80	8E/4	-
OS63G	25	25	25	25	100	100	80	8E/4	-
OS63G	32	30	30	30	100	100	80	8E/4	-
OS63G	40	40	40	40	100	100	80	8E/4	-
OS63G	50	45	45	45	100	100	80	8E/2	-
OS160G	80	80	80	80	100	100	80	8E	-
OS160G	100	100	100	100	100	100	80	8E	-
OS160G	125	125	125	125	100	100	80	8E	-
OS250	200	200	200	200	100	100	80	12E	-
OS400	250	250	250	250	100	100	80	16E	-
OS630	400	400	400	400	100	100	80	24E	-
OS630	500	465	465	465	100	100	80	24E	-

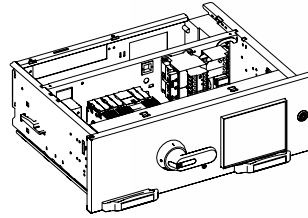
7.2.2.1 DOL with CB and EOL, 400V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Withdrawable module

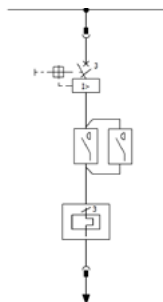


Application		Motor Starter DOL				
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	EF19	-	50, 65, 80, 100	8E/4, 8E/2, 6E, 8E
		MO132	EF19	-	50, 65, 80, 100	8E/4, 8E/2, 4E
11	22	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
		MO132	EF45	-	50	8E/4, 8E/2, 4E
15	29	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
18.5	35	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
22	41	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
30	55	XT2 160	EF65	-	50, 65, 80, 100	6E, 8E
37	66	XT2 160	EF96	-	50, 65, 80, 100	8E, 12E
45	80	XT2 160	EF96	-	50, 65, 80, 100	8E, 12E
55	97	XT2 160	EF19	CT4L185	50, 65, 80, 100	8E, 12E
75	132	XT4 250	EF19	CT4L185	50, 65, 80, 100	12E, 16E
90	160	XT5 400	EF19	CT4L185	50, 65, 80, 100	16E
110	195	XT5 400	EF19	CT4L310	50, 65, 80, 100	16E
132	230	XT5 400	EF19	CT4L310	50, 65, 80, 100	16E, 24E
160	280	XT5 630	EF19	CT4L310	50, 65, 80, 100	24E
200	350	XT5 630	EF19	CT5L500	50, 65, 80, 100	24E
250	430	XT5 630	EF19	CT5L500	50, 65, 80, 100	24E

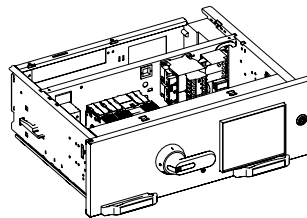
7.2.2.2 REV with CB and EOL, 400V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Withdrawable module

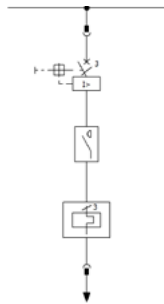


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	EF19	-	50, 65, 80, 100	8E/2, 6E, 8E
		MO132	EF19	-	50, 65, 80, 100	8E/4, 8E/2, 4E
11	22	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 8E
		MO132	EF45	-	50	8E/4, 8E/2, 4E
15	29	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 8E
18.5	35	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 8E
22	41	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 8E
30	55	XT2 160	EF65	-	50, 65, 80, 100	8E, 12E
37	66	XT2 160	EF96	-	50, 65, 80, 100	12E, 16E
45	80	XT2 160	EF96	-	50, 65, 80, 100	12E, 16E
55	97	XT2 160	EF19	CT4L185	50, 65, 80, 100	12E, 16E
75	132	XT4 250	EF19	CT4L185	50, 65, 80, 100	16E
90	160	XT5 400	EF19	CT4L185	50, 65, 80, 100	24E
110	195	XT5 400	EF19	CT4L310	50, 65, 80, 100	24E
132	230	XT5 400	EF19	CT4L310	50, 65, 80, 100	24E
160	280	XT5 630	EF19	CT4L310	50, 65, 80, 100	24E

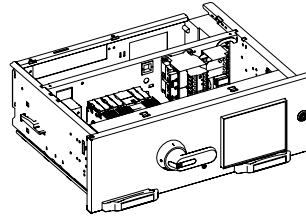
7.2.2.3 HD with CB and EOL, 400V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 400V

Single line



Withdrawable module

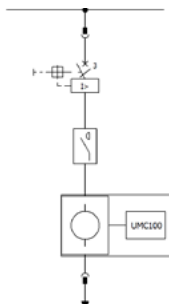


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	EF19	-	50, 65, 80, 100	8E/4, 8E/2, 6E, 8E
11	22	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
15	29	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
18.5	35	XT2 160	EF65	-	50, 65, 80, 100	8E/2, 6E, 8E
22	41	XT2 160	EF96	-	50, 65, 80, 100	6E, 8E
30	55	XT2 160	EF96	-	50, 65, 80, 100	8E, 12E
37	66	XT2 160	EF19	CT4L185	50, 65, 80, 100	8E, 12E
45	80	XT2 160	EF19	CT4L185	50, 65, 80, 100	8E, 12E
55	97	XT2 160	EF19	CT4L185	50, 65, 80, 100	12E, 16E
75	132	XT4 250	EF19	CT4L185	50, 65, 80, 100	16E
90	160	XT5 400	EF19	CT4L185	50, 65, 80, 100	16E, 24E
110	195	XT5 400	EF19	CT4L310	50, 65, 80, 100	16E, 24E
132	230	XT5 400	EF19	CT4L310	50, 65, 80, 100	16E, 24E
160	280	XT5 630	EF19	CT4L310	50, 65, 80, 100	24E

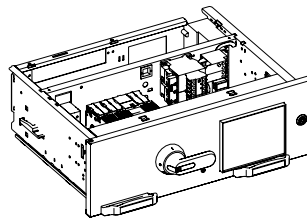
7.2.2.4 DOL with CB and UMC, 400V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Withdrawable module

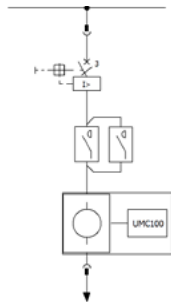


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
		MO132	UMC100.3	-	50, 65, 80, 100	8E/4, 8E/2, 4E
11	22	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
15	29	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
18.5	35	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
22	41	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
30	55	XT2 160	UMC100.3	-	50, 65, 80, 100	6E, 8E
37	66	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	8E, 12E
45	80	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	8E, 12E
55	97	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	8E, 12E
75	132	XT4 250	UMC100.3	CT4L185	50, 65, 80, 100	12E, 16E
90	160	XT5 400	UMC100.3	CT4L185	50, 65, 80, 100	16E
110	195	XT5 400	UMC100.3	CT4L310	50, 65, 80, 100	16E
132	230	XT5 400	UMC100.3	CT4L310	50, 65, 80, 100	16E, 24E
160	280	XT5 630	UMC100.3	CT4L310	50, 65, 80, 100	24E
200	350	XT5 630	UMC100.3	CT5L500	50, 65, 80, 100	24E
250	430	XT5 630	UMC100.3	CT5L500	50, 65, 80, 100	24E

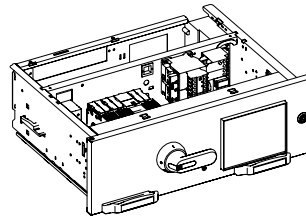
7.2.2.5 REV with CB and UMC, 400V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Withdrawable module



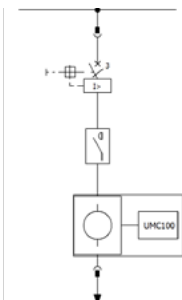
Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E*, 8E
		MO132	UMC100.3	-	50, 65, 80, 100	8E/4, 8E/2, 4E
11	22	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 8E
15	29	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 8E
18.5	35	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 8E
22	41	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 8E
30	55	XT2 160	UMC100.3	-	50, 65, 80, 100	8E, 12E
37	66	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	12E, 16E
45	80	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	12E, 16E
55	97	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	12E, 16E
75	132	XT4 250	UMC100.3	CT4L185	50, 65, 80, 100	16E
90	160	XT5 400	UMC100.3	CT4L185	50, 65, 80, 100	24E
110	195	XT5 400	UMC100.3	CT4L310	50, 65, 80, 100	24E
132	230	XT5 400	UMC100.3	CT4L310	50, 65, 80, 100	24E
160	280	XT5 630	UMC100.3	CT4L310	50, 65, 80, 100	24E

* = up to 65kA

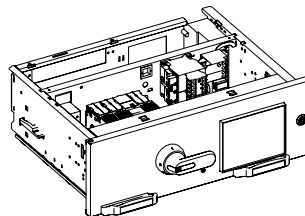
7.2.2.6 HD with CB and UMC, 400V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 400V

Single line



Withdrawable module

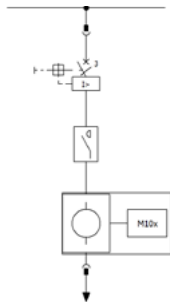


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
11	22	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
15	29	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
18.5	35	XT2 160	UMC100.3	-	50, 65, 80, 100	8E/2, 6E, 8E
22	41	XT2 160	UMC100.3	-	50, 65, 80, 100	6E, 8E
30	55	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	8E, 12E
37	66	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	8E, 12E
45	80	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	8E, 12E
55	97	XT2 160	UMC100.3	CT4L185	50, 65, 80, 100	12E, 16E
75	132	XT4 250	UMC100.3	CT4L185	50, 65, 80, 100	16E
90	160	XT5 400	UMC100.3	CT4L185	50, 65, 80, 100	16E, 24E
110	195	XT5 400	UMC100.3	CT4L310	50, 65, 80, 100	16E, 24E
132	230	XT5 400	UMC100.3	CT4L310	50, 65, 80, 100	16E, 24E
160	280	XT5 630	UMC100.3	CT4L310	50, 65, 80, 100	24E

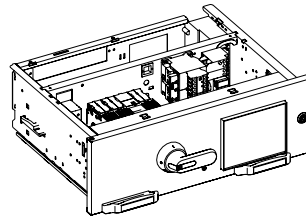
7.2.2.7 DOL with CB and M10x, 400V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Withdrawable module

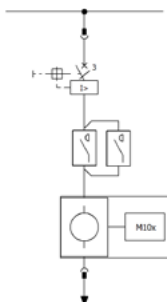


Application		Motor Starter DOL				
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
		MO132	M10x	-	50, 65, 80, 100	8E/4, 8E/2
11	22	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
15	29	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
18.5	35	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
22	41	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
30	55	XT2 160	M10x	-	50, 65, 80, 100	6E, 8E
37	66	XT2 160	M10x	PCT3L200	50, 65, 80, 100	8E, 12E
45	80	XT2 160	M10x	PCT3L200	50, 65, 80, 100	8E, 12E
55	97	XT2 160	M10x	PCT3L200	50, 65, 80, 100	8E, 12E
75	132	XT4 250	M10x	PCT3L200	50, 65, 80, 100	12E, 16E
90	160	XT5 400	M10x	PCT4L300	50, 65, 80, 100	16E
110	195	XT5 400	M10x	PCT4L300	50, 65, 80, 100	16E
132	230	XT5 400	M10x	PCT4L300	50, 65, 80, 100	16E, 24E
160	280	XT5 630	M10x	PCT4L300	50, 65, 80, 100	24E
200	350	XT5 630	M10x	PCT5L500	50, 65, 80, 100	24E
250	430	XT5 630	M10x	PCT5L500	50, 65, 80, 100	24E

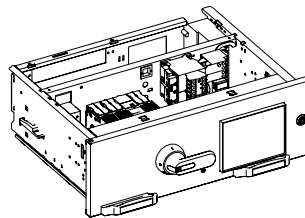
7.2.2.8 REV with CB and M10x, 400V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Withdrawable module



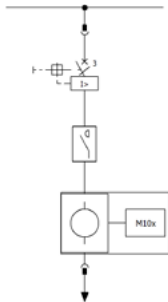
Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E*, 8E
		MO132	M10x	-	50, 65, 80, 100	8E/4, 8E/2
11	22	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 8E
15	29	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 8E
18.5	35	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 8E
22	41	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 8E
30	55	XT2 160	M10x	-	50, 65, 80, 100	8E, 12E
37	66	XT2 160	M10x	PCT3L200	50, 65, 80, 100	12E, 16E
45	80	XT2 160	M10x	PCT3L200	50, 65, 80, 100	12E, 16E
55	97	XT2 160	M10x	PCT4L300	50, 65, 80, 100	12E, 16E
75	132	XT4 250	M10x	PCT4L300	50, 65, 80, 100	16E
90	160	XT5 400	M10x	PCT4L300	50, 65, 80, 100	24E
110	195	XT5 400	M10x	PCT4L300	50, 65, 80, 100	24E
132	230	XT5 400	M10x	PCT4L300	50, 65, 80, 100	24E
160	280	XT5 630	M10x	PCT4L300	50, 65, 80, 100	24E

* = up to 65kA

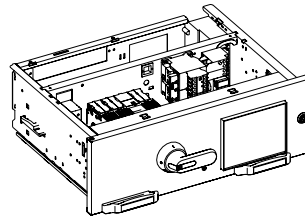
7.2.2.9 HD with CB and M10x, 400V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 400V

Single line



Withdrawable module

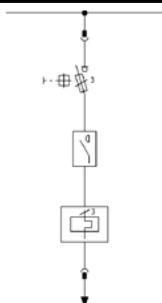


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size
0.25 - 7.5	0.85 - 15.5	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
11	22	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
15	29	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
18.5	35	XT2 160	M10x	-	50, 65, 80, 100	8E/2, 6E, 8E
22	41	XT2 160	M10x	-	50, 65, 80, 100	6E, 8E
30	55	XT2 160	M10x	PCT3L200	50, 65, 80, 100	8E, 12E
37	66	XT2 160	M10x	PCT3L200	50, 65, 80, 100	8E, 12E
45	80	XT2 160	M10x	PCT3L200	50, 65, 80, 100	8E, 12E
55	97	XT2 160	M10x	PCT4L300	50, 65, 80, 100	12E, 16E
75	132	XT4 250	M10x	PCT4L300	50, 65, 80, 100	16E
90	160	XT5 400	M10x	PCT4L300	50, 65, 80, 100	16E, 24E
110	195	XT5 400	M10x	PCT4L300	50, 65, 80, 100	16E, 24E
132	230	XT5 400	M10x	PCT4L300	50, 65, 80, 100	16E, 24E
160	280	XT5 630	M10x	PCT4L300	50, 65, 80, 100	24E

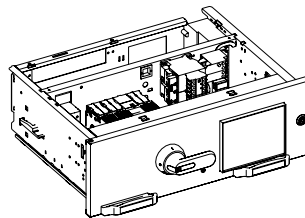
7.2.2.11 DOL with Fuses and EOL, 400V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

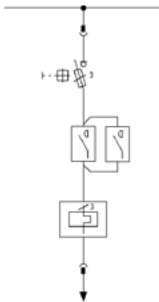


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
7.5	15.5	OS63	EF45	-	100	8E/4, 8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
11	22	OS63	EF45	-	100	8E/4, 8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
15	29	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
18.5	35	OS63	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
22	41	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
30	55	OS125	EF96	-	100	8E, 12E
37	66	OS250	EF146	-	100	12E, 16E
45	80	OS250	EF146	-	100	12E, 16E
55	97	OS250	EF146	-	100	12E, 16E
75	132	OS400	EF205	-	100	16E
90	160	OS400	EF205	-	100	16E
110	195	OS400	EF370	-	100	16E
132	230	OS630	EF370	-	100	24E
160	280	OS630	EF370	-	100	24E
200	350	OS630	EF460	-	100	24E

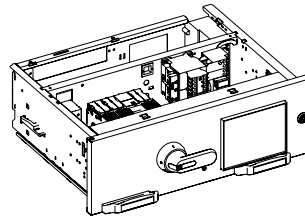
7.2.2.12 REV with Fuses and EOL, 400V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

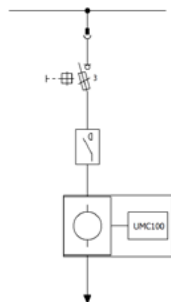


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
7.5	15.5	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
11	22	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
15	29	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
18.5	35	OS63	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
22	41	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
30	55	OS125	EF96	-	100	8E, 12E
37	66	OS250	EF146	-	100	12E, 16E
45	80	OS250	EF146	-	100	12E, 16E
55	97	OS250	EF146	-	100	12E, 16E
75	132	OS400	EF205	-	100	24E
90	160	OS400	EF205	-	100	24E
110	195	OS400	EF370	-	100	24E

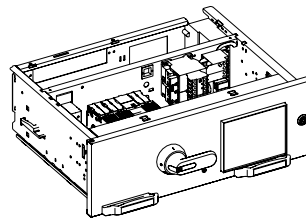
7.2.2.14 DOL with Fuses and UMC, 400V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

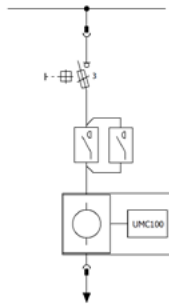


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
7.5	15.5	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
11	22	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
15	29	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
18.5	35	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
22	41	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
30	55	OS160	UMC100.3	-	100	8E, 12E
37	66	OS250	UMC100.3	PCT3L200	100	12E, 16E
45	80	OS250	UMC100.3	PCT3L200	100	12E, 16E
55	97	OS250	UMC100.3	PCT3L200	100	12E, 16E
75	132	OS400	UMC100.3	PCT3L200	100	16E
90	160	OS400	UMC100.3	PCT3L200	100	16E
110	195	OS400	UMC100.3	PCT3L200	100	16E
132	230	OS630	UMC100.3	PCT4L300	100	24E
160	280	OS630	UMC100.3	PCT4L300	100	24E
200	350	OS630	UMC100.3	PCT5L500	100	24E

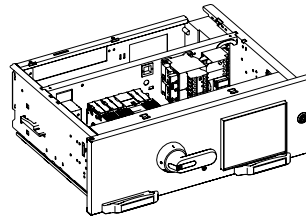
7.2.2.15 REV with Fuses and UMC, 400V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

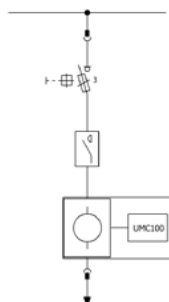


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
7.5	15.5	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
11	22	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
15	29	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
18.5	35	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
22	41	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
30	55	OS160	UMC100.3	-	100	8E, 12E
37	66	OS250	UMC100.3	PCT3L200	100	16E
45	80	OS250	UMC100.3	PCT3L200	100	16E
55	97	OS250	UMC100.3	PCT3L200	100	16E
75	132	OS400	UMC100.3	PCT3L200	100	24E
90	160	OS400	UMC100.3	PCT3L200	100	24E
110	195	OS400	UMC100.3	PCT3L200	100	24E

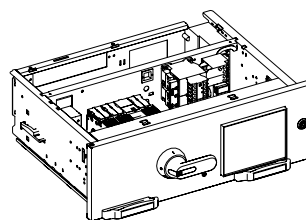
7.2.2.16 HD with Fuses and UMC, 400V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

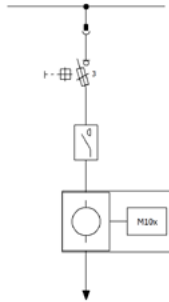


Application						
Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
7.5	15.5	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
11	22	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
15	29	OS63	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
18.5	35	OS63	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
22	41	OS160	UMC100.3	-	100	8E, 12E
30	55	OS250	UMC100.3	PCT3L200	100	12E, 16E
37	66	OS250	UMC100.3	PCT3L200	100	12E, 16E
45	80	OS250	UMC100.3	PCT3L200	100	12E, 16E
55	97	OS400	UMC100.3	PCT3L200	100	16E
75	132	OS400	UMC100.3	PCT3L200	100	16E
90	160	OS400	UMC100.3	PCT3L200	100	16E
110	195	OS630	UMC100.3	PCT3L200	100	24E
132	230	OS630	UMC100.3	PCT4L300	100	24E

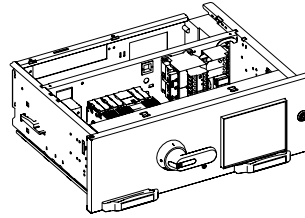
7.2.2.17 DOL with Fuses and M10x, 400V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

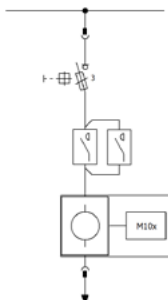


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	M10x	-	100	8E/4, 8E/2
		OT125	M10x	-	100	4E
		OS125	M10x	-	100	8E
7.5	15.5	OS63	M10x	-	100	8E/4, 8E/2
		OT125	M10x	-	100	4E
		OS125	M10x	-	100	8E
11	22	OS63	M10x	-	100	8E/4, 8E/2
		OT125	M10x	-	100	4E
		OS125	M10x	-	100	8E
15	29	OS63	M10x	-	100	8E/2
		OT125	M10x	-	100	4E
		OS125	M10x	-	100	8E
18.5	35	OS63	M10x	-	100	8E/2
		OT125	M10x	-	100	4E
		OS125	M10x	-	100	8E
22	41	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
30	55	OS160	M10x	-	100	8E, 12E
37	66	OS250	M10x	PCT3L200	100	12E, 16E
45	80	OS250	M10x	PCT3L200	100	12E, 16E
55	97	OS250	M10x	PCT3L200	100	12E, 16E
75	132	OS400	M10x	PCT3L200	100	16E
90	160	OS400	M10x	PCT3L200	100	16E
110	195	OS400	M10x	PCT3L200	100	16E
132	230	OS630	M10x	PCT4L300	100	24E
160	280	OS630	M10x	PCT4L300	100	24E
200	350	OS630	M10x	PCT5L500	100	24E

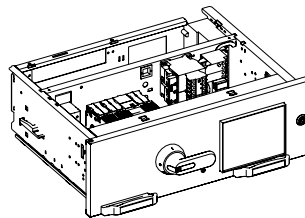
7.2.2.18 REV with Fuses and M10x, 400V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

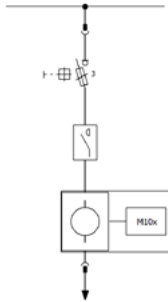


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
7.5	15.5	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
11	22	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
15	29	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
18.5	35	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
22	41	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
30	55	OS160	M10x	-	100	8E, 12E
37	66	OS250	M10x	PCT3L200	100	16E
45	80	OS250	M10x	PCT3L200	100	16E
55	97	OS250	M10x	PCT3L200	100	16E
75	132	OS400	M10x	PCT3L200	100	24E
90	160	OS400	M10x	PCT3L200	100	24E
110	195	OS400	M10x	PCT3L200	100	24E

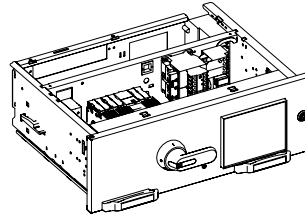
7.2.2.19 HD with Fuses and M10x, 400V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 400V, gG

Single line



Withdrawable module

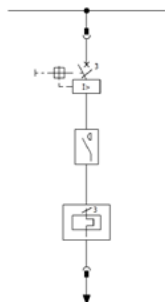


Application		Motor Starter REV				
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.85 - 11.5	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
7.5	15.5	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
11	22	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
15	29	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
18.5	35	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
22	41	OS160	M10x	-	100	8E, 12E
30	55	OS250	M10x	PCT3L200	100	12E, 16E
37	66	OS250	M10x	PCT3L200	100	12E, 16E
45	80	OS250	M10x	PCT3L200	100	12E, 16E
55	97	OS400	M10x	PCT3L200	100	16E
75	132	OS400	M10x	PCT3L200	100	16E
90	160	OS400	M10x	PCT3L200	100	16E
110	195	OS630	M10x	PCT3L200	100	24E
132	230	OS630	M10x	PCT4L300	100	24E

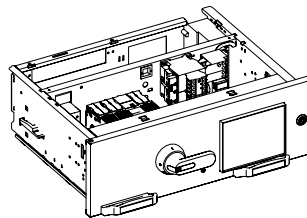
7.2.3.1 DOL with CB and EOL, 500V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 500V

Single line



Withdrawable module



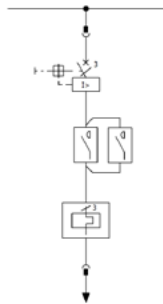
Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	EF19	-	50, 65, 80	8E/2, 6E, 8E
		2 x MO132	EF19	-	50, 65, 80	8E/2, 4E
11	17.6	XT2 160	EF19	-	50, 65, 80	8E/2, 6E, 8E
15	23	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
18.5	28	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
22	33	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
30	44	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
37	53	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
45	64	XT2 160	EF96	-	50, 65, 80	8E, 12E
55	78	XT2 160	EF96	-	50, 65, 80	8E, 12E
75	106	XT2 160	EF19	CT4L185	50	12E, 16E
		XT4 160	EF19	CT4L185	65, 80	12E, 16E
90	128	XT4 250	EF19	CT4L185	50, 65, 80	12E, 16E
110	156	XT5 400	EF19	CT4L185	50, 65, 80	16E
132	184	XT5 400	EF19	CT4L185	50, 65, 80	16E
160	224	XT5 400	EF19	CT4L310	50, 65, 80	16E
200	280	XT5 630	EF19	CT4L310	50, 65, 80	16E, 24E
250	344	XT5 630	EF19	CT5L500	50, 65, 80	24E
315	432	XT5 630	EF19	CT5L500	50, 65, 80	24E

* = up to 65kA only

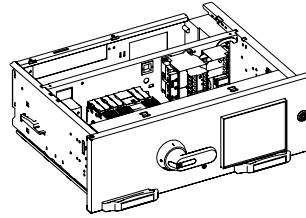
7.2.3.2 REV with CB and EOL, 500V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 500V

Single line



Withdrawable module



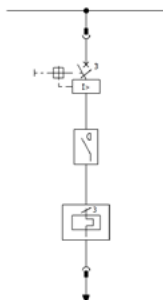
Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	EF19	-	50, 65, 80	8E/2, 8E
		2 x MO132	EF19	-	50, 65, 80	8E/2, 4E
11	17.6	XT2 160	EF19	-	50, 65, 80	8E/2, 8E
15	23	XT2 160	EF65	-	50, 65, 80	8E/2, 8E
18.5	28	XT2 160	EF65	-	50, 65, 80	8E/2, 8E
22	33	XT2 160	EF65	-	50, 65, 80	8E/2, 8E
30	44	XT2 160	EF65	-	50, 65, 80	8E/2, 8E
37	53	XT2 160	EF65	-	50, 65, 80	8E/2*, 8E
45	64	XT2 160	EF96	-	50, 65, 80	12E, 16E
55	78	XT2 160	EF96	-	50, 65, 80	12E, 16E
75	106	XT2 160	EF19	CT4L185	50	16E
		XT4 160	EF19	CT4L185	65, 80	16E
90	128	XT4 250	EF19	CT4L185	50, 65, 80	16E
110	156	XT5 400	EF19	CT4L185	50, 65, 80	24E
132	184	XT5 400	EF19	CT4L185	50, 65, 80	24E
160	224	XT5 400	EF19	CT4L310	50, 65, 80	24E
200	280	XT5 630	EF19	CT4L310	50, 65, 80	24E

* = up to 65kA only

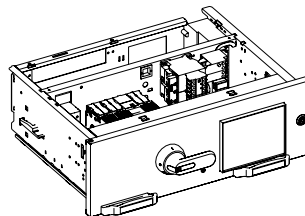
7.2.3.3 HD with CB and EOL, 500V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 500V

Single line



Withdrawable module



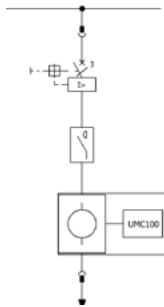
Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	EF19	-	50, 65, 80	8E/2, 6E, 8E
11	17.6	XT2 160	EF19	-	50, 65, 80	8E/2, 6E*, 8E
15	23	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
18.5	28	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
22	33	XT2 160	EF65	-	50, 65, 80	8E/2, 6E*, 8E
30	44	XT2 160	EF96	-	50, 65, 80	6E*, 8E, 12E
37	53	XT2 160	EF96	-	50, 65, 80	6E*, 8E, 12E
45	64	XT2 160	EF19	CT4L185	50, 65, 80	12E, 16E
55	78	XT2 160	EF19	CT4L185	50, 65, 80	12E, 16E
75	106	XT2 160	EF19	CT4L185	50	16E
		XT4 160	EF19	CT4L185	65	16E
		XT4 250	EF19	CT4L185	80	16E
90	128	XT4 250	EF19	CT4L185	50, 65, 80	16E
110	156	XT5 400	EF19	CT4L185	50, 65, 80	16E
132	184	XT5 400	EF19	CT4L185	50, 65, 80	16E
160	224	XT5 400	EF19	CT4L310	50, 65, 80	16E
200	280	XT5 630	EF19	CT4L310	50, 65, 80	24E

* = up to 65kA only

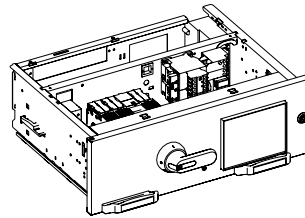
7.2.3.4 DOL with CB and UMC, 500V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 500V

Single line



Withdrawable module

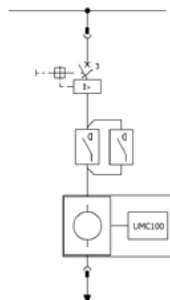


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
		2 x MO132	UMC100.3	-	50, 65, 80	8E/2, 4E
11	17.6	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
15	23	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
18.5	28	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
22	33	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
30	44	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
37	53	XT2 160	UMC100.3	-	50	8E/2, 6E, 8E
		XT2 160	UMC100.3	-	65, 80	6E, 8E
45	64	XT2 160	UMC100.3	CT4L185	50, 65, 80	8E, 12E
55	78	XT2 160	UMC100.3	CT4L185	50, 65, 80	8E, 12E
75	106	XT2 160	UMC100.3	CT4L185	50	12E, 16E
		XT4 160	UMC100.3	CT4L185	65, 80	12E, 16E
90	128	XT4 250	UMC100.3	CT4L185	50, 65, 80	12E, 16E
110	156	XT5 400	UMC100.3	CT4L185	50, 65, 80	16E, 24E
132	184	XT5 400	UMC100.3	CT4L310	50, 65, 80	16E, 24E
160	224	XT5 400	UMC100.3	CT4L310	50, 65, 80	16E, 24E
200	280	XT5 630	UMC100.3	CT4L310	50, 65, 80	16E, 24E
250	344	XT5 630	UMC100.3	CT5L500	50, 65, 80	24E
315	432	XT5 630	UMC100.3	CT5L500	50, 65, 80	24E

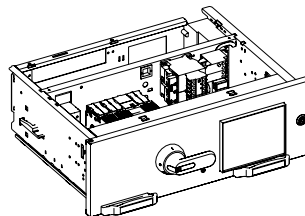
7.2.3.5 REV with CB and UMC, 500V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 500V

Single line



Withdrawable module



Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
		2 x MO132	UMC100.3	-	50, 65, 80	8E/2, 4E
11	17.6	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
15	23	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
18.5	28	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
22	33	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
30	44	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
37	53	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 8E
45	64	XT2 160	UMC100.3	CT4L185	50, 65, 80	12E, 16E
55	78	XT2 160	UMC100.3	CT4L185	50, 65, 80	12E, 16E
75	106	XT2 160	UMC100.3	CT4L185	50	16E
		XT4 160	UMC100.3	CT4L185	65, 80	16E
90	128	XT4 250	UMC100.3	CT4L185	50, 65, 80	16E
110	156	XT5 400	UMC100.3	CT4L185	50, 65, 80	24E
132	184	XT5 400	UMC100.3	CT4L310	50, 65, 80	24E
160	224	XT5 400	UMC100.3	CT4L310	50, 65, 80	24E
200	280	XT5 630	UMC100.3	CT4L310	50, 65, 80	24E

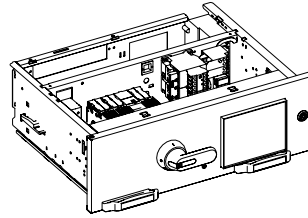
* = up to 65kA only

7.2.3.6 HD with CB and UMC, 500V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 500V

Single line

Withdrawable module



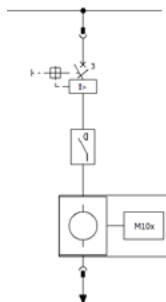
Application		Motor Starter HD				
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
11	17.6	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
15	23	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
18.5	28	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
22	33	XT2 160	UMC100.3	-	50, 65, 80	8E/2, 6E, 8E
30	44	XT2 160	UMC100.3	-	50, 65, 80	6E*, 8E, 12E
37	53	XT2 160	UMC100.3	-	50, 65, 80	6E*, 8E, 12E
45	64	XT2 160	UMC100.3	CT4L185	50, 65, 80	12E, 16E
55	78	XT2 160	UMC100.3	CT4L185	50, 65, 80	12E, 16E
75	106	XT2 160	UMC100.3	CT4L185	50	16E
		XT4 160	UMC100.3	CT4L185	65	16E
		XT4 250	UMC100.3	CT4L185	80	16E
90	128	XT4 250	UMC100.3	CT4L185	50, 65, 80	16E
110	156	XT5 400	UMC100.3	CT4L185	50, 65, 80	16E, 24E
132	184	XT5 400	UMC100.3	CT4L310	50, 65, 80	16E, 24E
160	224	XT5 400	UMC100.3	CT4L310	50, 65, 80	16E, 24E
200	280	XT5 630	UMC100.3	CT4L310	50, 65, 80	24E

* = up to 65kA only

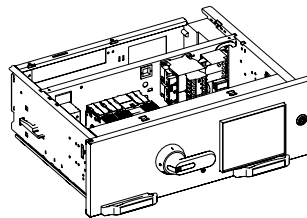
7.2.3.7 DOL with CB and M10x, 500V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 500V

Single line



Withdrawable module

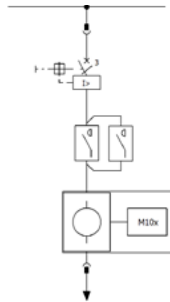


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
		2 x MO132	M10x	-	50, 65, 80	8E/2
11	17.6	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
15	23	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
18.5	28	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
22	33	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
30	44	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
37	53	XT2 160	M10x	-	50	8E/2, 6E, 8E
		XT2 160	M10x	-	65, 80	6E, 8E
45	64	XT2 160	M10x	PCT3L200	50, 65, 80	8E, 12E
55	78	XT2 160	M10x	PCT3L200	50, 65, 80	8E, 12E
75	106	XT2 160	M10x	PCT3L200	50	12E, 16E
		XT4 160	M10x	PCT3L200	65, 80	12E, 16E
90	128	XT4 250	M10x	PCT3L200	50, 65, 80	12E, 16E
110	156	XT5 400	M10x	PCT4L300	50, 65, 80	16E, 24E
132	184	XT5 400	M10x	PCT4L300	50, 65, 80	16E, 24E
160	224	XT5 400	M10x	PCT4L300	50, 65, 80	16E, 24E
200	280	XT5 630	M10x	PCT4L300	50, 65, 80	16E, 24E
250	344	XT5 630	M10x	PCT5L500	50, 65, 80	24E
315	432	XT5 630	M10x	PCT5L500	50, 65, 80	24E

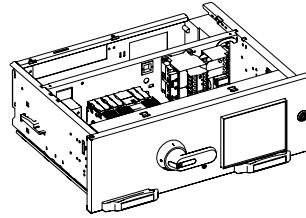
7.2.3.8 REV with CB and M10x, 500V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 500V

Single line



Withdrawable module

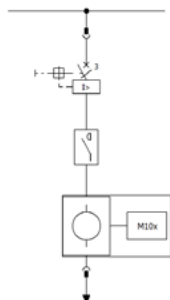


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
		2 x MO132	M10x	-	50, 65, 80	8E/2
11	17.6	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
15	23	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
18.5	28	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
22	33	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
30	44	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
37	53	XT2 160	M10x	-	50, 65, 80	8E/2, 8E
45	64	XT2 160	M10x	PCT3L200	50, 65, 80	12E, 16E
55	78	XT2 160	M10x	PCT3L200	50, 65, 80	12E, 16E
75	106	XT2 160	M10x	PCT3L200	50	16E
		XT4 160	M10x	PCT3L200	65, 80	16E
90	128	XT4 250	M10x	PCT4L300	50, 65, 80	16E
110	156	XT5 400	M10x	PCT4L300	50, 65, 80	24E
132	184	XT5 400	M10x	PCT4L300	50, 65, 80	24E
160	224	XT5 400	M10x	PCT4L300	50, 65, 80	24E
200	280	XT5 630	M10x	PCT4L300	50, 65, 80	24E

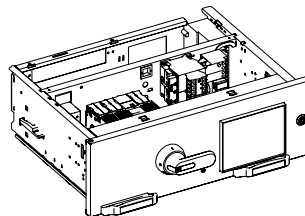
7.2.3.9 HD with CB and M10x, 500V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 500V

Single line



Withdrawable module



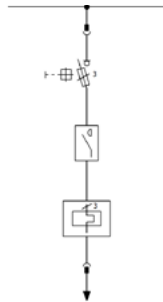
Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.68 - 12.4	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
11	17.6	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
15	23	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
18.5	28	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
22	33	XT2 160	M10x	-	50, 65, 80	8E/2, 6E, 8E
30	44	XT2 160	M10x	-	50, 65, 80	6E*, 8E
37	53	XT2 160	M10x	-	50, 65, 80	6E*, 8E, 12E
45	64	XT2 160	M10x	PCT3L200	50, 65, 80	12E, 16E
55	78	XT2 160	M10x	PCT3L200	50, 65, 80	12E, 16E
75	106	XT2 160	M10x	PCT3L200	50	16E
		XT4 160	M10x	PCT3L200	65	16E
		XT4 250	M10x	PCT3L200	80	16E
90	128	XT4 250	M10x	PCT4L300	50, 65, 80	16E
110	156	XT5 400	M10x	PCT4L300	50, 65, 80	16E, 24E
132	184	XT5 400	M10x	PCT4L300	50, 65, 80	16E, 24E
160	224	XT5 400	M10x	PCT4L300	50, 65, 80	16E, 24E
200	280	XT5 630	M10x	PCT4L300	50, 65, 80	24E

* = up to 65kA only

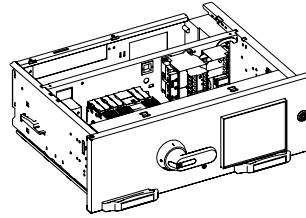
7.2.3.11 DOL with Fuses and EOL, 500V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

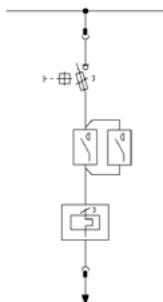


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
7.5	12.4	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
11	17.6	OS63	EF45	-	100	8E/4, 8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
15	23	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
18.5	28	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
22	33	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
30	44	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
37	53	OS160	EF96	-	100	8E, 12E
45	64	OS160	EF96	-	100	8E, 12E
55	78	OS250	EF146	-	100	12E, 16E
75	106	OS250	EF205	-	100	16E
90	128	OS400	EF205	-	100	16E
110	156	OS400	EF370	-	100	16E
132	184	OS400	EF370	-	100	16E
160	224	OS630	EF370	-	100	24E
200	280	OS630	EF460	-	100	24E
250	344	OS630	EF460	-	100	24E

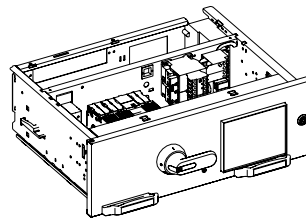
7.2.3.12 REV with Fuses and EOL, 500V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

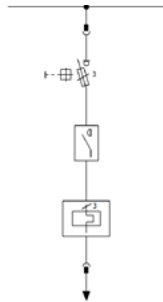


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
7.5	12.4	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
11	17.6	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
15	23	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
18.5	28	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
22	33	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
30	44	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
37	53	OS160	EF96	-	100	8E, 12E
45	64	OS160	EF96	-	100	8E, 12E
55	78	OS250	EF146	-	100	12E, 16E
75	106	OS250	EF205	-	100	24E
90	128	OS400	EF205	-	100	24E
110	156	OS400	EF370	-	100	24E
132	184	OS400	EF370	-	100	24E

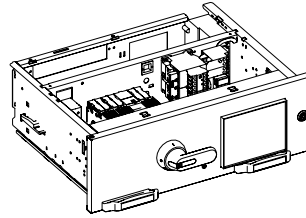
7.2.3.13 HD with Fuses and EOL, 500V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

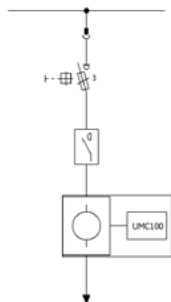


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
7.5	12.4	OS63	EF19	-	100	8E/4, 8E/2
		OT125	EF19	-	100	4E
		OS125	EF19	-	100	8E
11	17.6	OS63	EF45	-	100	8E/4, 8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
15	23	OS63	EF45	-	100	8E/2
		OT125	EF45	-	100	4E
		OS125	EF45	-	100	8E
18.5	28	OS63	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
22	33	OT125	EF65	-	100	8E/2
		OS125	EF65	-	100	8E
30	44	OS125	EF96	-	100	8E, 12E
37	53	OS250	EF146	-	100	12E
45	64	OS250	EF146	-	100	12E, 16E
55	78	OS250	EF146	-	100	12E, 16E
75	106	OS400	EF205	-	100	16E
90	128	OS400	EF205	-	100	16E
110	156	OS400	EF370	-	100	16E
132	184	OS630	EF460	-	100	24E
160	224	OS630	EF460	-	100	24E
200	280	OS630	EF460	-	100	24E

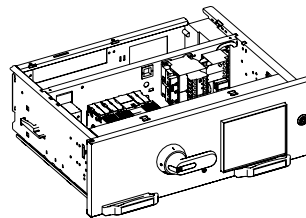
7.2.3.14 DOL with Fuses and UMC, 500V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

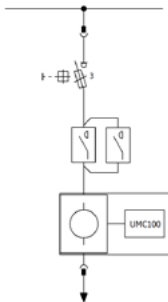


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
7.5	12.4	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
11	17.6	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
15	23	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
18.5	28	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
22	33	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
30	44	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
37	53	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
45	64	OS250	UMC100.3	PCT3L200	100	12E
55	78	OS250	UMC100.3	PCT3L200	100	12E, 16E
75	106	OS250	UMC100.3	PCT3L200	100	12E, 16E
90	128	OS400	UMC100.3	PCT3L200	100	16E
110	156	OS400	UMC100.3	PCT3L200	100	16E
132	184	OS400	UMC100.3	PCT3L200	100	16E
160	224	OS630	UMC100.3	PCT4L300	100	24E
200	280	OS630	UMC100.3	PCT4L300	100	24E
250	344	OS630	UMC100.3	PCT5L500	100	24E

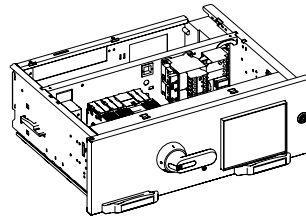
7.2.3.15 REV with Fuses and UMC, 500V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

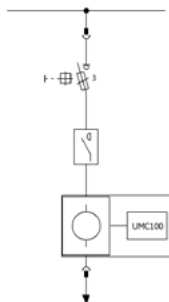


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
7.5	12.4	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
11	17.6	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
15	23	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
18.5	28	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
22	33	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
30	44	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
37	53	OS125	UMC100.3	-	100	8E, 12E
45	64	OS250	UMC100.3	PCT3L200	100	16E
55	78	OS250	UMC100.3	PCT3L200	100	16E
75	106	OS250	UMC100.3	PCT3L200	100	16E
90	128	OS400	UMC100.3	PCT3L200	100	24E
110	156	OS400	UMC100.3	PCT3L200	100	24E
132	184	OS400	UMC100.3	PCT3L200	100	24E

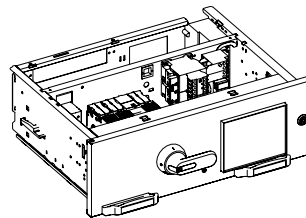
7.2.3.16 HD with Fuses and UMC, 500V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

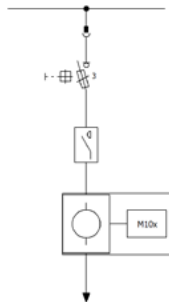


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
7.5	12.4	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
11	17.6	OS63	UMC100.3	-	100	8E/4, 8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
15	23	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
18.5	28	OS63	UMC100.3	-	100	8E/2
		OT125	UMC100.3	-	100	4E
		OS125	UMC100.3	-	100	8E
22	33	OT125	UMC100.3	-	100	8E/2
		OS125	UMC100.3	-	100	8E
30	44	OS125	UMC100.3	-	100	8E, 12E
37	53	OS250	UMC100.3	-	100	12E, 16E
45	64	OS250	UMC100.3	PCT3L200	100	12E, 16E
55	78	OS250	UMC100.3	PCT3L200	100	12E, 16E
75	106	OS400	UMC100.3	PCT3L200	100	16E
90	128	OS400	UMC100.3	PCT3L200	100	16E
110	156	OS400	UMC100.3	PCT3L200	100	16E
132	184	OS630	UMC100.3	PCT3L200	100	24E
160	224	OS630	UMC100.3	PCT4L300	100	24E
200	280	OS630	UMC100.3	PCT4L300	100	24E

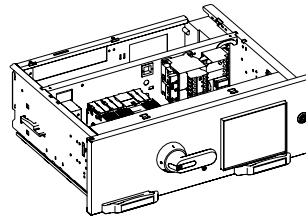
7.2.3.17 DOL with Fuses and M10x, 500V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

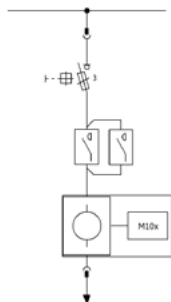


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
7.5	12.4	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
11	17.6	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
15	23	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
18.5	28	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
22	33	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
30	44	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
37	53	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
45	64	OS250	M10x	PCT3L200	100	12E
55	78	OS250	M10x	PCT3L200	100	12E, 16E
75	106	OS250	M10x	PCT3L200	100	12E, 16E
90	128	OS400	M10x	PCT3L200	100	16E
110	156	OS400	M10x	PCT3L200	100	16E
132	184	OS400	M10x	PCT3L200	100	16E
160	224	OS630	M10x	PCT4L300	100	24E
200	280	OS630	M10x	PCT4L300	100	24E
250	344	OS630	M10x	PCT5L500	100	24E

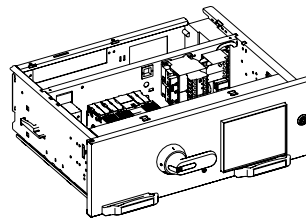
7.2.3.18 REV with Fuses and M10x, 500V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

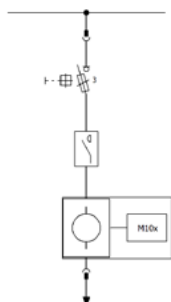


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
7.5	12.4	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
11	17.6	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
15	23	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
18.5	28	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
22	33	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
30	44	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
37	53	OS125	M10x	-	100	8E, 12E
45	64	OS250	M10x	PCT3L200	100	16E
55	78	OS250	M10x	PCT3L200	100	16E
75	106	OS250	M10x	PCT3L200	100	16E
90	128	OS400	M10x	PCT3L200	100	24E
110	156	OS400	M10x	PCT3L200	100	24E
132	184	OS400	M10x	PCT3L200	100	24E

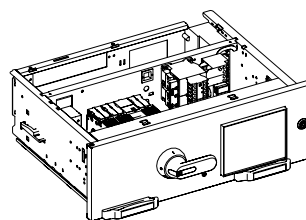
7.2.3.19 HD with Fuses and M10x, 500V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 500V, gG

Single line



Withdrawable module

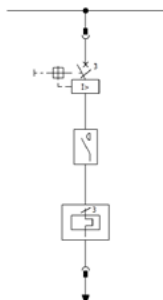


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 5.5	0.68 - 9.2	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
7.5	12.4	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
11	17.6	OS63	M10x	-	100	8E/4, 8E/2
		OS125	M10x	-	100	8E
15	23	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
18.5	28	OS63	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
22	33	OT125	M10x	-	100	8E/2
		OS125	M10x	-	100	8E
30	44	OS125	M10x	-	100	8E, 12E
37	53	OS250	M10x	-	100	12E, 16E
45	64	OS250	M10x	PCT3L200	100	12E, 16E
55	78	OS250	M10x	PCT3L200	100	12E, 16E
75	106	OS400	M10x	PCT3L200	100	16E
90	128	OS400	M10x	PCT3L200	100	16E
110	156	OS400	M10x	PCT3L200	100	16E
132	184	OS630	M10x	PCT3L200	100	24E
160	224	OS630	M10x	PCT4L300	100	24E
200	280	OS630	M10x	PCT4L300	100	24E

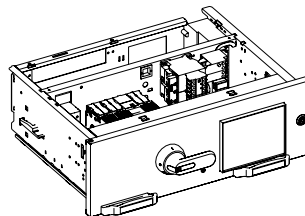
7.2.4.1 DOL with CB and EOL, 690V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 690V

Single line



Withdrawable module



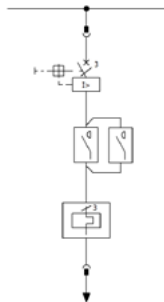
Application						
Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	EF19	-	50, 65	8E/2, 6E, 8E
		2 x MO132	EF19	-	50, 65	8E/2, 4E
11	12.8	XT2 160	EF19	-	50, 65	8E/2, 6E, 8E
		2 x MO132	EF19	-	50, 65	8E/2, 4E
15	17	XT2 160	EF65	-	50, 65	8E/2, 6E*, 8E
		2 x MO132	EF19	-	50, 65	8E/2, 4E
18.5	21	XT2 160	EF65	-	50, 65	8E/2, 8E
22	24	XT2 160	EF65	-	50, 65	8E/2, 8E
30	32	XT2 160	EF65	-	50, 65	8E/2*, 8E
37	39	XT2 160	EF65	-	50, 65	8E/2*, 8E
45	47	XT2 160	EF96	-	50, 65	8E, 12E
55	57	XT2 160	EF96	-	50, 65	8E, 12E
75	77	XT4 160	EF19	CT4L185	50, 65	12E, 16E
90	93	XT4 160	EF19	CT4L185	50, 65	12E, 16E
110	113	XT4 250	EF19	CT4L185	50, 65	12E, 16E
132	134	XT5 400	EF19	CT4L185	50, 65	16E, 24E
160	162	XT5 400	EF19	CT4L185	50, 65	16E, 24E
200	203	XT5 400	EF19	CT4L310	50, 65	16E, 24E
250	250	XT5 630	EF19	CT4L310	50, 65	16E, 24E
315	313	XT5 630	EF19	CT5L500	50, 65	24E
355	354	XT5 630	EF19	CT5L500	50, 65	24E

* = up to 50kA only

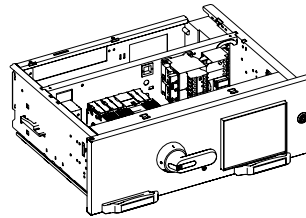
7.2.4.2 REV with CB and EOL, 690V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 690V

Single line



Withdrawable module



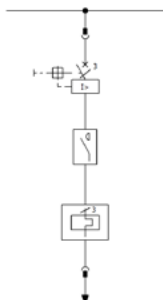
Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	EF19	-	50, 65	8E/2, 8E
		2 x MO132	EF19	-	50, 65	8E/2, 4E
11	12.8	XT2 160	EF19	-	50, 65	8E/2, 8E
		2 x MO132	EF19	-	50, 65	8E/2, 4E
15	17	XT2 160	EF65	-	50, 65	8E/2, 8E
		2 x MO132	EF19	-	50, 65	8E/2, 4E
18.5	21	XT2 160	EF65	-	50, 65	8E/2, 8E
22	24	XT2 160	EF65	-	50, 65	8E/2, 8E
30	32	XT2 160	EF65	-	50, 65	8E/2 *, 8E, 12E
37	39	XT2 160	EF65	-	50, 65	8E/2 *, 8E, 12E
45	47	XT2 160	EF96	-	50, 65	8E, 12E
55	57	XT2 160	EF96	-	50, 65	8E, 12E
75	77	XT4 160	EF19	CT4L185	50, 65	16E
90	93	XT4 160	EF19	CT4L185	50, 65	16E
110	113	XT4 250	EF19	CT4L185	50, 65	16E
132	134	XT5 400	EF19	CT4L185	50, 65	24E
160	162	XT5 400	EF19	CT4L185	50, 65	24E
200	203	XT5 400	EF19	CT4L310	50, 65	24E
250	250	XT5 630	EF19	CT4L310	50, 65	24E

* = up to 50kA only

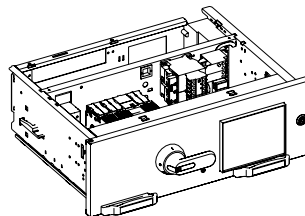
7.2.4.3 HD with CB and EOL, 690V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 690V

Single line



Withdrawable module



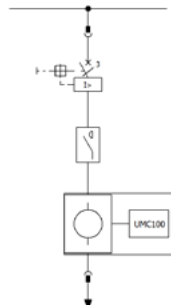
Application Motor Starter HEV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	EF19	-	50, 65	8E/2, 6E, 8E
11	12.8	XT2 160	EF19	-	50, 65	8E/2, 6E, 8E
15	17	XT2 160	EF65	-	50, 65	8E/2, 6E, 8E
18.5	21	XT2 160	EF65	-	50, 65	8E/2, 8E
22	24	XT2 160	EF65	-	50, 65	8E/2, 8E
30	32	XT2 160	EF65	-	50, 65	8E/2*, 8E
37	39	XT2 160	EF65	-	50, 65	8E/2*, 8E
45	47	XT2 160	EF96	-	50, 65	8E, 12E
55	57	XT2 160	EF19	CT4L185	50, 65	8E, 12E
75	77	XT4 160	EF19	CT4L185	50, 65	12E, 16E
90	93	XT4 160	EF19	CT4L185	50, 65	12E, 16E
110	113	XT4 250	EF19	CT4L185	50, 65	16E
132	134	XT5 400	EF19	CT4L185	50, 65	16E
160	162	XT5 400	EF19	CT4L185	50, 65	16E
200	203	XT5 400	EF19	CT4L310	50, 65	16E
250	250	XT5 630	EF19	CT4L310	50, 65	16E, 24E

* = up to 50kA only

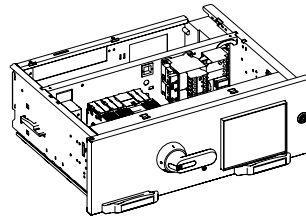
7.2.4.4 DOL with CB and UMC, 690V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 690V

Single line



Withdrawable module



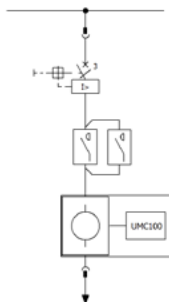
Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
		2 x MO132	UMC100.3	-	50, 65	8E/2, 4E
11	12.8	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
		2 x MO132	UMC100.3	-	50, 65	8E/2, 4E
15	17	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
		2 x MO132	UMC100.3	-	50, 65	8E/2, 4E
18.5	21	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
22	24	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
30	32	XT2 160	UMC100.3	-	50, 65	8E/2*, 6E*, 8E
37	39	XT2 160	UMC100.3	-	50, 65	8E/2*, 6E*, 8E
45	47	XT2 160	UMC100.3	-	50, 65	8E, 12E
55	57	XT2 160	UMC100.3	-	50, 65	8E, 12E
75	77	XT4 160	UMC100.3	CT4L185	50, 65	12E, 16E
90	93	XT4 160	UMC100.3	CT4L185	50, 65	12E, 16E
110	113	XT4 250	UMC100.3	CT4L185	50, 65	12E, 16E
132	134	XT5 400	UMC100.3	CT4L185	50, 65	16E, 24E
160	162	XT5 400	UMC100.3	CT4L185	50, 65	16E, 24E
200	203	XT5 400	UMC100.3	CT4L310	50, 65	16E, 24E
250	250	XT5 630	UMC100.3	CT4L310	50, 65	16E, 24E
315	313	XT5 630	UMC100.3	CT5L500	50, 65	24E
355	354	XT5 630	UMC100.3	CT5L500	50, 65	24E

* = up to 50kA only

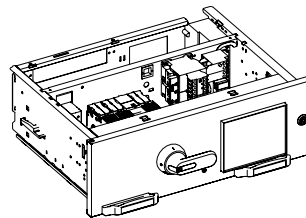
7.2.4.5 REV with CB and UMC, 690V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 690V

Single line



Withdrawable module



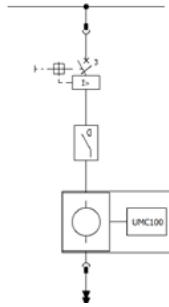
Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	UMC100.3	-	50, 65	8E/2, 8E
		2 x MO132	UMC100.3	-	50, 65	8E/2, 4E
11	12.8	XT2 160	UMC100.3	-	50, 65	8E/2, 8E
		2 x MO132	UMC100.3	-	50, 65	8E/2, 4E
15	17	XT2 160	UMC100.3	-	50, 65	8E/2, 8E
		2 x MO132	UMC100.3	-	50, 65	8E/2, 4E
18.5	21	XT2 160	UMC100.3	-	50, 65	8E/2, 8E
22	24	XT2 160	UMC100.3	-	50, 65	8E/2, 8E
30	32	XT2 160	UMC100.3	-	50, 65	8E/2*, 8E, 12E
37	39	XT2 160	UMC100.3	-	50, 65	8E/2*, 8E, 12E
45	47	XT2 160	UMC100.3	CT4L185	50, 65	8E, 12E
55	57	XT2 160	UMC100.3	CT4L185	50, 65	8E, 12E
75	77	XT4 160	UMC100.3	CT4L185	50, 65	16E
90	93	XT4 160	UMC100.3	CT4L185	50, 65	16E
110	113	XT4 250	UMC100.3	CT4L185	50, 65	16E
132	134	XT5 400	UMC100.3	CT4L185	50, 65	24E
160	162	XT5 400	UMC100.3	CT4L185	50, 65	24E
200	203	XT5 400	UMC100.3	CT4L310	50, 65	24E
250	250	XT5 630	UMC100.3	CT4L310	50, 65	24E

* = up to 50kA only

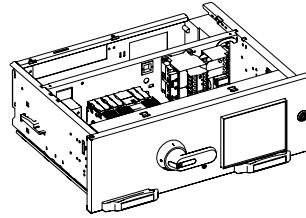
7.2.4.6 HD with CB and UMC, 690V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 690V

Single line



Withdrawable module



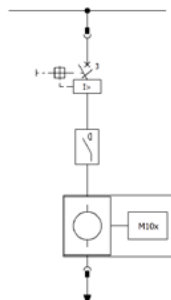
Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
11	12.8	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
15	17	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
18.5	21	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
22	24	XT2 160	UMC100.3	-	50, 65	8E/2, 6E, 8E
30	32	XT2 160	UMC100.3	-	50, 65	8E/2*, 6E*, 8E
37	39	XT2 160	UMC100.3	-	50, 65	6E*, 8E
45	47	XT2 160	UMC100.3	-	50, 65	8E, 12E
55	57	XT2 160	UMC100.3	CT4L185	50, 65	8E, 12E
75	77	XT4 160	UMC100.3	CT4L185	50, 65	12E, 16E
90	93	XT4 160	UMC100.3	CT4L185	50, 65	12E, 16E
110	113	XT4 250	UMC100.3	CT4L185	50, 65	16E
132	134	XT5 400	UMC100.3	CT4L185	50, 65	16E
160	162	XT5 400	UMC100.3	CT4L185	50, 65	16E
200	203	XT5 400	UMC100.3	CT4L310	50, 65	16E
250	250	XT5 630	UMC100.3	CT4L310	50, 65	24E

* = up to 50kA only

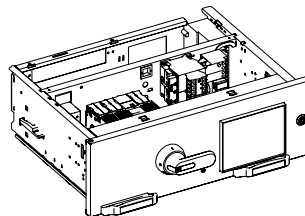
7.2.4.7 DOL with CB and M10x, 690V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 690V

Single line



Withdrawable module



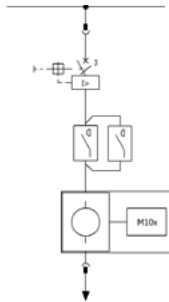
Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
		2 x MO132	M10x	-	50, 65	8E/2
11	12.8	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
		2 x MO132	M10x	-	50, 65	8E/2
15	17	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
		2 x MO132	M10x	-	50, 65	8E/2
18.5	21	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
22	24	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
30	32	XT2 160	M10x	-	50, 65	8E/2*, 6E*, 8E
37	39	XT2 160	M10x	-	50, 65	8E/2*, 6E*, 8E
45	47	XT2 160	M10x		50, 65	8E, 12E
55	57	XT2 160	M10x		50, 65	8E, 12E
75	77	XT4 160	M10x	PCT3L200	50, 65	12E, 16E
90	93	XT4 160	M10x	PCT3L200	50, 65	12E, 16E
110	113	XT4 250	M10x	PCT3L200	50, 65	12E, 16E
132	134	XT5 400	M10x	PCT4L300	50, 65	16E, 24E
160	162	XT5 400	M10x	PCT4L300	50, 65	16E, 24E
200	203	XT5 400	M10x	PCT4L300	50, 65	16E, 24E
250	250	XT5 630	M10x	PCT4L300	50, 65	16E, 24E
315	313	XT5 630	M10x	PCT5L500	50, 65	24E
355	354	XT5 630	M10x	PCT5L500	50, 65	24E

* = up to 50kA only

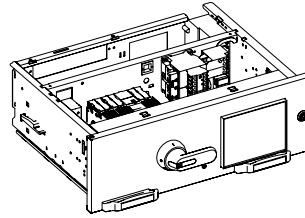
7.2.4.8 REV with CB and M10x, 690V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 690V

Single line



Withdrawable module



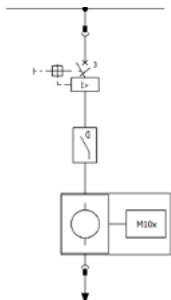
Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	M10x	-	50, 65	8E/2, 8E
		2 x MO132	M10x	-	50, 65	8E/2
11	12.8	XT2 160	M10x	-	50, 65	8E/2, 8E
		2 x MO132	M10x	-	50, 65	8E/2
15	17	XT2 160	M10x	-	50, 65	8E/2, 8E
		2 x MO132	M10x	-	50, 65	8E/2
18.5	21	XT2 160	M10x	-	50, 65	8E/2, 8E
22	24	XT2 160	M10x	-	50, 65	8E/2, 8E
30	32	XT2 160	M10x	-	50, 65	8E/2 *, 8E, 12E
37	39	XT2 160	M10x	-	50, 65	8E/2 *, 8E, 12E
45	47	XT2 160	M10x	PCT3L200	50, 65	8E, 12E
55	57	XT2 160	M10x	PCT3L200	50, 65	8E, 12E
75	77	XT4 160	M10x	PCT3L200	50, 65	16E
90	93	XT4 160	M10x	PCT3L200	50, 65	16E
110	113	XT4 250	M10x	PCT3L200	50, 65	16E
132	134	XT5 400	M10x	PCT4L300	50, 65	24E
160	162	XT5 400	M10x	PCT4L300	50, 65	24E
200	203	XT5 400	M10x	PCT4L300	50, 65	24E
250	250	XT5 630	M10x	PCT4L300	50, 65	24E

* = up to 50kA only

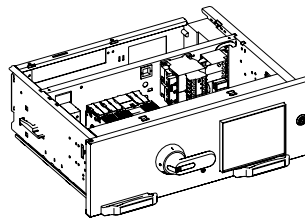
7.2.4.9 HD with CB and M10x, 690V

Motor Starter, Direct-on-line - heavy-duty, with Tmax XT, type 2, NE/HE, 690V

Single line



Withdrawable module



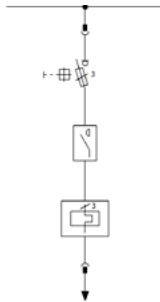
Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.25 - 7.5	0.49 - 8.9	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
11	12.8	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
15	17	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
18.5	21	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
22	24	XT2 160	M10x	-	50, 65	8E/2, 6E, 8E
30	32	XT2 160	M10x	-	50, 65	8E/2 *, 6E *, 8E
37	39	XT2 160	M10x	-	50, 65	6E *, 8E
45	47	XT2 160	M10x	-	50, 65	8E, 12E
55	57	XT2 160	M10x	PCT3L200	50, 65	8E, 12E
75	77	XT4 160	M10x	PCT3L200	50, 65	12E, 16E
90	93	XT4 160	M10x	PCT3L200	50, 65	12E, 16E
110	113	XT4 250	M10x	PCT3L200	50, 65	16E
132	134	XT5 400	M10x	PCT4L300	50, 65	16E
160	162	XT5 400	M10x	PCT4L300	50, 65	16E
200	203	XT5 400	M10x	PCT4L300	50, 65	16E
250	250	XT5 630	M10x	PCT4L300	50, 65	24E

* = up to 50kA only

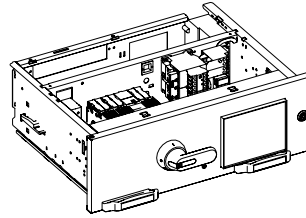
7.2.4.11 DOL with Fuses and EOL, 690V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

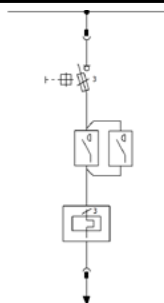


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	EF19	-	80	8E/4, 8E/2
		OT125	EF19	-	80	4E
		OS125	EF19	-	80	8E
7.5	8.9	OS63	EF19	-	80	8E/4, 8E/2
		OT125	EF19	-	80	4E
		OS125	EF19	-	80	8E
11	12.8	OS63	EF45	-	80	8E/4, 8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
15	17	OS63	EF45	-	80	8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
18.5	21	OS63	EF45	-	80	8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
22	24	OT125	EF65	-	80	8E/2, 8E
		OS125	EF65	-	80	8E
30	32	OT125	EF65	-	80	8E/2, 8E
		OS125	EF65	-	80	8E
37	39	OS125	EF96	-	80	8E, 12E
45	47	OS125	EF96	-	80	8E, 12E
55	57	OS250	EF146	-	80	12E, 16E
75	77	OS400	EF205	-	80	16E
90	93	OS400	EF205	-	80	16E
110	113	OS400	EF205	-	80	16E
132	134	OS400	EF370	-	80	16E
160	162	OS400	EF370	-	80	16E
200	203	OS630	EF370	-	80	24E
250	250	OS630	EF370	-	80	24E

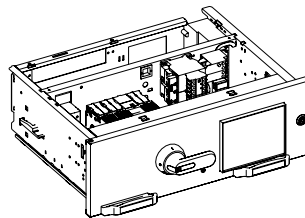
7.2.4.12 REV with Fuses and EOL, 690V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

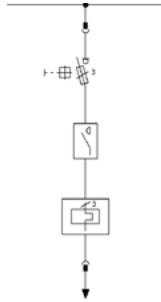


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	EF19	-	80	8E/4, 8E/2
		OT125	EF19	-	80	4E
		OS125	EF19	-	80	8E
7.5	8.9	OS63	EF19	-	80	8E/4, 8E/2
		OT125	EF19	-	80	4E
		OS125	EF19	-	80	8E
11	12.8	OS63	EF45	-	80	8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
15	17	OS63	EF45	-	80	8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
18.5	21	OS63	EF45	-	80	8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
22	24	OS125	EF65	-	80	8E
30	32	OS125	EF65	-	80	8E, 12E
37	39	OS125	EF96	-	80	8E, 12E
45	47	OS125	EF96	-	80	8E, 12E
55	57	OS250	EF146	-	80	12E, 16E
75	77	OS400	EF205	-	80	24E
90	93	OS400	EF205	-	80	24E
110	113	OS400	EF205	-	80	24E
132	134	OS400	EF370	-	80	24E
160	162	OS400	EF370	-	80	24E

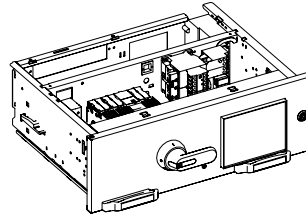
7.2.4.13 HD with Fuses and EOL, 690V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

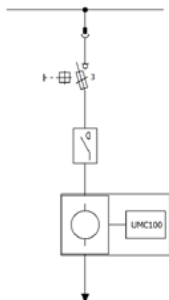


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	EF19	-	80	8E/4, 8E/2
		OT125	EF19	-	80	4E
		OS125	EF19	-	80	8E
7.5	8.9	OS63	EF19	-	80	8E/4, 8E/2
		OT125	EF19	-	80	4E
		OS125	EF19	-	80	8E
11	12.8	OS63	EF45	-	80	8E/4, 8E/2
		OT125	EF45	-	80	4E
		OS125	EF45	-	80	8E
15	17	OT125	EF45	-	80	8E/2
		OS125	EF45	-	80	8E
18.5	21	OT125	EF45	-	80	8E/2
		OS125	EF45	-	80	8E
22	24	OS125	EF65	-	80	8E
30	32	OS125	EF65	-	80	8E
37	39	OS125	EF96	-	80	8E, 12E
45	47	OS250	EF96	-	80	12E, 16E
55	57	OS250	EF146	-	80	12E, 16E
75	77	OS400	EF205	-	80	16E
90	93	OS400	EF205	-	80	16E
110	113	OS400	EF205	-	80	16E
132	134	OS400	EF370	-	80	24E
160	162	OS400	EF370	-	80	24E
200	203	OS630	EF460	-	80	24E

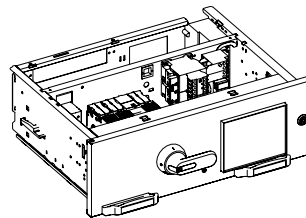
7.2.4.14 DOL with Fuses and UMC, 690V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

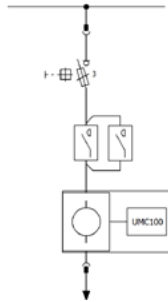


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	UMC100.3	-	80	8E/4, 8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
7.5	8.9	OS63	UMC100.3	-	80	8E/4, 8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
11	12.8	OS63	UMC100.3	-	80	8E/4, 8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
15	17	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
18.5	21	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
22	24	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
30	32	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
37	39	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
45	47	OS125	UMC100.3	-	80	8E, 12E
55	57	OS250	UMC100.3	-	80	12E, 16E
75	77	OS250	UMC100.3	PCT3L200	80	12E, 16E
90	93	OS400	UMC100.3	PCT3L200	80	16E
110	113	OS400	UMC100.3	PCT3L200	80	16E
132	134	OS400	UMC100.3	PCT3L200	80	16E
160	162	OS400	UMC100.3	PCT3L200	80	16E
200	203	OS630	UMC100.3	PCT4L300	80	24E
250	250	OS630	UMC100.3	PCT5L500	80	24E

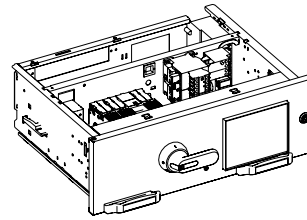
7.2.4.15 REV with Fuses and UMC, 690V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

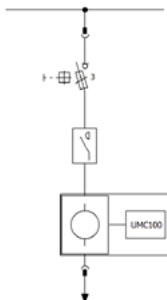


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
7.5	8.9	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
11	12.8	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
15	17	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
18.5	21	OS63	UMC100.3	-	80	8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
22	24	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
30	32	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
37	39	OS125	UMC100.3	-	80	8E, 12E
45	47	OS125	UMC100.3	-	80	8E, 12E
55	57	OS250	UMC100.3	-	80	16E
75	77	OS250	UMC100.3	PCT3L200	80	16E
90	93	OS400	UMC100.3	PCT3L200	80	24E
110	113	OS400	UMC100.3	PCT3L200	80	24E
132	134	OS400	UMC100.3	PCT3L200	80	24E
160	162	OS400	UMC100.3	PCT3L200	80	24E

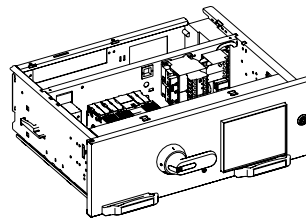
7.2.4.16 HD with Fuses and UMC, 690V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

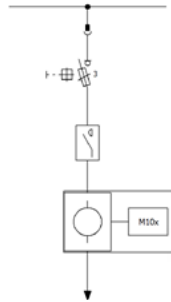


Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	UMC100.3	-	80	8E/4, 8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
7.5	8.9	OS63	UMC100.3	-	80	8E/4, 8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
11	12.8	OS63	UMC100.3	-	80	8E/4, 8E/2
		OT125	UMC100.3	-	80	4E
		OS125	UMC100.3	-	80	8E
15	17	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
18.5	21	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
22	24	OT125	UMC100.3	-	80	8E/2
		OS125	UMC100.3	-	80	8E
30	32	OS125	UMC100.3	-	80	8E, 12E
37	39	OS125	UMC100.3	-	80	8E, 12E
45	47	OS250	UMC100.3	-	80	12E, 16E
55	57	OS250	UMC100.3	PCT3L200	80	12E, 16E
75	77	OS400	UMC100.3	PCT3L200	80	16E
90	93	OS400	UMC100.3	PCT3L200	80	16E
110	113	OS400	UMC100.3	PCT3L200	80	16E
132	134	OS630	UMC100.3	PCT3L200	80	24E
160	162	OS630	UMC100.3	PCT3L200	80	24E
200	203	OS630	UMC100.3	PCT4L300	80	24E

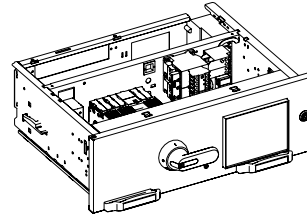
7.2.4.17 DOL with Fuses and M10x, 690V

Motor Starter, Direct-on-line, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

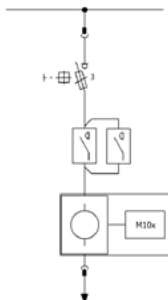


Application Motor Starter DOL						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	M10x	-	80	8E/4, 8E/2
		OS125	M10x	-	80	8E
7.5	8.9	OS63	M10x	-	80	8E/4, 8E/2
		OS125	M10x	-	80	8E
11	12.8	OS63	M10x	-	80	8E/4, 8E/2
		OS125	M10x	-	80	8E
15	17	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
18.5	21	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
22	24	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
30	32	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
37	39	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
45	47	OS125	M10x	-	80	8E, 12E
55	57	OS250	M10x	-	80	12E, 16E
75	77	OS250	M10x	PCT3L200	80	12E, 16E
90	93	OS400	M10x	PCT3L200	80	16E
110	113	OS400	M10x	PCT3L200	80	16E
132	134	OS400	M10x	PCT3L200	80	16E
160	162	OS400	M10x	PCT3L200	80	16E
200	203	OS630	M10x	PCT4L300	80	24E
250	250	OS630	M10x	PCT5L500	80	24E

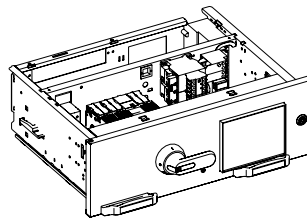
7.2.4.18 REV with Fuses and M10x, 690V

Motor Starter, Reversing, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module

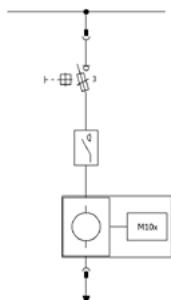


Application Motor Starter REV						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
7.5	8.9	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
11	12.8	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
15	17	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
18.5	21	OS63	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
22	24	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
30	32	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
37	39	OS125	M10x	-	80	8E, 12E
45	47	OS125	M10x	-	80	8E, 12E
55	57	OS250	M10x	-	80	16E
75	77	OS250	M10x	PCT3L200	80	16E
90	93	OS400	M10x	PCT3L200	80	24E
110	113	OS400	M10x	PCT3L200	80	24E
132	134	OS400	M10x	PCT3L200	80	24E
160	162	OS400	M10x	PCT3L200	80	24E

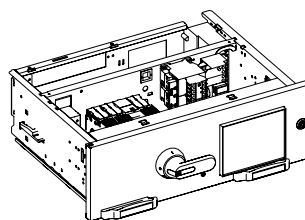
7.2.4.19 HD with Fuses and M10x, 690V

Motor Starter, Direct-on-line - heavy-duty, with OS/OT, type 2, NE/HE, 690V, gG

Single line



Withdrawable module



Application Motor Starter HD						
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size
0.37 - 5.5	0.64 - 6.7	OS63	M10x	-	80	8E/4, 8E/2
		OS125	M10x	-	80	8E
7.5	8.9	OS63	M10x	-	80	8E/4, 8E/2
		OS125	M10x	-	80	8E
11	12.8	OS63	M10x	-	80	8E/4, 8E/2
		OS125	M10x	-	80	8E
15	17	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
18.5	21	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
22	24	OT125	M10x	-	80	8E/2
		OS125	M10x	-	80	8E
30	32	OS125	M10x	-	80	8E, 12E
37	39	OS125	M10x	-	80	8E, 12E
45	47	OS250	M10x	-	80	12E, 16E
55	57	OS250	M10x	PCT3L200	80	12E, 16E
75	77	OS400	M10x	PCT3L200	80	16E
90	93	OS400	M10x	PCT3L200	80	16E
110	113	OS400	M10x	PCT3L200	80	16E
132	134	OS630	M10x	PCT3L200	80	24E
160	162	OS630	M10x	PCT3L200	80	24E
200	203	OS630	M10x	PCT4L300	80	24E

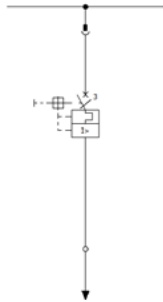
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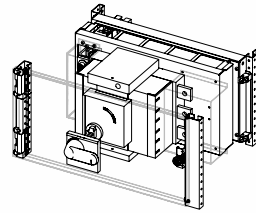
7.3.1.1 ED with MCCB Tmax XT

Feeder modules with MCCB Tmax XT

Single line



Plug-in module

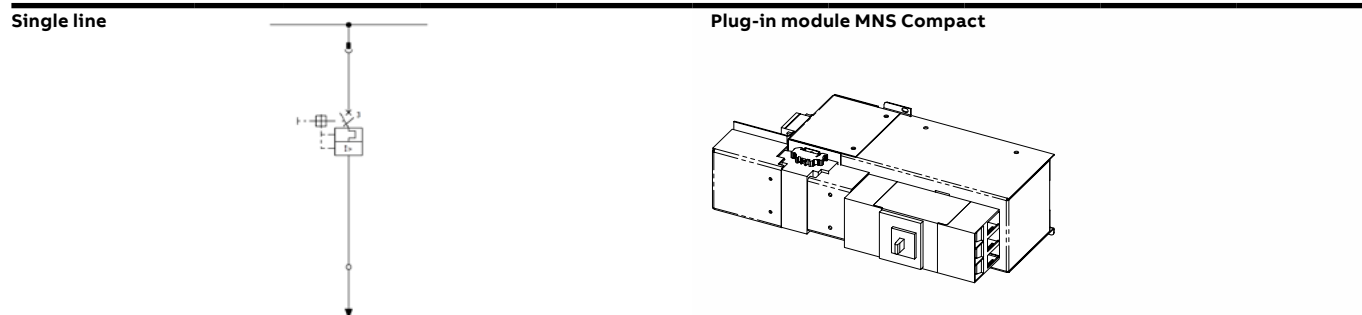


Application		Feeder							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size EQW = 600mm	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT1 160 TMD50	f/p	50	50	50	65	50	-	6E	6E
XT1 160 TMD63	f/p	55	55	50	65	50	-	6E	6E
XT1 160 TMD80	f/p	70	70	65	65	50	-	6E	6E
XT1 160 TMD100	f/p	100	100	90	65	50	-	6E	6E
XT1 160 TMD125	f/p	105	105	90	65	50	-	6E	6E
XT2 160 TMD10 - XT2 160 TMA100	f/p	10 - 100	10 - 100	10 - 100	100	65	-	6E	8E
XT2 160 TMA125	f/p	125	125	120	100	65	-	6E	8E
XT2 160 TMA160	f/p	145	145	125	100	65	-	6E	8E
XT4 160 TMD16 - XT4 160 TMA125	f	16 - 125	16 - 125	16 - 125	-	-	80	6E	8E
XT4 160 TMA160	f	160	160	150	-	-	80	6E	8E
XT4 250 TMA200	f/p	200	200	190	100	80	80	6E	8E
XT4 250 TMA250	f/p	250	250	240	100	80	80	6E	8E
XT2 160 Ekip 10	f/p	10	10	10	100	65	-	6E	8E
XT2 160 Ekip 25	f/p	25	25	25	100	65	-	6E	8E
XT2 160 Ekip 63	f/p	63	63	63	100	65	-	6E	8E
XT2 160 Ekip 100	f/p	100	100	100	100	65	-	6E	8E
XT2 160 Ekip 160	f/p	160	160	150	100	65	-	6E	8E
XT4 160 Ekip 40	f	40	40	40	-	80	80	6E	8E
XT4 160 Ekip 63	f	63	63	63	-	80	80	6E	8E
XT4 160 Ekip 100	f	100	100	100	-	80	80	6E	8E
XT4 160 Ekip 160	f	160	160	150	-	80	80	6E	8E
XT4 250 Ekip 250	f	250	250	250	100	80	80	6E	8E
XT5 400 Ekip 320	f	320	320	320	100	80	80	8E	12E
XT5 400 Ekip 400	f	400	400	380	100	80	80	8E	12E
XT5 630 Ekip 630	f	500	500	500	100	80	80	12E	16E
	f	600	600	550	100	80	80	24E*	24E*
XT6 800 Ekip 630	f	550	550	500	65	50	-	16E	16E
	f	630	630	600	65	50	-	16E*	16E*

* = at the bottom of the section

7.3.1.2 ED MNS Compact with MCCB Tmax XT

MNS Compact Feeder modules with MCCB Tmax XT

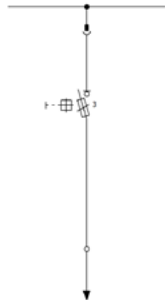


Application		Feeder							
Main switching device	MCCB Type	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT2 160 TMD10 - XT2 160 TMA100	f	10 - 100	10 - 100	-	100	-	-	4E/2, 6E/2	6E/2
XT2 160 TMA125	f	110	110	-	100	-	-	4E/2, 6E/2	6E/2
XT2 160 TMA160	f	120	120	-	100	-	-	6E/2	6E/2
XT4 160 TMD16 - XT4 160 TMA160	f	16 - 160	16 - 160	-	100	-	-	6E/2	6E/2
XT4 250 TMA200	f	200	200	-	100	-	-	6E/2	6E/2
XT2 160 Ekip 10	f	10	10	-	100	-	-	4E/2, 6E/2	6E/2
XT2 160 Ekip 25	f	25	25	-	100	-	-	4E/2, 6E/2	6E/2
XT2 160 Ekip 63	f	63	63	-	100	-	-	4E/2, 6E/2	6E/2
XT2 160 Ekip 100	f	100	100	-	100	-	-	4E/2, 6E/2	6E/2
XT2 160 Ekip 160	f	160	160	-	100	-	-	6E/2	6E/2
XT4 160 Ekip 40	f	40	40	-	100	-	-	6E/2	6E/2
XT4 160 Ekip 63	f	63	63	-	100	-	-	6E/2	6E/2
XT4 160 Ekip 100	f	100	100	-	100	-	-	6E/2	6E/2
XT4 160 Ekip 160	f	160	160	-	100	-	-	6E/2	6E/2
XT4 250 Ekip 250	f	250	250	-	100	-	-	6E/2	8E/2
XT5 400 Ekip 320	f	320	320	-	100	-	-	6E/2	8E/2
XT5 400 Ekip 400	f	400	400	-	100	-	-	8E/2	10E/2
XT5 630 Ekip 630	f	500	500	-	100	-	-	8E/2	10E/2

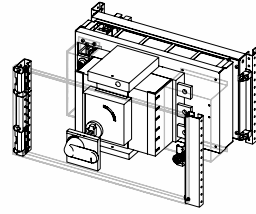
7.3.1.3 ED with Switch fuses OS

Feeder modules with Switch fuses OS

Single line



Plug-in module

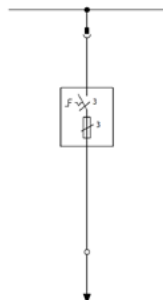


Application		Feeder							
Main switching device	Fuse rating [A]	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size EQW = 600mm	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
OS63G	10	10	10	10	100	100	80	6E	8E
OS63G	16	16	16	16	100	100	80	6E	8E
OS63G	20	20	20	20	100	100	80	6E	8E
OS63G	25	25	25	25	100	100	80	6E	8E
OS63G	32	32	32	32	100	100	80	6E	8E
OS63G	40	40	40	40	100	100	80	6E	8E
OS63G	50	50	50	50	100	100	80	6E	8E
OS125G	63	63	63	63	100	100	80	6E	12E
OS125G	80	80	80	80	100	100	80	6E	12E
OS125G	100	100	100	100	100	100	80	6E	12E
OS125G	125	125	125	110	100	100	80	6E	-
OS250	125	125	125	125	100	100	80	-	12E
OS250	160	160	160	160	100	100	80	8E	12E
OS250	200	200	200	190	100	100	80	8E	-
OS400	200	200	200	200	100	100	80	-	16E
OS400	250	250	250	235	100	100	80	8E, 12E	16E
OS400	315	315	315	300	100	100	80	8E, 12E	-
OS630	315	315	315	315	100	100	80	16E	24E
OS630	400	400	400	400	100	100	80	16E	24E
OS630	500	500	500	475	100	100	80	16E	24E

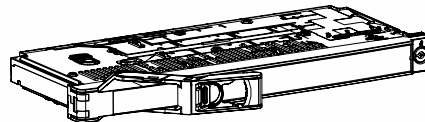
7.3.1.4 ED with SlimLine XR-G

Feeder modules with Switch disconnector SlimLine XR-G

Single line



Plug-in module SlimLine

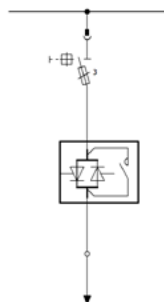


Application		Feeder							
Main switching device	Fuse rating [A]	Rated current Inc (up to) [A]			Short-circuit breaking capacity Icu (up to) [kA]			Module size EQW = 600mm	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XR-G 00	10	10	10	-	100	100	80	2E	4E
XR-G 00	16	16	16	-	100	100	80	2E	4E
XR-G 00	20	20	20	-	100	100	80	2E	4E
XR-G 00	25	25	25	-	100	100	80	2E	4E
XR-G 00	32	32	32	-	100	100	80	2E	4E
XR-G 00	40	40	40	-	100	100	80	2E	4E
XR-G 00	50	50	50	-	100	100	80	2E	4E
XR-G 00	63	63	63	-	100	100	80	2E	4E
XR-G 00	80	80	80	-	100	100	80	2E	4E
XR-G 00	100	100	100	-	100	100	80	2E	4E
XR-G 00	125	125	125	-	100	100	80	2E	4E
XR-G 00	160	160	160	-	100	100	80	2E	4E
XR-G 1	200	200	200	-	100	100	80	4E	6E
XR-G 1	200	200	200	-	100	100	80	4E	6E
XR-G 1	250	250	250	-	100	100	80	4E	6E
XR-G 2	300	300	300	-	100	100	80	8E	10E
XR-G 2	315	315	315	-	100	100	80	8E	10E
XR-G 2	355	355	355	-	100	100	80	8E	10E
XR-G 2	400	400	400	-	100	100	80	8E	10E
XR-G 3	425	425	425	-	100	100	80	8E	10E
XR-G 3	450	450	450	-	100	100	80	8E	10E
XR-G 3	500	500	500	-	100	100	80	8E	10E
XR-G 3	630	500	500	-	100	100	80	8E	10E

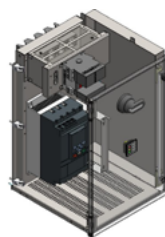
7.3.2.1 DOL with Fuses and Softstarter 400V

Motor Starter, Direct-on-line with Softstarter, with OS, type 2, 400V

Single line



Plug-in module Soft Starter

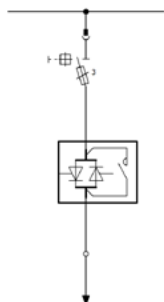


Application Motor Starter DOL with Softstarter							
Power [kW]	Rating [A]	Main switching device	Soft- starter Type	PCT	Short-circuit breaking capacity Icu [kA]	Module size	
						EQW 400mm	EQW 600mm
15	29	OS32G	PSTX30	-	100	24E	24E
18.5	35	OS63G	PSTX37	-	100	24E	24E
22	41	OS63G	PSTX45	-	100	24E	24E
22	53	OS63G	PSTX60	-	100	24E	24E
30	55	OS63G	PSTX60	-	100	24E	24E
37	66	OS125G	PSTX72	-	100	24E	24E
45	80	OS125G	PSTX85	-	100	24E	24E
55	97	OS250	PSTX105	-	100	36E	36E
75	132	OS400	PSTX142	-	100	-	36E

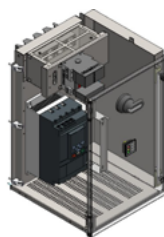
7.3.2.2 DOL with Fuses and Softstarter 500V

Motor Starter, Direct-on-line with Softstarter, with OS, type 2, 500V

Single line



Plug-in module Soft Starter

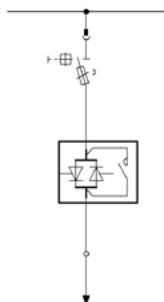


Application Motor Starter DOL with Softstarter							
Power [kW]	Rating [A]	Main switching device	Soft- starter Type	PCT	Short-circuit breaking capacity Icu [kA]	Module size	
						EQW 400mm	EQW 600mm
18.5	29	OS32G	PSTX30	-	100	24E	24E
22	35	OS63G	PSTX37	-	100	24E	24E
22	41	OS63G	PSTX45	-	100	24E	24E
30	53	OS63G	PSTX60	-	100	24E	24E
37	55	OS63G	PSTX60	-	100	24E	24E
45	66	OS125G	PSTX72	-	100	24E	24E
55	80	OS125G	PSTX85	-	100	24E	24E
75	97	OS250	PSTX105	-	100	36E	36E
90	132	OS400	PSTX142	-	100	-	36E

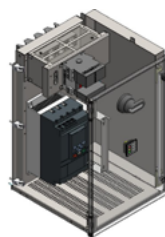
7.3.2.3 DOL with Fuses and Softstarter 690V

Motor Starter, Direct-on-line with Softstarter, with OS, type 2, 690V

Single line



Plug-in module Soft Starter

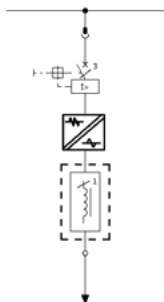


Application Motor Starter DOL with Softstarter							
Power [kW]	Rating [A]	Main switching device	Soft- starter Type	PCT	Short-circuit breaking capacity Icu [kA]	Module size	
						EQW 400mm	EQW 600mm
22	24	OS63G	PSTX30	-	80	24E	24E
30	32	OS63G	PSTX37	-	80	24E	24E
37	39	OS63G	PSTX45	-	80	24E	24E
45	47	OS63G	PSTX60	-	80	24E	24E
55	57	OS125G	PSTX60	-	80	24E	24E
55	67	OS125G	PSTX72	-	80	24E	24E
75	77	OS125G	PSTX85	-	80	24E	24E
90	93	OS250	PSTX105	-	80	36E	36E
110	113	OS400	PSTX142	-	80	-	36E
132	134	OS400	PSTX142	-	80	-	36E

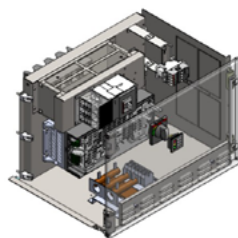
7.3.3.1 DOL with CB and Frequency Converter, 400V

Motor Starter, Direct-on-line with frequency converter, with Tmax XT, type 2, 400V

Single line



Plug-in module VSD

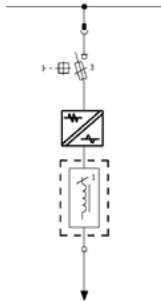


Application Motor Starter DOL with VSD						
Power [kW]	Rating [A]	Main switching device	VSD Type ACS880-01-	DuDt filter	Short-circuit breaking capacity Icu [kA]	Module size EQW 400mm
0.75	2.4	XT2	02A4-3	-	65	16E, 24E
		XT2	02A4-3	NOCH0016	65	16E, 24E
1.1	3.3	XT2	03A3-3	-	65	16E, 24E
		XT2	03A3-3	NOCH0016	65	16E, 24E
1.5	4	XT2	04A0-3	-	65	16E, 24E
		XT2	04A0-3	NOCH0016	65	16E, 24E
2.2	5.6	XT2	05A6-3	-	65	16E, 24E
		XT2	05A6-3	NOCH0016	65	16E, 24E
3	8	XT2	07A2-3	-	65	16E, 24E
		XT2	07A2-3	NOCH0016	65	16E, 24E
4	10	XT2	09A4-3	-	65	16E, 24E
		XT2	09A4-3	NOCH0016	65	16E, 24E
5.5	12.9	XT2	12A6-3	-	65	16E, 24E
		XT2	12A6-3	NOCH0016	65	16E, 24E
7.5	17	XT2	017A-3	-	65	16E, 24E
		XT2	017A-3	NOCH0016	65	16E, 24E
11	25	XT2	025A-3	-	65	16E, 24E
		XT2	025A-3	NOCH0030	65	16E, 24E
15	32	XT2	032A-3	-	65	28E
		XT2	032A-3	NOCH0030	65	28E
18.5	38	XT2	038A-3	-	65	28E
		XT2	038A-3	NOCH0030	65	28E
22	45	XT2	045A-3	-	65	36E
		XT2	045A-3	NOCH0070	65	36E
30	61	XT2	061A-3	-	65	36E
		XT2	061A-3	NOCH0070	65	36E

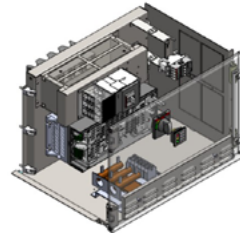
7.3.3.2 DOL with Fuses and Frequency Converter, 400V

Motor Starter, Direct-on-line with frequency converter, with OS, type 2, 400V, gG

Single line



Plug-in module VSD

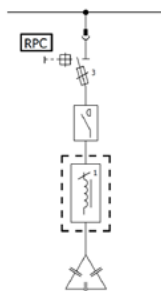


Application Motor Starter DOL with VSD						
Power [kW]	Rating [A]	Main switching device	VSD Type ACS880-01-	DuDt filter	Short-circuit breaking capacity Icu [kA]	Module size EQW = 600mm
0.75	2.4	OS32G	02A4-3	-	65	16E, 24E
		OS32G	02A4-3	NOCH0016	65	16E, 24E
1.1	3.3	OS32G	03A3-3	-	65	16E, 24E
		OS32G	03A3-3	NOCH0016	65	16E, 24E
1.5	4	OS32G	04A0-3	-	65	16E, 24E
		OS32G	04A0-3	NOCH0016	65	16E, 24E
2.2	5.6	OS32G	05A6-3	-	65	16E, 24E
		OS32G	05A6-3	NOCH0016	65	16E, 24E
3	8	OS32G	07A2-3	-	65	16E, 24E
		OS32G	07A2-3	NOCH0016	65	16E, 24E
4	10	OS32G	09A4-3	-	65	16E, 24E
		OS32G	09A4-3	NOCH0016	65	16E, 24E
5.5	12.9	OS32G	12A6-3	-	65	16E, 24E
		OS32G	12A6-3	NOCH0016	65	16E, 24E
7.5	17	OS32G	017A-3	-	65	16E, 24E
		OS32G	017A-3	NOCH0016	65	16E, 24E
11	25	OS63G	025A-3	-	65	16E, 24E
		OS63G	025A-3	NOCH0030	65	16E, 24E
15	32	OS63G	032A-3	-	65	28E
		OS63G	032A-3	NOCH0030	65	28E
18.5	38	OS63G	038A-3	-	65	28E
		OS63G	038A-3	NOCH0030	65	28E
22	45	OS63G	045A-3	-	65	36E
		OS63G	045A-3	NOCH0070	65	36E
30	61	OS125G	061A-3	-	65	36E
		OS125G	061A-3	NOCH0070	65	36E

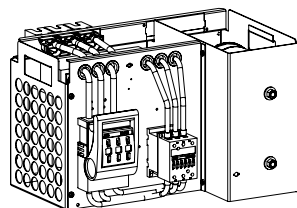
7.3.4.1 Reactive Power Compensation

Reactive Power Compensation

Single line



Plug-in module



Application		RPC		Short-circuit breaking capacity				Module size
Module Power [kvar]	Steps	Capacitor Type	Choke [%]	Icu (up to) [kA]				
				400V	415V	525V	690V	
25	2 x 12,5	MKPgG	7 / 12,5	100	100	-	-	14E
25	1 x 25	MKPgG	7 / 12,5	100	100	-	-	14E
50	1 x 50	MKPgG	7 / 12,5	100	100	-	-	14E
20	2 x 10	CLMD	7 / 12,5	-	-	100	-	14E
20	1 x 20	CLMD	7 / 12,5	-	-	100	-	14E
40	2 x 20	CLMD	7 / 12,5	-	-	100	-	14E
40	1 x 40	CLMD	7 / 12,5	-	-	100	-	14E
20	2 x 10	CLMD	7 / 12,5	-	-	-	80	14E
20	1 x 20	CLMD	7 / 12,5	-	-	-	80	14E
25	2 x 12,5	CLMD	7 / 12,5	-	-	-	80	14E
25	1 x 25	CLMD	7 / 12,5	-	-	-	80	14E
40	2 x 20	CLMD	7 / 12,5	-	-	-	80	14E
40	1 x 40	CLMD	7 / 12,5	-	-	-	80	14E
50	2 x 25	CLMD	7 / 12,5	-	-	-	80	14E
50	1 x 50	CLMD	7 / 12,5	-	-	-	80	14E

7.4 Fixed Modules

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7.4.3 Motor starter 690V

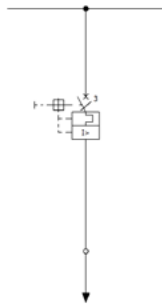
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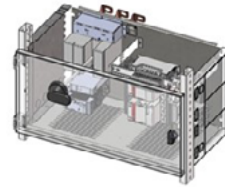
7.4.1.1 ED with MCCB Tmax XT

Feeder modules with MCCB Tmax XT

Single line



Fixed module



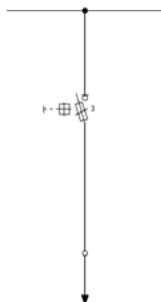
Application		Feeder									
Main switching device	MCCB Type	Rated current I _{ng} (up to) [A]			Short-circuit breaking capacity I _{cu} (up to) [kA]			Module size			
								EQW 400mm		EQW 600mm	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole	3-pole	4-pole
XT1 160 TMD50	f/p/w	50	50	50	65	-	-	8E	12E	8E	12E
XT1 160 TMD63	f/p/w	63	63	63	65	-	-	8E	12E	8E	12E
XT1 160 TMD80	f/p/w	80	80	80	65	-	-	8E	12E	8E	12E
XT1 160 TMD100	f/p/w	100	100	100	65	-	-	8E	12E	8E	12E
XT1 160 TMD125	f/p/w	125	125	100	65	-	-	8E	12E	8E	12E
XT2 160 TMD10 - XT2 160 TMA125	f/p/w	10 - 125	10 - 125	10 - 125	100	-	-	8E	12E	8E	12E
XT2 160 TMA160	f/p/w	160	160	140	100	-	-	8E	12E	8E	12E
XT4 160 TMD16 - XT4 160 TMA160	f/p	16 - 160	16 - 160	16 - 160	100	65	65	-	-	8E	-
	f/p/w	16 - 160	16 - 160	16 - 160	100	65	65	20E	20E	12E, 20E	12E, 20E
XT4 250 TMA200	f/p	200	200	200	100	65	65	-	-	8E	-
	f/p/w	200	200	200	100	65	65	20E	20E	12E, 20E	12E, 20E
XT4 250 TMA250	f/p	250	250	230	100	65	65	-	-	8E	-
	f/p/w	200	200	230	100	65	65	20E	20E	12E, 20E	12E, 20E
XT2 160 Ekip 10	f/p/w	10	10	10	100	-	-	8E	12E	8E	12E
XT2 160 Ekip 25	f/p/w	25	25	25	100	-	-	8E	12E	8E	12E
XT2 160 Ekip 63	f/p/w	63	63	63	100	-	-	8E	12E	8E	12E
XT2 160 Ekip 100	f/p/w	100	100	100	100	-	-	8E	12E	8E	12E
XT2 160 Ekip 160	f/p/w	160	160	140	100	-	-	8E	12E	8E	12E
XT4 160 Ekip 40 - XT4 160 Ekip 160	f/p	40 - 160	40 - 160	40 - 160	100	65	65	-	-	8E	-
	f/p/w	40 - 160	40 - 160	40 - 160	100	65	65	20E	20E	12E, 20E	12E, 20E
XT4 250 Ekip 250	f/p	250	250	230	100	65	65	-	-	8E	-
	f/p/w	250	250	230	100	65	65	20E	20E	12E, 20E	12E, 20E
XT5 400 Ekip 320	f/p/w	320	320	320	100	65	65	24E	24E	12E, 16E	16E
XT5 400 Ekip 400*	f/p/w	400	400	360	100	65	65	24E	24E	12E, 16E	16E
XT5 630 Ekip 630*	f	560	560	490	100	65	65	-	-	12E, 16E	16E
	f	585	585	485	100	65	65	24E	24E	24E	24E
	p/w	600	600	510	100	65	65	-	-	12E, 16E	16E
	p/w	600	600	510	100	65	65	24E, 28E	28E	24E, 28E	28E

* = can be used as incomer module. Available for 400V / 100kA only

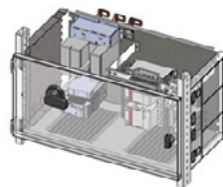
7.4.1.2 ED with Switch fuses OS

Feeder modules with Switch fuses OS

Single line



Fixed module

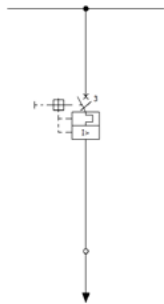


Application	Feeder										
Main switching device	Fuse rating [A]	Rated current I _{ng} (up to) [A]			Short-circuit breaking capacity I _{cu} (up to) [kA]			Module size			
								EQW 400mm		EQW 600mm	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole	3-pole	4-pole
OS32	10	10	10	10	100	80	80	8E	8E	8E	8E
OS32	16	16	16	16	100	80	80	8E	8E	8E	8E
OS32	20	20	20	20	100	80	80	8E	8E	8E	8E
OS32	25	25	25	25	100	80	80	8E	8E	8E	8E
OS32	32	32	32	32	100	80	80	8E	8E	8E	8E
OS63	40	40	40	40	100	80	80	8E	8E	8E	8E
OS63	50	50	50	50	100	80	80	8E	8E	8E	8E
OS63	63	63	63	63	100	80	80	8E	8E	8E	8E
OS125	80	80	80	80	100	80	80	8E,12E	8E,12E	8E,12E	8E,12E
OS125	100	100	100	100	100	80	80	8E,12E	8E,12E	8E,12E	8E,12E
OS160	125	125	125	125	100	80	80	8E,12E	8E,12E	8E,12E	8E,12E
OS250	160	160	160	160	100	80	80	12E,16E	-	12E,16E	12E,16E
OS250	200	200	200	200	100	80	80	12E,16E	-	12E,16E	12E,16E
OS250	250	250	250	220	100	80	80	12E,16E	-	12E,16E	12E,16E
OS400	315	315	315	315	100	-	-	16E	-	16E	16E
OS400	355	355	355	355	-	80	80	16E	-	16E	16E
OS400	400	400	400	360	100	-	-	16E	-	16E	16E
OS630	500	500	500	500	100	80	80	24E	-	24E	24E
OS630	630	630	630	630	100	80	-	24E	-	24E	24E
OS800	800	760	760	670	100	80	-	24E	-	24E	24E

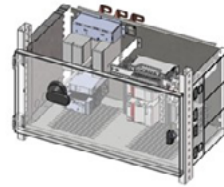
7.4.1.3 ED with MCCB Tmax XT

Feeder modules with MCCB Tmax XT for MNS Rear Access

Single line



Fixed module

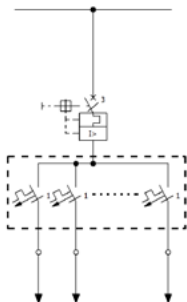


Application		Feeder							
Main switching device	MCCB Type	Rated current I _{ng} (up to) [A]			Short-circuit breaking capacity I _{cu} (up to) [kA]			Module size EQW 400mm	
		IP30/40	IP31-43	IP54	400V	500V	690V	3-pole	4-pole
XT1 160 TMD50	p	50	50	-	65	-	-	6E	6E
XT1 160 TMD63	p	63	63	-	65	-	-	6E	6E
XT1 160 TMD80	p	80	80	-	65	-	-	6E	6E
XT1 160 TMD100	p	100	100	-	65	-	-	6E	6E
XT1 160 TMD125	p	113	113	-	65	-	-	6E	6E
XT2 160 TMD10 - XT2 160 TMA125	p	10 - 125	10 - 125	-	65	-	-	6E	6E
XT2 160 TMA160	p	145	145	-	65	-	-	6E	6E
XT4 160 TMD16 - XT4 160 TMA160	p	16 - 160	16 - 160	-	65	-	-	8E	8E
XT4 250 TMA200	p	200	200	-	65	-	-	8E	8E
XT2 160 Ekip 10	p	10	10	-	65	-	-	6E	6E
XT2 160 Ekip 25	p	25	25	-	65	-	-	6E	6E
XT2 160 Ekip 63	p	63	63	-	65	-	-	6E	6E
XT2 160 Ekip 100	p	100	100	-	65	-	-	6E	6E
XT2 160 Ekip 160	p	160	160	-	65	-	-	6E	6E
XT4 160 Ekip 40	p	40	40	-	65	-	-	8E	8E
XT4 160 Ekip 63	p	63	63	-	65	-	-	8E	8E
XT4 160 Ekip 100	p	100	100	-	65	-	-	8E	8E
XT4 160 Ekip 160	p	160	160	-	65	-	-	8E	8E
XT4 250 Ekip 250	p	250	250	-	65	-	-	8E	8E
XT5 400 Ekip 320	p	320	320	-	65	-	-	12E	12E
XT5 400 Ekip 400	p	400	400	-	65	-	-	12E	12E
XT5 630 Ekip 630	p	550	550	-	65	-	-	12E	12E
T6 630 PR* 630	w	630	630	-	65	-	-	16E	16E

7.4.1.4 ED with MCB in Remote Power Panel (RPP)

Feeder section with MCB in Remote Power Panel (RPP & iRPP)

Single line

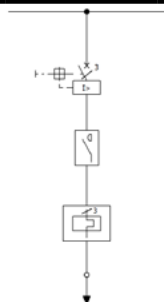


Application		Feeder								
Main switching device Incomer	MCCB Type	No. of Circuits	Rated current Ing (up to) [A]		Short-circuit Icu (up to) [kA]	Section [mm]				Height
			IP30/40	IP31-43		Standalone		Integrated		
					400V	Width	Depth	Width	Depth	
RPP section										
XT4 250	S400	84	250	250	50	800	400	-	-	85E
	S400	84	250	250	50	800	600	800	600	85E
XT5 400	S400	168	400	400	50	1000	400	-	-	85E
	S400	168	400	400	50	1000	600	1000	600	85E
iRPP section										
XT4 250	S400	84	250	250	50	600	400	-	-	85E
	S400	84	250	250	50	600	600	600	600	85E
XT5 400	S400	120	400	400	50	800	400	-	-	85E
	S400	120	400	400	50	800	600	800	600	85E

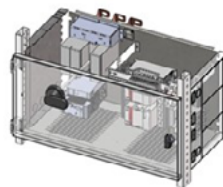
7.4.2.1 DOL with CB and EOL, 400V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Fixed module

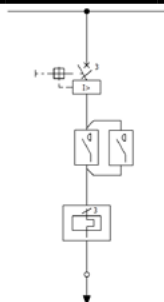


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.85 - 15.5	MO132	EF19	-	50	8E	600
11	22	MO132	EF45	-	50	8E	600
15	29	XT2 160	EF65	-	50, 65, 100	8E	600
18.5	35	XT2 160	EF65	-	50, 65, 100	8E	600
22	41	XT2 160	EF65	-	50, 65, 100	8E	600
30	55	XT2 160	EF65	-	50, 65, 100	8E	600
37	66	XT2 160	EF96	-	50, 65, 100	8E	600
45	80	XT2 160	EF96	-	50, 65, 100	8E	600
55	97	XT2 160	EF146	-	50, 65, 100	8E	600
75	132	XT4 250	EF205	-	50, 65, 100	12E	600
90	160	XT4 250	EF205	-	50, 65, 100	12E	600
110	195	XT5 400	EF370	-	50, 65, 100	16E	600
132	230	XT5 400	EF370	-	50, 65, 100	20E	600
160	280	XT5 400	EF370	-	50, 65, 100	20E	600
200	350	XT5 630	EF460	-	50, 65, 100	80E	400
250	430	XT5 630	EF750	-	50, 65, 100	80E	400
315	540	XT6 800	EF750	-	50, 65	80E	400
	540	XT7 800	EF1250	-	100	80E	600

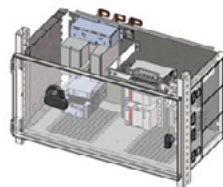
7.4.2.2 REV with CB and EOL, 400V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Fixed module

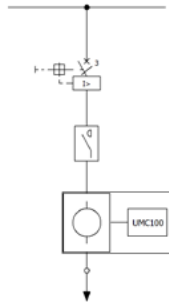


Application Motor Starter REV							
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.85 - 15.5	MO132	EF19	-	50	8E	600
11	22	MO132	EF45	-	50	8E	600
15	29	XT2 160	EF65	-	50, 65, 100	8E	600
18.5	35	XT2 160	EF65	-	50, 65, 100	8E	600
22	41	XT2 160	EF65	-	50, 65, 100	8E	600
30	55	XT2 160	EF65	-	50, 65, 100	8E	600
37	66	XT2 160	EF96	-	50, 65, 100	12E	600
45	80	XT2 160	EF96	-	50, 65, 100	12E	600
55	97	XT2 160	EF146	-	50, 65, 100	12E	600
75	132	XT4 250	EF205	-	50, 65, 100	16E	600
90	160	XT4 250	EF205	-	50, 65, 100	16E	600
110	195	XT5 400	EF370	-	50, 65	20E	600

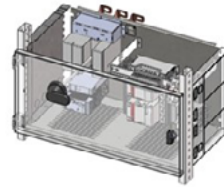
7.4.2.3 DOL with CB and UMC, 400V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Fixed module

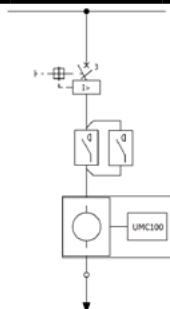


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.85 - 15.5	MO132	UMC100.3	-	100	8E	600
11	22	MO132	UMC100.3	-	100	8E	600
15	29	XT2 160	UMC100.3	-	50, 65, 100	8E	600
18.5	35	XT2 160	UMC100.3	-	50, 65, 100	8E	600
22	41	XT2 160	UMC100.3	-	50, 65, 100	8E	600
30	55	XT2 160	UMC100.3	-	50, 65, 100	12E	600
37	66	XT2 160	UMC100.3	CT4L185	50, 65, 100	12E	600
45	80	XT2 160	UMC100.3	CT4L185	50, 65, 100	12E	600
55	97	XT2 160	UMC100.3	CT4L185	50, 65, 100	12E	600
75	132	XT4 250	UMC100.3	CT4L185	50, 65, 100	12E	600
90	160	XT4 250	UMC100.3	CT4L185	50, 65, 100	12E	600
110	195	XT5 400	UMC100.3	CT4L310	50, 65, 100	16E	600
132	230	XT5 400	UMC100.3	CT4L310	50, 65, 100	20E	600
160	280	XT5 400	UMC100.3	CT4L310	50, 65, 100	20E	600
200	350	XT5 630	UMC100.3	CT5L500	50, 65, 100	80E	400
250	430	XT5 630	UMC100.3	CT5L500	50, 65, 100	80E	400
315	540	XT6 800	UMC100.3	CT5L850	50, 65	80E	400
	540	XT7 800	UMC100.3	CT5L850	100	80E	600

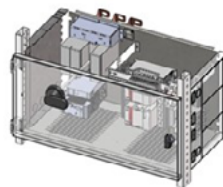
7.4.2.4 REV with CB and UMC, 400V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Fixed module

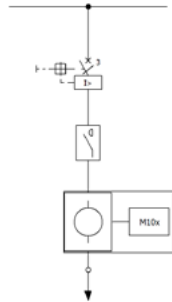


Application Motor Starter REV							
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.85 - 15.5	MO132	UMC100.3	-	100	8E	600
11	22	MO132	UMC100.3	-	100	8E	600
15	29	XT2 160	UMC100.3	-	50, 65, 100	8E	600
18.5	35	XT2 160	UMC100.3	-	50, 65, 100	8E	600
22	41	XT2 160	UMC100.3	-	50, 65, 100	8E	600
30	55	XT2 160	UMC100.3	-	50, 65, 100	12E	600
37	66	XT2 160	UMC100.3	CT4L185	50, 65, 100	12E	600
45	80	XT2 160	UMC100.3	CT4L185	50, 65, 100	12E	600
55	97	XT2 160	UMC100.3	CT4L185	50, 65, 100	12E	600
75	132	XT4 250	UMC100.3	CT4L185	50, 65, 100	16E	600
90	160	XT4 250	UMC100.3	CT4L185	50, 65, 100	16E	600
110	195	XT5 400	UMC100.3	CT4L310	50, 65	20E	600

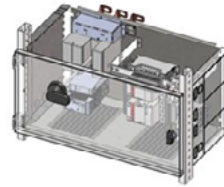
7.4.2.5 DOL with CB and M10x, 400V

Motor Starter, Direct-on-line, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



Fixed module

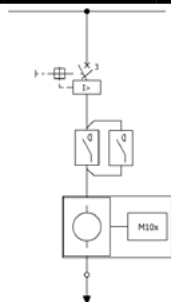


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.85 - 15.5	XT2 160	M10x	-	50, 65, 100	8E	600
		MO132	M10x	-	100	8E	600
11	22	XT2 160	M10x	-	50, 65, 100	8E	600
		MO132	M10x	-	100	8E	600
15	29	XT2 160	M10x	-	50, 65, 100	8E	600
18.5	35	XT2 160	M10x	-	50, 65, 100	8E	600
22	41	XT2 160	M10x	-	50, 65, 100	8E	600
30	55	XT2 160	M10x	-	50, 65, 100	8E	600
37	66	XT2 160	M10x	PCT3L200	50, 65, 100	12E	600
45	80	XT2 160	M10x	PCT3L200	50, 65, 100	12E	600
55	97	XT2 160	M10x	PCT3L200	50, 65, 100	12E	600
75	132	XT4 250	M10x	PCT3L200	50, 65, 100	12E	600
90	160	XT4 250	M10x	PCT3L200	50, 65, 100	12E	600
110	195	XT5 400	M10x	PCT3L200	50, 65	16E	600
		XT5 400	M10x	PCT3L200	100	20E	600
132	230	XT5 400	M10x	PCT4L300	50, 65, 100	20E	600
160	280	XT5 400	M10x	PCT4L300	50, 65, 100	20E	600
200	350	XT5 630	M10x	PCT5L500	50, 65, 100	80E	400
250	430	XT5 630	M10x	PCT5L500	50, 65, 100	80E	400

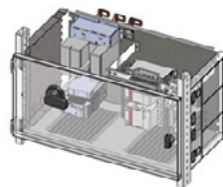
7.4.2.6 REV with CB and M10x, 400V

Motor Starter, Reversing, with Tmax XT and MO, type 2, NE/HE, 400V

Single line



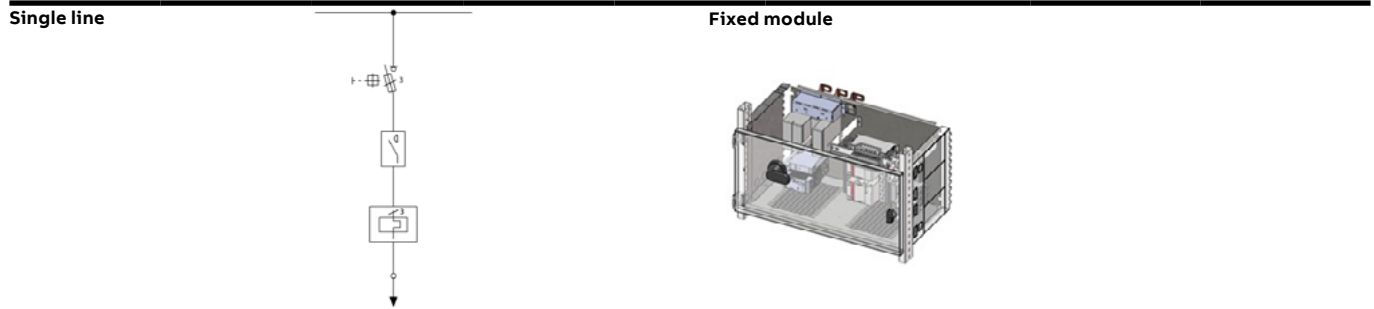
Fixed module



Application Motor Starter REV							
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.85 - 15.5	XT2 160	M10x	-	50, 65, 100	8E	600
		MO132	M10x	-	100	8E	600
11	22	XT2 160	M10x	-	50, 65, 100	8E	600
		MO132	M10x	-	100	8E	600
15	29	XT2 160	M10x	-	50, 65, 100	8E	600
18.5	35	XT2 160	M10x	-	50, 65, 100	8E	600
22	41	XT2 160	M10x	-	50, 65, 100	8E	600
30	55	XT2 160	M10x	-	50, 65, 100	8E	600
37	66	XT2 160	M10x	PCT3L200	50, 65, 100	12E	600
45	80	XT2 160	M10x	PCT3L200	50, 65, 100	12E	600
55	97	XT2 160	M10x	PCT3L200	50, 65, 100	12E	600
75	132	XT4 250	M10x	PCT3L200	50, 65, 100	16E	600
90	160	XT4 250	M10x	PCT3L200	50, 65, 100	16E	600
110	195	XT5 400	M10x	PCT3L200	50, 65	20E	600

7.4.2.7 DOL with Fuses and EOL, 400V

Motor Starter, Direct-on-line, with OS, type 2, NE/HE, 400V, gG

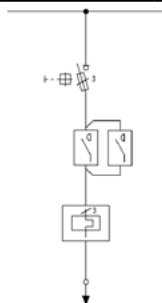


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
0.25 - 5.5	0.85 - 11.5	OS63	EF19	-	100	8E	600
7.5	15.5	OS63	EF45	-	100	8E	600
11	22	OS125	EF45	-	100	8E	600
15	29	OS125	EF96	-	100	8E	600
18.5	35	OS125	EF96	-	100	8E	600
22	41	OS125	EF96	-	100	8E	600
30	55	OS125	EF96	-	100	8E	600
37	66	OS250	EF146	-	100	16E	600
45	80	OS250	EF146	-	100	16E	600
55	97	OS250	EF146	-	100	16E	600
75	132	OS400	EF205	-	100	20E	600
90	160	OS400	EF370	-	100	20E	600
110	195	OS400	EF370	-	100	20E	600
132	230	OS630	EF460	-	100	80E	400
160	280	OS630	EF460	-	100	80E	400
200	350	OS630	EF750	-	100	80E	400
250	430	OS800	EF750	-	100	80E	400

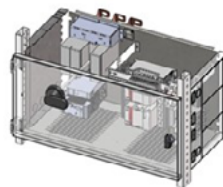
7.4.2.8 REV with Fuses and EOL, 400V

Motor Starter, Reversing, with OS, type 2, NE/HE, 400V, gG

Single line



Fixed module



Application

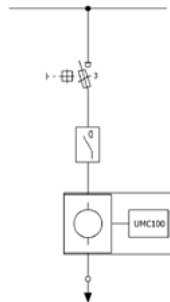
Motor Starter REV

Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
0.25 - 5.5	0.85 - 11.5	OS63	EF19	-	100	8E	600
7.5	15.5	OS63	EF45	-	100	8E	600
11	22	OS125	EF45	-	100	8E	600
15	29	OS125	EF96	-	100	8E	600
18.5	35	OS125	EF96	-	100	12E	600
22	41	OS125	EF96	-	100	12E	600
30	55	OS125	EF96	-	100	12E	600
37	66	OS250	EF146	-	100	20E	600
45	80	OS250	EF146	-	100	20E	600
55	97	OS250	EF146	-	100	20E	600
75	132	OS400	EF205	-	100	24E	600
90	160	OS400	EF370	-	100	24E	600
110	195	OS400	EF370	-	100	24E	600

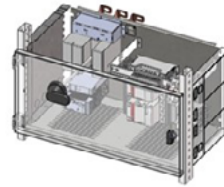
7.4.2.9 DOL with Fuses and UMC, 400V

Motor Starter, Direct-on-line, with OS, type 2, NE/HE, 400V, gG

Single line



Fixed module

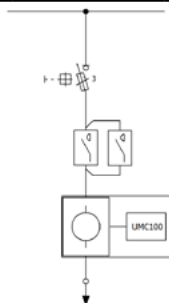


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 5.5	0.85 - 11.5	OS63	UMC100.3	-	100	8E	600
7.5	15.5	OS63	UMC100.3	-	100	8E	600
11	22	OS125	UMC100.3	-	100	12E	600
15	29	OS160	UMC100.3	-	100	12E	600
18.5	35	OS160	UMC100.3	-	100	12E	600
22	41	OS160	UMC100.3	-	100	12E	600
30	55	OS160	UMC100.3	-	100	12E	600
37	66	OS250	UMC100.3	CT4L185	100	16E	600
45	80	OS250	UMC100.3	CT4L185	100	16E	600
55	97	OS250	UMC100.3	CT4L185	100	16E	600
75	132	OS400	UMC100.3	CT4L185	100	20E	600
90	160	OS400	UMC100.3	CT4L310	100	20E	600
110	195	OS400	UMC100.3	CT4L310	100	20E	600
132	230	OS630	UMC100.3	CT4L310	100	80E	400
160	280	OS630	UMC100.3	CT5L500	100	80E	400
200	350	OS630	UMC100.3	CT5L500	100	80E	400
250	430	OS800	UMC100.3	CT5L850	100	80E	400
315	540	OS1250	UMC100.3	CT5L850	100	80E	600

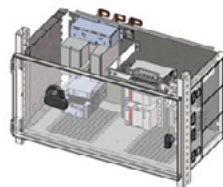
7.4.2.10 REV with Fuses and UMC, 400V

Motor Starter, Reversing, with OS, type 2, NE/HE, 400V, gG

Single line



Fixed module

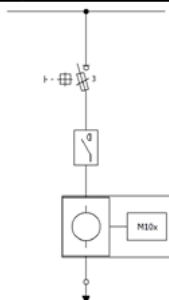


Application Motor Starter REV							
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 5.5	0.85 - 11.5	OS63	UMC100.3	-	100	8E	600
7.5	15.5	OS63	UMC100.3	-	100	8E	600
11	22	OS125	UMC100.3	-	100	12E	600
15	29	OS160	UMC100.3	-	100	12E	600
18.5	35	OS160	UMC100.3	-	100	12E	600
22	41	OS160	UMC100.3	-	100	12E	600
30	55	OS160	UMC100.3	-	100	12E	600
37	66	OS250	UMC100.3	CT4L185	100	20E	600
45	80	OS250	UMC100.3	CT4L185	100	20E	600
55	97	OS250	UMC100.3	CT4L185	100	20E	600
75	132	OS400	UMC100.3	CT4L185	100	24E	600
90	160	OS400	UMC100.3	CT4L310	100	24E	600
110	195	OS400	UMC100.3	CT4L310	100	24E	600

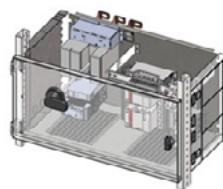
7.4.2.11 DOL with Fuses and M10x, 400V

Motor Starter, Direct-on-line, with OS, type 2, NE/HE, 400V, gG

Single line



Fixed module



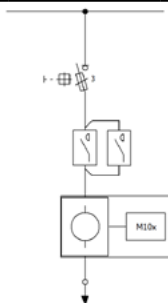
Application Motor Starter DOL

Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
0.25 - 5.5	0.85 - 11.5	OS63	M10x	-	100	8E	600
7.5	15.5	OS63	M10x	-	100	8E	600
11	22	OS125	M10x	-	100	8E	600
15	29	OS125	M10x	-	100	8E	600
18.5	35	OS125	M10x	-	100	8E	600
22	41	OS125	M10x	-	100	8E	600
30	55	OS160	M10x	-	100	12E	600
37	66	OS250	M10x	PCT3L200	100	16E	600
45	80	OS250	M10x	PCT3L200	100	16E	600
55	97	OS250	M10x	PCT3L200	100	16E	600
75	132	OS400	M10x	PCT3L200	100	20E	600
90	160	OS400	M10x	PCT3L200	100	20E	600
110	195	OS400	M10x	PCT4L300	100	20E	600
132	230	OS630	M10x	PCT4L300	100	80E	400
160	280	OS630	M10x	PCT4L300	100	80E	400
200	350	OS630	M10x	PCT5L500	100	80E	400

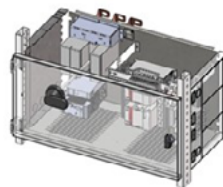
7.4.2.12 REV with Fuses and M10x, 400V

Motor Starter, Reversing, with OS, type 2, NE/HE, 400V, gG

Single line



Fixed module



Application

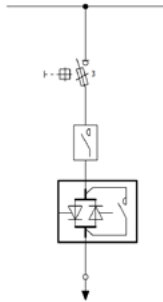
Motor Starter REV

Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 5.5	0.85 - 11.5	OS63	M10x	-	100	8E	600
7.5	15.5	OS63	M10x	-	100	8E	600
11	22	OS125	M10x	-	100	12E	600
15	29	OS125	M10x	-	100	12E	600
18.5	35	OS125	M10x	-	100	12E	600
22	41	OS125	M10x	-	100	12E	600
30	55	OS160	M10x	-	100	12E	600
37	66	OS250	M10x	PCT3L200	100	20E	600
45	80	OS250	M10x	PCT3L200	100	20E	600
55	97	OS250	M10x	PCT3L200	100	20E	600
75	132	OS400	M10x	PCT3L200	100	24E	600
90	160	OS400	M10x	PCT3L200	100	24E	600
110	195	OS400	M10x	PCT4L300	100	24E	600

7.4.2.13 DOL with Fuses and Softstarter 400V

Motor Starter, Direct-on-line with Softstarter, with OS, type 2, 400V

Single line



Fixed module

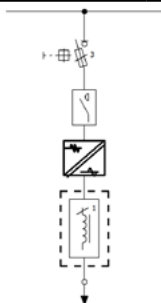


Application Motor Starter DOL with Softstarter							
Power [kW]	Rating [A]	Main switching device	Soft-starter Type	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
15	29	OS32G	PSTX30	-	80	24E	400, 600
18.5	35	OS63G	PSTX37	-	80	24E	400, 600
22	41	OS63G	PSTX45	-	80	24E	400, 600
22	53	OS63G	PSTX60	-	80	24E	400, 600
30	55	OS63G	PSTX60	-	80	24E	400, 600
37	66	OS125G	PSTX72	-	80	24E	400, 600
45	80	OS125G	PSTX85	-	80	24E	400, 600
55	97	OS250	PSTX105	-	80	40E	400, 600
75	132	OS400	PSTX142	-	80	40E	600
90	160	OS400	PSTX170	-	80	40E	600
110	195	OS400	PSTX210	-	80	85E	600
132	230	OS400	PSTX250	-	80	85E	600
160	280	OS630	PSTX300	-	80	85E	600
200	350	OS630	PSTX370	-	80	85E	600
250	430	OS630	PSTX470	-	80	85E	600
315	540	OS630	PSTX570	-	80	85E	600
355	610	OS800	PSTX720	-	80	85E	600
400	690	OS800	PSTX720	-	80	85E	600
450	770	OT1250	PSTX840	-	80	85E	600
500	850	OT1250	PSTX1050	-	80	85E	600
560	950	OT1250	PSTX1050	-	80	85E	600
630	1060	OT1250	PSTX1250	-	80	85E	600
710	1190	OT1250	PSTX1250	-	80	85E	600

7.4.2.14 DOL with Fuses and Frequency Converter, 400V

Motor Starter, Direct-on-line with frequency converter, with OS, type 2, 400V, gG

Single line



Fixed module

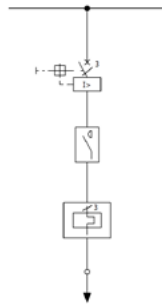


Application Motor Starter DOL with VSD							
Power [kW]	Rating [A]	Main switching device	VSD Type ACS880-01-	DuDt filter	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.75 - 5.5	2.4 - 12.9	OS32G	02A4-3 - 12A6-3	-	65	20E	400
		OS32G	02A4-3 - 12A6-3	-	65	12E	600
		OS32G	02A4-3 - 12A6-3	NOCH0016	65	32E	400
7.5	17	OS32G	017A-3	-	65	20E	400
		OS32G	017A-3	-	65	12E	600
		OS32G	017A-3	NOCH0016	65	32E	400
11	25	OS63G	025A-3	-	65	20E	400
		OS63G	025A-3	-	65	12E	600
		OS63G	025A-3	NOCH0030	65	32E	400
15	32	OS63G	032A-3	-	65	24E	400
		OS63G	032A-3	NOCH0030	65	36E	400
18.5	38	OS63G	038A-3	-	65	24E	400
		OS63G	038A-3	NOCH0030	65	36E	400
22	45	OS63G	045A-3	-	65	40E	400
		OS63G	045A-3	NOCH0070	65	52E	400
30	61	OS125G	061A-3	-	65	40E	400
		OS125G	061A-3	NOCH0070	65	52E	400
37	72	OS125G	072A-3	-	65	56E, 85E	400
		OS125G	072A-3	NOCH0070	65	85E	400
45	87	OS125G	087A-3	-	65	56E, 85E	400
		OS125G	087A-3	NOCH0070	65	85E	400
55	105	OS160G	105A-3	-	65	85E	400
		OS160G	105A-3	NOCH0070	65	85E	400
75	145	OS160G	145A-3	-	65	85E	400
		OS160G	145A-3	NOCH0120	65	85E	400
90	169	OS250	169A-3	-	65	85E	400
		OS250	169A-3	FOCH0260	65	85E	400
110	206	OS250	206A-3	-	65	85E	400
		OS250	206A-3	FOCH0260	65	85E	400
132	246	OS400	246A-3	-	65	85E	800
		OS400	246A-3	FOCH0260	65	85E	800
160	293	OS400	293A-3	-	65	85E	800
		OS400	293A-3	FOCH0320	65	85E	800
200	363	OS630	363A-3	-	65	85E	1000
		OS630	363A-3	FOCH0320	65	85E	1000
250	430	OS630	430A-3	-	65	85E	1000
		OS630	430A-3	FOCH0320	65	85E	1000

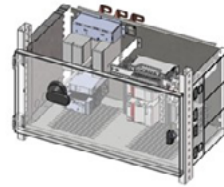
7.4.3.1 DOL with CB and EOL, 690V

Motor Starter, Direct-on-line, with Tmax XT, type 2, NE/HE, 690V

Single line



Fixed module

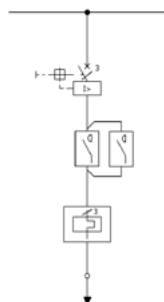


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	XT2 160	EF19	-	50, 65	8E	600
11	12.8	XT2 160	EF19	-	50, 65	8E	600
15	17	XT2 160	EF19	-	50, 65	8E	600
18.5	21	XT2 160	EF65	-	50, 65, 80	8E	600
22	24	XT2 160	EF65	-	50, 65, 80	8E	600
30	32	XT2 160	EF65	-	50, 65	8E	600
37	39	XT2 160	EF96	-	50, 65, 80	8E	600
45	47	XT2 160	EF96	-	50, 65	8E	600
55	57	XT2 160	EF146	-	50, 65, 80	12E	600
75	77	XT4 160	EF146	-	50, 65	12E	600
90	93	XT4 160	EF205	-	50, 65	12E	600
110	113	XT4 250	EF205	-	50, 65	12E	600
132	134	XT4 250	EF205	-	50, 65	16E	600
160	162	XT5 400	EF370	-	50, 65	20E	600
		XT4 250	EF370		80	16E	600
200	203	XT5 400	EF370	-	50, 65	20E	600
250	250	XT5 400	EF460	-	50, 65	20E	600
315	313	XT5 630	EF460	-	50, 65	20E	600
355	354	XT5 630	EF460	-	50, 65	80E	400

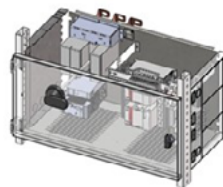
7.4.3.2 REV with CB and EOL, 690V

Motor Starter, Reversing, with Tmax XT, type 2, NE/HE, 690V

Single line



Fixed module



Application

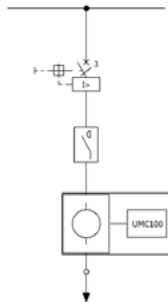
Motor Starter REV

Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	XT2 160	EF19	-	50	8E	600
11	12.8	XT2 160	EF19	-	50	8E	600
15	17	XT2 160	EF19	-	50	8E	600
18.5	21	XT2 160	EF65	-	50	8E	600
22	24	XT2 160	EF65	-	50, 65, 80	8E	600
30	32	XT2 160	EF65	-	50	8E	600
37	39	XT2 160	EF96	-	50	12E	600
		XT2 160	EF65		65, 80	12E	600
45	47	XT2 160	EF96	-	50	12E	600
55	57	XT2 160	EF146	-	50	16E	600
		XT4 160	EF146		65, 80	12E	600
75	77	XT4 160	EF146	-	50	16E	600
90	93	XT4 160	EF205	-	50	16E	600
110	113	XT4 250	EF205	-	50	16E	600

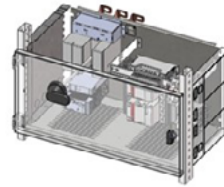
7.4.3.3 DOL with CB and UMC, 690V

Motor Starter, Direct-on-line, with Tmax XT, type 2, NE/HE, 690V

Single line



Fixed module

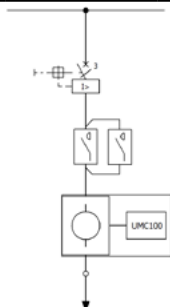


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity I _{cu} [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	XT2 160	UMC100.3	-	50	8E	600
11	12.8	XT2 160	UMC100.3	-	50	8E	600
15	17	XT2 160	UMC100.3	-	50	8E	600
18.5	21	XT2 160	UMC100.3	-	50	8E	600
22	24	XT2 160	UMC100.3	-	50	8E	600
30	32	XT2 160	UMC100.3	-	50	8E	600
37	39	XT2 160	UMC100.3	-	50	8E	600
45	47	XT2 160	UMC100.3	-	50	8E	600
55	57	XT4 160	UMC100.3	CT4L185	50, 65, 80	12E	600
75	77	XT4 160	UMC100.3	CT4L185	50	12E	600
90	93	XT4 160	UMC100.3	CT4L185	50	12E	600
110	113	XT4 250	UMC100.3	CT4L185	50	12E	600
132	134	XT4 250	UMC100.3	CT4L185	50	16E	600
160	162	XT5 400	UMC100.3	CT4L310	50	20E	600
		XT4 250	UMC100.3	CT4L185	65, 80	16E	600
200	203	XT5 400	UMC100.3	CT4L310	50, 65, 85	20E	600
250	250	XT5 400	UMC100.3	CT4L310	50	20E	600
315	313	XT5 630	UMC100.3	CT5L500	50	80E	400
355	354	XT5 630	UMC100.3	CT5L500	50	80E	400
400	400	XT5 630	UMC100.3	CT5L500	50	80E	400
450	460	XT5 630	UMC100.3	CT5L500	50	80E	600
500	493	XT7 800	UMC100.3	CT5L500	50	80E	600

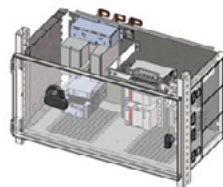
7.4.3.4 REV with CB and UMC, 690V

Motor Starter, Reversing, with Tmax XT, type 2, NE/HE, 690V

Single line



Fixed module



Application

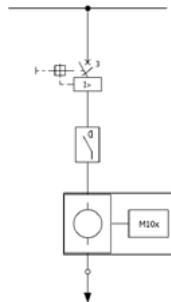
Motor Starter REV

Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	XT2 160	UMC100.3	-	50	8E	600
11	12.8	XT2 160	UMC100.3	-	50	8E	600
15	17	XT2 160	UMC100.3	-	50	8E	600
18.5	21	XT2 160	UMC100.3	-	50	8E	600
22	24	XT2 160	UMC100.3	-	50	8E	600
30	32	XT2 160	UMC100.3	-	50	8E	600
37	39	XT2 160	UMC100.3	-	50	8E	600
45	47	XT2 160	UMC100.3	-	50	12E	600
55	57	XT4 160	UMC100.3	CT4L185	50, 65, 80	16E	600
75	77	XT4 160	UMC100.3	CT4L185	50	16E	600
90	93	XT4 160	UMC100.3	CT4L185	50	16E	600
110	113	XT4 250	UMC100.3	CT4L185	50	16E	600

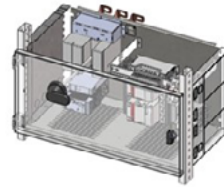
7.4.3.5 DOL with CB and M10x, 690V

Motor Starter, Direct-on-line, with Tmax XT, type 2, NE/HE, 690V

Single line



Fixed module

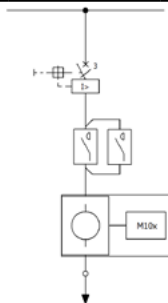


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	XT2 160	M10x	-	50	8E	600
11	12.8	XT2 160	M10x	-	50	8E	600
15	17	XT2 160	M10x	-	50	8E	600
18.5	21	XT2 160	M10x	-	50	8E	600
22	24	XT2 160	M10x	-	50	8E	600
30	32	XT2 160	M10x	-	50	8E	600
37	39	XT2 160	M10x	-	50	8E	600
45	47	XT2 160	M10x	-	50	8E	600
55	57	XT2 160	M10x	-	50	8E	600
75	77	XT4 160	M10x	PCT3L200	50	12E	600
90	93	XT4 160	M10x	PCT3L200	50	12E	600
110	113	XT4 250	M10x	PCT3L200	50	12E	600
132	134	XT4 250	M10x	PCT3L200	50	16E	600
160	162	XT4 250	M10x	PCT3L200	50	16E	600
200	203	XT5 400	M10x	PCT4L300	50	20E	600
250	250	XT5 400	M10x	PCT4L300	50	20E	600
315	313	XT5 630	M10x	PCT5L500	50	80E	400
355	354	XT5 630	M10x	PCT5L500	50	80E	400
400	400	XT5 630	M10x	PCT5L500	50	80E	400
450	460	XT5 630	M10x	PCT5L500	50	80E	600
500	493	XT7 800	M10x	PCT5L500	50	80E	600

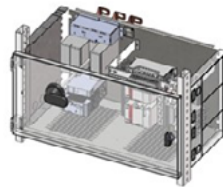
7.4.3.6 REV with CB and M10x, 690V

Motor Starter, Reversing, with Tmax XT, type 2, NE/HE, 690V

Single line



Fixed module



Application

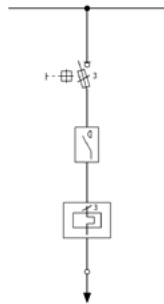
Motor Starter REV

Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	XT2 160	M10x	-	50	8E	600
11	12.8	XT2 160	M10x	-	50	8E	600
15	17	XT2 160	M10x	-	50	8E	600
18.5	21	XT2 160	M10x	-	50	8E	600
22	24	XT2 160	M10x	-	50	8E	600
30	32	XT2 160	M10x	-	50	8E	600
37	39	XT2 160	M10x	-	50	8E	600
45	47	XT2 160	M10x	-	50	12E	600
55	57	XT2 160	M10x	-	50	12E	600
75	77	XT4 160	M10x	PCT3L200	50	16E	600
90	93	XT4 160	M10x	PCT3L200	50	16E	600
110	113	XT4 250	M10x	PCT3L200	50	16E	600

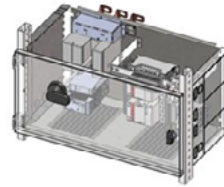
7.4.3.7 DOL with Fuses and EOL, 690V

Motor Starter, Direct-on-line, with OS, type 2, NE/HE, 690V, gG

Single line



Fixed module

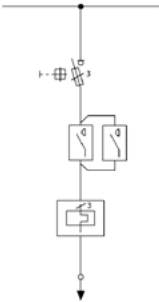


Application Motor Starter DOL							
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	OS32	EF19	-	80	8E	600
11	12.8	OS63	EF65	-	80	8E	600
15	17	OS125	EF65	-	80	8E	600
18.5	21	OS125	EF65	-	80	8E	600
22	24	OS125	EF65	-	80	8E	600
30	32	OS125	EF96	-	80	8E	600
37	39	OS125	EF96	-	80	8E	600
45	47	OS125	EF96	-	80	8E	600
55	57	OS250	EF146	-	80	16E	600
75	77	OS250	EF146	-	80	16E	600
90	93	OS400	EF205	-	80	20E	600
110	113	OS400	EF205	-	80	20E	600
132	134	OS400	EF205	-	80	20E	600
160	162	OS630	EF460	-	80	80E	400
200	203	OS630	EF460	-	80	80E	400

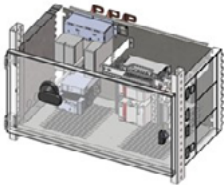
7.4.3.8 REV with Fuses and EOL, 690V

Motor Starter, Reversing, with OS, type 2, NE/HE, 690V, gG

Single line



Fixed module

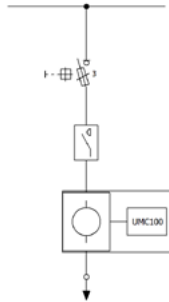


Application		Motor Starter REV					
Power [kW]	Rating [A]	Main switching device	Overload relay EOL	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	OS32	EF19	-	80	8E	600
11	12.8	OS63	EF65	-	80	12E	600
15	17	OS125	EF65	-	80	12E	600
18.5	21	OS125	EF65	-	80	12E	600
22	24	OS125	EF65	-	80	12E	600
30	32	OS125	EF96	-	80	12E	600
37	39	OS125	EF96	-	80	12E	600
45	47	OS125	EF96	-	80	12E	600
55	57	OS250	EF146	-	80	20E	600
75	77	OS250	EF146	-	80	20E	600
90	93	OS400	EF205	-	80	24E	600

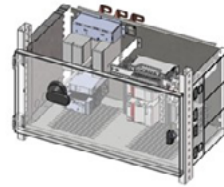
7.4.3.9 DOL with Fuses and UMC, 690V

Motor Starter, Direct-on-line, with OS, type 2, NE/HE, 690V, gG

Single line



Fixed module



Application

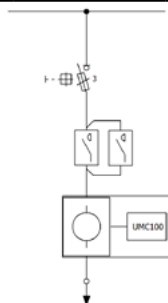
Motor Starter DOL

Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity	Module size	EQ width [mm]
					Icu [kA]		
0.25 - 7.5	0.49 - 8.9	OS63	UMC100.3	-	80	8E	600
11	12.8	OS125	UMC100.3	-	80	12E	600
15	17	OS125	UMC100.3	-	80	12E	600
18.5	21	OS125	UMC100.3	-	80	12E	600
22	24	OS125	UMC100.3	-	80	12E	600
30	32	OS125	UMC100.3	-	80	12E	600
37	39	OS125	UMC100.3	-	80	12E	600
45	47	OS125	UMC100.3	-	80	12E	600
55	57	OS250	UMC100.3	CT4L185	80	16E	600
75	77	OS250	UMC100.3	CT4L185	80	16E	600
90	93	OS400	UMC100.3	CT4L185	80	20E	600
110	113	OS400	UMC100.3	CT4L185	80	20E	600
132	134	OS400	UMC100.3	CT4L185	80	20E	600
160	162	OS630	UMC100.3	CT4L310	80	80E	400
200	203	OS630	UMC100.3	CT4L310	80	80E	400
315	313	OS1250	UMC100.3	CT5L500	80	80E	600

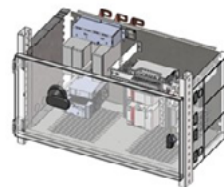
7.4.3.10 REV with Fuses and UMC, 690V

Motor Starter, Reversing, with OS, type 2, NE/HE, 690V, gG

Single line



Fixed module



Application

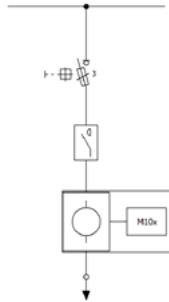
Motor Starter REV

Power [kW]	Rating [A]	Main switching device	Overload relay UMC	PCT	Short-circuit breaking capacity	Module size	EQ width [mm]
					Icu [kA]		
0.25 - 7.5	0.49 - 8.9	OS63	UMC100.3	-	80	8E	600
11	12.8	OS125	UMC100.3	-	80	12E	600
15	17	OS125	UMC100.3	-	80	12E	600
18.5	21	OS125	UMC100.3	-	80	12E	600
22	24	OS125	UMC100.3	-	80	12E	600
30	32	OS125	UMC100.3	-	80	12E	600
37	39	OS125	UMC100.3	-	80	12E	600
45	47	OS125	UMC100.3	-	80	12E	600
55	57	OS250	UMC100.3	CT4L185	80	20E	600
75	77	OS250	UMC100.3	CT4L185	80	20E	600
90	93	OS400	UMC100.3	CT4L185	80	24E	600

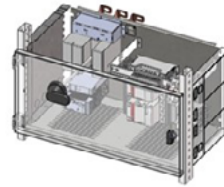
7.4.3.11 DOL with Fuses and M10x, 690V

Motor Starter, Direct-on-line, with OS, type 2, NE/HE, 690V, gG

Single line



Fixed module



Application

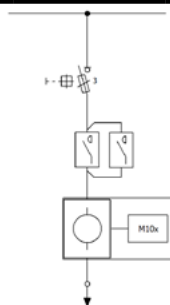
Motor Starter DOL

Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity	Module size	EQ width [mm]
					Icu [kA]		
0.25 - 7.5	0.49 - 8.9	OS63	M10x	-	80	8E	600
11	12.8	OS63	M10x	-	80	8E	600
15	17	OS63	M10x	-	80	8E	600
18.5	21	OS63	M10x	-	80	8E	600
22	24	OS125	M10x	-	80	8E	600
30	32	OS125	M10x	-	80	8E	600
37	39	OS125	M10x	-	80	12E	600
45	47	OS125	M10x	-	80	12E	600
55	57	OS250	M10x		80	16E	600
75	77	OS250	M10x		80	16E	600
90	93	OS400	M10x	PCT3L200	80	20E	600
110	113	OS400	M10x	PCT3L200	80	20E	600
132	134	OS400	M10x	PCT3L200	80	20E	600
160	162	OS400	M10x	PCT3L200	80	20E	600
200	203	OS630	M10x	PCT4L300	80	80E	400
250	250	OS630	M10x	PCT4L300	80	80E	400
315	313	OS1250	M10x	PCT4L300	80	80E	600
355	354	OS1250	M10x	PCT5L500	80	80E	600
400	400	OS1250	M10x	PCT5L500	80	80E	600

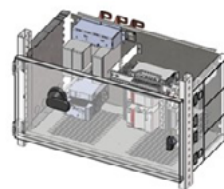
7.4.3.12 REV with Fuses and M10x, 690V

Motor Starter, Reversing, with OS, type 2, NE/HE, 690V, gG

Single line



Fixed module

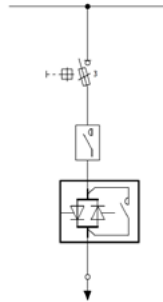


Application Motor Starter REV							
Power [kW]	Rating [A]	Main switching device	Overload relay M10x	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
0.25 - 7.5	0.49 - 8.9	OS63	M10x	-	80	8E	600
11	12.8	OS63	M10x	-	80	8E	600
15	17	OS63	M10x	-	80	8E	600
18.5	21	OS63	M10x	-	80	8E	600
22	24	OS125	M10x	-	80	12E	600
30	32	OS125	M10x	-	80	12E	600
37	39	OS125	M10x	-	80	12E	600
45	47	OS125	M10x	-	80	12E	600
55	57	OS250	M10x		80	20E	600
75	77	OS250	M10x		80	20E	600
90	93	OS400	M10x	PCT3L200	80	24E	600
110	113	OS400	M10x	PCT3L200	80	24E	600

7.4.3.13 DOL with Fuses and Softstarter 690V

Motor Starter, Direct-on-line with Softstarter, with OS, type 2, 690V

Single line



Fixed module



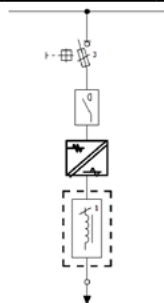
Application Motor Starter DOL with Softstarter

Power [kW]	Rating [A]	Main switching device	Soft- starter Type	PCT	Short-circuit breaking capacity Icu [kA]	Module size	EQ width [mm]
22	24	OS32G	PSTX30	-	80	24E	400, 600
30	32	OS63G	PSTX37	-	80	24E	400, 600
37	39	OS63G	PSTX45	-	80	24E	400, 600
45	47	OS63G	PSTX60	-	80	24E	400, 600
55	57	OS63G	PSTX60	-	80	24E	400, 600
55	72	OS125G	PSTX72	-	80	24E	400, 600
75	77	OS125G	PSTX85	-	80	24E	400, 600
90	93	OS250	PSTX105	-	80	40E	400, 600
110	113	OS400	PSTX142	-	80	40E	600
132	134	OS400	PSTX142	-	80	40E	600
160	162	OS400	PSTX170	-	80	40E	600
200	203	OS400	PSTX210	-	80	85E	600
250	250	OS400	PSTX250	-	80	85E	600
250	300	OS630	PSTX300	-	80	85E	600
315	313	OS630	PSTX370	-	80	85E	600
355	354	OS630	PSTX370	-	80	85E	600
400	400	OS630	PSTX470	-	80	85E	600
450	446	OS630	PSTX470	-	80	85E	600
500	493	OS630	PSTX570	-	80	85E	600
560	551	OS630	PSTX570	-	80	85E	600
630	615	OS800	PSTX720	-	80	85E	600
710	690	OS800	PSTX720	-	80	85E	600
800	780	OT1250	PSTX840	-	80	85E	600
900	880	OT1250	PSTX1050	-	80	85E	600
1000	970	OT1250	PSTX1050	-	80	85E	600
1100	1067	OT1250	PSTX1250	-	80	85E	600

7.4.3.14 DOL with Fuses and Frequency Converter, 690V

Motor Starter, Direct-on-line with frequency converter, with OS, type 2, 690V, gG

Single line



Fixed module



Application
Motor Starter
DOL with VSD

Power [kW]	Rating [A]	Main switching device	VSD Type ACS880-01-	DuDt filter	Short-circuit breaking capacity	Module size	EQ width [mm]
					Icu [kA]		
5.5	7.4	OS63G	07A4-7	-	65	24E	400
		OS63G	07A4-7	NOCH0016	65	36E	400
7.5	9.9	OS63G	09A9-7	-	65	24E	400
		OS63G	09A9-7	NOCH0016	65	36E	400
11	14.3	OS63G	14A3-7	-	65	24E	400
		OS63G	14A3-7	NOCH0016	65	36E	400
15	19	OS63G	019A-7	-	65	24E	400
		OS63G	019A-7	NOCH0030	65	36E	400
18.5	23	OS63G	023A-7	-	65	24E	400
		OS63G	023A-7	NOCH0030	65	36E	400
22	27	OS63G	027A-7	-	65	24E	400
		OS63G	027A-7	NOCH0030	65	36E	400
30	35	OS63G	035A-7	-	65	85E	400
		OS63G	035A-7	NOCH0070	65	85E	400
37	42	OS125G	042A-7	-	65	85E	400
		OS125G	042A-7	NOCH0070	65	85E	400
45	49	OS125G	049A-7	-	65	85E	400
		OS125G	049A-7	NOCH0070	65	85E	400
55	61	OS125G	061A-7	-	65	85E	400
		OS125G	061A-7	NOCH0070	65	85E	400
75	84	OS250	084A-7	-	65	85E	400
		OS250	084A-7	NOCH0120	65	85E	400
90	98	OS250	098A-7	-	65	85E	400
		OS250	098A-7	NOCH0120	65	85E	400
110	119	OS250	119A-7	-	65	85E	400
		OS250	119A-7	FOCH0260	65	85E	600
132	142	OS250	142A-7	-	65	85E	800
		OS250	142A-7	FOCH0260	65	85E	800
160	174	OS400	174A-7	-	65	85E	800
		OS400	174A-7	FOCH0260	65	85E	800
200	210	OS630	210A-7	-	65	85E	1000
		OS630	210A-7	FOCH0260	65	85E	1000
250	271	OS630	271A-7	-	65	85E	1000
		OS630	271A-7	FOCH0260	65	85E	1000



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