

TECHNICAL INFO

MNS 3.0

Low Voltage Switchgear



- Safer, more reliable, more intelligent,
more value to customers

Features & Applications

ABB Xiamen Low Voltage Equipment Co., Ltd. is the one and only MNS® low voltage switchgear production base set up by ABB Group in China and introduced the advanced technologies of MNS® modular low voltage system from ABB Germany. The ABB MNS system is a low-voltage switchgear assembly verified in accordance with GB/T 7251.1/2, IEC 61439 -2 and certified according to IEC TR 61641 Ed. 3 guide for testing under conditions of arcing due to internal faults.

Comprehensive application solutions and services

- Full range of low-voltage switchgear solutions can meet the application needs of customers in different industries
- Products and services around the world can help customers develop overseas market
- All-round services can prolong the service life of equipment and shorten the time of field modification

Safe and reliable low-voltage switchgear

- Anti-arc design and complete type tests can ensure the safety of operators
- Effective prevention from high temperature rise, overvoltage and earthquake can ensure the continuous operation of equipment
- Maintenance-free busbars and reliable electrical/mechanical components can effectively prolong the service life of switchgear

Flexible, compact and highly available

- Single front(front access or rear access), back-to-back or duplex (more space-saving) design with different technologies withdrawable, fixed and plug-in are available to meet multiple layout requirements.
- By virtue of the modular design & compact structure, reduced design time, optimized footprint and high-efficient system upgrade & retrofit are all achievable for MNS® Switchgear.

- The withdrawable design provides the better availability and interchangeability to reduce the loss caused by downtime and maintenance.
- Plug-in and fixed designs provide users with scalable and flexible solutions that meet customers' diversified needs across the entire value chain, taking into account the system reliability, availability and flexibility.

Digital intelligent solutions

- Multiple digital and intelligent solutions are used to help customers reduce operating costs
- Intelligent temperature measurement technology is used for realtime monitoring of key components temperature, to reduce the risk of power failure
- Various monitoring and diagnostic data are provided to help customers conduct data analysis and make maintenance plans

Thus MNS® proves to have the approved solutions for the following industries:

- Chemical, oil and gas, on and off shore
- Petrochemical/coal chemical
- Metals, mining and mineral
- Electronics and semiconductors
- Marine
- Cement/glass
- Automotive
- Pulp and paper
- Food & beverage
- Pharmaceutical
- Water

As well as for infrastructure requirements:

- Power stations
- Data centers
- Railway
- Airports
- Hospitals
- Commercial buildings
- Residence community



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Typical Layout

Technical Data

				GB/T 7251.1/2, IEC 61439-1/2, EN 61439-1/2, DIN_VDE 0660, Part 500 BS 5486, UTE 63-412		
Standards	Design verified and Type-tested switchgear assemblies					
Test certificates	China Compulsory Product Certification(CCC) & CQC Mark Certification			China Quality Certification Centre		
	Type tests			ASTA, DEKRA, Shanghai Testing & Inspection Institute For Electrical Equipment Co. Ltd		
	Short-circuit withstand strength tests			ASTA, DEKRA, Shanghai Testing & Inspection Institute For Electrical Equipment Co. Ltd		
	Resist to accidental arcs acc. to IEC TR 61641 and part 508 of VDE0660			ASTA, Great-Britain		
	Classification Society Certification (Ships)			GL, ABS, BV, DNV, CCS		
	Earthquake tests for Security Areas in Nuclear Power Stations			DLR German Research Institute / China National Center for Quality Supervision and Test of Electrical Apparatus Products		
Electrical data	Rated voltages	Rated insulation voltage Ui		up to 1000V AC, 3P, 1500V DC*		
		Rated operational voltage Ue		up to 690V AC, 3P, 750V DC*		
		Rated impulse withstand voltage Uimp		6/8/12 kV*		
	Overvoltage category		II/III/IV*			
	Degree of pollution		3			
	Rated frequency		up to 60 Hz			
	Rated currents	Main busbars	Rated current Ie		up to 7300 A	
			Rated peak withstand current Ipk		up to 264 kA	
			Rated short-time withstand current Icw		up to 120 kA, 1s up to 100 kA, 3s	
		Distribution bars	Rated current Ie		up to 2000 A	
			Rated peak withstand current Ipk		up to 220 kA	
			Rated short-time withstand current Icw		up to 100 kA, 1s	
		Arc proof	Rated operational voltage		up to 690 V	
			Prospective short-circuit current		up to 100 kA	
			Duration of short-circuit		300 ms	
			Arcing Classification of the Assembly (IEC TR 61641)		Arcing Class C	
		Mechanical characteristics	Dimensions	Sections and frames		DIN41488
				Recommended height		2200, 2300 mm
	Recommended width			400, 600, 800, 1000, 1200 mm		
Recommended depth				800, 1000, 1200 mm		
Basic grid size				E=25 mm acc. to DIN 43660		
Surface protection/ paint	Frame, Incl. internal subdivisions		Zn or Al-Zn coated			
	Cladding, Internal		Zn or Al-Zn coated			
	Cladding, external		Plastic, Zn or Al-Zn coated and powder coated RAL 7035 (light grey)			
Degree of protection of enclosure	IEC 60529		up to IP54			
Plastic components	Halogen-free, self-extinguishing		DIN VDE0304 Part 3			
	Flame retardant, CFC-free		IEC 60707			
Forms of separation			up to Form 4			
Paint	Enclosure		Standard RAL 7035, other colors on request			

* Depending on the electrical equipment.

Switchgear structure

MNS Front Access Switchgear

Functional Compartments and Segregation

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 3 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.

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.

Outgoing section structure

① Equipment compartment

It is used to accommodate the withdrawable/fixed/plug-in outgoing circuits, such as the withdrawable motor starter circuits.

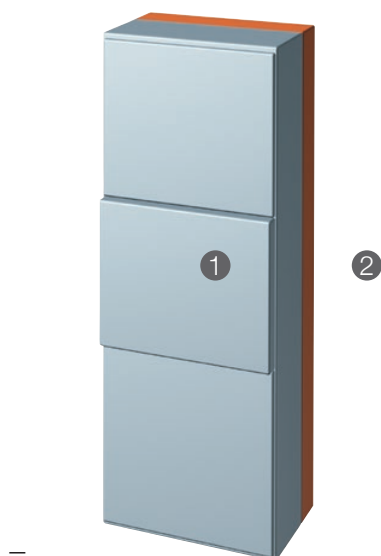
② Busbar compartment

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.



Structure of front access circuit breaker section



Structure of front access outgoing section

Multifunction Separator

The multifunction separator (MFS) with the embedded distribution bars is a unique MNS 3.0 design. It constitutes a complete barrier between the main busbars and the equipment compartment.

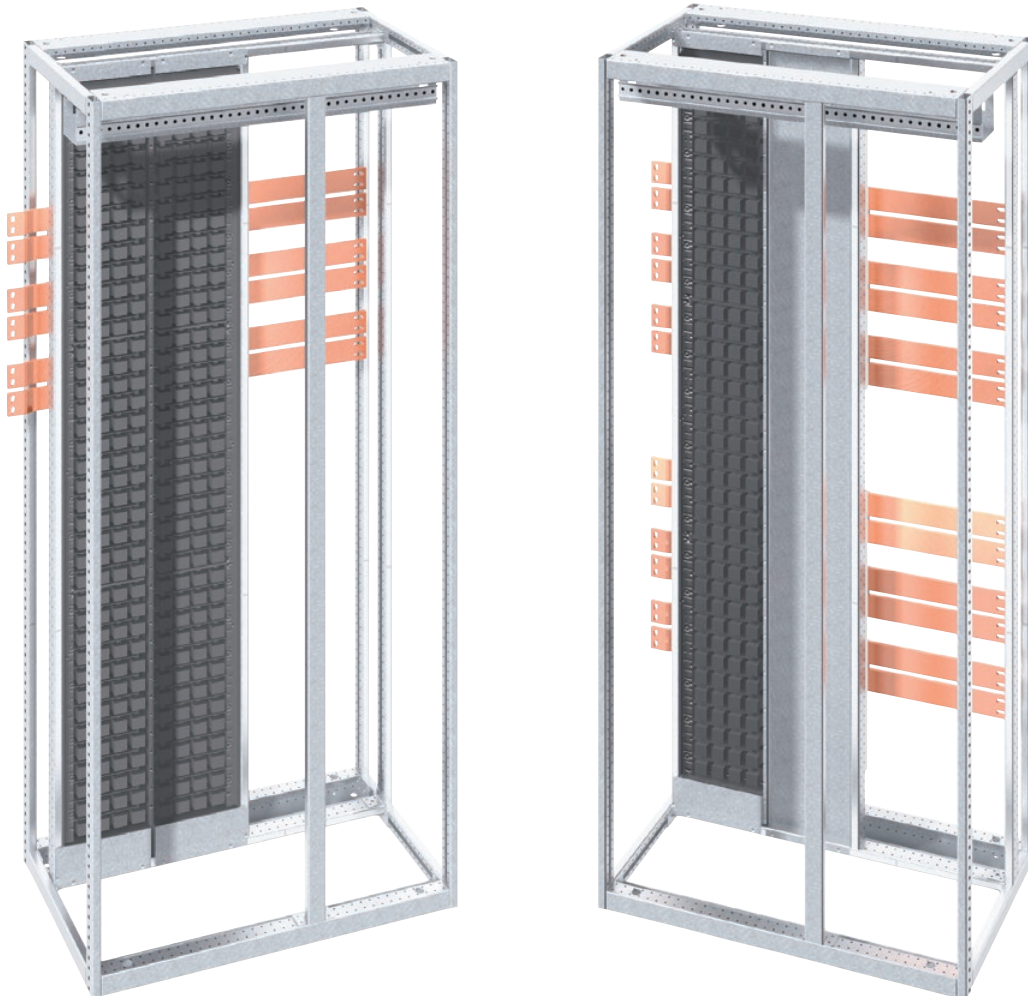
The distribution bars are fully phase segregated and insulated. This design makes it virtually impossible for an arc to pass between distribution bar phases or between main busbars and equipment compartment. The insulation material is CFC and halogen free, flame-retardant and self-extinguishing.

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

With the use of MNS 3.0 specific power contact housings full single phase segregation is assured prior to the connection of the power contacts to the distribution bars.

System Highlights:

- Maintenance free busbars construction
- Easy switchgear extension
- Main busbars arrangement at the rear thus assuring
 - adequate safety to personnel
 - effective withstand against highest stresses in case of short circuit
 - optimum heat dissipation
- Gas tight seals for connection from the equipment compartment to the main busbar system.
- Option for Form 4 separation for both incoming and outgoing assemblies.
- Active and passive arc fault prevention tested according to IEC TR 61641
- Isolating materials are free of CFC and halogens



Outgoing solutions

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 3.0 offers users the scalability they need to take advantage of the customized solutions.

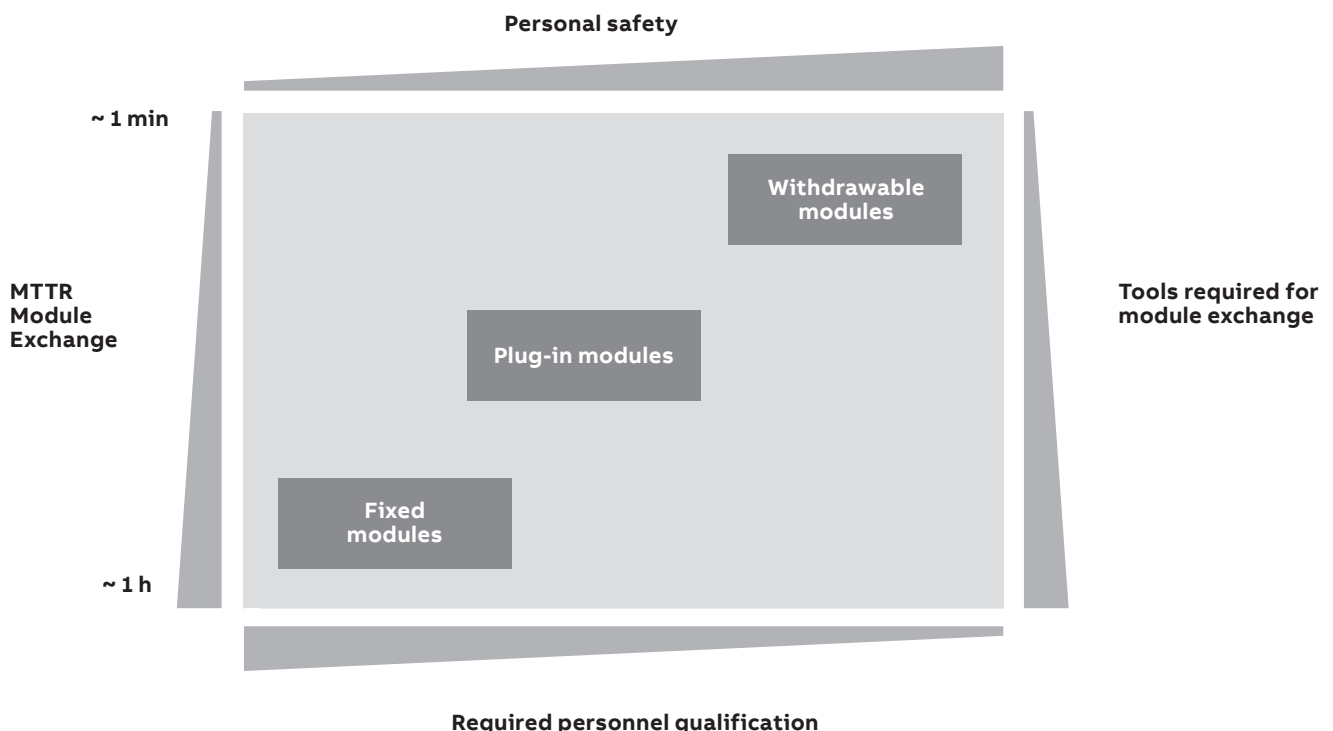
The figure below details the scalability of the system from Fixed to Withdrawable and operational aspects associated with the different functional unit designs. Where high process availability is essential and minimal time is required for module exchange the withdrawable solution has proved to be the 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 well compatible to suit various operational requirements with excellent 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.



AC Industrial Drives & Softstarters

Thanks to its inherent modular design, MNS can easily be adapted to house the different series of ABB industrial drivers and softstarters. The switchgear can accommodate multiple drives or softstarters in one single section.

Switch fuse is recommended as the standard main protection device. Meanwhile, filter and door mounted control panel can be options for AC industrial drives.

Reactive Power Compensation Solution

MNS 3.0 can provide various compensation solutions for AC system. Compensation solutions with different reactor rates are available. With centralized design, the widths of vertical sections may vary from 600 mm to 1,200 mm based on different compensation capacity. The maximum capacity per section is up to 450kVAR.



—
Variable frequency drive section



—
Softstarter section



—
Capacitor section

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).

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

Meanwhile modules can be easily exchanged under service condition thus ensuring the possible maximum flexibility.

Small modules

Withdrawable technique is distinguished by its compact design where, 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 user to use the assembly space more efficiently which in turn reduces the overall footprint of the switchgear.

For withdrawable module design there are condaptors to be used to connect the small withdrawable modules to the distribution bars,

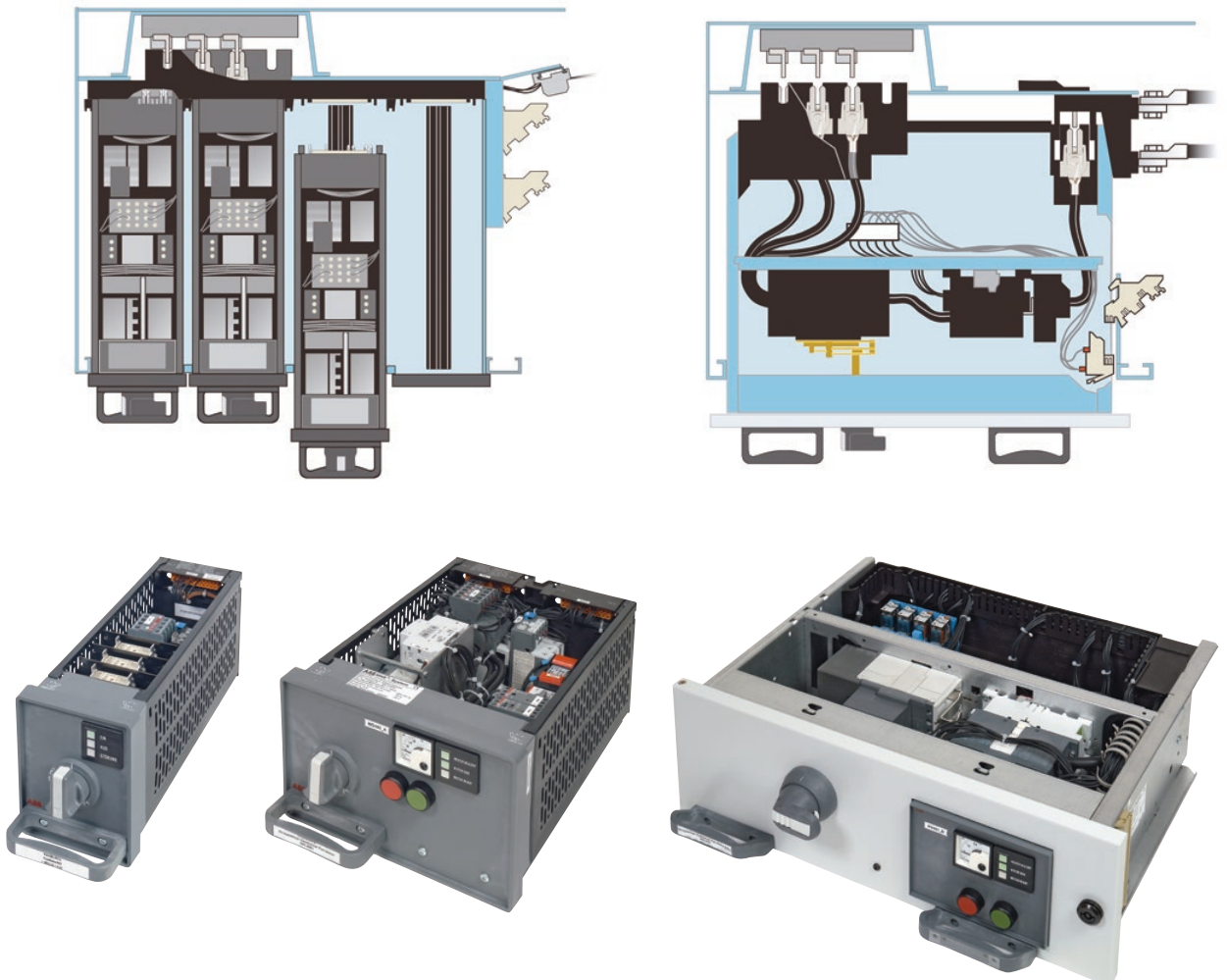
which allows 2 modules (8E/2) or 4 modules (8E/4) to be located adjacently on the same horizontal position inside the switchgear. Condaptors are available in 3 or 4 pole options. Cable connections for main and auxiliary circuits are integrated into the condaptors and are accessible from the cable compartment.

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.

Full width modules connect directly to the distribution bars through the multifunction separator. The design of the module enables auxiliary components to be located on both the vertical and horizontal mounting plates within the module, thus optimizing the available space usage within the module. Cable connections for main and auxiliary circuits are accessible from the cable compartment.



Module operation

MNS® modules are operated with the multifunction operating handle. This handle also activates the electrical/mechanical interlocking of the module and the module door. No further tool or unlocking device is necessary to withdraw a module, thus replacing a module takes less than a minute. Replacement as well as retrofit of modules can be performed under service condition, should plant operation procedures allow.

Withdrawable module positions

All main and auxiliary connections are self-locating, without the need of additional tools.

All positions/status are clearly marked on the fixed section of the operation handle in accordance with IEC 61439-1/-2 and GB/T 7251.1/2.

System Highlights

- High stacking density, resulting in a reduced footprint
- Complete phase isolation of main power contacts prior to connection to the distribution bars
- Full module functionality with external operation
- Module replacement possible in less than 1 minute, no tool required

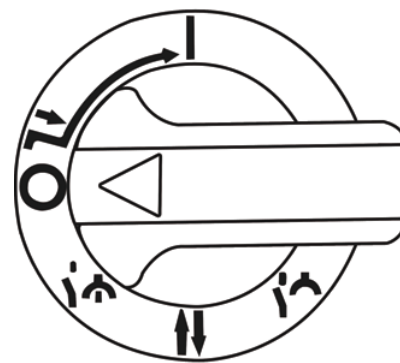




8E/4 Withdrawable Module



8E/2 Withdrawable Module



Module Operating Handle

Standard Module Solutions

- Switch fuse or molded case circuit breaker
- Power distribution circuit with FC61x or FC710 feeder monitoring and control unit
- The motor starter with switch fuse
- The motor starter with molded case circuit breaker
- The motor starter with M10x or MC510 motor control and protection device

Size of the modules:

8E/4, 8E/2, 4E, 6E, 8E, 12E, 16E, 20E, 24E

8E/4 and 8E/2 Withdrawable Modules

Withdrawable units size 8E/4 and 8E/2 comprise:

1. One or two base profile sections for mounting snap-on components
2. One rear wall with main conductors and control plug (one or two 16- or 20-pole control plugs for 8E/2 modules on request)
3. A front panel made of insulating material
4. The side walls, etc.

And each 8E/2 module can be provided with one or two 20-pole terminal blocks on request.

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 mechanical interlocking. A micro switch with 1 × NO and 1 × NC contacts is provided for electrical interlocking.

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”.

8E/4 and 8E/2 withdrawable module positions

		ON position-Main and control circuits are closed. Module is locked.
		OFF position-Main circuit are disconnected, the control circuits are closed. Module is locked.
		TEST position-Main circuit are disconnected, the control circuits are closed. Module is locked.
		MOVE position-Main and control circuits are disconnected.
		ISOLATED position-The module is 30 mm drawn out of the section. Main and control circuits are disconnected and the isolating distance is fulfilled.

Digital solutions

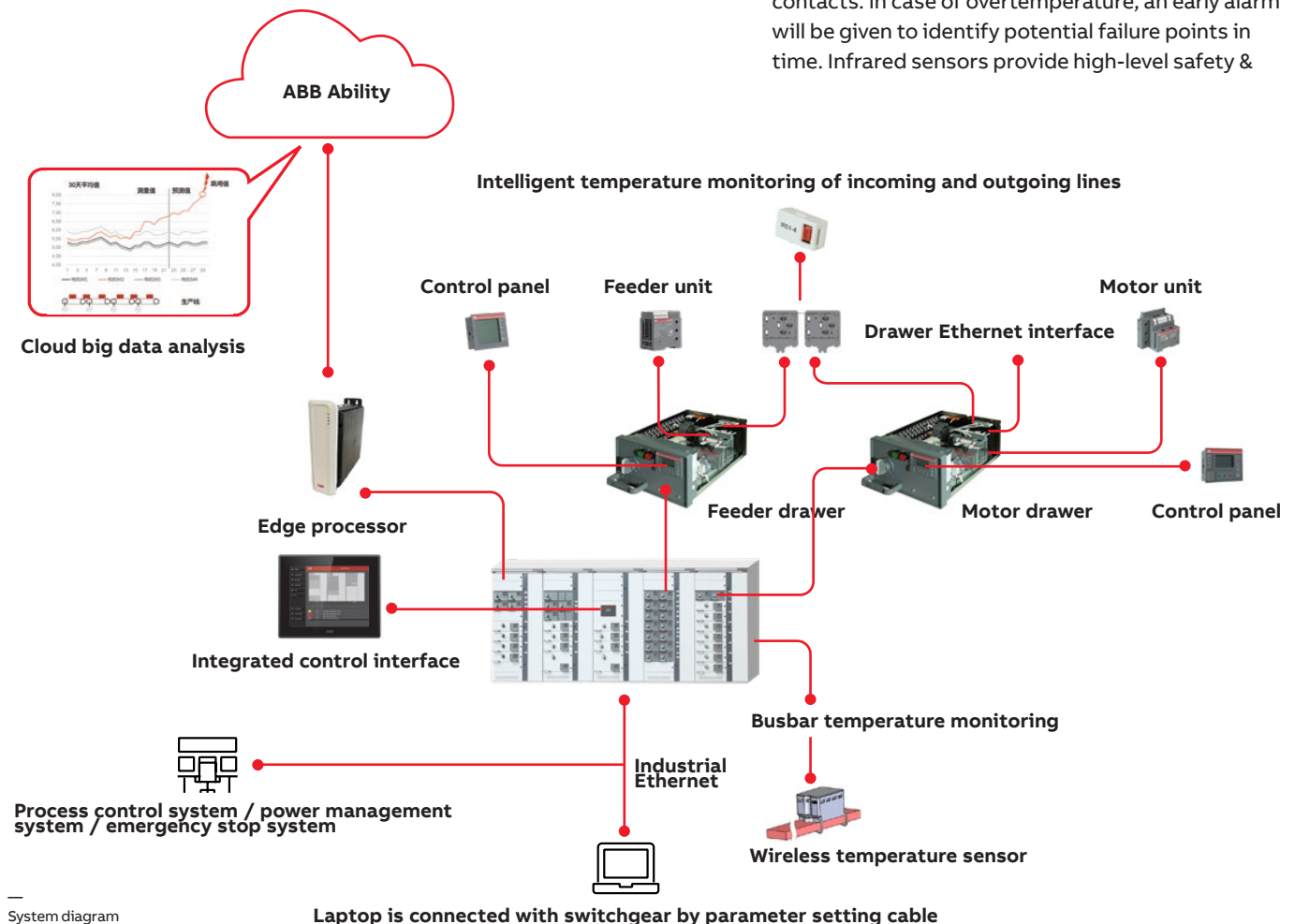
A new generation of MNS Digital solution, which inherits the excellent quality standards and manufacturing technology of MNS® system and integrates Internet and smart sensor technology, can realize remote monitoring, control and setting, and provide detailed fault diagnosis and event log to help users to carry out large data analysis; it can provide early alarm of equipment faults, and achieve proactive maintenance to ensure safe, reliable and continuous electricity demand. Safe and continuous production 24/7 is critical to process industry users. MNS Digital solution has maintained and developed the safety and reliability of MNS®, which can provide more reliable continuous power supply for customers and ensure the higher personal safety of operating personnel.

Powerful Ethernet communication

Industrial standard communication interfaces is applied and the communication rate is a few hundred times of that of traditional communication network, so that the information can be transmitted to the relevant people (such as operators & maintenance staff, and management personnel) in an allround way. Reliable Ethernet connection technologies are adopted to meet the operating requirements for industrial environment; A loop structure is achieved to establish a redundant system for the safer communication. And full certification for the network security is available to prevent the network from being attacked.

Advanced temperature measurement

Infrared technology is used for realtime online monitoring of incoming and outgoing power contacts. In case of overtemperature, an early alarm will be given to identify potential failure points in time. Infrared sensors provide high-level safety &



easy to maintain features due to its plug-in design & contactless monitoring in high current areas of the switchgear assembly. Therefore no additional insulation measure is needed for the intelligent temperature monitoring system.

Scalability of control modules

Optional control modules are provided for better system scalability based on diverse requirements.

- simple or complex motor starting types (14 starting types for selection)
- protection functions (16 protection functions for selection)
- feeder management (monitoring and diagnosis)
- field input/output signal

System access based on "off-the-shelf" universal web browser

Through the network browser, authorized users can easily access to the system via any device with embedded network server. Information could be obtained by just clicking the link under a friendly operating interface.

Ethernet communication connection

Industrial Ethernet has been widely used for high-speed communication between the same industrial network backbones and for data collection & long-term preventive maintenance. Ethernet is also being used gradually at the device layer. This means that Ethernet provides an ideal environment for interoperability between control layers of the plant.

The operation is more transparent, more reliable and more cost-effective under the unified Ethernet communication environment.

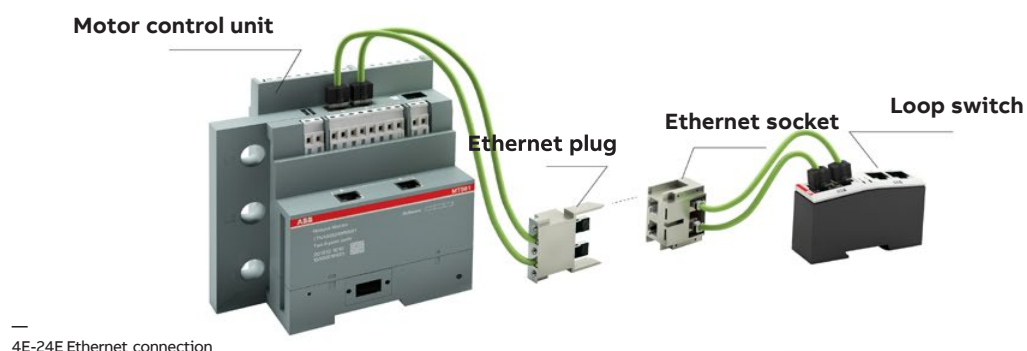
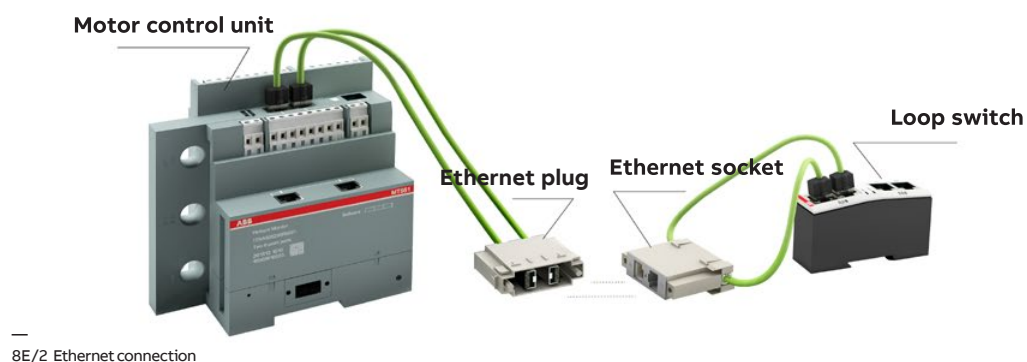
Features and advantages:

- Support multiple topologies
- Support ring redundancy
- Support MRP (Media Redundancy Protocol)
- Support removable withdrawable modules with loop switch

Demanding connection and wiring requirements of Ethernet high-speed communication could be fulfilled with switchgear and Ethernet communication integrated in the same MNS Digital solution. For withdrawable modules, not only high-speed communication requirements of Ethernet systems but also requirements of system connection reliability against mechanical shock could be met by MNS Digital solution. The Ethernet interface consists of two parts, namely the plug and the socket.

For 8E/2 withdrawable modules, the Ethernet plug is embedded in the rear panel of the withdrawable modules and the Ethernet socket is integrated into the adapter.

For 4-24E withdrawable modules, the Ethernet plug is mounted on the right side of the withdrawable modules and the Ethernet socket is mounted in the cable compartment.



Motor management

Motor management module MC510

MC510 is a scalable controller used for motor starter circuits and contactor feeder circuits, which can help users control, protect and monitor these circuits more professionally. It can perform all the required tasks, and its advantages include:

- Modular design concept
- High operation performance and enhanced safety
- Supporting various motor starting types
- Excellent motor protection functions
- Multifarious measurement and diagnostic functions
- Proactive maintenance possibility
- Flexible logic programming



Motor management module MC510



Operation panel MP51

In-situ monitoring scheme

Human-machine interface MV570

MNS Digital solution provides a human-machine interface MV570 to display the operating condition of connected devices. In addition, MV570 is also a web interface enabling the access via any standard personal computer web browser, such as Microsoft's Internet Explorer. MV570 is a touch tablet conforming to industry standard, which is mounted directly on the switchgear. ABB's "plant-wide informatization" concept is fully reflected here.

Based on users' access rights, MV570 provides the following functional options:

1. Monitoring:

- Realtime data for circuit operation (current, voltage, power, power factor, power contact temperature, etc.)
- Circuit status: run/stop
- Alarm and trip information

2. Parameterization

- Access control and protection parameters
- Download control and protection parameters

3. Control:

- Start/stop/trip reset

4. Maintenance:

- SOE
- Motor start/stop time
- Number of starts
- Number of trips
- MC510 firmware upgrading

5. Project management:

- Create new project, copy project or delete project
- Switchgear layout interface editing

6. User management:

- Add or delete accounts for different types of users
- Password management



Monitoring system integrated into plant area

MNS Digital is a LV switchgear platform integrated with control system which is really based on the Internet technology. ABB's digital switchgear solutions integrates innovative protection, control and sensing devices, where all measurements, status and commands are reliably transferred on a realtime Ethernet communication bus via the Modbus TCP, OPC-UA or IEC 61850 protocol as applicable and desired based on the final needs. MNS Digital solution provides process operators, electrical engineers, maintenance teams and plant management personnel with the required engineering information.

Plant control system

The application of industrial process control system needs the support of multiple systems that are connected to the switchgear and motor control center via an Ethernet communication interface.

This is because specific users raise different control operational requirements and need different information at different operating locations.

MNS Digital solution strives to meet users' needs and effectively support multiple industrial Ethernet communication interfaces and applications.

Grid monitoring / SCADA

The plant's electricity demand is increasing, so is the need for electrical monitoring and site conditions monitoring.

Being able to provide the right information at the right time is so vital that it may determine whether or not a plant is profitable.

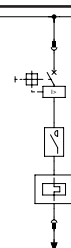
This function is an important part of MNS Digital solution.

With the standard industry Ethernet interface, it is easy to access to the below electrical data:

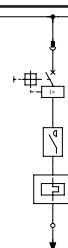
- Measured values, equipment status and failure analysis
- Time records of alarms and events

Solution No.

09



10



Motor Starter (Direct-on-line)

1000 (600^[1])

Withdrawable

Fixed

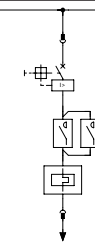
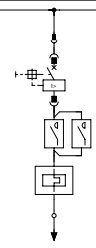
Power (kW)	Rating (A)	Main switching device	Contactor	Overload relay	Current range	Height	Height
0.06	0.2	MO132-0.25	AF09	TF42-0.23	0.17-0.23	8E/2	8E
0.09	0.3	MO132-0.4	AF09	TF42-0.31	0.23-0.31	8E/2	8E
0.12	0.44	MO132-0.63	AF09	TF42-0.55	0.41-0.55	8E/2	8E
0.18	0.6	MO132-0.63	AF09	TF42-0.74	0.55-0.74	8E/2	8E
0.25	0.85	MO132-1.0	AF09	TF42-1.0	0.74-1.0	8E/2	8E
0.37	1.1	MO132-1.6	AF09	TF42-1.3	1.0-1.3	8E/2	8E
0.55	1.5	MO132-1.6	AF09	TF42-1.7	1.3-1.7	8E/2	8E
0.75	1.9	MO132-2.5	AF09	TF42-2.3	1.7-2.3	8E/2	8E
1.1	2.7	MO132-4.0	AF26	TF42-3.1	2.3-3.1	8E/2	8E
1.5	3.6	MO132-4.0	AF26	TF42-4.2	3.1-4.2	8E/2	8E
2.2	4.9	MO132-6.3	AF26	TF42-5.7	4.2-5.7	8E/2	8E
3	6.5	MO132-10	AF26	TF42-7.6	5.7-7.6	8E/2	8E
4	8.5	MO132-10	AF26	TF42-10	7.6-10	8E/2	8E
5.5	11.5	MO132-12	AF26	TF42-13	10-13	8E/2	8E
7.5	15.5	MO132-16	AF26	TF42-16	13-16	8E/2	8E
11	22	MO132-25	AF26	TF42-24	20-24	8E/2	8E

Remark:dimension [1] is for MNS rear access.

Solution No.						11	12
Singleline							
Application						Motor Starter (DOL)	
Width (mm)						1000 (600 ⁽¹⁾)	
Module type						Withdrawable	Fixed
Power (kW)	Rating (A)	Main switching device	Contactor	Overload relay	Current range	Height	
0.37	1.1	XT2S160 MF2	AF09	EF19-2.7	0.8 ... 2.7	8E/2,8E	TBD
0.55	1.5	XT2S160 MF2	AF09	EF19-2.7	0.8 ... 2.7	8E/2,8E	TBD
0.75	1.9	XT2S160 MF2	AF09	EF19-2.7	0.8 ... 2.7	8E/2,8E	TBD
1.1	2.7	XT2S160 MF4	AF26	EF19-6.3	1.9 ... 6.3	8E/2,8E	TBD
1.5	3.6	XT2S160 MF4	AF26	EF19-6.3	1.9 ... 6.3	8E/2,8E	TBD
2.2	4.9	XT2S160 MF8.5	AF38	EF19-6.3	1.9 ... 6.3	8E/2,8E	TBD
3	6.5	XT2S160 MF8.5	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
4	8.5	XT2S160 MF12.5	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
5.5	11.5	XT2S160 MF12.5	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
7.5	15.5	XT2S160 MA20	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
11	22	XT2S160 MA32	AF40	EF65-56	20 ... 56	8E/2,8E	TBD
15	29	XT2S160 MA32	AF40	EF65-70	25 ... 70	8E/2,8E	TBD
18.5	35	XT2S160 MA52	AF40	EF65-70	25 ... 70	8E/2,8E	TBD
22	41	XT2S160 MA52	AF52	EF65-70	25 ... 70	8E/2,8E	TBD
30	55	XT2S160 MA80	AF65	EF65-70	25 ... 70	8E	TBD
37	66	XT2S160 MA160	AF116	EF146-150	54 ... 150	8E	TBD
45	80	XT2S160 MA160	AF116	EF146-150	54 ... 150	8E	TBD
55	97	XT2S160 MA160	AF116	EF146-150	54 ... 150	8E	TBD
75	132	XT2S160 MA160	AF140	EF146-150	54 ... 150	8E	TBD
90	160	XT4S250 Ekip I In 250	AF190	EF205-210	63 ... 210	12E	TBD
110	195	T5S 400 PR221DS-I In 400	AF265	EF370-380	115 ... 380	16E	TBD
132	230	T5S 400 PR221DS-I In 400	AF265	EF370-380	115 ... 380	16E	TBD
160	280	T5S 400 PR221DS-I In 400	AF305	EF370-380	115 ... 380	24E	TBD
200	350	T6S 630 PR221DS-I In 630	AF460	EF460-500	150 ... 500	24E	TBD
250	430	T6S 630 PR221DS-I In 630	AF460	EF460-500	150 ... 500	24E	TBD

Remark:dimension [1] is for MNS rear access.

Motor Starter, Reversing Starter, Withdrawable/ Fixed Module (XTmax+EOL), type 2

Solution No.						13	14
Singleline							
Application						Motor Starter (Reversing)	
Width (mm)						1000 (600 ^[1])	
Module type						Withdrawable	Fixed
Power (kW)	Rating (A)	Main switching device	Contactorx2	Overload relay	Current range	Height	
0.37	1.1	XT2S160 MF2	AF09	EF19-2.7	0.8 ... 2.7	8E/2,8E	TBD
0.55	1.5	XT2S160 MF2	AF09	EF19-2.7	0.8 ... 2.7	8E/2,8E	TBD
0.75	1.9	XT2S160 MF2	AF09	EF19-2.7	0.8 ... 2.7	8E/2,8E	TBD
1.1	2.7	XT2S160 MF4	AF26	EF19-6.3	1.9 ... 6.3	8E/2,8E	TBD
1.5	3.6	XT2S160 MF4	AF26	EF19-6.3	1.9 ... 6.3	8E/2,8E	TBD
2.2	4.9	XT2S160 MF8.5	AF38	EF19-6.3	1.9 ... 6.3	8E/2,8E	TBD
3	6.5	XT2S160 MF8.5	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
4	8.5	XT2S160 MF12.5	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
5.5	11.5	XT2S160 MF12.5	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
7.5	15.5	XT2S160 MA20	AF38	EF19-18.9	5.7 ... 18.9	8E/2,8E	TBD
11	22	XT2S160 MA32	AF40	EF65-56	20 ... 56	8E/2,8E	TBD
15	29	XT2S160 MA32	AF40	EF65-70	25 ... 70	8E/2,8E	TBD
18.5	35	XT2S160 MA52	AF40	EF65-70	25 ... 70	8E/2,8E	TBD
22	41	XT2S160 MA52	AF52	EF65-70	25 ... 70	8E/2,8E	TBD
30	55	XT2S160 MA80	AF65	EF65-70	25 ... 70	8E	TBD
37	66	XT2S160 MA160	AF116	EF146-150	54 ... 150	16E	TBD
45	80	XT2S160 MA160	AF116	EF146-150	54 ... 150	16E	TBD
55	97	XT2S160 MA160	AF116	EF146-150	54 ... 150	16E	TBD
75	132	XT2S160 MA160	AF140	EF146-150	54 ... 150	16E	TBD
90	160	XT4S250 Ekip I In 250	AF190	EF205-210	63 ... 210	16E	TBD
110	195	T5S 400 PR221DS-I In 400	AF265	EF370-380	115 ... 380	24E	TBD
132	230	T5S 400 PR221DS-I In 400	AF265	EF370-380	115 ... 380	24E	TBD
160	280	T5S 400 PR221DS-I In 400	AF305	EF370-380	115 ... 380	24E	TBD

Remark: dimension [1] is for MNS rear access.

[illegible]

Remark:dimension [1] is for MNS rear access.

Motor Starter, Direct on line Starter with XTmax+M102, type 2

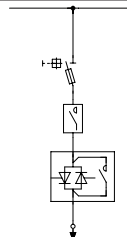
[illegible]

Remark:dimension [1] is for MNS rear access.

Motor Starter, Reversing Starter with XTmax+M102, type 2

Solution No.						19	20
Singleline							
Application						Motor Starter (M102 Reversing)	
Width (mm)						1000 (600 ^[1])	
Module type						Withdrawable	
Power (kW)	Rating (A)	Main switching device	Contactor2x	Motor protector	Protective transformer	Height	
0.37	1.1	XT2S160 MF2	AF09	M102/MC510		8E/2,8E	
0.55	1.5	XT2S160 MF2	AF09	M102/MC510		8E/2,8E	
0.75	1.9	XT2S160 MF2	AF09	M102/MC510		8E/2,8E	
1.1	2.7	XT2S160 MF4	AF26	M102/MC510		8E/2,8E	
1.5	3.6	XT2S160 MF4	AF26	M102/MC510		8E/2,8E	
2.2	4.9	XT2S160 MF8.5	AF38	M102/MC510		8E/2,8E	
3	6.5	XT2S160 MF8.5	AF38	M102/MC510		8E/2,8E	
4	8.5	XT2S160 MF12.5	AF38	M102/MC510		8E/2,8E	
5.5	11.5	XT2S160 MF12.5	AF38	M102/MC510		8E/2,8E	
7.5	15.5	XT2S160 MA20	AF38	M102/MC510		8E/2,8E	
11	22	XT2S160 MA32	AF40	M102/MC510		8E/2,8E	
15	29	XT2S160 MA32	AF40	M102/MC510		8E/2,8E	
18.5	35	XT2S160 MA52	AF40	M102/MC510		8E/2,8E	
22	41	XT2S160 MA52	AF52	M102/MC510		8E/2,8E	
30	55	XT2S160 MA80	AF65	M102/MC510		8E	
37	66	XT2S160 MA160	AF116	M102/MC510	PCT 3L 200/5R	16E	
45	80	XT2S160 MA160	AF116	M102/MC510	PCT 3L 200/5R	16E	
55	97	XT2S160 MA160	AF116	M102/MC510	PCT 3L 200/5R	16E	
75	132	XT2S160 MA160	AF140	M102/MC510	PCT 3L 200/5R	16E	
90	160	XT4S250 Ekip I In 250	AF190	M102/MC510	PCT 3L 200/5R	16E	
110	195	T5S 400 PR221DS-I In 400	AF265	M102/MC510	PCT 4L 300/5R	24E	
132	230	T5S 400 PR221DS-I In 400	AF265	M102/MC510	PCT 4L 300/5R	24E	
160	280	T5S 400 PR221DS-I In 400	AF305	M102/MC510	PCT 4L 300/5R	24E	

Solution No.	21
Singleline	



Application							Motor Starter (softstarter)
Module type							Fixed
Power (kW)	Rating (A)	Main switching device	Fuse (aR)	Main contactor	Pass-by contactor	Softstarter	Height
15	30	OS32GD12	100	AF30	Built-in	PSTX30	24E
18.5	37	OS63GD12	125	AF38	Built-in	PSTX37	24E
22	45	OS63GD12	160	AF52	Built-in	PSTX45	24E
30	60	OS63GD12	160	AF65	Built-in	PSTX60	24E
37	72	OS125GD12	250	AF80	Built-in	PSTX72	24E
45	85	OS125GD12	315	AF96	Built-in	PSTX85	24E
55	106	OS250D12	400	AF116	Built-in	PSTX105	32E/400x2200(2300[1])
75	143	OS400D12	500	AF140	Built-in	PSTX142	400x2200(2300[1])
90	171	OS400D12	630	AF190	Built-in	PSTX170	400x2200(2300[1])
110	210	OS400D12	630	AF205	Built-in	PSTX210	400x2200(2300[1])
132	250	OS400D12	700	AF265	Built-in	PSTX250	400x2200(2300[1])
160	300	OS630D12	800	AF305	Built-in	PSTX300	600x2200(2300[1])
200	370	OS630D12	900	AF370	Built-in	PSTX370	600x2200(2300[1])
250	470	OS630D12	900	AF460	Built-in	PSTX470	600x2200(2300[1])
315	570	OS630D12	1000	AF580	Built-in	PSTX570	600x2200(2300[1])
400	720	OT800D12	1250	AF750	Built-in	PSTX720	800x2200(2300[1])
450	840	E2.2N1600	1,500	AF1350	Built-in	PSTX840	1000x2200(2300[1])
560	1050	E2.2N2000	1,800	AF1650	Built-in	PSTX1050	1000x2200(2300[1])
710	1250	E2.2N2000	2,000	-	Built-in	PSTX1250	1000x2200(2300[1])

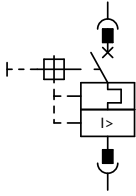
Remark: Dimension [1] is for MNS rear access.
Millimeter (mm) is used as length unit unless otherwise noted.

Motor Starter, Variable Frequency Driver ACS880, type 2

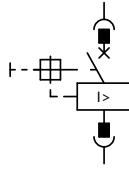
[illegible]

Remark: Dimension [1] is for MNS rear access.
Millimeter (mm) is used as length unit unless otherwise noted.

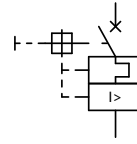
Legends



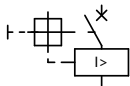
Plug-in/withdrawable circuit breaker
(overload and short-circuit protection)



Plug-in/withdrawable circuit breaker
(short-circuit protection only)



Fixed circuit breaker
(overload and short-circuit protection)



Fixed circuit breaker
(short-circuit protection only)



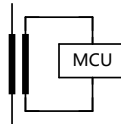
Switch fuse



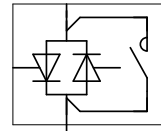
Contactor



Thermal relay



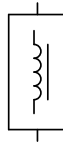
Motor control and protection unit



Softstarter



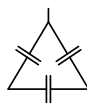
Variable speed drive



Du/Dt filter



Fuse switch disconnect



Capacitor



Reactor



Arrester



Current transformer



Motor operator of circuit breaker



Cable plug
(plug-in/fixed connection)