

DISTRIBUTION SOLUTIONS

SEN Plus

Reliable low-voltage
switchgear solutions



SEN Plus, a complete solution

From power distribution to sophisticated intelligent motor control applications, SEN Plus is the ideal solution. Robust design, technical excellence and state-of-the-art safety features make SEN Plus the obvious choice for electrical installations in all different environments, or whenever reliable power distribution, process continuity and optimal equipment availability are critical.

As part of the ABB Distribution Solutions portfolio, SEN Plus' safe, reliable and efficient system helps distribute, protect and control electricity worldwide.

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Why SEN Plus?



Boundaryless

Fully DEKRA certified assemblies up to 6300A for power distribution and motor control as per IEC 61439-2 / EN 61439-2. Enables usage in a global environment.



Production environment

Certified to IEC 60529 for IP30 - IP54 arrangements. Enables the installation of the equipment in a range of environmental conditions.



Safe modifications

Up to Form 4B as per IEC 61439-2
Facilitates safe modification under energized conditions.



Functional floor space

Allows maximum utilisation of functional floor space in building services.



Fast delivery

Fast and efficient assembly techniques secures fast deliveries and customer satisfaction.



Resistant

Product design and epoxy powder coating provides a shock and scratch resistant design. Minimizes damage during installation.



Lower investment

Central design and ongoing testing to the latest standards. Lowers investment costs.



Environmental benefits

Control of waste and packaging reduces manufacturing processes, additional power monitoring features provide energy saving opportunities.

Markets

The SEN Plus system has been designed from the outset based on customer requirements. The result is a product that offers unrivalled flexibility and user safety, backed up by comprehensive testing and support for many specific applications.

Buildings, machinery and processes

Commercial

- Small and large offices
- Warehouses
- Shopping malls
- Schools
- Hospitals
- Airports

Industrial

- Printing
- Machinery
- Pharmaceutical
- Automotive
- Paper and pulp
- Chemical industry
- Marine
- Oil and gas

Utilities

- Water treatment plants
- Waste management
- Energy distribution (Electricity and gas)
- Telecommunications
- Public transport

Flexible system to suit your requirements

SEN Plus system can meet the most demanding requirements from high current applications up to 6300A down to motor control applications for a few kW. Furthermore the system is available in different configurations, which include:

- Fixed, plug-in, withdrawable
- Front or rear access
- Distribution
- Motor control

The system offers varying forms of separation up to Form 4B to IEC 61439-2 and ingress protection from IP30 to IP54.



Safety

Safety

The combination of SEN Plus and ABB Emax 2 air circuit breaker excel in terms of safety – both for personnel as well as system protection.

The switchgear has been independently tested to IEC 61439. With a short-circuit fault withstand rating up to 100kA the system is equipped to deal with large faults. Compartmentalization of the functional areas will help to reduce the risk of accidental contact to live parts during maintenance and operations. To ensure the highest operator protection additional tests have been performed, verifying the resistance against arc flash events.

Complete system control

As a manufacturer of various types of protective equipment ABB offers a complete choice, which includes:

- Miniature, moulded case and air circuit breakers
- Fuses and switch disconnectors
- Variable speed drives and contactors
- Intelligent motor management solutions

Communication and control increasingly forms part of a system – data exchange via Ethernet, Profibus or Modbus is available for most components, to ensure a homogeneous setup.

Environmental considerations

Caring for the environment in which we live and work is playing an increasingly important role in the considerations for the purchase of electrical equipment. SEN Plus has taken this into account in every aspect of its design.

Manufacturing process

The manufacturing plants are certified to ISO 14001 eliminating waste and packaging. Six Sigma and ISO 9001 ensure that waste is eliminated through highest efficiency in processing and design.

Components

The steelwork used is mild steel and does not contain harmful cadmium. The frames are zinc plated to prevent corrosion and ensure the product has a long life.

Operation

You can manage your impact upon the environment while operating SEN Plus by using the various accessories that can improve energy efficiency, like usage of variable speed drives, kWh meters or intelligent motor management modules. A range of software is available to get the highest grade of efficiency while using such products.



Certification

SEN Plus has been designed in close consultation with our customers to ensure the product really does what you need it to do. The result is a system that really meets all the key requirements and a wide range of technical specifications as proven by comprehensive testing and full DEKRA certification.

Design verification

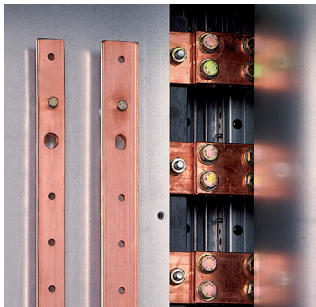
Design verification in accordance with IEC EN 61439-2 will include:

- Verification of the characteristics relevant to construction:
 - Strength of materials and parts
 - Degrees of protection IP
 - Clearances and creepage distances
 - Protection against electric shock and integrity of protective circuits
 - Incorporation of switching devices and of components
 - Internal electrical circuits and connections
 - Terminals for external conductors
- Verifications of the characteristic relevant to the performance:
 - Dielectric properties
 - Verification of temperature-rise limits
 - Short-circuit withstand strength
 - Electromagnetic compatibility (EMC)
 - Mechanical operation.
- Complementary testing
 - Testing under conditions of arcing due to an internal fault according to IEC TR 61641
 - Seismic qualification following IEEE 693 and ICC ES AC156 test criteria

Photo courtesy
of DEKRA



Benefits of SEN Plus



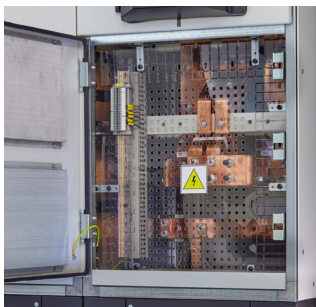
Easy commissioning on site

- Main busbars links are accessible from the front



Rigid frame construction

- Non-welded self-supporting construction
- Doors and covers in 2mm sheet steel



Simplified cabling

- Optimized terminal bar arrangement for large cable cross sections



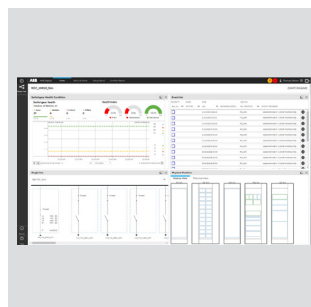
Optimum accessibility

- 135/180° door opening angle



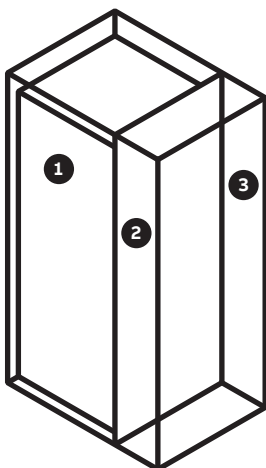
Communication

- Ethernet, Modbus and Profibus are available to integrate industrial automation and communication requirements



Ready to support ABB Ability™

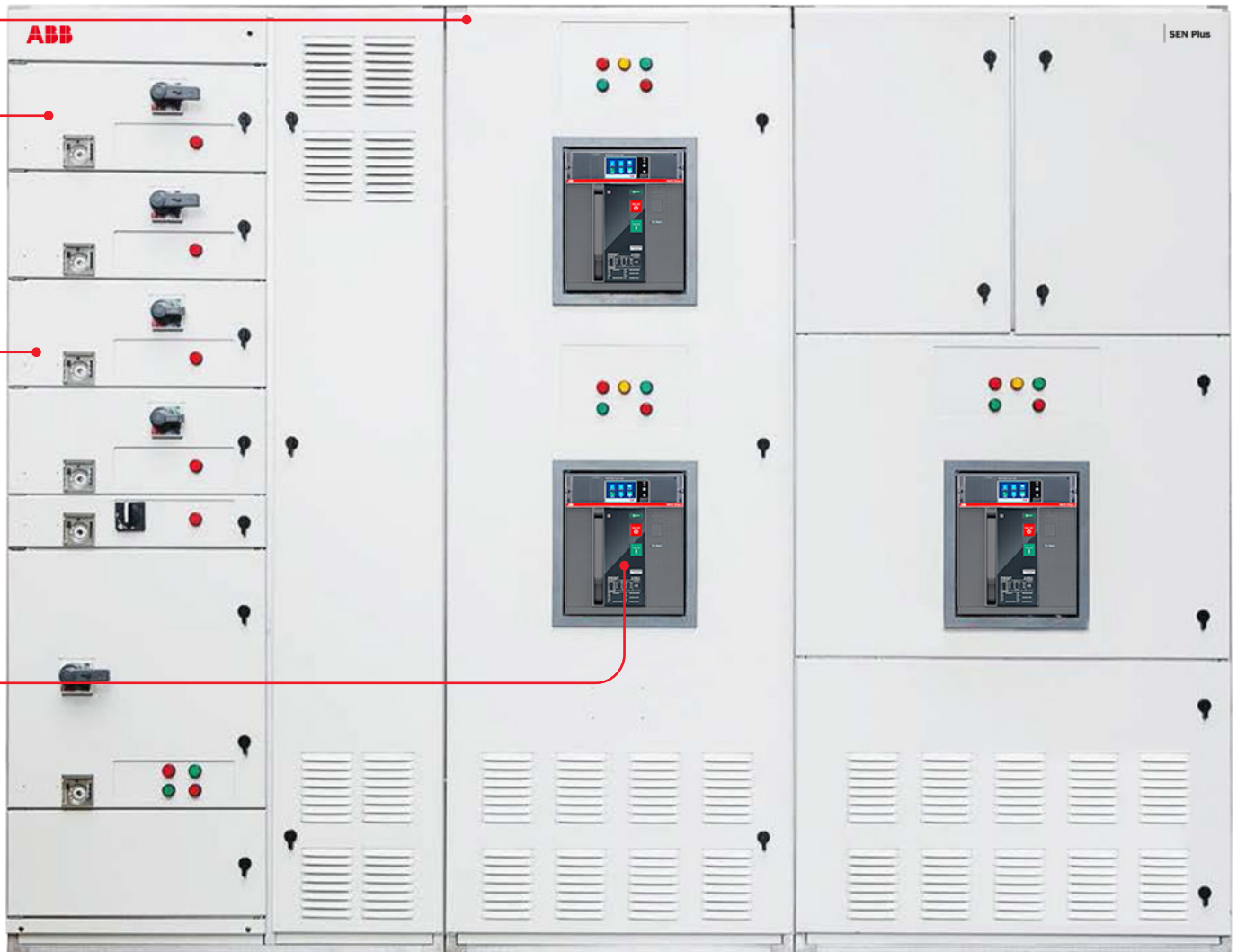
- SEN Plus is ready to realize sophisticated industrial automation and communication solutions supporting protection, control and monitoring requirements



Internal form of separation

- Panel clearly structured into the 3 different zones: equipment, cable and busbar zone
- Up to form 4 separation possible

- 1 Equipment zone
- 2 Cable zone
- 3 Busbar zone



Complete system integration

- Equipped with the complete range of IEC 60947 tested components

All for your safety



Operator protection

- A special mechanism allows full operation of the module while the door is closed. This ensures the maximum safety level for the operator.



Prepared to work in rough environments

- DEKRA certified dust and water protection up to a degree of protection of IP54
- Real tests at 50°C ambient temperature



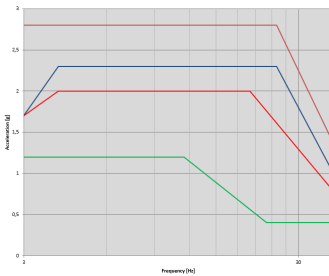
Ready to withstand internal arc faults

- Proven passive protection as per EC 61641 & optional active protection using the ABB Arc Guard System TVOC II



Highly technical features

- Ready to support highest technical requirements for both power distribution and motor control applications



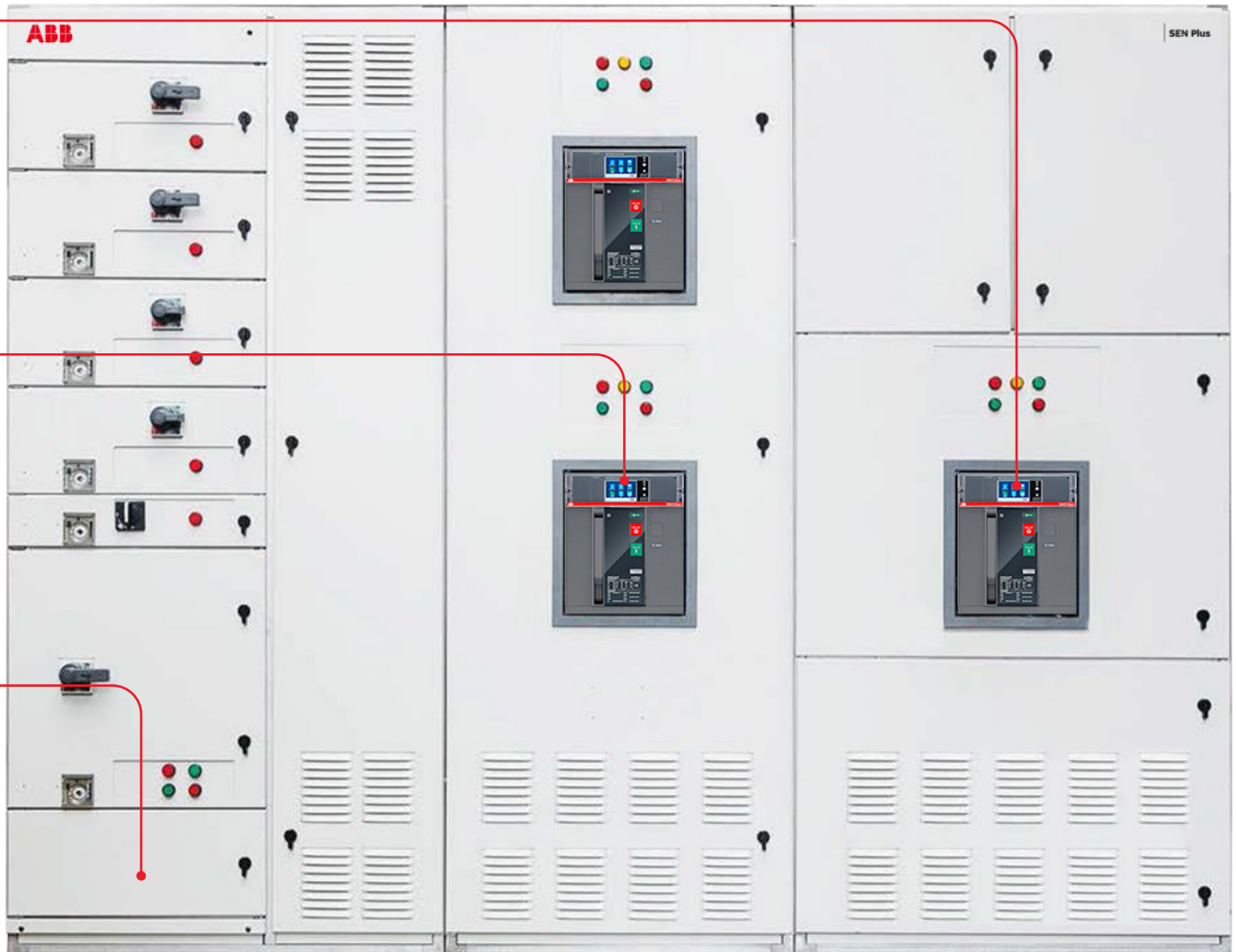
Seismic proven design

- Compliant with the most important seismic standards
- Process continuity during & after the seismic event



Easy and safe operation and maintenance

- Finger proof shrouds and barriers prevent accidental contact with busbars
- Door locks according to your safety requirements



Comprehensive distribution solutions



ABBAbility™ Energy and Asset Management

- Ready for the future – reliable remote control, monitoring and analysis of your energy consumption via bus communication



Continuous operation

- Various features for optimized ventilation and electronic monitoring to ensure continuous performance in all conditions



Addressing increased industry demands for safe energy distribution

- Compact, space-saving design
- Easy installation
- Increased cabling space



A cutting-edge molded case circuit-breaker range

- modular, upgradable design using one-fits-all accessories. * Upgradable from basic functions to a sophisticated device with Ekip Touch trip unit



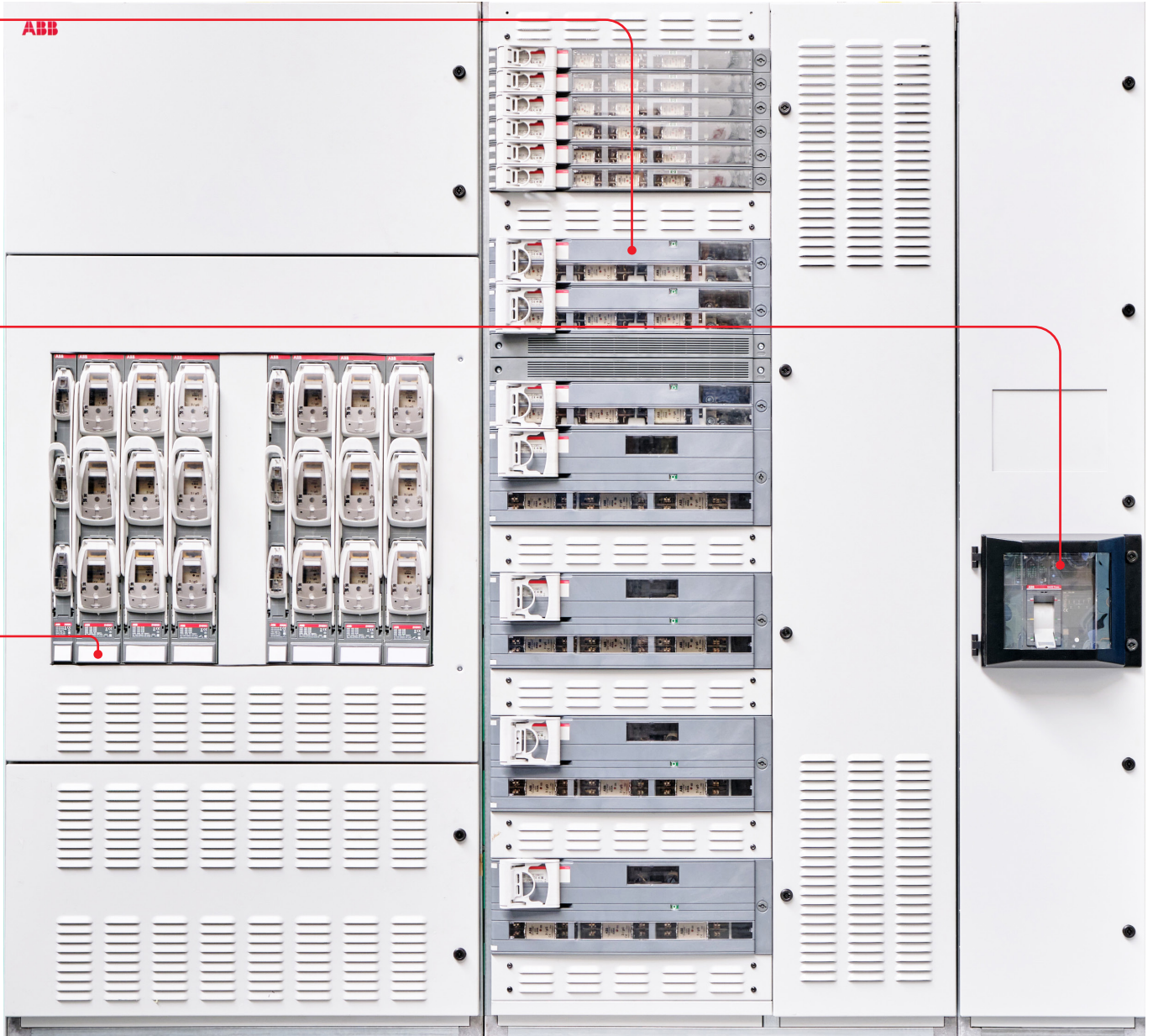
CombiLine N module

- Sub-distribution solutions up to 400A
- For modular components on DIN-rails
- Mounting plates



Complete fusegear product portfolio

- Motor operated switch fuses
- Electronic fuse monitoring
- Smart metering & monitoring solutions



Standard applications

Feeder arrangements

400 V

3 pole				4 pole	
Current	Circuit breaker	Unit height	Module size	Unit height	Module size
[A]	Type	[mm]		[mm]	
Up to 20	MS132	125	5E	-	-
Up to 32	MS165	125	5E	-	-
Up to 125	XT2L 160	125	5E	250	10E
Up to 250	XT4L 250	250	10E	250	10E
Up to 630	XT5L 630	250	10E	300	12E

500 V

3 pole				4 pole	
Current	Circuit breaker	Unit height	Module size	Unit height	Module size
[A]	Type	[mm]		[mm]	
Up to 125	XT2V 160	150	6E	250	10E
Up to 250	XT4V 250	250	10E	250	10E
Up to 630	XT5L 630	250	10E	300	12E

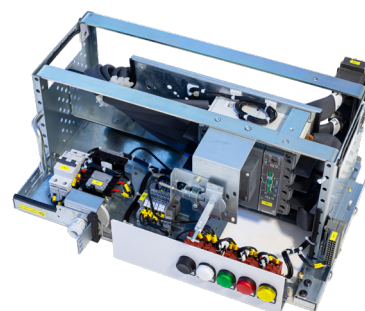
690 V

3 pole				4 pole	
Current	Circuit breaker	Unit height	Module size	Unit height	Module size
[A]	Type	[mm]		[mm]	
Up to 250	XT4X 250	250	10E	250	10E
Up to 630	XT5L	250	10E	300	12E

400 V, 500 V, 690 V

3 pole				4 pole		
Current	Switch disconnector	Unit height	Module size	Switch disconnector	Unit height	Module size
[A]	Type	[mm]		Type	[mm]	
Up to 160A	XR00	50	2E	XR00	100	4E
Up to 250A	HR1	100	4E	XR1	150	6E
Up to 400A	HR2	200	8E	XR2	250	10E
Up to 630A	HR3	200	8E	XR3	250	10E

Withdrawable modules



Switch disconnector fuse type Slimline XR



Feeder arrangements

400 V, 500 V, 690 V

Current	Tmax XT	3 pole	4 pole
		width	width
[A]	Type	[mm]	[mm]
Up to 800A	1 x XT7	400/500/600	500/600/800
Up to 1250A	1 x XT7	400/500/600	500/600/800
Up to 1600A	1 x XT7	400/500/600	500/600/800

400 V, 500 V, 690 V

Current	Tmax XT	3 pole	4 pole
		width	width
[A]	Type	[mm]	[mm]
Up to 800A	2 x XT7	400/500/600	500/600/800
Up to 1250A	2 x XT7	400/500/600	500/600/800
Up to 1600A	2 x XT7	400/500/600	500/600/800



400 V, 500 V, 690 V

Current	Fuse Switch disconnecter	3 pole	
		Unit height	Module size
[A]	Type	[mm]	
Up to 160A	ZHBM00	50	2E
Up to 250A	ZHBM1	100	4E
Up to 400A	ZHBM2	100	4E
Up to 630A	ZHBM3	100	4E

Fuse switch disconnector
type Inline II



Dimensions

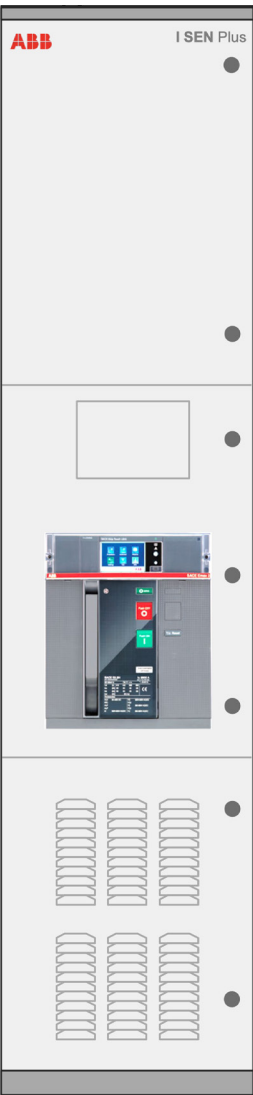
Power Center

1600 A



depth: 600/800/1000mm

2000 A



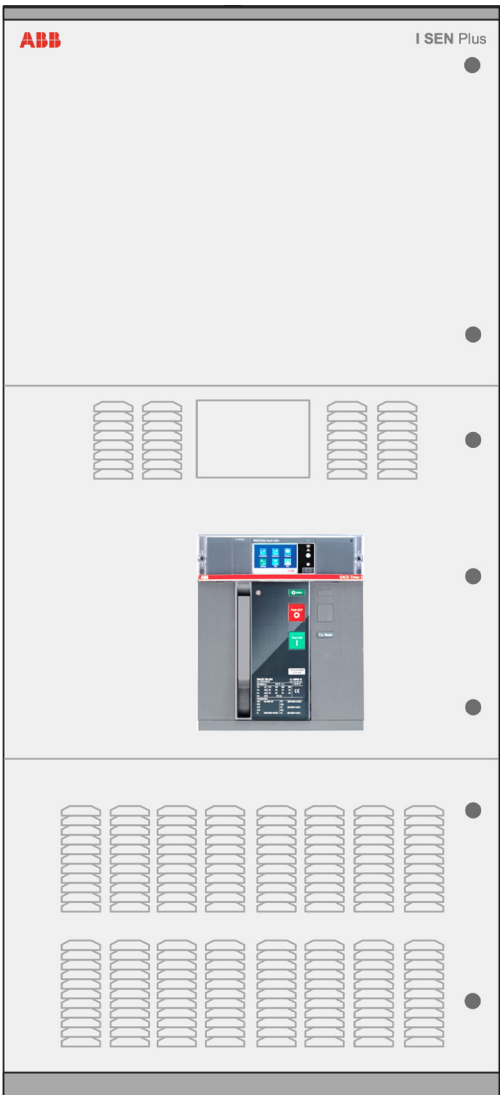
depth: 600/800/1000mm

2500 - 4000 A



depth: 600/800/1000mm

5000 - 6300 A



depth: 1000mm

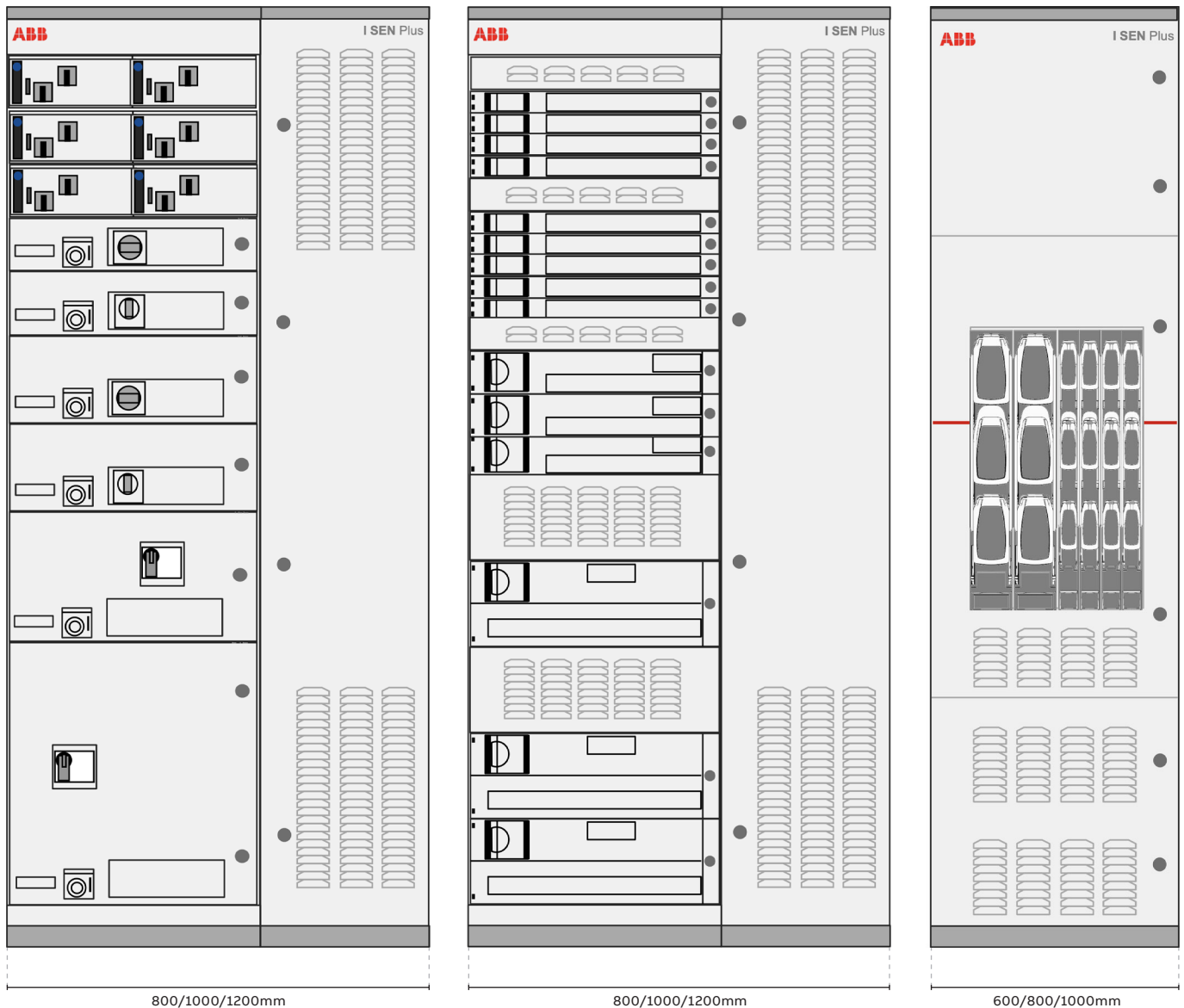
Dimensions in mm

	Height	Width	Depth	Devices
up to 1600A	2200	400/500	600/800/1000	1 or 2 MCCBs/1 or 2 ACBs
up to 2500A	2200	500/600	600/800/1000	1 or 2 ACBs
2500-4000A	2200	600/800	600/800/1000	1 ACB
5000A-6300A	2200	1000/1200	600/800/1000	1 ACB

Height ventilated roof + 165 mm

Dimensions

Motor Control Center & Distribution Board



Dimensions in mm

	Height	Width	Depth	Devices
Fixed design	2200	600/800/1000	600/800/1000	Fuse switch disconnectors
Plug-in design (185mm)	2200	800/1000/1200	600/800/1000	Switch disconnectors
Plug-in design (60mm)	2200	800/1000/1200	600/800/1000	Motor starter and feeder
Withdrawable design	2200	800/1000/1200	600/800/1000	Motor starter and feeder

Height ventilated roof + 165 mm

Technical data

Electrical data

Rated operational voltage	Ue	up to 690 V AC
Rated frequency	f	50/60 Hz
Rated insulation voltage	Ui	
Rated impulse withstand voltage	Uimp	8/12kV
Overvoltage category		III/IV
Ambient air temperature		-5°C to +40°C (see note 1)
Rated current horizontal busbars		1000A up to 6700A
Rated current vertical busbars PC		1250A up to 6300A
Rated current vertical busbars MCC		1000A up to 1900A
Rated short time withstand current	Icw	up to 100kA , 1s
Rated peak withstand current	Ipk	up to 220kA
Rated conditinal short-circuit current	Icc	up to 100kA

Mechanical data

Dimensions of columns	height	2200mm
	depth	600/800/1000mm
	width	400–1200mm
Modularity		1E = 25mm
Maximum stacking density		80E
Standard module size		5E up to 36E
Degree of protection		IP30 / IP42 / IP54
Internal separation PC		up to form 4b
Internal separation MCC		form 3b / 4b
Painting		Epoxy - Polyester
		RAL 7035

Standards

Design verification	IEC 61439-1/-2, Edition 3.0
Internal arc testing	IEC TR 61641
Arc fault mitigation systems	IEC TS 63107
Seismic testing	IEEE 693 / ICC ES AC156

Note 1: also tested & certified for ambient air temperature of 50°C



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