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UniSec

Medium Voltage Air Insulated Switchgear for Secondary Distribution

Product Presentation, 2024



UniSec - Air Insulated SWG for Secondary Distribution

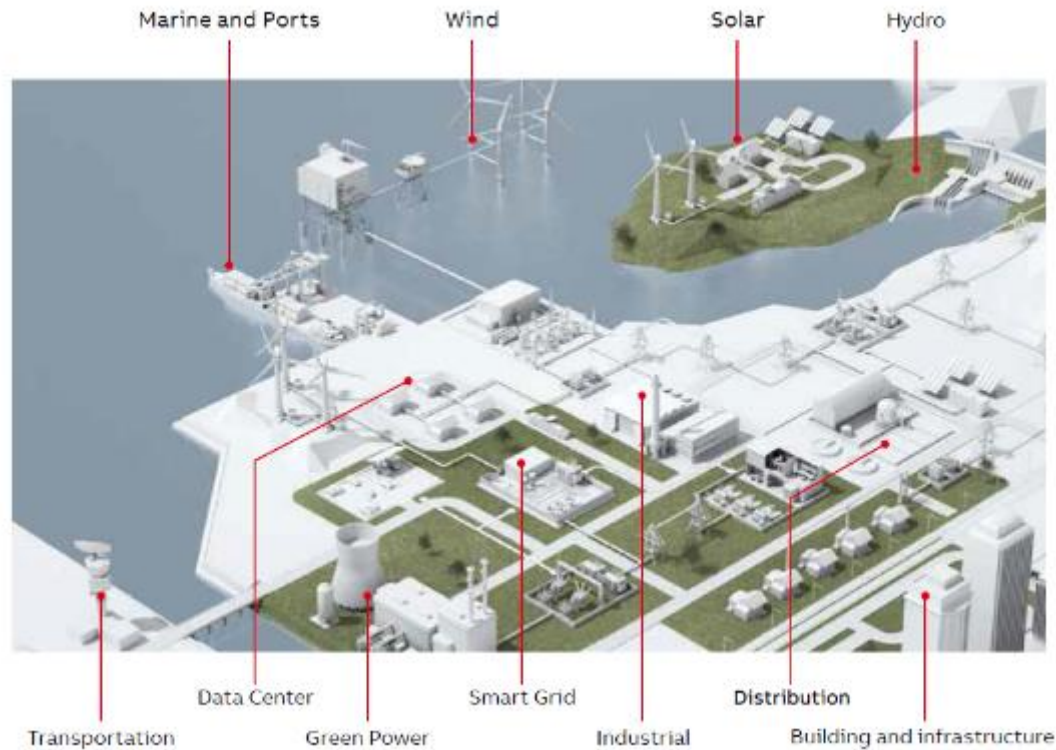
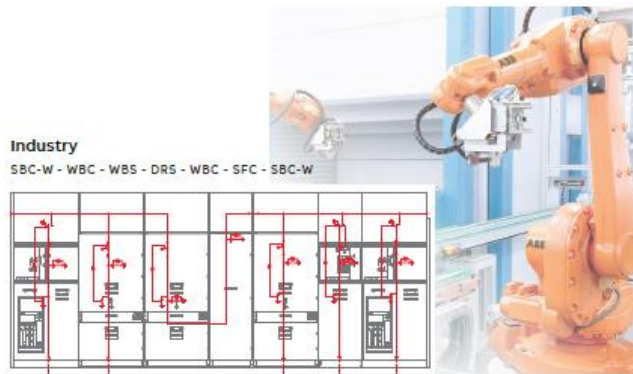
- Application and references
- Product overview
 - Loss of Service continuity and IAC
 - Homologations and certifications
 - Product positioning and Most Valuable Units
- Smart solutions
- UniSec's strength overview

UniSec - MV Air Insulated Switchgear for Secondary Distribution

Secondary Distribution

General product applications

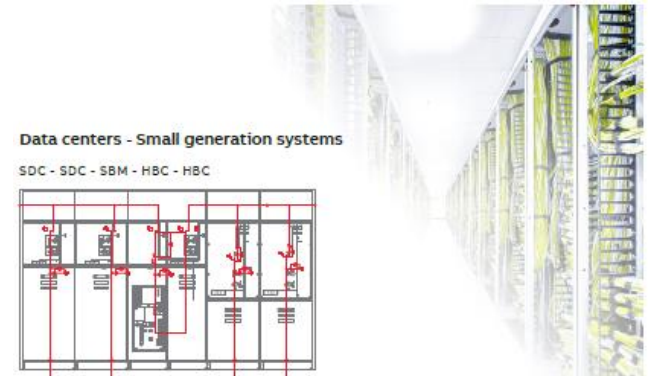
Industry
SBC-W - WBC - WBS - DR5 - WBC - SFC - SBC-W



Marine and Ports Wind Solar Hydro

Transportation Data Center Green Power Smart Grid Industrial Distribution Building and infrastructure

Data centers - Small generation systems
SDC - SDC - SBM - HBC - HBC



Substations and Smart grids
SDC - SDC - SFC



Buildings and infrastructures - Light Industry
SBC-W - HBC - HBC - SFC



UniSec - MV Air Insulated Switchgear for Secondary Distribution

Success stories and References

Project Global Endeavor



Cruise Ship AIDA



Hospital Papa Giovanni XXIII, Bergamo



2014 Winter Olympic Games for Sochi Airport



Petroamazonas



Tram of Nice (France)



Aruba Datacenter



CNES, Space Center of Guyana (GSC)



UniSec - Air Insulated SWG for Secondary Distribution

- Product overview
 - Loss of Service continuity ans IAC
 - Homologations and certifications
 - Product positioning and Most Valuable Units

IEC 62271-200: Terms and definitions for MV Switchgear

History

From manufacturer to user perspective

Former IEC 60298: Manufacturer view

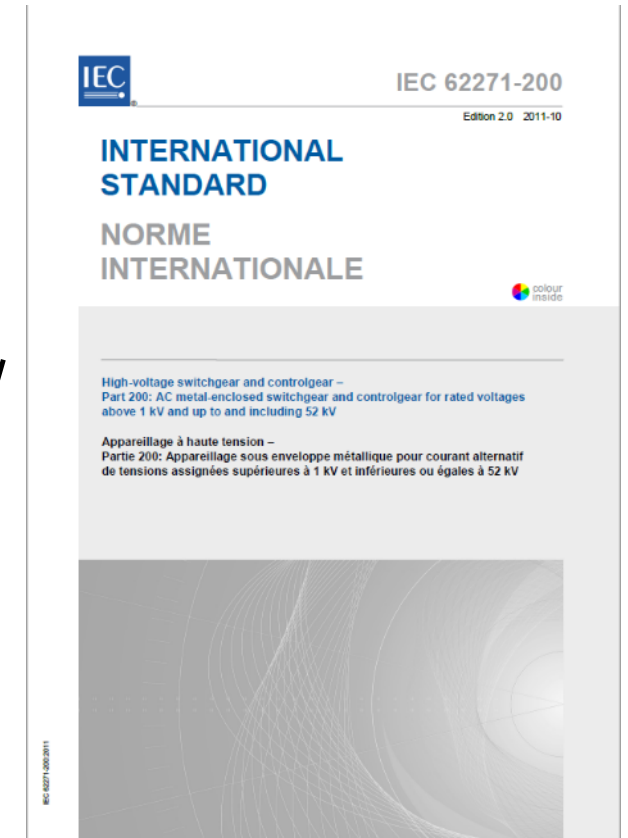
Based on switchgear construction rules, available designs and technologies

Current IEC 62271-200: More user perspective

New release of IEC 62271-200 standard issued in 2003, replacing IEC 60298. In 2011, second edition of IEC 62271-200 published.

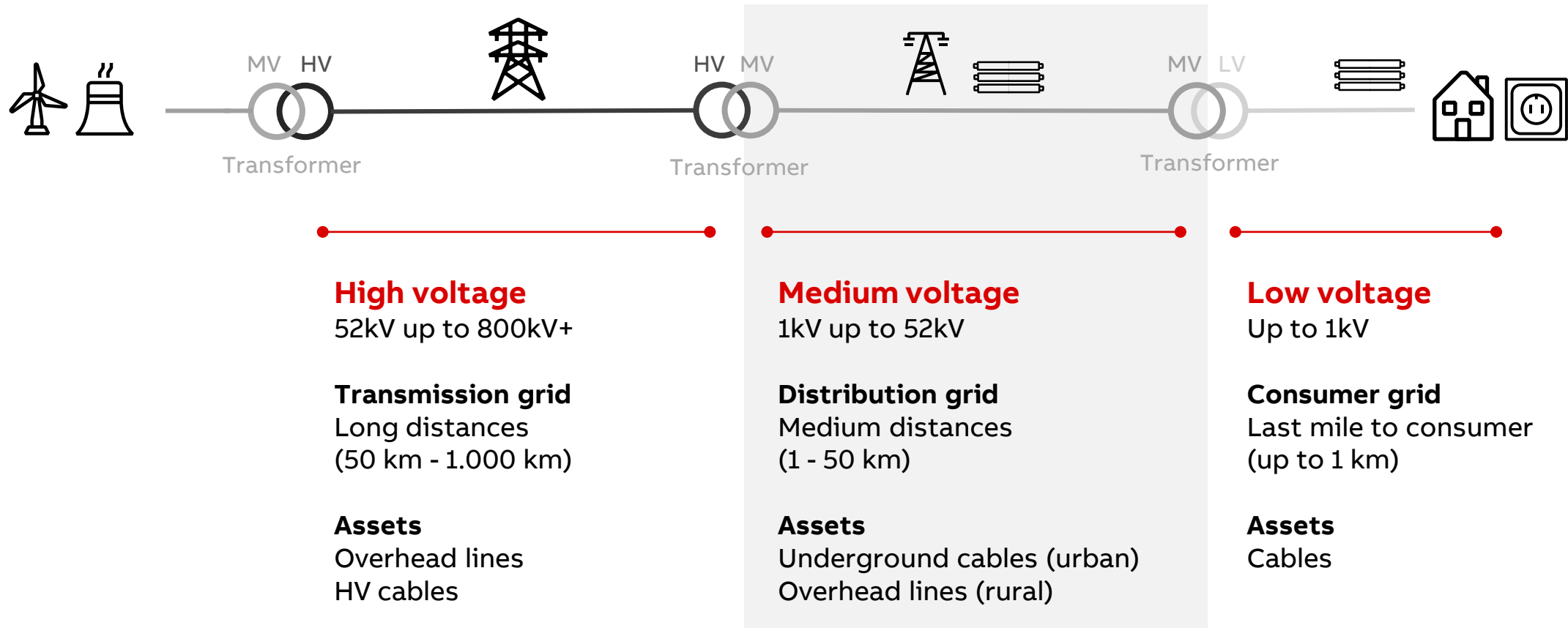
- While old standard was designed acc. to construction rules and technologies. New standard focusses more on the user, how the switchgear is operated and maintain.
- Old definitions like 'Metal-clad', 'Compartmented' and 'cubicle type' have been abandoned. They were replaced by introducing e.g. the 'Loss of Service Continuity (LSC)'.

~~metal-clad~~
~~compartmented~~
~~cubicle type~~
loss of service continuity ✓



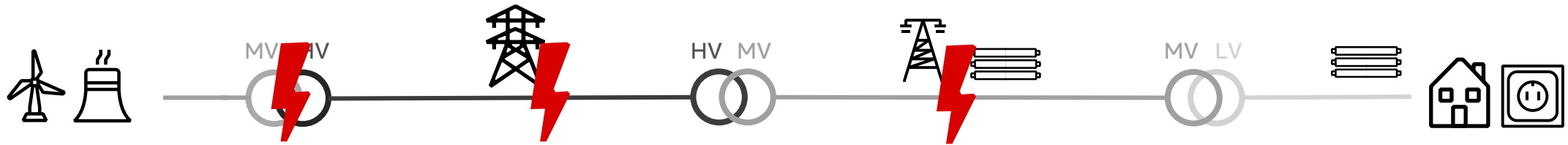
Medium Voltage IEC Switchgear

The electricity grid - From generation to consumers



Medium Voltage IEC Switchgear

Why is switchgear needed?



Faulty transformer



Photo: electrical-engineering-portal.com

Defect overhead lines



Photo: Markus Weggässer, storm-chasing.de

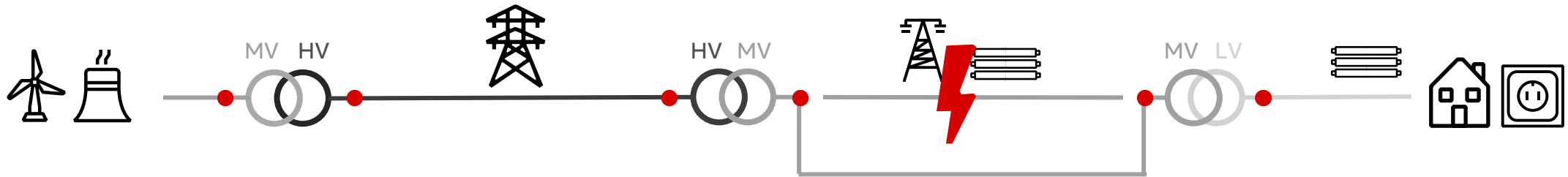
Excavator hits cable



Photo: westernpower.com.au

Medium Voltage IEC Switchgear

Why is switchgear needed?

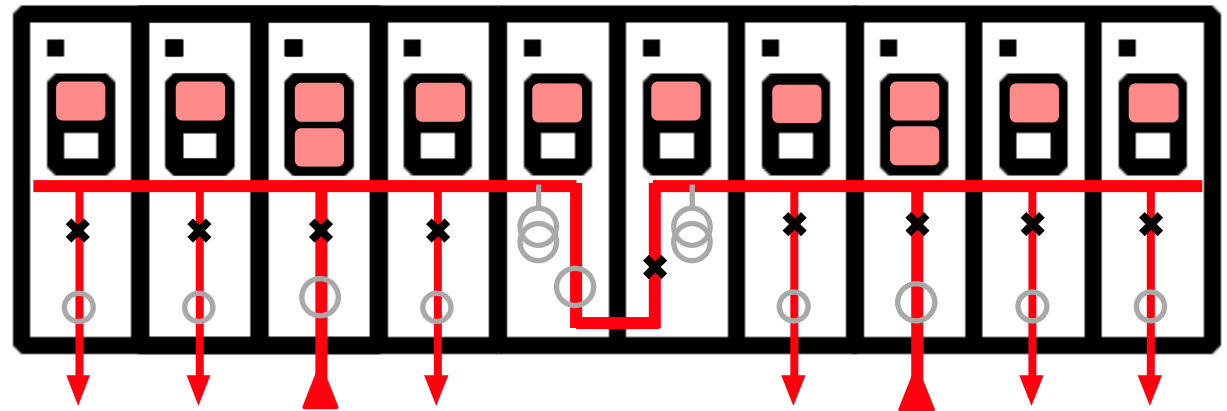


Switchgear limits negative impact of failures

- Clear fault currents and separate faulty assets from the grid
- Restore power over healthy assets

Benefits

- Limits damages to assets
- Quick restoration of power supply
- Increased safety



UniSec - MV Air Insulated Switchgear for Secondary Distribution

Product Overview

UniSec

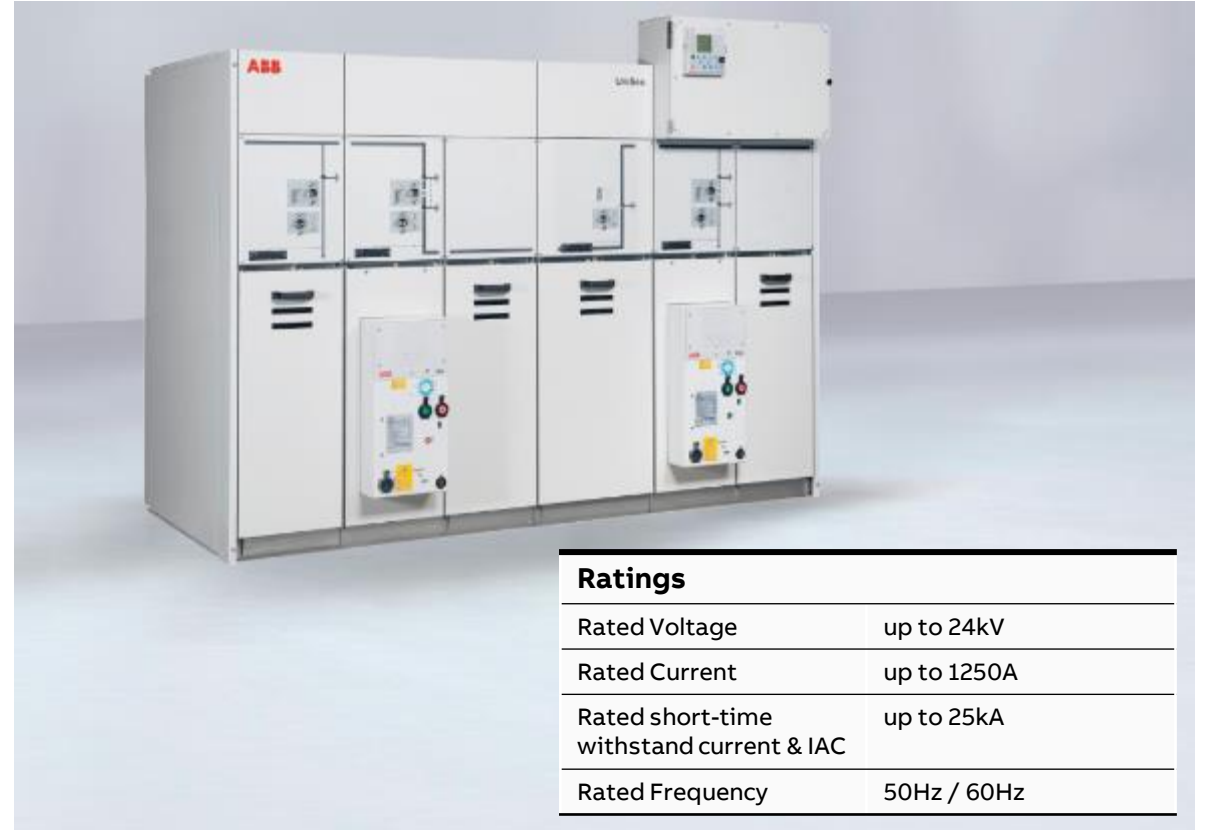
Description

UniSec air-insulated switchgear is based on a highly flexible, modular concept with fewer parts and standardized solutions that can be readily configured to meet the specific needs of each application.

Key features

- Designed & Tested acc. to **latest IEC 62271-200**, GB (CN)
- Internal arc proof IAC **AF/AFL/AFLR** with different gas exhausting variants
- Loss of Service Continuity **LSC2B/ LSC2A/LSC2** solutions available
- Partition Metallic **PM** Classification
- Load Break Switch, Vacuum Contactor, Vacuum and SF6 Circuit Breakers
- Anti-Seismic and Marine version available

Safe conditions for all applications



Ratings

Rated Voltage	up to 24kV
Rated Current	up to 1250A
Rated short-time withstand current & IAC	up to 25kA
Rated Frequency	50Hz / 60Hz

UniSec - MV Air Insulated Switchgear for Secondary Distribution

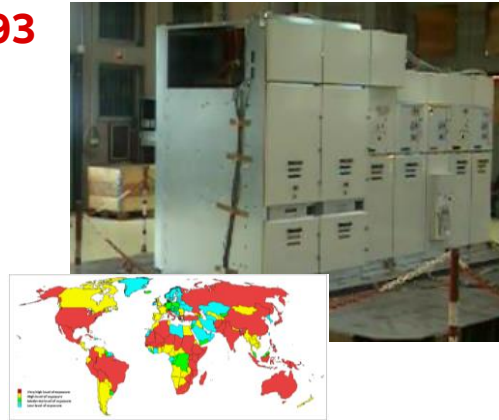
Installation in Harsh Environment

Anti-Seismic according to IEEE 693

Based on the seismic test performed according to the IEEE 693 Standard

UniSec panels are compliant with the requirements of UBC Zone 4 up to 1g of acceleration

* 0,25g threshold guaranteed on whole portfolio



Vibration Test (Marine appl.)

15h resistance test on vibrating platform that simulates loads on 3 main axes



Ageing according to IEC 62271-304

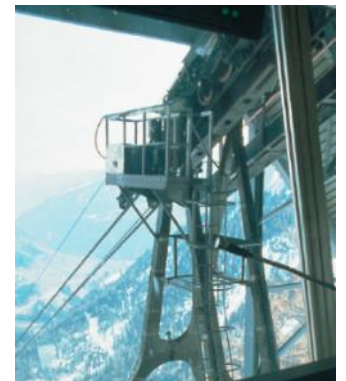
Based on the ageing test performed according to the IEC 62271-304 Standard (49 days in climatic chamber), UniSec panels are declared Level2



Application for low temperature

Tested for LBS GSec and Vacuum CBs VD4 and HySec:

- 25° C on service
- 40°C on storage



UniSec - MV Air Insulated Switchgear for Secondary Distribution

Values - Productivity and Flexibility

Broad portfolio

Different projects line-up to be covered with more than 20 typical panels:

- Units with switch disconnectors
- Units with fused switch disconnectors
- Units with frontal withdrawable circuit breaker or contactor
- Metering units
- Units with switch disconnectors and fixed/removable/withdrawable circuit breaker

Units with switch-disconnector

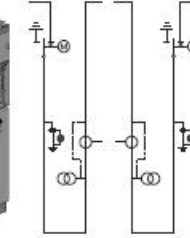
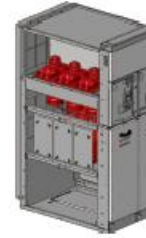
SDC
Incoming/outgoing



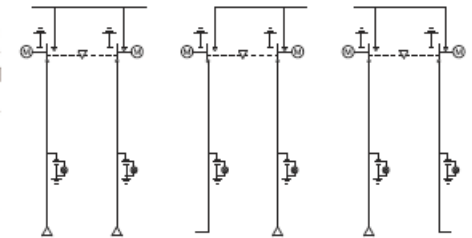
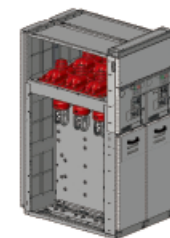
SDS
Coupler



SDM
Coupler with measure

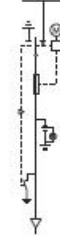
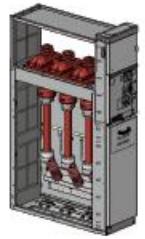


SDD
Double switch-disconnector



Units with switch-disconnector and fuses

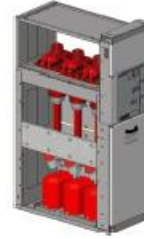
SFC
Outgoing



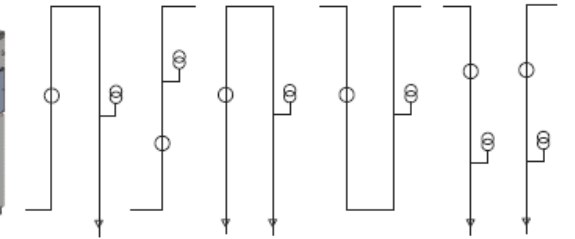
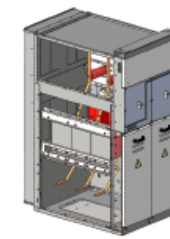
SFS
Coupler



SFV
Measure



UMP
Universal metering



UniSec - MV Air Insulated Switchgear for Secondary Distribution

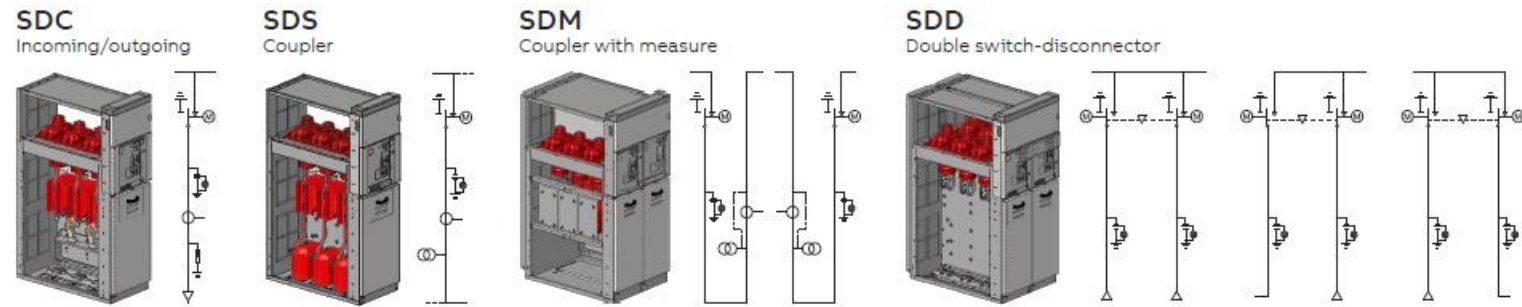
Values - Productivity and Flexibility

Broad portfolio

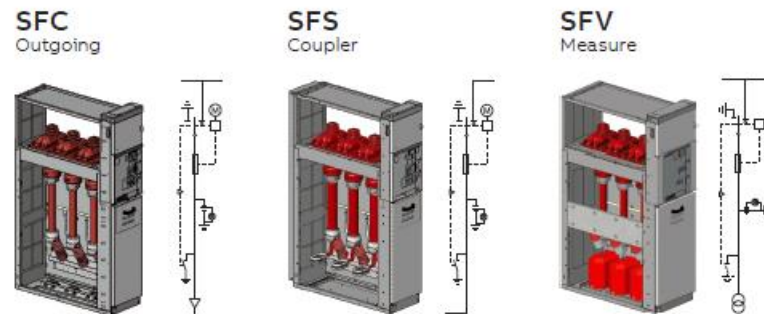
Different projects line-up to be covered with more than 20 typical panels:

- Units with switch disconnectors
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- Units with frontal withdrawable circuit breaker or contactor
- Metering units
- Units with switch disconnectors and fixed/removable/withdrawable circuit breaker

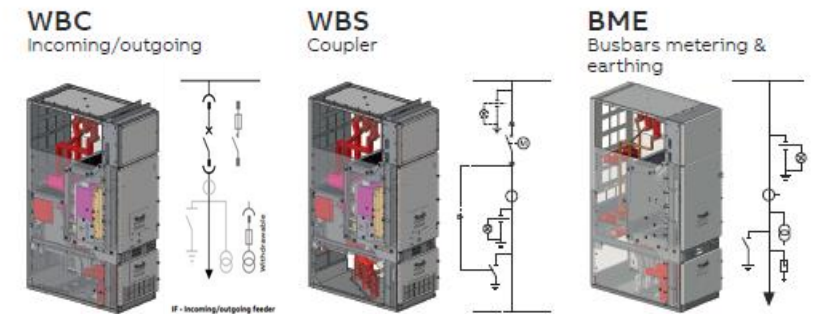
Units with switch-disconnector



Units with switch-disconnector and fuses



Units with withdrawable circuit-breaker or contactor



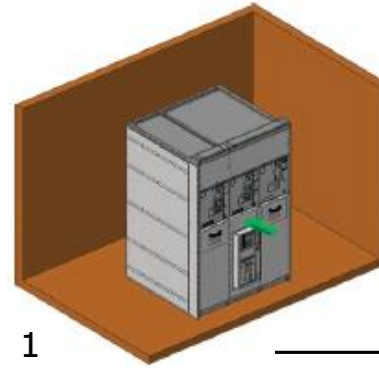
UniSec - MV Air Insulated Switchgear for Secondary Distribution

Internal Arc classification

Easy to install

Fully tested and designed to always guarantee internal arc protection, according to IEC62271-200:

1. IAC AF up to 16kA 1s as base proposal and pressure relief inside the room
2. IAC AFL up to 12,5kA 1s with pressure relief into arc chamber built using wall on the rear of the Swg
3. IAC AFLR up to 21kA 1s with arc gas absorbers (filters) and pressure relief inside the Swg room or downward into cable trench. (25kA 1s for LSC2B panels 12-17.5kV)
4. IAC AFLR up to 21kA 1s with arc gas duct and pressure relief outside the Swg room (25kA 1s for LSC2A W750-H2000mm panels and LSC2B panels 12-17.5kV)

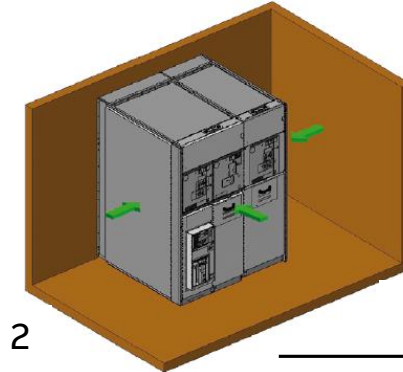


A-F

1

16kA

	Cubicle	Room
	1700	>2100
	2000	>2400

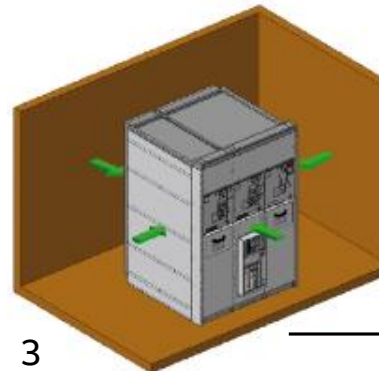


A-FL

2

12,5kA

	Cubicle	Room
	1700	>2100
	2000	>2400



A-FLR with filters

3

16kA

	Cubicle	Room
	1700	>2100
	2000	>2400

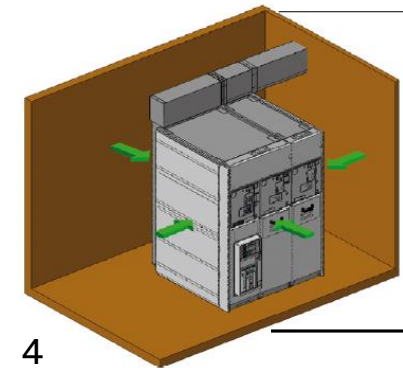
21kA

	Cubicle	Room
	2000	>2600

25kA(*)

	Cubicle	Room
	2000	>2600

* 16kA for LSC2B @24kV



A-FLR by Gas Duct or Downwards

4

21kA(*)

	Cubicle	Room
	1700	>2100
	2000	>2400

* 25kA for

- LSC2A W=750mm or
- LSC2B up to 17,5kV

UniSec - MV Air Insulated Switchgear for Secondary Distribution

Internal Arc classification



IAC Test Criteria :

- The doors of the switchgear must remain closed and no opening of the cover panels must occur
- Any part of the switchgear which may be hazardous for personnel must not be ejected
- No holes must appear in the external housing of the switchgear in any parts accessible to personnel
- The vertically and horizontally arranged fabric indicators placed outside the switchgear must not get burnt
- All the switchgear earthing connections must remain effective.

UniSec - MV Air insulated Switchgear for Secondary Distribution

Loss of Service Continuity

Loss of Service Continuity

Busbar compartment

- Contains busbars that run along the switchgear lineup

Apparatus and Cable compartment

- Contains circuit-breaker or other protection devices as fuses
- MV cables are connected here. Contains also CTs and VTs.

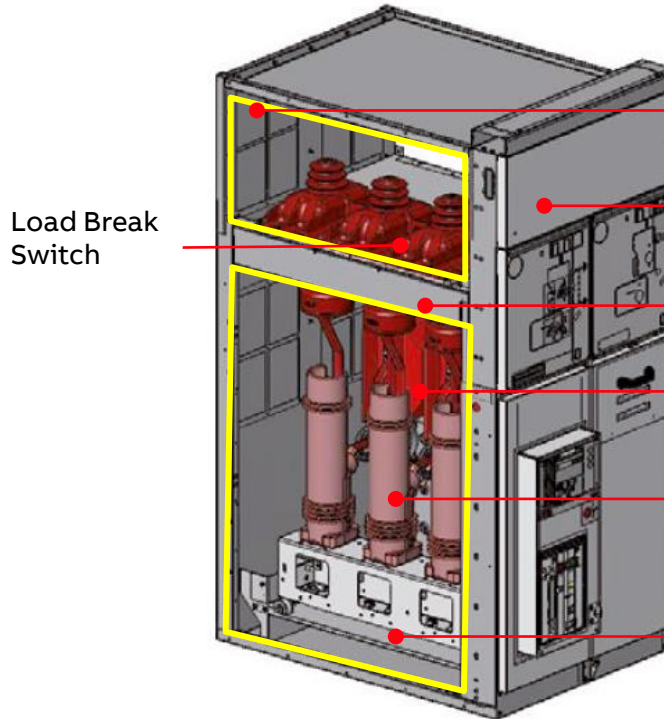
Metallic Partition PM

- Given by the design of 3 position Load Break Switch (LSC2A)
- Given by metallic shutters (LSC2B up to 17,5kV)

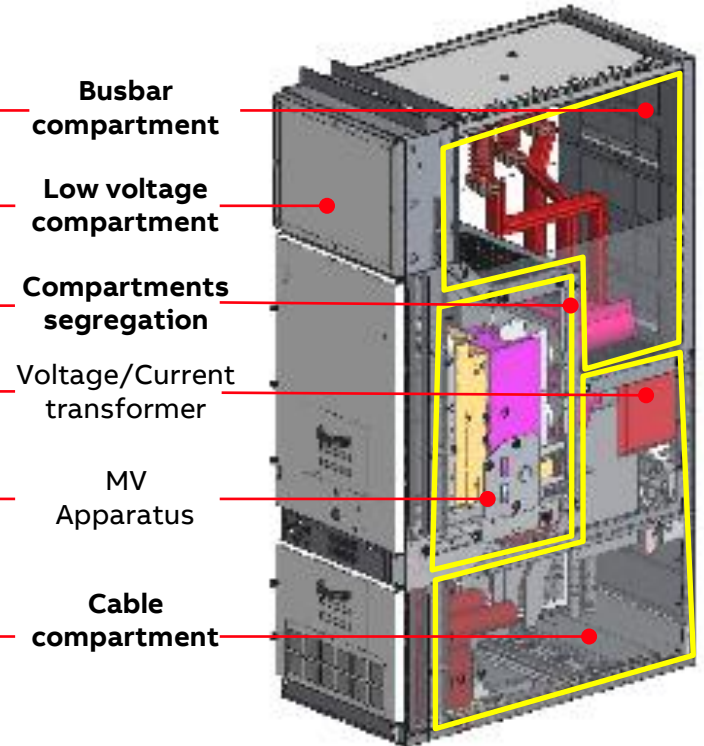
Low voltage compartment

- Contains protection relay, LV control and supply devices

UniSec - LSC2A



UniSec - LSC2B



UniSec - MV Air Insulated Switchgear for Secondary Distribution

Product portfolio

LSC2A

..24kV 1250A 16/20kA

- Switch Disconnecter
- Fused Switch Disconnecter
- Fixed Circuit Breaker



SDC; SFC *



HBC *



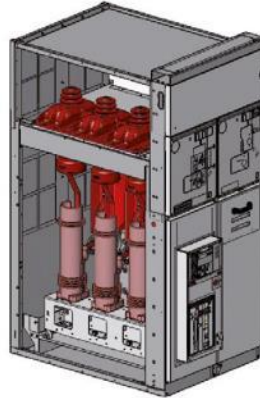
* Unit up to 630A

..24kV 1250A 20/25kA

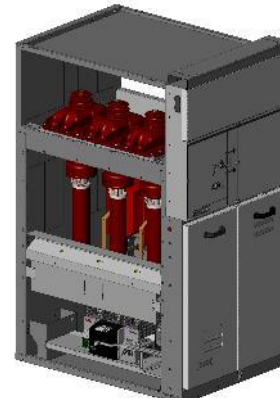
- Withdrawable/ Removable Circuit Breaker
- Removable Contactor
- Combination with Switch Disconnecter panels



SBC



SCC



LSC2B

..24kV 1250A 20/25kA

- Withdrawable Circuit Breaker
- Withdrawable Contactor
- Combination with Switch Disconnecter panels (LSC2A)



WBC



UniSec - MV Air insulated Switchgear for Secondary Distribution

Design: Flexible for various switching devices

High flexibility - Modular design

Integration with all ABB Devices

- Choose from various switching Apparatus
- Vacuum or SF₆ as per customer preference
- Fixed, removable or withdrawable apparatus

Many options also on other components

- Current transformers (CTs), type DIN and ring
- Voltage transformers (VTs), type DIN

Digital offering

- Current and Voltage sensors
- Protection relays
- Monitoring & Diagnostic solutions



Vacuum Circuit Breakers



SF₆ Circuit Breakers



SF₆ Load-Break Switch / fuse



Up to 1250A

SF₆ Disconnecter



Hybrid Vacuum CB and Disconnecter



Contactor



Conventional Instrument transformers



Non-conventional Current and Voltage sensors



Smart Sensors for M&D condition-based



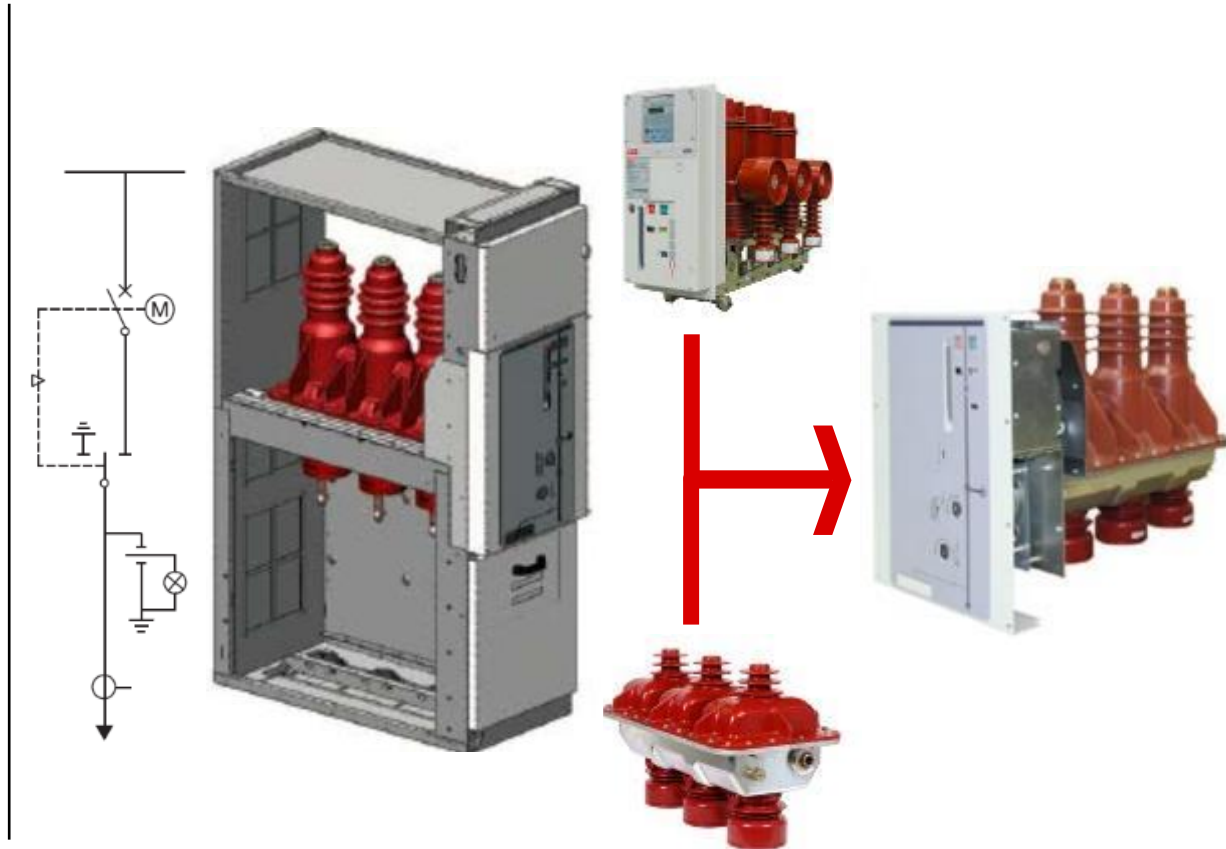
Protection relays

Most valuable Units

UniSec HBC - with multifunctional apparatus

- Only 500mm wide
- Direct Earthing of the cables with HySec
- Flexible, used as Incoming and Outgoing

HBC



Apparatus HySec:

Upper part

- Vacuum poles for CB function
- Epoxy resin

Lower part

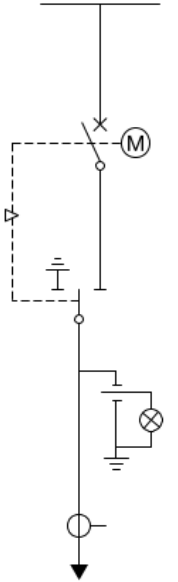
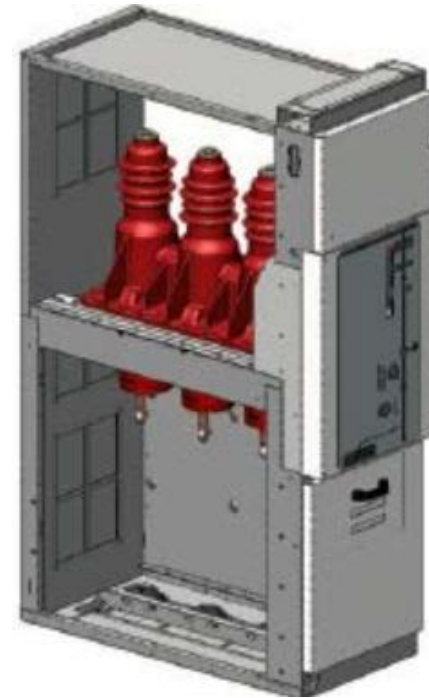
- SF6 3 positions Disconnectors
- Stainless steel

UniSec HBC

with multifunctional apparatus

Ratings and Performances

Rated Voltage	Up to 24kV
Frequency	50-60Hz
Test and Impulse Voltage	50\125kV (@24kV)
Busbar Current	630A
Rated Current	630A
Short Circuits Current (peak)	21kA 3s (peak) for SF6 16kA 1s (40kA peak)
Internal Arc Current	Up to A-FLR 16kA x 1s
LSC – Loss Service Continuity	LSC2-PM
International Standard	IEC 62271-200



mm	Width	Height	Depth
HBC	500	1700\2000	1030

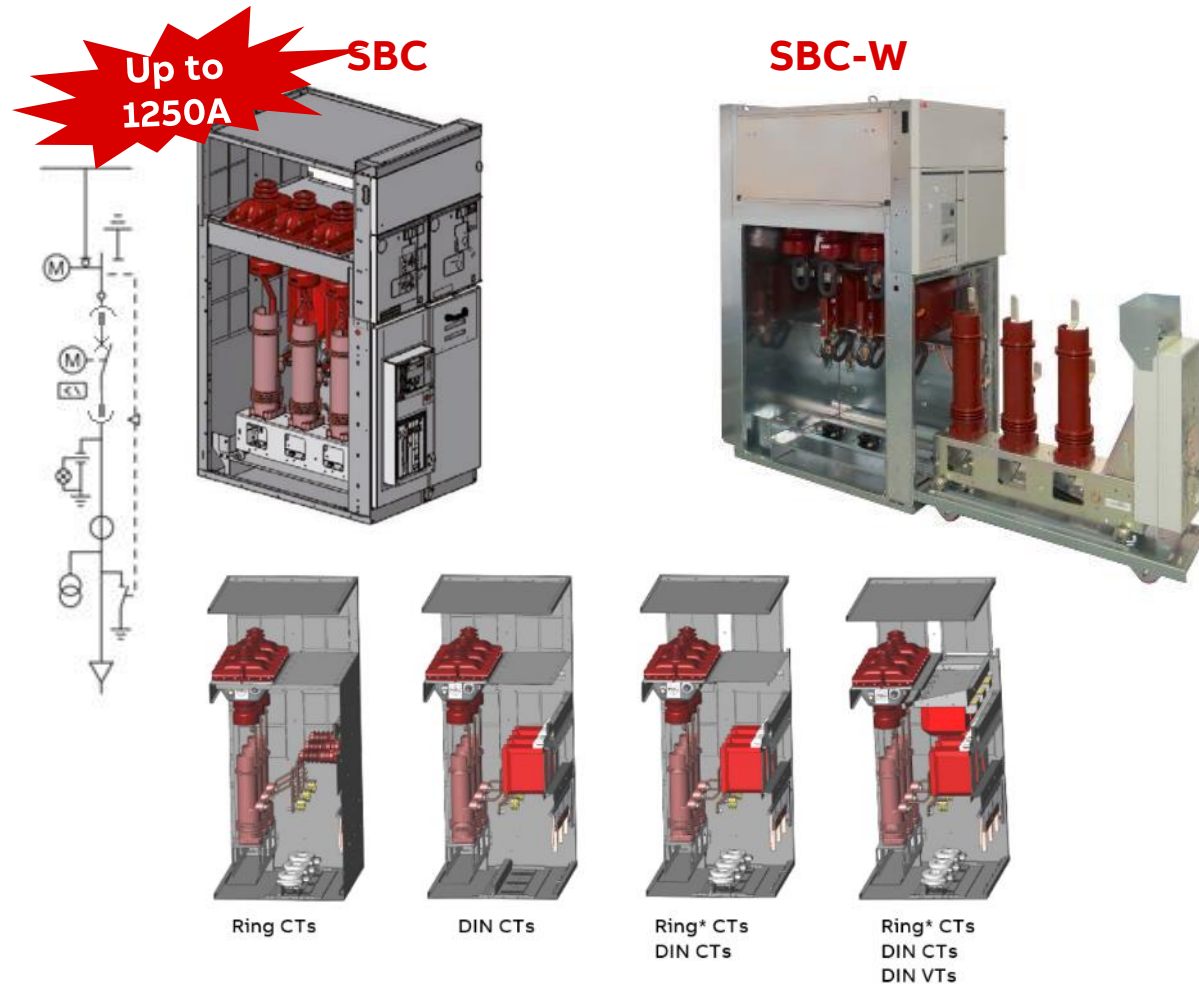
Compact solution with Circuit Breaker in only 500mm

Most valuable Units

UniSec SBC\SBC-W - LSC2A cubicle with lateral removeable\withdrawable CB and LBS

- Both Vacuum (VD4/R-Sec) and SF₆ (HD4/R-Sec) technologies available for the circuit breaker

- Big internal space for highly customizable configuration



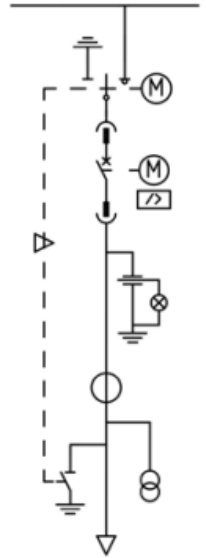
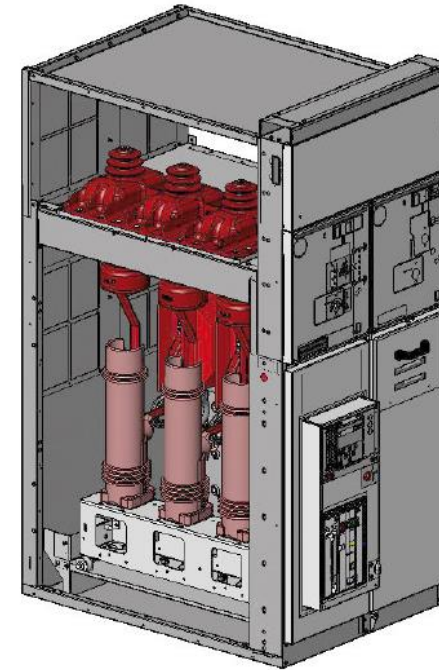
- Withdrawable version for faster Service activity
- Reduction of downtime
- Easier to connect MV cables
- Unique frontal door

SBC-W

LSC2A cubicle with lateral withdrawable CB and LBS

Ratings and Performances

Rated Voltage	Up to 24kV
Frequency	50-60Hz
Test and Impulse Voltage	50\125kV
Busbar Current	630\1250A
Rated Current	630A
Short Circuits Current (peak)	Up to 25kA 3s (62,5kA peak)
Internal Arc Current	Up to A-FLR 25kA x 1s
LSC – Loss Service Continuity	LSC2A-PM
International Standard	IEC 62271-200
Circuit Breaker technology VD4/R-Sec	Vacuum\SF ₆



mm	Width	Height	Depth
SBC-W	750	1700/2000	1070

Replacement of CB in less than 1' min for minimizing downtime period

SBC-W

1':30'' to restore the service of continuity



UniSec - MV Air Insulated Switchgear for Secondary Distribution

Most valuable Units

- **NEW** functional unit for applications requiring high number of operations and a high switching frequency, for the control of motors, transformers, capacitor banks
- LSC2A service continuity classification

SCC



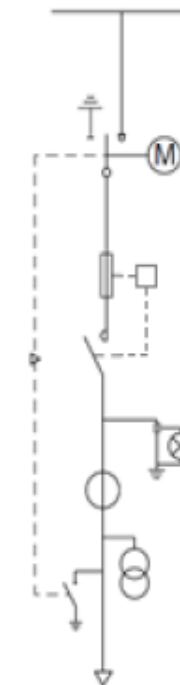
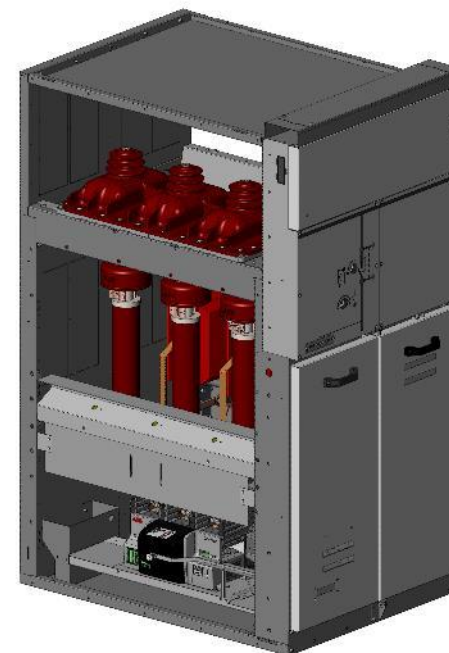
- Removable ConVac Contactor
- Panel optimized for secondary distribution application needs
- Broad features and accessories readily configured to meet customer needs

SCC

LSC2A cubicle with Removeable contactor and LBS

Ratings and Performances

Rated Voltage	Up to 12kV
Frequency	50\60Hz
Test and Impulse Voltage	28\75kV
Busbar Current	630A/1250A
Rated Current	Max fuse 315A @ 7,2 ; 200A @ 12kV 400A (without fuses)
Short Circuits Current (peak)	Up to 25kA 3s (62,5kA peak) @12kV
Internal Arc Current	Up to A-FLR 25kA x 1s
LSC – Loss Service Continuity	LSC2A-PM
International Standard	IEC 62271-200
Apparatus Technologt	Vacuum ConVac® Contactor



mm	Width	Height	Depth
SCC	750	1700/2000	1070

The most relevant cubicle when customers need a very high number of operation

Most valuable Units

UniSec WBC – LSC2B cubicle with frontal withdrawable CB

- Both Vacuum (VD4) and SF₆ (HD4) technologies available for the circuit breaker
- Available up to 1250A , 25kA
- Suggested for highly customizable configuration

WBC



- Withdrawable version for faster Service activity (LSC2B)
- Reduction of downtime

WBC

LSC2B cubicle with frontal withadrawable CB

Ratings and Performances

Rated Voltage	Up to 24kV
Frequency	50-60Hz
Test and Impulse Voltage	50\125kV
Busbar Current	1250A
Rated Current	1250A
Short Circuits Current (peak)	Up to 25kA 3s (62,5kA peak)
Internal Arc Current	Up to A-FLR 25kA x 1s (@17,5kV)
LSC – Loss Service Continuity	LSC2B-PM (Up to 17,5kV) LSC2B-PI (@24kV)
International Standard	IEC 62271-200
Circuit Breaker technology	Vacuum\SF6
Contactor technology	Contactor VSC (Up to 12kV)

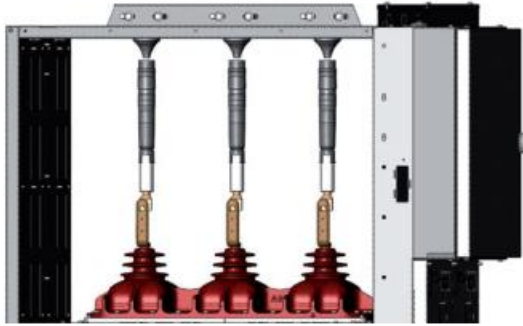


mm	Width	Height	Depth
WBC 12-17,5 kV	600	2000	1200
WBC 24kV	750	2000	1300

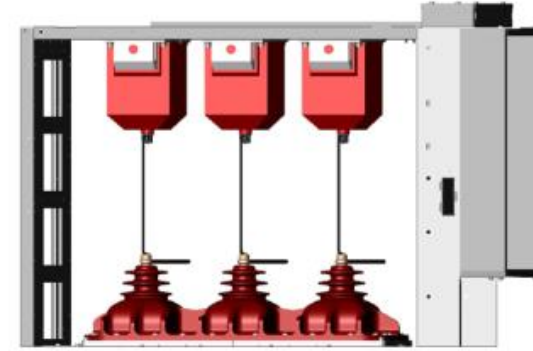
UniSec Valuable solutions

Top Application for 2000mm panel height

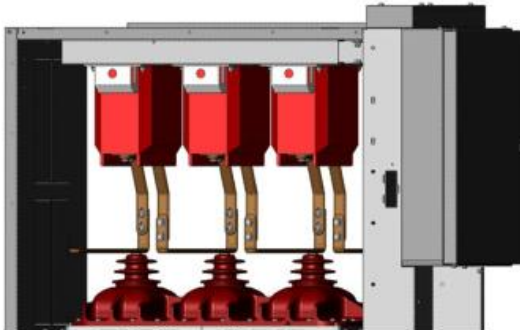
Cable entry directly onto busbar



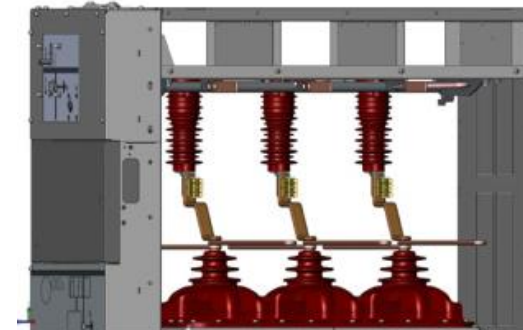
Busbar Voltage Transformers



Busbar Current Transformers



Busbar earthing switch with full making capacity



Alternative solutions to optimize the overall dimensions of the switchboards and optimize their costs

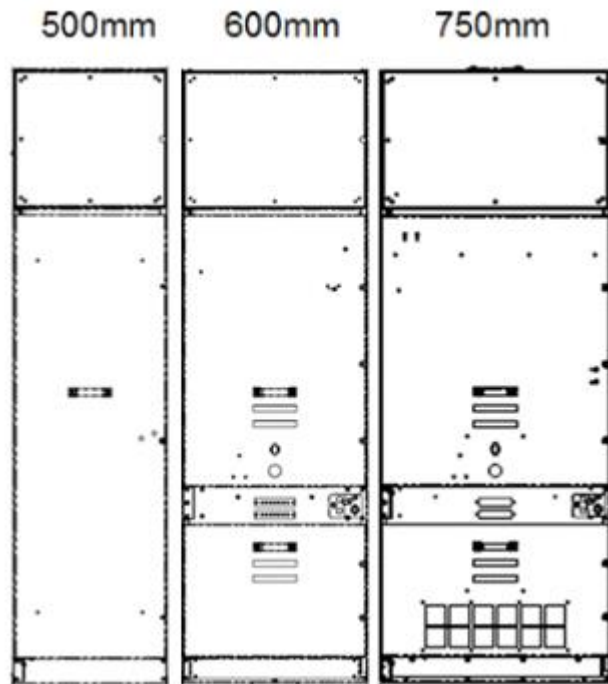
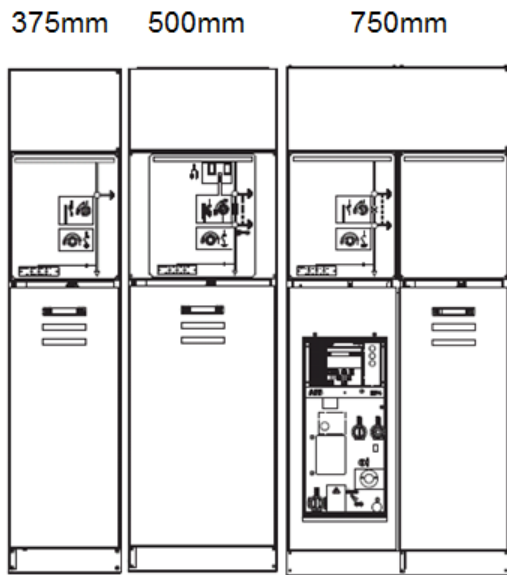
UniSec - MV Air Insulated Switchgear for Secondary Distribution

Line-Up configuration

Panel Width

LSC2A

LSC2B



Low Voltage Compartment

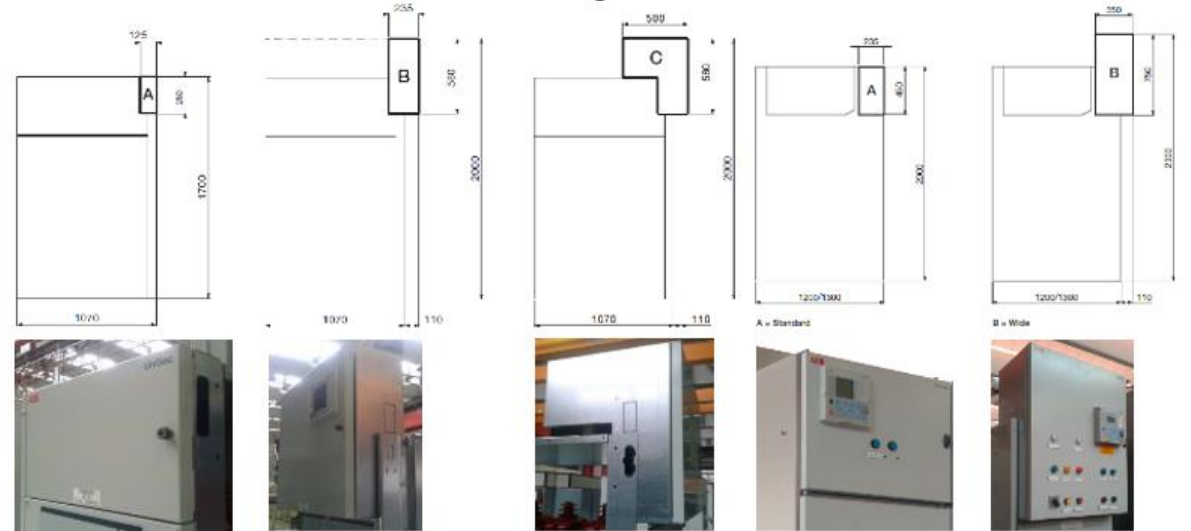
Standard

Wide

Big

Standard

Wide



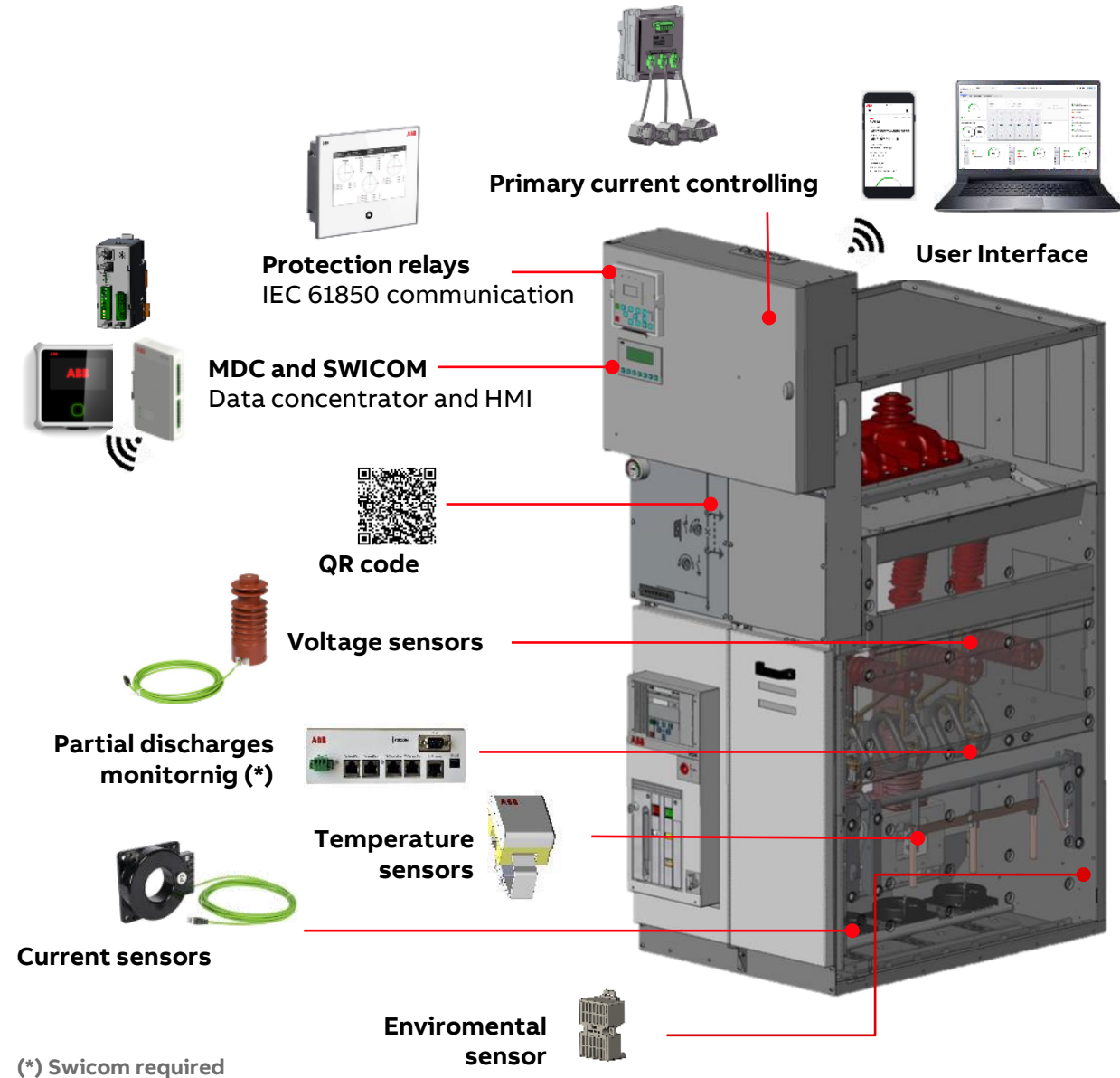
UniSec - Air Insulated SWG for Secondary Distribution

- Smart solutions

Smart Solutions

Overview

- Same robust & safe design and user experience as conventional UniSec switchgear
- Featuring Relion® series protection and control relays
- Self-supervised with GOOSE (Generic Object-Oriented Substation Event) & SMV (Sample measured values) over IEC 61850 bus
- Increased safety for operation & testing thanks to current and voltage sensors technology
- Monitoring and Diagnostic to supervise the health status of the equipment and the switchgear, failures can be prevented and condition- based maintenance can be planned to guarantee the service continuity
- Integration with ABB Ability™ to enhance digital features and increase monitoring and diagnostic level
- QR code for easy access to documentation
- HMI to display data and status



Monitoring & Diagnostic Overview



1 Temperature monitoring



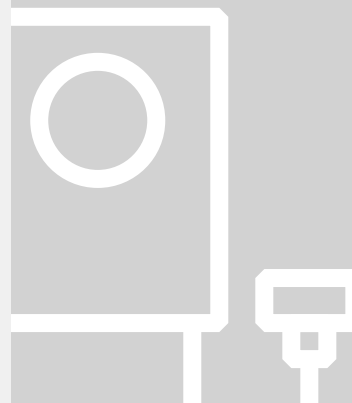
2 Environment temperature & humidity



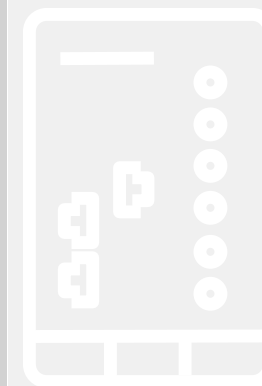
3 Gas monitoring



4 Substation control



5 Primary current monitoring



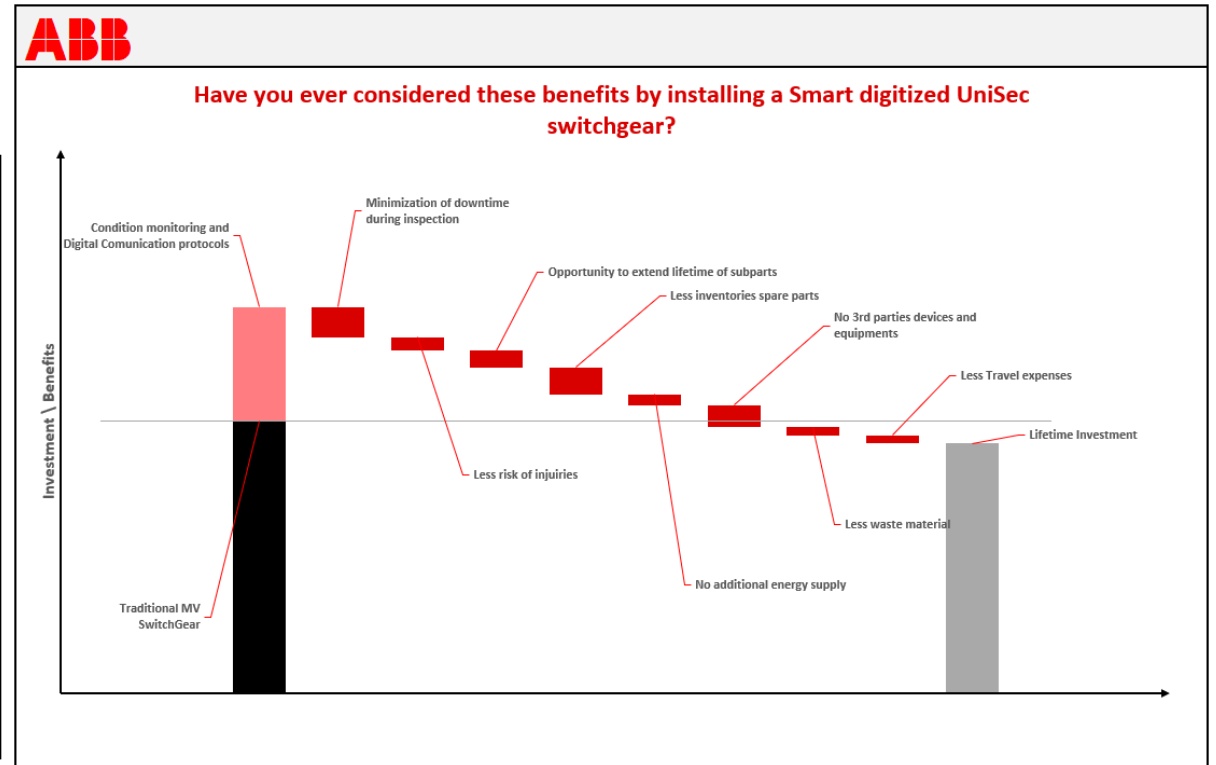
6 Partial Discharge monitoring (*)

Smart Solutions

Value Proposition

Key Points of preventive maintenance based on conditions

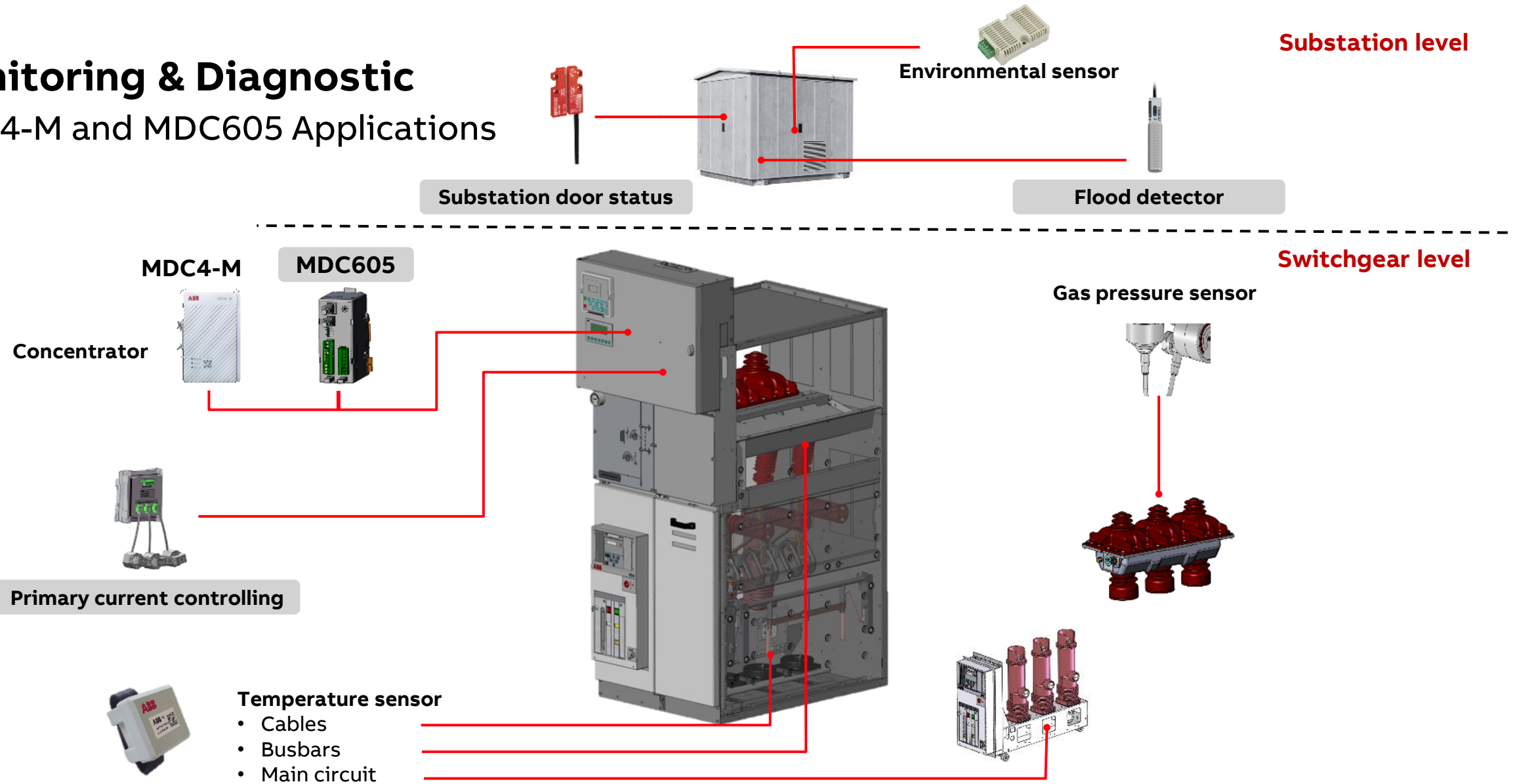
- Maintenance optimization
- Cost Savings
- Safety
- Extended Lifetime



25% of failures in MV Air Insulated Switchgear can be traced back to thermal runaway due to faulty connections, while **another 20%** are a result of rapid aging in harsh environmental conditions

Monitoring & Diagnostic

MDC4-M and MDC605 Applications



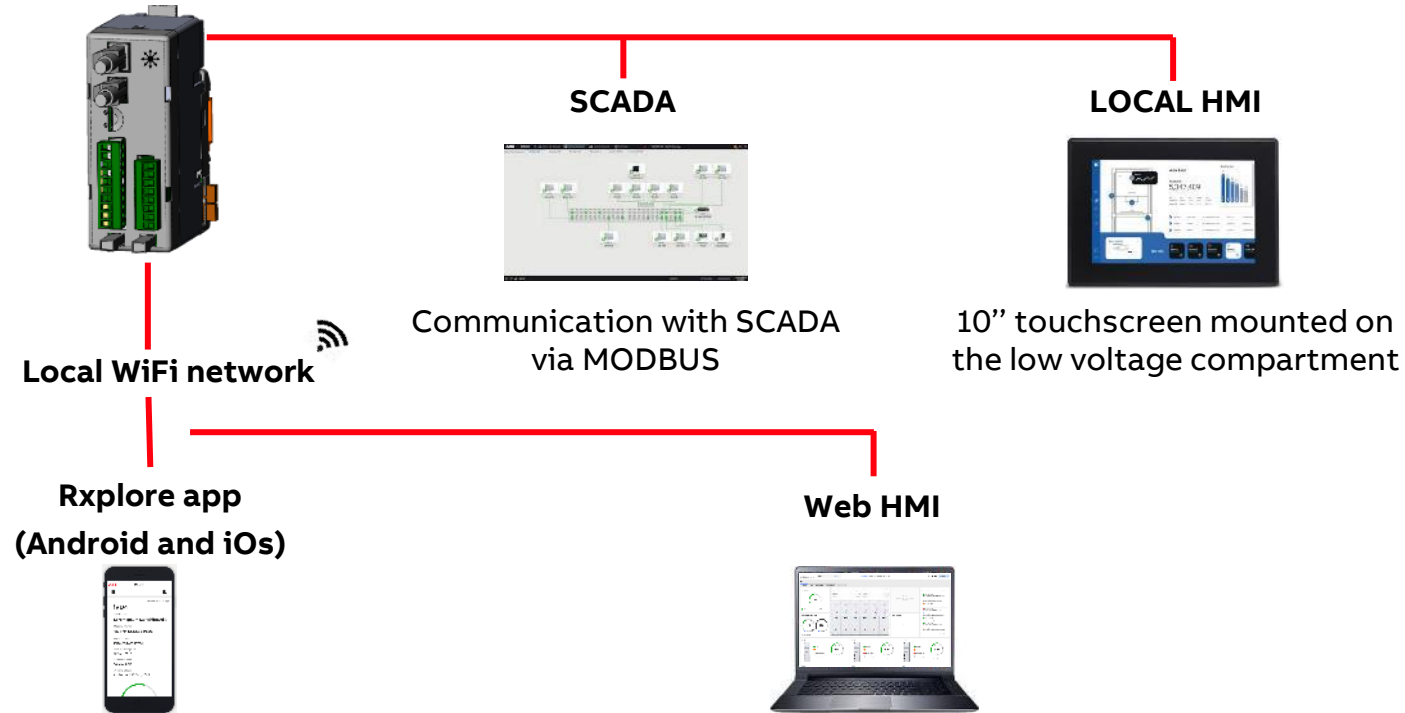
Monitoring & Diagnostic

Main Characteristics

		Basic Solution	Advanced Solution	
Technical characteristics	Concentrator	MDC4-M	MDC605	
	Data acquisition	real time data	real time and historical data, trends and troubleshooting	
	Communication	RS485, local Wi-Fi	RS485, local Wi Fi, ethernet ports RJ12 and RJ45	
Sensors	Temperature Greybox TR	Temperature monitoring based on wireless self-powered sensor positioned in multiple locations: <ul style="list-style-type: none"> • Cables • Busbars • Main circuit 	up to 18	up to 54
	Environmental THS01	Collection and tracking of environmental conditions in the switchgear room.	1 for substation	
	Primary current SEC201	Non contact sensors placed on transformers secondary circuit to track current.	-	up to 6
	Gas manometer ZMJ60R	Actual gas pressure monitoring of the GSec load break switch or HySec apparatus.	up to 6	
	Contact door	Detection of substation door status.	-	1 for substation
	Flood sensor	A flood sensor detects if water overpasses the warning level in the substation.	-	1 for substation

Monitoring & Diagnostic

MDC605: architectures and User Interfaces



Trends and analytics

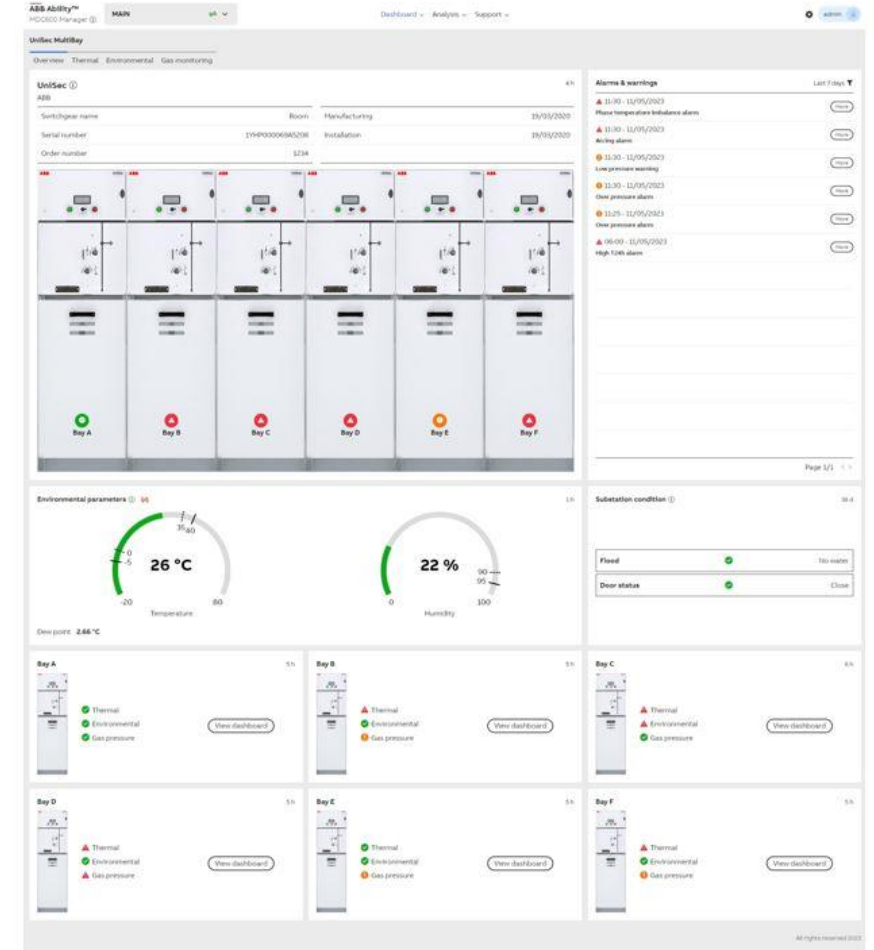
- Historical data
- Trends visualization
- Detailed graphs
- Document management
- Possibility to export raw data.

Switchgear troubleshooting

Self-diagnostic of components and sensors.

Cyber security

Secure boot, HTTPS webpages, security audit logging, role based access monitor, user management.



Dashboard for switchgear overview

The most important information are collected in configurable dashboards that can be organized adding different widgets and templates.

Monitoring & Diagnostic

Diagnostic analytics

Basic Solution

Advanced Solution

Concentrator		MDC4-M	MDC605
User interfaces	Display	local HMI type OP320 3,7" yellow-green backlight LCD one display per concentrator	WebHMI or local HMI type Ex710M 10" colorful touchscreen one for multiple concentrators as option
	Mobile APP	ABB MDC4	Rxplore
	Settings	only internal setting	internal and external setting with PCM600
	Dashboard	static	user configurable
		<ul style="list-style-type: none"> Temperature between phases compared with static threshold 	<ul style="list-style-type: none"> Temperature between phases compared with static threshold Absolute temperature compared with static threshold Temperature rise between ambient and main circuit temperature compared with threshold Main circuit temperature compared with threshold, dynamically adjusted considering the load condition
Analytics	Thermal		<ul style="list-style-type: none"> Ambient temperature and humidity comparison with static threshold over 24h and 30 days according to IEC standard
	Environmental	-	
	Gas pressure	<ul style="list-style-type: none"> Gas pressure compared with static threshold 	<ul style="list-style-type: none"> Gas pressure compared with static thresholds
	Primary current	-	<ul style="list-style-type: none"> Primary current compared with static threshold Primary current between phases compared with static threshold

Smart Solutions

Current/voltage sensors vs traditional instrument transformers



Why are current & voltage sensors better in the switchgear?

- Accurate in the whole operating range and no saturation
- Offers flexibility towards varying load flows and changing loads in the network



Which are related benefits?

- Based on well-established technology
- Easy to install



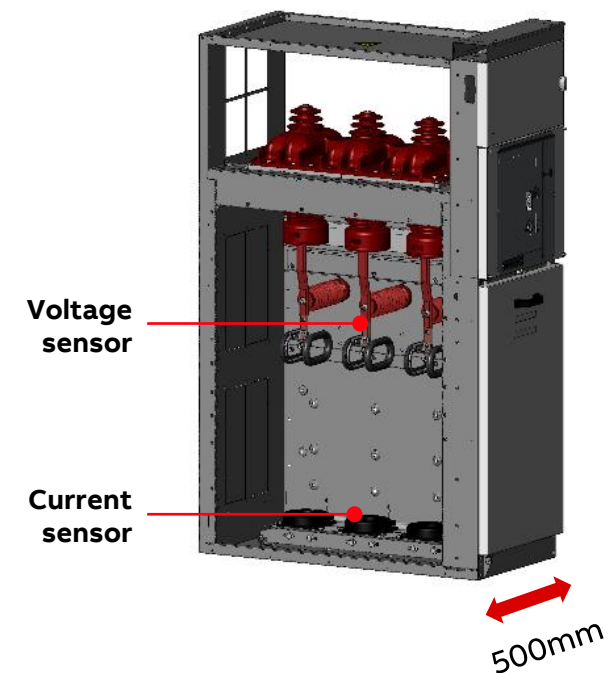
Upsides

- **Safety:** Increased personnel safety due to less impact on MV connection
- **Flexibility:** Enables late customizations and changes, covering a wide range of ratings/settings
- **Efficiency:** Minimal electrical losses, no saturation
- **Handling:** Light and compact enabling easy installation / replacement
- **Sustainability:** Lowers the environmental impact / energy losses

Traditional instrument transformers



Current/voltage sensors



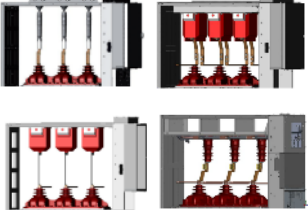

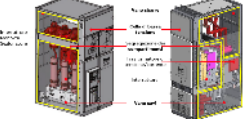
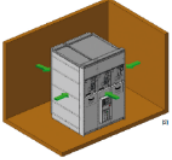




UniSec - Air Insulated SWG for Secondary Distribution

- UniSec's strength overview

UniSec, its strength

What problem I'm requested to solve

<p>Installation in limited room</p>		<p>Scoparto HBC typical unit 500mm wide with Multifunction Apparatus (HySec)</p>	<p>Maximize the loss fo service continuity</p>		<p>WBC panel as LSC2B-PM with frontal withdrawable circuit breaker</p>
<p>Line-Up optimizatoin</p>		<p>TOP Application in busbar compartment: 2000mm panels height to install CTs or VTs or Earthing switch or cable entry</p>	<p>Downtime minimization</p>		<p>SBC/W panel LSC2A-PM with lateral withdrawable circuit breaker that allow to restore electrical continuity in less than 2min</p>
<p>Internal Arc</p>	<p>standard</p>	<p>Minimal A-F protection up to 16kA</p>	<p>To be installed in harsh conditions</p>		<p>Partition Metallic (PM) segregation between compartments</p>
<p>Avoid and limit cost of installation</p>		<p>arc gas absorbers (filters) and pressure relief directly inside the electrical room as IAC A-FLR</p>	<p>Applications with high demanding number of operations (capacitors, motors, transformer feeder)</p>		<p>SCC panel with ConVac contactor with low level chipping current and long mechanical life up to 10.000.000 switching operation</p>
<p>Installation in harsh environment</p>	<p>standard</p>	<p>IEC 62271-304 class 2 conformity</p>	<p>Predictive maintenance</p>		<p>M&D: concentrators with connection to digital sensors and smart communication</p>
<p>Installation in seismic region</p>	<p>standard</p>	<p>Up to 0,25g (PGA), as option up to 1g (PGA)</p>			

3D-Catalogue

The smartest way to explore interactively the UniSec Portfolio

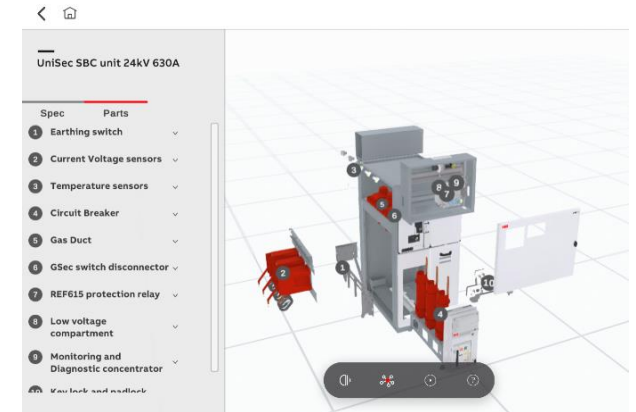
Go to the platform



Select the typical unit

<p>UniSec SDC unit 24 kV 630 A</p> <p>Incoming and outgoing unit section mainly used for ring distribution network equipped with three position switch disconnector. Available with different sizes 375 mm, 500 mm and 750 mm</p> 	<p>UniSec SFC unit 24 kV</p> <p>Transformer protection unit equipped with three position switch disconnector GSec combined with medium voltage fuses. Available with different sizes 375 mm, 500 mm and 750 mm</p> 
<p>UniSec SBC unit 24 kV 630 A</p> <p>Incoming and outgoing unit section equipped with three position switch disconnector and vacuum circuit breaker</p> 	<p>UniSec HBC unit 24 kV 630 A</p> <p>Incoming and outgoing unit section equipped with HySec multifunction apparatus with integrated vacuum circuit-breaker and three position disconnector</p> 
<p>UniSec WBC unit 12 kV 1250 A</p> <p>Incoming and outgoing unit section equipped with vacuum withdrawable circuit breaker</p> 	<p>UniSec WBC unit 24 kV 1250 A</p> <p>Incoming and outgoing unit section equipped with vacuum withdrawable circuit breaker</p> 
<p>UniSec UMP unit 24kV 630A</p> <p>Metering unit with instrument transformers available in more configurations to meet the requirement of different applications.</p> 	<p>UniSec SDM unit 24kV 630A</p> <p>Coupling unit with switch disconnectors and instrument transformers</p> 

Explore and discover the details



<https://new.abb.com/medium-voltage/switchgear/3d-ecatalogue/mv-air-insulated/secondary-ais-unisecc>

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