



Medium Voltage Products

## UniGear ZS2

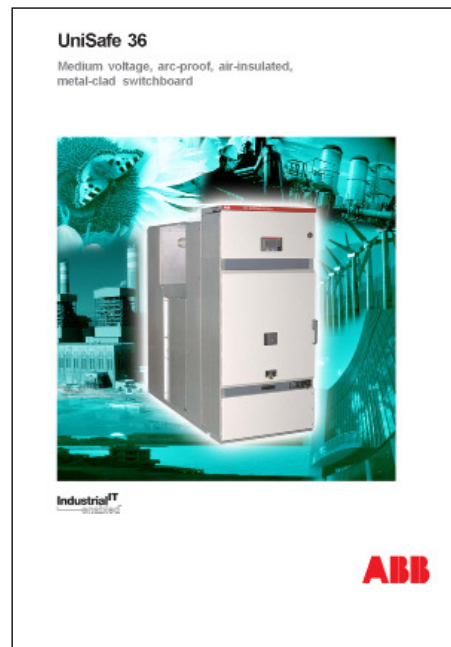
36 kV, 2500A, 31.5 kA Medium voltage, arc-proof,  
air insulated switchgear

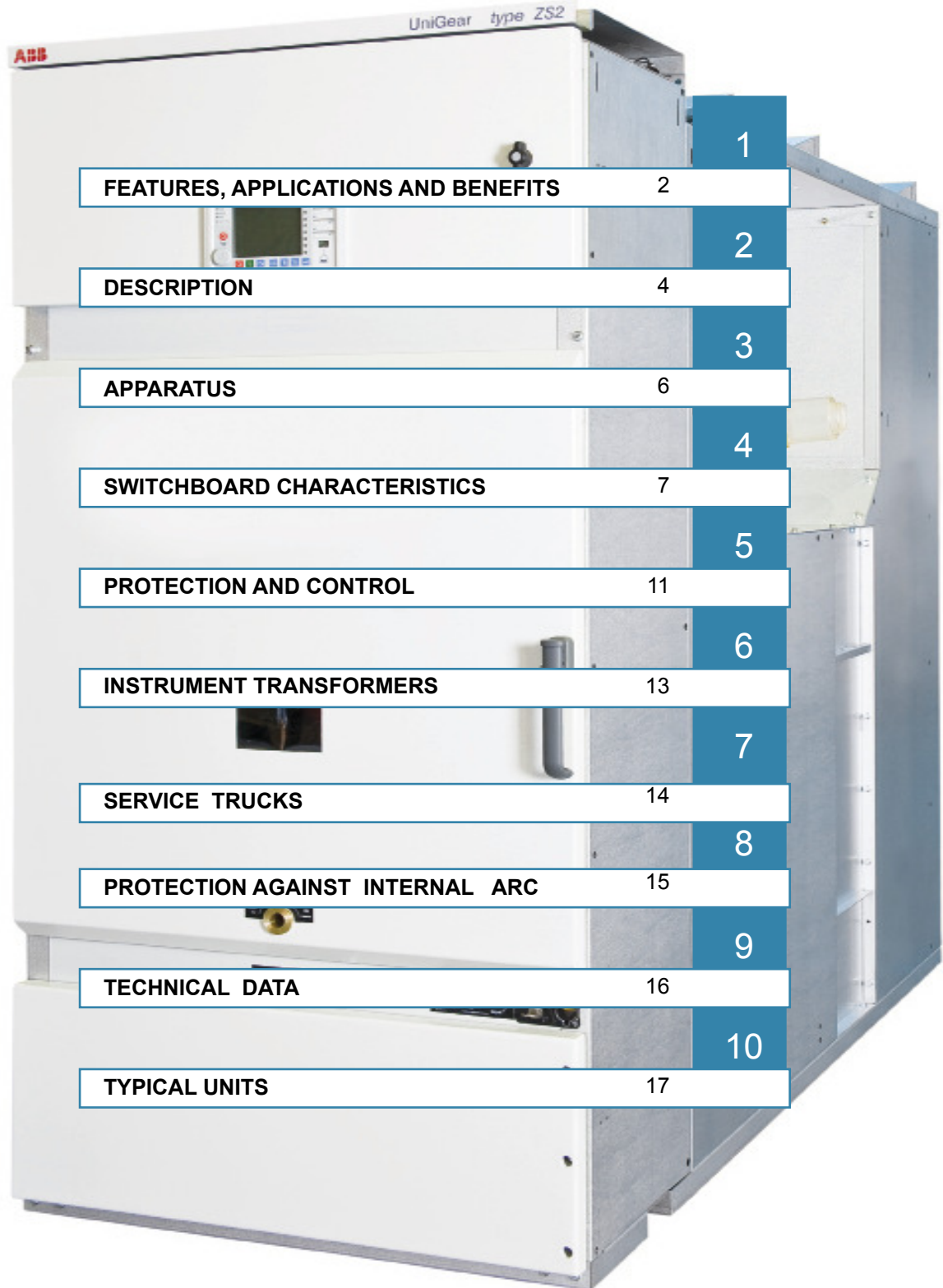
**UniGear ZS2** is the new name of well-established **UniSafe 36** switchgear.

The product is identical to Unisafe 36 without any technical difference. Therefore all related technical documentation under the name of UniSafe 36 will be valid and applicable to the product with the name of UniGear ZS2.

Name change was done because of product portfolio and classification reasons.

Supplementary official disclaimer letter from ABB, could be submitted along with the product and technical documentation, upon request.





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## FEATURES, APPLICATIONS AND BENEFITS

### UniGear ZS2 characteristics

- Air insulated switchboard LSC 2B, PM
- Designed for medium voltage distribution
- Factory-tested for indoor installations
- Fully arc-proof switchboard, IAC AF-LR
- Earthed metallic partitions between compartments

- Mechanical safety interlocks
- Compartments made of AluZinc coated steel sheets
- Front access for installation, maintenance and routine operations
- Conventional instrument transformers
- Wide range of functional units for any installation requirement
- Easy-to-assemble modular structure.

### Applications

#### Utilities and Power Plants

- Power stations, wind farms
- Transformer stations
- Switching stations
- Main and auxiliary switchboards.

#### Industry

- Pulp and Paper
- Textile
- Chemical
- Food
- Automotive
- Petrochemical.
- Mining

#### Transports

- Airports
- Ports
- Railways
- Underground transport.
- Light Rail Transport

#### Services

- Shopping Centres
- Supermarkets
- Hospitals
- Infrastructures and civil works.



## Customer Benefits

## Features

### \*Cost Saving

Thanks to ABB technology and its compact design;

- Most compact cubicle of the world in this category
- up to % 55 less transportation cost
- up to % 50 less civil works cost
- Maintenance free compact SF6 Circuit Breakers
- Modular construction
- Easily extendable from both side
- Continuous plant operation
- SF6 gas indicators for alarm and interlock
- Up to %32,5 less room height requirement even with arc gas duct solution
- 3000 mm room height is enough for internal arc protection

### \*Efficient

- Duplex option is available
- With LSC 2B and PM, cable compartment can be accessed while busbar is energized. No need to deenergize whole switchgear
- Maintenance free compact SF6 Circuit Breakers
- Less maintenance
- Less installation time by compact dimensions
- Highest service continuity via LSC 2B, PM design
- Real front access and back access at the sametime without dismantling anything
- No need for special toroidal current transformers
- Temperature rise type test is made according to IEC with 40 C condition  
No DIN 43671 standard (with 35 C condition)is applicable which means less current carrying capacity
- Voltage transformers with fuses are on the truck to provide more space in cable compartment. Less replacement&service time

### \*Safe

- IAC AF-LR, LSC 2B, PM design
- Rear side arc protection. Gives possibility for real back access. No fence, no restriction
- Left side arc protection
- Right side arc protection
- Front side arc protection
- Arc gas duct solution to exhaust arc gasses outside of substation room
- Earthquake proof design up to ZPZ=0.5g according to IEEE standard
- All the flaps at top. No rear side arc flap
- Main busbars are located at top instead of bottom.
- All the busbars are always insulated. No flashover due to bare busbar
- Fully type tested according to IEC
- SF6 gas indicators with pressure switch for alarm& interlock
- SF6 auto puffer& self blast switching technique. No overvoltages created during switching
- Possibility to see earthing switch position with naked eyes via front side glass window
- No complex mechanical connection linkage to earthing switch for position indication
- Self standing busbar solution. No support insulator, no vibration, no fault point for main busbars



## DESCRIPTION

UniGear ZS2 is the switchboard version made for applications over 24kV and up to 36 kV.

UniGear can be used for higher altitudes above 1000 m a.s.l. for rated voltage below 36 kV. The main characteristics of the UniGear switchboard remains the same.

Thanks to compactness, reduced footprint and the possibility of placing the switchboard against the installation room walls of UniGear.

The switchboard is also available in the Back to Back arrangement version for carrying out double busbar system configurations.

The entire busbar system (main and branches) is insulated.

Apart from making the main busbar system installation operations extremely simple, these characteristics help to guarantee the performances required by a 36 kV air insulated switchboard.

In order to ensure easy access to the feeder compartment and, at the same time, not to increase the switchboard dimensions, the transformers for current measurement are specially positioned with a particular triangular shape.

This special layout of the transformers allows all the electrical parameters of the switchboard and ensures more space for the operators during erection and maintenance procedures.

Metal sheets segregate each compartment and the energised components are air insulated.

The arc-proof units are in compliance with IEC 62271-200 Standards.

The installation requires very simple civil works. The switchboard can be wall-mounted.

The power cables terminals are accessible from the front.



### Standard colour

RAL7035

\*Colour range is available on request

### Protection degrees

The protection degrees in compliance with IEC 60529 Standards are the following:

- IP4X on the external housing
- IP2X inside the compartments.

Cubicles with higher protection degrees (up to a maximum of IP52) can be manufactured upon request.



### Compliance with Standards

The switchboard and its components comply with the following International and European Standards:

	IEC
Switchboard	60694 62271-200
Circuit breakers	62271-100
SF6 gas	60376
Earthing switches	62271-102

### Ambient conditions

The switchboard ratings are guaranteed under the following ambient conditions:

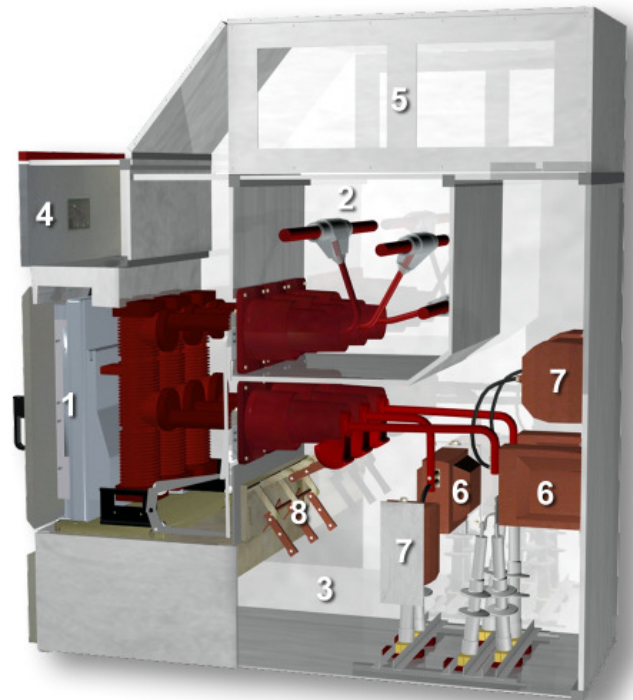
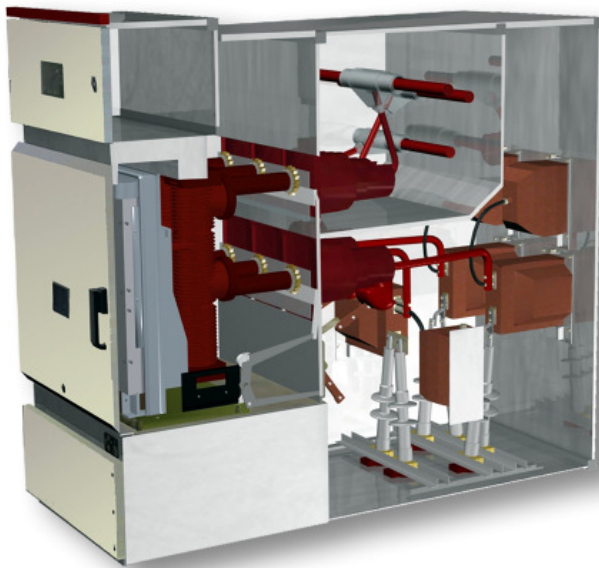
Minimum ambient temperature	- 5 °C
Maximum ambient temperature	+ 40 °C
Maximum relative humidity	95 %
Maximum altitude	1000 m a.s.l.
In presence of unpolluted and not corrosive atmosphere.	

### Main electrical characteristics

Rated voltage	<b>36 kV</b>
Rated current	... 2500A*
Rated short time withstand current	... 31,5 kA 3 sec

The electrical characteristics can change depending on different ambient conditions or on protection degrees higher than the standard values.

\* Please contact ABB for 3150A main horizontal busbar solution.



- 1 Circuit breaker compartment
- 2 Busbar compartment
- 3 Cable compartment
- 4 Low voltage compartment

- 5 Optional Arc channel (for arc proof version)
- 6 Current transformers
- 7 Voltage transformers
- 8 Earthing switch

Above illustration represents 1000 mm wide panel. In case of 1200 mm wide panel, all current transformers and voltage transformers are mounted side by side on a separate plate at the back of the cubicle in the cable compartment. Please contact ABB for detailed design drawing.

## APPARATUS

### HD4 SF6 Circuit breaker

UniGear ZS2 switchboard is equipped with SF6 HD4 circuit breaker.

The circuit breaker is fitted with a truck for the racking in and out with closed door.

The light and compact structure of UniGear guarantees sturdiness and high mechanical reliability. The stored energy, free-release mechanical operating mechanism allows opening and closing without the operator's intervention.

The operating mechanism and the poles are fixed to the metal structure, which acts also as a support for the kinematics automation of the moving contacts. HD4 medium voltage circuit breakers use sulphur hexafluoride (SF6) for arc quenching and as an insulating medium.

HD4 breaking principle relies on compression and self-blast techniques in order to achieve the best performances at all service current values with minimum arc times and gradual arc extinction without chopping, restriking and operating overvoltages. These features guarantee a long electrical life for the circuit breaker and limited dynamic, dielectric and thermal stresses on the network.

The poles, which form the breaking part, are maintenance-free, life-long sealed pressure systems in compliance with IEC 62271-100 Standards.



### VD4 Vacuum Circuit Breaker

UniGear ZS2 switchboard can be equipped with VD4 Vacuum circuit breaker.

The VD4 medium voltage circuit-breaker interrupters use the vacuum to extinguish the electric arc and as the insulating medium. Thanks to the unequalled properties of vacuum and the breaking technique used, current interruption takes place without arc chopping and without overvoltages. Restoration of the dielectric properties following interruption is extremely rapid. The VD4 circuit-breakers are used in electrical distribution for control and protection of cables, overhead lines, transformer and distribution substations, motors, transformers, generators and capacitor banks. The VD4 medium voltage circuit-breakers use vacuum interrupters embedded in poles. Embedding the interrupter in the pole makes the circuit-breaker particularly sturdy and protects the interrupter itself against shocks, deposits of dust and humidity. The vacuum interrupter houses the contacts and makes up the interruption chamber.

ABB circuit-breakers use the most advanced vacuum breaking techniques: with radial magnetic flow for circuit-breakers with medium-low performances and with axial magnetic flow for those with high breaking capacity. Both techniques guarantee even distribution of the arc roots over the whole surface of the contacts, allowing top performances at all current values.

The structure of a vacuum interrupter is relatively simple. The housing is made up of a ceramic insulator closed at the ends by stainless steel covers. The contacts are made of pure copper and sintered chrome and are welded to the copper terminals. A metallic bellows allows movement of the moving contact-terminal group, at the same time guaranteeing that the vacuum is maintained in the interrupter.



**Vacuum Circuit breaker**



## SWITCHBOARD CHARACTERISTICS

### Compartments

Each unit consists of three power compartments; Busbars, feeder, circuit breaker and low voltage compartment for instruments, auxiliary circuit wiring.

The arc proof switchboard is equipped with a duct to release the gases resulting from a possible internal arc.

All the compartments are segregated from each other with metal sheets.

### Main busbars

The busbar compartment houses the main busbar system, which is connected to the circuit breaker fixed insulating contacts by means of branches. The main busbars are made of insulated electrolytic copper.

The system is air-insulated and busbars are insulated tubular & rectangular bars.

### Branch connectors

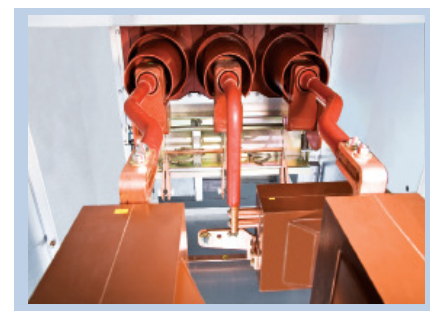
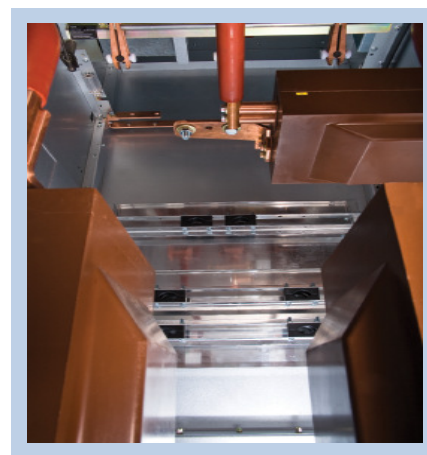
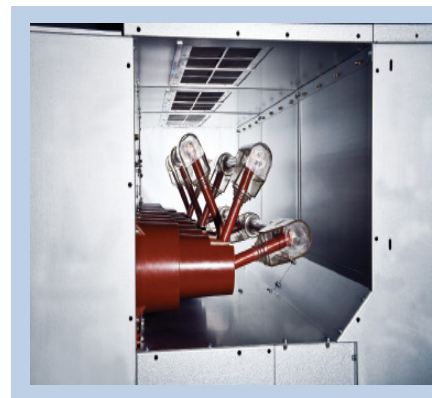
The feeder compartment houses the branch system for connecting the power cables to the circuit breaker fixed insulating contacts. The branch connectors are made of electrolytic insulated round copper.

### Earthing switch

Each feeder unit can be equipped with an earthing switch for the earthing of the power cables. The same device can also be used for the earthing of the busbar system (measuring, bus tie and rise units). The device has short circuit current making capacity. On request, its opening and closing operations can be prevented by means of key or padlocks. The earthing switch is properly mechanically interlocked with circuit breaker and manually operated from the front.

### Cables

The cable compartment is easily accessible from the front thus making it possible to have a wall-standing installation. The units can be equipped with single or three core cables depending on the current rating and the cable cross-section.



Feeder compartment : Lower bushings, current transformers and branch connectors.

## SWITCHBOARD CHARACTERISTICS

### Bushings and shutters

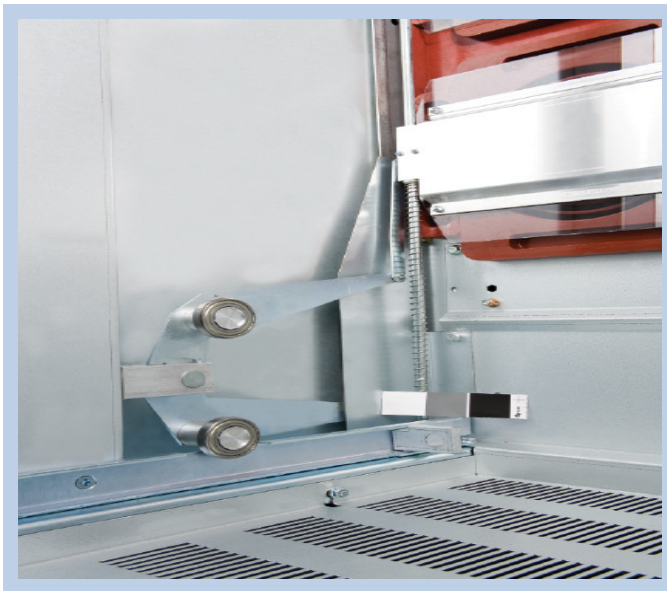
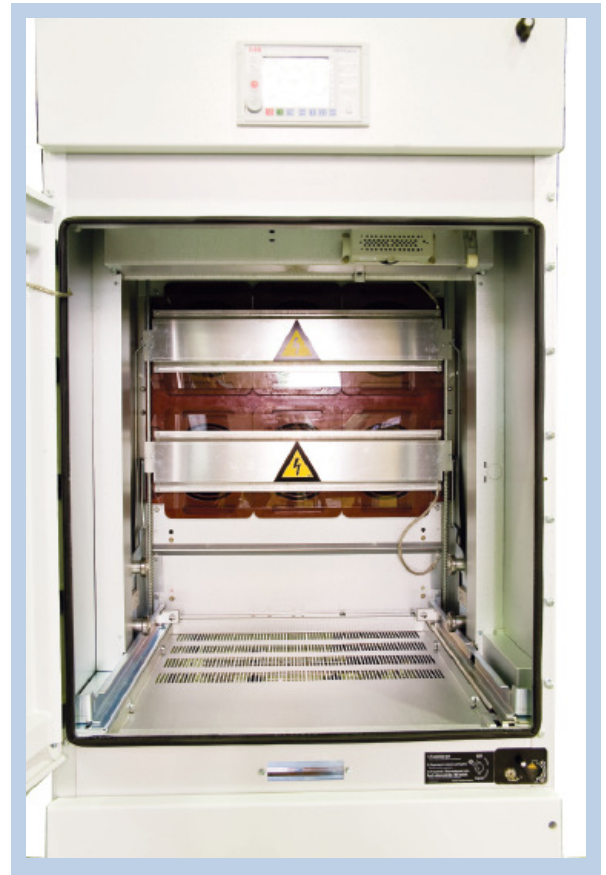
The bushings consist of insulating monoblocs, which house the power contacts for the connection between circuit breaker and feeder / busbar compartments.

The shutters are automatically operated when the circuit breaker is drawn from test to service position and vice versa.

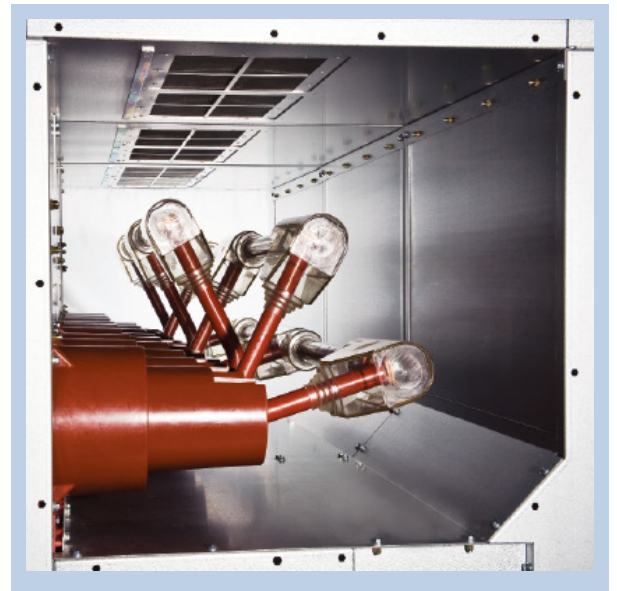
On request, two independent padlocks can lock each shutter separately.

### Earthing busbar

The earthing busbar is made of electrolytic copper. It runs through the whole switchboard length thus guaranteeing a high safety degree both for the personnel and the installation.



Automatic shutters



Automatic shutters

## SWITCHBOARD CHARACTERISTICS



### Safety interlocks

The UniGear switchboard is fitted with all the interlocks and accessories needed to guarantee the high level of safety and reliability both for installation and operators.

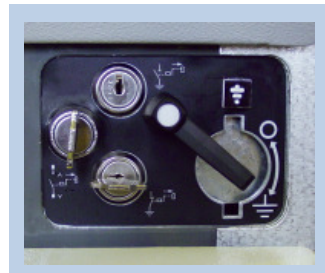
The Safety interlocks can either be the standard ones (1-2-3) or optional ones (4-5). Standard interlocks are foreseen by the standards and are therefore required to guarantee the correct operation sequence. Optional interlocks can be supplied on request and they must be foreseen by the installation service and maintenance procedures. The presence of interlocks guarantees the highest level of reliability even in the case of accidental error and allows what ABB defines as an “error-free” system.

### Keys

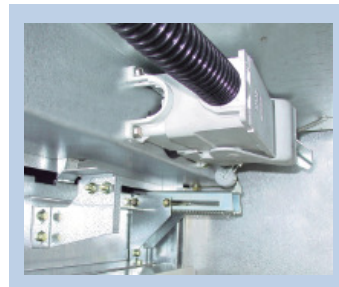
The use of key interlocks is very important in realising the interlocking logic between the units of the same switchboard, or of other medium, low and high voltage switchboards. The interlocking logic can be realised by ringing the keys in the same keyholder or by special key arrangement mechanism.

### Locking magnets

The locking magnets are used to make automatic interlock logics without human intervention. The magnets operate with active logics and therefore the lack of auxiliary voltage makes the lock become non-operative.




Interlocks on earthing switch operating mechanism




Withdrawable circuit breaker control wiring plug&socket

## SWITCHBOARD CHARACTERISTICS


### Standard safety interlocks (mandatory)

	Lock		Condition	Mechanical / Electrical Interlock	Standard/ Optional
	1	A	Circuit breaker racking-in/out	Closed Circuit breaker	M
	B	Circuit breaker closing	Undefined truck position	M	S
2	A	Circuit breaker racking-in	Unplugged Circuit breaker multi contact plug	E	S
	B	Circuit breaker multi contact plug unplugging	Truck in service or undefined position	M	S
3	A	Earthing switch closing	Truck in service or undefined position	M	S
	B	Circuit breaker racking-in	Closed earthing switch	M	S


### Additional safety interlocks

	Lock		Condition		
	4	A	Circuit breaker compartment door opening	Truck in service or undefined position	E
	B	Circuit breaker racking-in	Open circuit breaker compartment door	M	S
5	A	Feeder compartment door opening	Open earthing switch	M	O
	B	Earthing switch opening	Open feeder compartment door	M	O

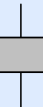
### Keys

	Lock		Condition			
	6		Circuit breaker racking-in lock	Can only be removed with the truck in the racked-out position	M	O
	7		Earthing switch closing lock	Can only be removed with the earthing switch open	M	O
	8		Earthing switch opening lock	Can only be removed with the earthing switch closed	M	S
9		Insertation of the earthing switch operating lever	Can always be removed	M	S	

### Padlocks

	Lock		Condition			
	10		Circuit breaker compartment door opening		M	O
	11		Feeder compartment door opening		M	O
	12		Insertation of the Circuit breaker racking-in/out crank lever		M	O
	13		Insertation of the earthing switch operating lever		M	O
14		Shutters opening or closing		M	O	

### Locking magnets

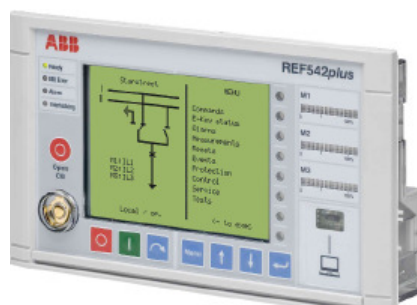
	Lock		Condition			
	15		Circuit breaker racking-in/out		E	S
	16		Earthing switch opening and closing		E	O
17		Circuit breaker compartment door opening		E	O	

### Optional Accessory devices

18	Circuit breaker-switchboard unit compatibility matrix	The Circuit breaker multi-contact plug and relative switchboard unit socket are equipped with a mechanical matrix, that disables circuit breaker racking-in into switchboard unit with an inappropriate rated current
19	Circuit breaker mechanical operating mechanism	The Circuit breaker compartment is equipped with a mechanical device, that enables circuit breaker closing and/or opening directly by means of the front operating mechanism pushbuttons, keeping the door closed. The controls can be operated with the circuit breakers in the service and racked-out position.



## PROTECTION AND CONTROL



The REF542plus unit integrates all the secondary functions relevant to a switchgear unit in a single module fitted with watchdog. Thanks to the flexibility of its software, the unit is able to satisfy a vast range of installation requirements. The high level of functionality of the REF542plus unit is supported by a simple and easy-to-use user interface.

Thanks to the use of the REF542plus unit, each medium voltage UniGear panel becomes an integrated and independent unit able to carry out all the required functions.

- Integration of all the functions in a single instrument: protection, measurement, controls, signalling, interlocking, automation and communication.
- Single interface between switchboard and operator for all the installation panels: feeder, transformer, motor, generator, power correction banks, bus-tie and measurements units.
- Single type of spare parts and accessories: a single hardware unit.
- Reduced maintenance: drastic reduction in preventive maintenance, great limitation of the faults caused by tampering and errors.
- Easy modification and upgrading of the functions: by means of the unit configuration software, even with the switchboard in service.

### Hardware

The device consists of a central unit housed inside the auxiliary compartment of the switchgear and of a user interface located on the door of this compartment.

The two pieces of apparatus are connected together by means of a simple communication cable. The user interface can be replaced keeping the central unit in service and guaranteeing all the measurement, control and protection functions during maintenance work.

All the connections are made by means of plug-socket connectors to optimise service and maintenance operations.

### Machine-user interface

The UniGear switchboard becomes extremely simple to operate by means of the user interface made available by the REF542plus unit.

All the apparatus control operations, readout of measurements, detection of signals and parameterisation of the functions can be carried out directly from the front of the unit or by means of a laptop computer connected to the optic communication gate located on the front.

### Central unit

The central unit consists of modular electronic modules with the functions described below.

- **Feeder.** The apparatus is fitted with a multivoltage internal feeder and can operate from 48 to 220 Volt d.c. Thanks to its digital technology, consumption is very low.
- **Digital inputs.** Each unit is fitted with a minimum of 14 digital inputs to interface the apparatus contained in the switchboard, such as the circuit-breaker and the earthing switch. These can be increased up to a maximum of 42. They operate between 20 and 250 Volt d.c. and are freely programmable.
- **Digital outputs.** The digital outputs consist of free contacts made available by bistable relays. Each unit is provided with at least 8 outputs to operate the switchgear apparatus and the minimum signals required. These can be increased up to a maximum of 24. They operate up to 250 Volt d.c./a.c. and are freely programmable. The output dedicated to the circuit-breaker opening control can carry out control of circuit continuity.

By means of the static outputs with which it is fitted (from 1 to a maximum of 3), it is possible to interface conventional supervision systems by means of active and reactive power measurement with impulse emitter.

- **Analogue inputs.** Each unit is fitted with 8 analogue inputs to carry out measurements and protections.

The signals coming from conventional current ( $/1$  and  $/5A$ ) and voltage ( $/100$  and  $/110V$ ) transformers, or from measurement sensors (Rogowski coil and resistive divider) can be acquired.

- **Analogue outputs.** The 4 analogue outputs the unit can be provided with make it possible to interface conventional supervision systems by means of the integrated measurement functions. Each output can be freely programmed as  $0...20mA$  or  $4...20mA$ .



# PROTECTION AND CONTROL

## Communication

The REF542plus unit can be connected with supervision and process systems by means of the integrated communication function.

This means the apparatus becomes the window through which the system accesses all the switch-gear information and makes the following functions possible:

- Monitoring
- Control
- Parameterisation of the protection functions
- Measurements
- Storage of events
- Monitoring of all operating apparatus
- Disturbance oscillography.

The following protocols are available for connection to the supervision and automation systems:

- ABB SPA-bus
- LON-bus in accordance with ABB Lon Application Guide (LAG 1.4);
- IEC 60870-5-103 (in accordance with VDEW specifications);
- MODBUS RTU.

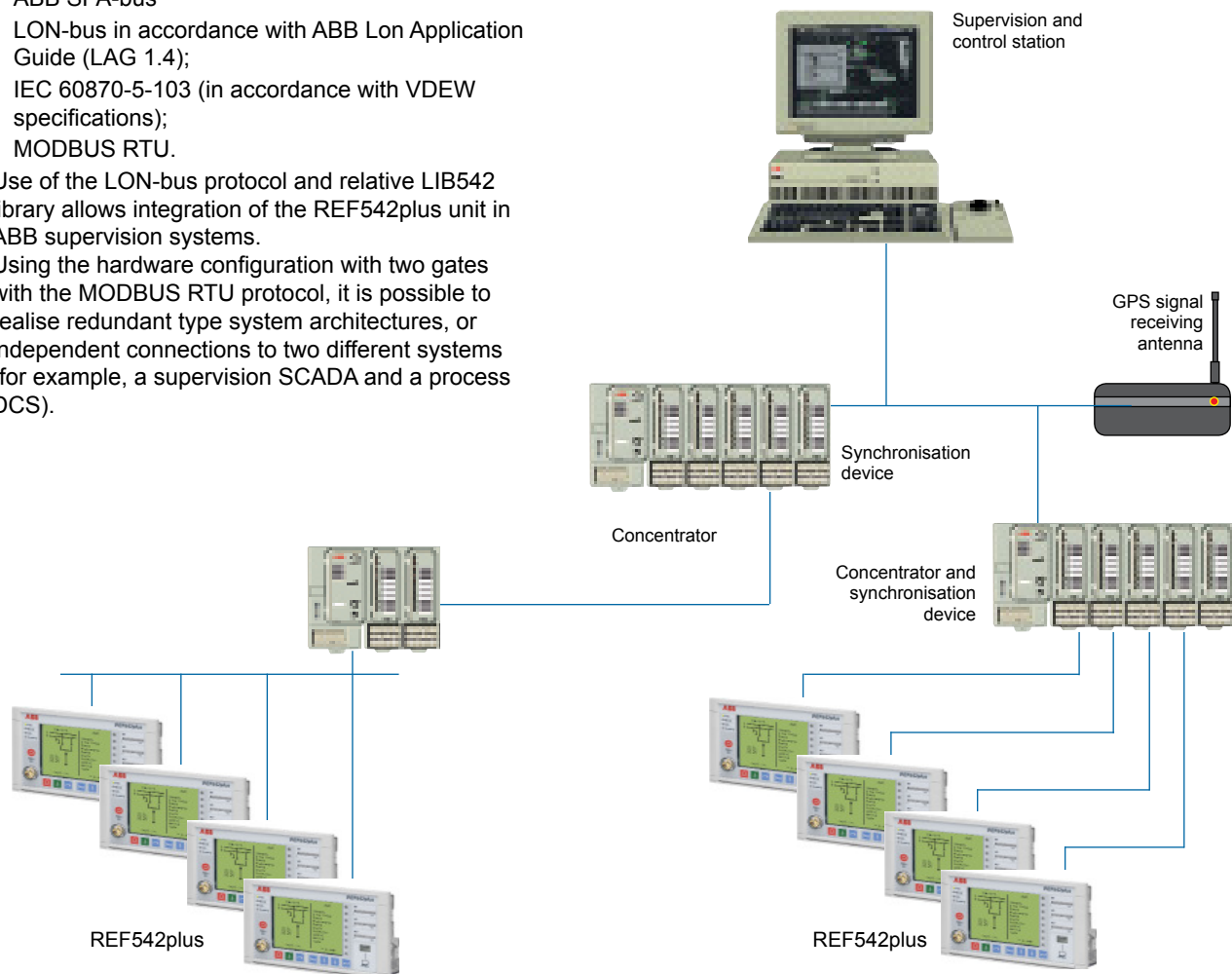
Use of the LON-bus protocol and relative LIB542 library allows integration of the REF542plus unit in ABB supervision systems.

Using the hardware configuration with two gates with the MODBUS RTU protocol, it is possible to realise redundant type system architectures, or independent connections to two different systems (for example, a supervision SCADA and a process DCS).

## Synchronisation

By means of a dedicated optic input, the REF542plus unit can be connected to an external master clock (typically a GPS) for synchronisation. When synchronised using this method, the REF542plus units guarantee a precision in chronological recording of the events of one millisecond or better.

- Dedicated optic input for synchronisation.
- Recording of events with a precision of one millisecond or better.
- Protocol accepted: IRIG-B.



## INSTRUMENT TRANSFORMERS

### Voltage transformers

Resin-insulated voltage transformers are used for the feeding of measuring instruments and protections. They are suitable either for fixed installation or mounted on withdrawable trucks. They comply with IEC 60044-2 Standards. Withdrawable version equipped with fuses is custom-made.

Voltage transformers can be fitted either with one or two poles. Their performances and accuracy classes comply with the functional requirements of the apparatus they are connected to.

Withdrawable version is equipped with medium voltage protection fuses, their replacement can be carried out while the switchboard is in service.

### Current transformers

Current transformers are resin-insulated and suitable for the feeding of measuring instruments and protections.

These transformers can have a wound core or a bushing bar with one or more cores. Their performances and accuracy classes comply with the apparatus requirements.

Current transformers comply with IEC 60044-1 Standards.

Current transformers can be equipped also with a capacitive voltage dividers for being connected to capacitive voltage indicator lamps.

### Toroidal current transformers

Toroidal current transformers are resin-insulated and suitable for the feeding of measuring instruments and protections.

These transformers can have a ring or a split core. Their performances and accuracy classes comply with the apparatus requirements.

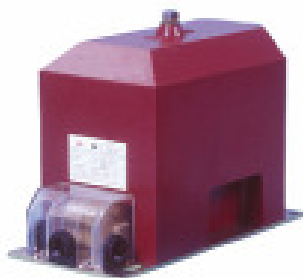
They are suitable both for measuring phase currents and determining earth fault currents. They meet the requirements of IEC 60044-1 Standards.



Toroidal current transformers



Voltage transformers with primary fuses



Fixed type voltage transformer for cable side



Current transformers block type  
Dimensions according to DIN standards

## SERVICE TRUCKS

The UniGear can be fitted with the service trucks required to complete the switchboard and needed in service operations and during maintenance work.

The trucks are divided into three different types:

- Earthing without making capacity.
- Test cables.
- Isolation.

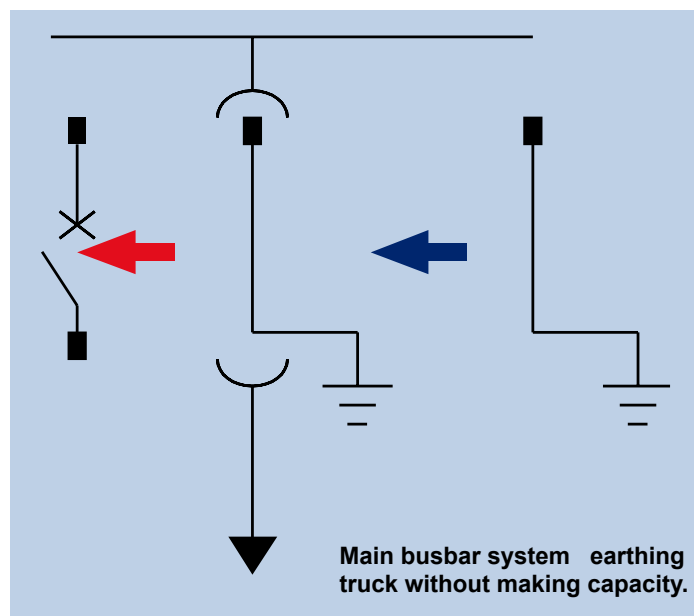
**Earthing trucks without making capacity**

This trucks carry out the same function as the earthing switch without making capacity. They therefore have no capacity to earth live circuits in fault conditions.

They are used to ensure an additional fixed earth, as is required by some installation service and maintenance procedures, as a further guarantee for personnel.

The use of these trucks foresees removal of the apparatus from the switchboard (circuit-breaker) and its replacement with the truck. The units preset for use of the earthing trucks are provided with a key lock which, when activated, prevents their racking-in. This truck is available for Earthing of the main busbar system.

The earthing truck of the main busbars, during the racking-in phase, only lifts the top shutter and earths the contacts connected to the top branch connections (and therefore to the main busbar system) by means of the switchboard structure.



## PROTECTION AGAINST INTERNAL ARC

An internal arc is extremely rare in LSC 2B, PM switchboards since the apparatus is manufactured so as to prevent such an occurrence. Anyway, UniGear ensures maximum personnel safety even in case of internal arc. The switchboard is built to withstand the overpressures ensuing from the internal arc and is fitted with ducts to convey the exhausted gases and prevent damage to operators and apparatus. The different units are guaranteed arc-proof in compliance with IEC 62271-200. UniGear ZS2 is conforming to IEC 62271-200 standard with below definitions:

### **Partition class: PM (Partition metallic)**

Metal-enclosed switchgear and controlgear providing continuous metallic partitions and/or shutters (if applicable), intended to be earthed, between opened accessible compartments and live parts of the main circuit. Metallic partitions and shutters or metallic parts of them shall be connected to the earthing point of the functional unit.

### **Loss of service continuity category LSC2B**

Bus bar, feeder and apparatus compartments physically and electrically segregated.

Internal Arc Classification IAC AF-LR, 31.5A/1s, based on internal arc tests performed with reference to IEC62271-200

F: front, L: lateral, R: rear internal arc protection of switchgear.

Rear side internal arc protection is vital for the reliability of maintenance person who is making operation on the switchgear.

Accessibility is restricted to authorised personnel only.

UniGear ZS2 is fully conforms to all the five criteria:

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

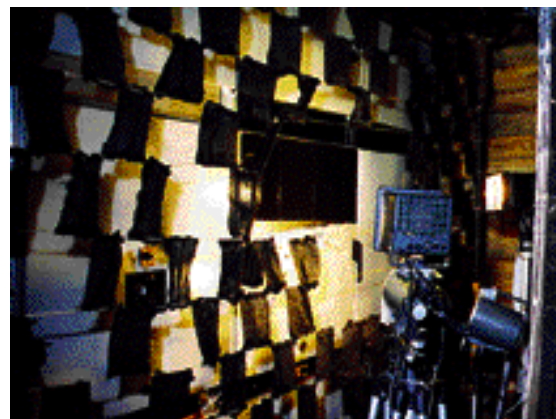
### **TVOC**

This system consists of an electronic monitoring device located in the auxiliary compartment which the optic sensors are subject to.

These are distributed in the various power compartments and are connected to the device by means of optic fibres.

When a certain established light level is exceeded, the device opens the circuit-breakers. To prevent the system from intervening due to light occasionally generated by external phenomena (flash of a camera, reflections of external lights, etc.), the current transformers can also be connected.

The protection module only sends the opening command to the circuit-breaker if it receives the light and short-circuit current signal simultaneously.



Test carried out by means of an infrared camera.

## ELECTRICAL CHARACTERISTICS

Switchboard		
Rated voltage	kV	36
Rated insulation voltage	kV	36
Rated power frequency withstand voltage	kV (1 min)	70
Rated lightning impulse withstand voltage	kV	170
Rated short-time withstand current	kA (3s)	31.5
Peak current	kA	80
Internal arc withstand current	kA (1s)	31.5
Main busbar rated current	A	....2500*
Branch connection rated current	A	....2500

\* Please contact with ABB for 3150 A main horizontal busbar solution

## TYPICAL UNITS

<b>Depth (mm)</b>		2400				2600			
<b>Height (mm)</b>		2310				2310			
<b>Height with arc gas exhaust duct (mm)</b>		2662				2662			
<b>Width (mm)</b>		1000				1200			
<b>Branch Rated current (A)</b>		1250	1600	2000	2500	1250	1600	2000	2500
<b>IF</b>	Incoming/Outgoing								
	with Fixed Voltage Transformers								
	with Fixed fused Voltage Transformers								
	with Withdrawable fused Voltage Transformers	Please consult ABB for details							
<b>BT</b>	Bus-tie								
<b>R</b>	Riser								
<b>M</b>	Measurements								
<b>IFD</b>	Direct cable connection								
	with Fixed Voltage Transformers								
	with Fixed fused Voltage Transformers								
<b>IFDM</b>	Direct cable connection with measurements ( with Withdrawable fused Voltage Transformers )								
<b>Connections</b>									
Connection suitable for power cables up to 2x630mm <sup>2</sup> per phase									
Connection suitable for power cables up to 4x630mm <sup>2</sup> per phase									
Top busbar connection		Please consult ABB for details							
Top cable entry		Please consult ABB for details							
	Colored cells indicates availability								
<b>Note:</b>	Above dimensioning is valid together with explanations given specifically for each unit in page 17,18 and 19.								



## IF unit Incoming/outgoing Feeder Cubicle

**Rated main busbar current (A) : 1250/1600/2000/2500**

**Rated circuit current (A) : 1250/1600/2000/2500**

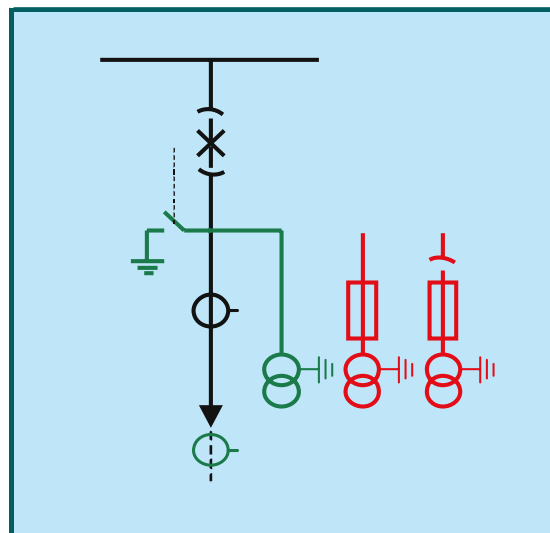
Block type current transformers <sup>(1)</sup>	: Yes
Cable core current transformers <sup>(2)</sup>	: Optional
Fixed voltage transformers without fuses	: Optional
Fixed voltage transformers with fuses <sup>(3)</sup>	: Optional
Withdrawable voltage transformers with fuses <sup>(4)</sup>	: Optional
Earthing switch	: Optional
Arc duct for arc proof version	: Optional

<sup>(1)</sup> Post insulators replace block type current transformers whenever latter is not required

<sup>(2)</sup> Cable connection is typically one cable per phase when cable core current transformers (CCT) are used. Application of CCTs may effect the overall dimensioning of the switchboard depending on the specific configuration and requirement. In case of such requirement please contact ABB for detailed design and information

<sup>(3)</sup> Only available in 1200mm wide panel version

<sup>(4)</sup> Requires additional panel. Please contact ABB for details



## BT & R unit

### Bus-tie and Riser Cubicle <sup>(1)</sup>

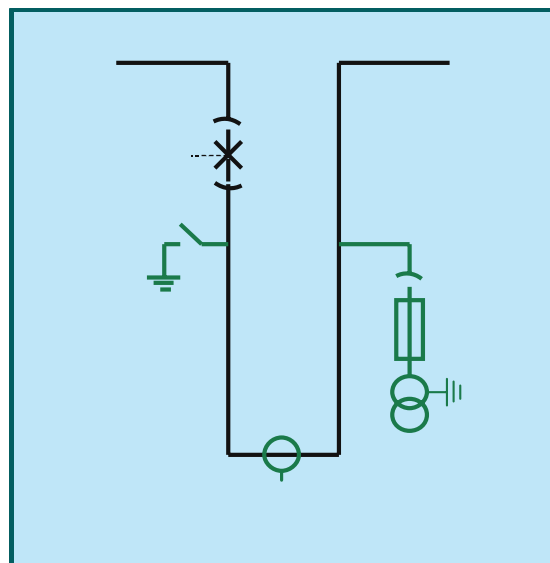
**Rated main busbar current (A) : 1250/1600/2000/2500**

**Rated circuit current (A) : 1250/1600/2000/2500**

Block type current transformers <sup>(2)</sup>	: Yes
Withdrawable voltage transformers with fuses	: Optional
Earthing switch	: Optional
Arc duct for arc proof version	: Optional

<sup>(1)</sup> The width of each Bus tie and Riser cubicle is 1000 mm. Each panel can be used separately for various combinations

<sup>(2)</sup> Post insulators replace block type current transformers whenever latter is not required



#### Key to components

<span style="color: black;">—</span>	Standard components
<span style="color: green;">—</span>	Accessories
<span style="color: red;">—</span>	Alternative solutions

## TYPICAL UNITS

### M unit

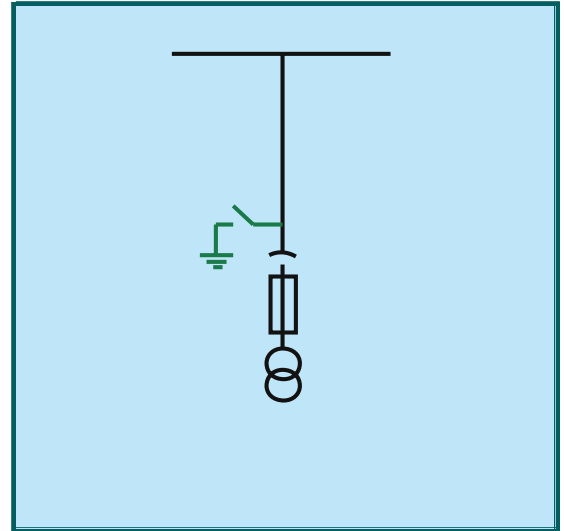
#### Measuring Cubicle

**Rated main busbar current** (A) : 1250/1600/2000/2500

**Rated circuit current** (A) : 1250

Withdrawable voltage transformers with fuses : Yes  
 Earthing switch : Optional  
 Arc duct for arc proof version : Optional

Please contact ABB for busbar mounted current transformers solution for busbar measuring.



### IFD unit

#### Direct Cable Connection Cubicle

**Rated main busbar current** (A) : 1250/1600/2000/2500

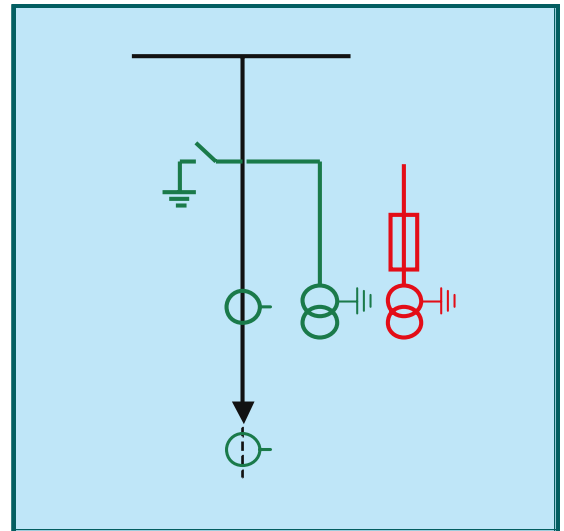
**Rated circuit current** (A) : 1250/1600/2000/2500

Block type current transformers <sup>(1)</sup> : Yes  
 Cable core current transformers <sup>(2)</sup> : Optional  
 Fixed voltage transformers without fuses : Optional  
 Fixed voltage transformers with fuses <sup>(3)</sup> : Optional  
 Earthing switch : Optional  
 Arc duct for arc proof version : Optional

<sup>(1)</sup> Post insulators replace block type current transformers whenever latter is not required

<sup>(2)</sup> Cable connection is typically one cable per phase when cable core current transformers (CCT) are used. Application of CCTs may effect the overall dimensioning of the switchboard depending on the specific configuration and requirement. In case of such requirement please contact ABB for detailed design and information

<sup>(3)</sup> Only available in 1200mm wide panel version.



Key to components  
 — Standard components  
 — Accessories  
 — Alternative solutions

# IFDM unit

## Direct Cable Connection with Measurement Cubicle

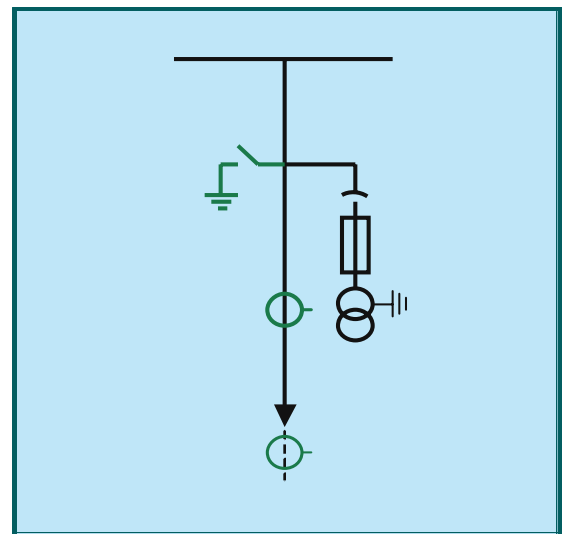
**Rated main busbar current** (A) : 1250/1600/2000/2500

**Rated circuit current** (A) : 1250/1600/2000/2500

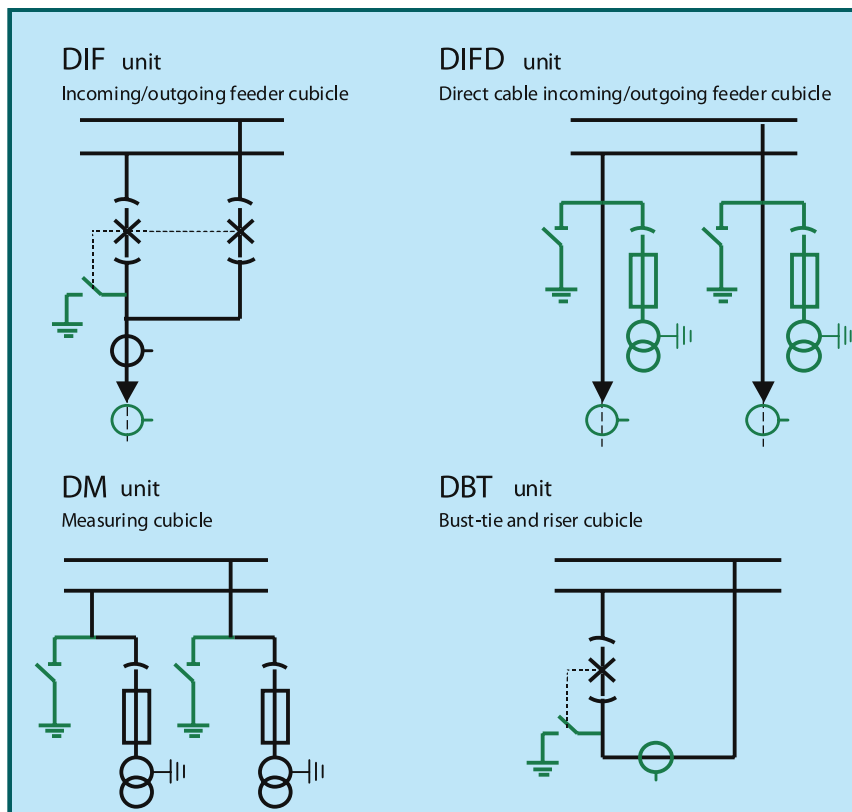
- Block type current transformers <sup>(1)</sup> : Yes
- Cable core current transformers <sup>(2)</sup> : Optional
- Withdrawable voltage transformers with fuses : Yes
- Earthing switch : Optional
- Arc duct for arc proof version : Optional

<sup>(1)</sup> Post insulators replace block type current transformers whenever latter is not required

<sup>(2)</sup> Cable connection is typically one cable per phase when cable core current transformers are used. Please contact ABB for details



## Duplex cubicle solutions



### Dimensions :

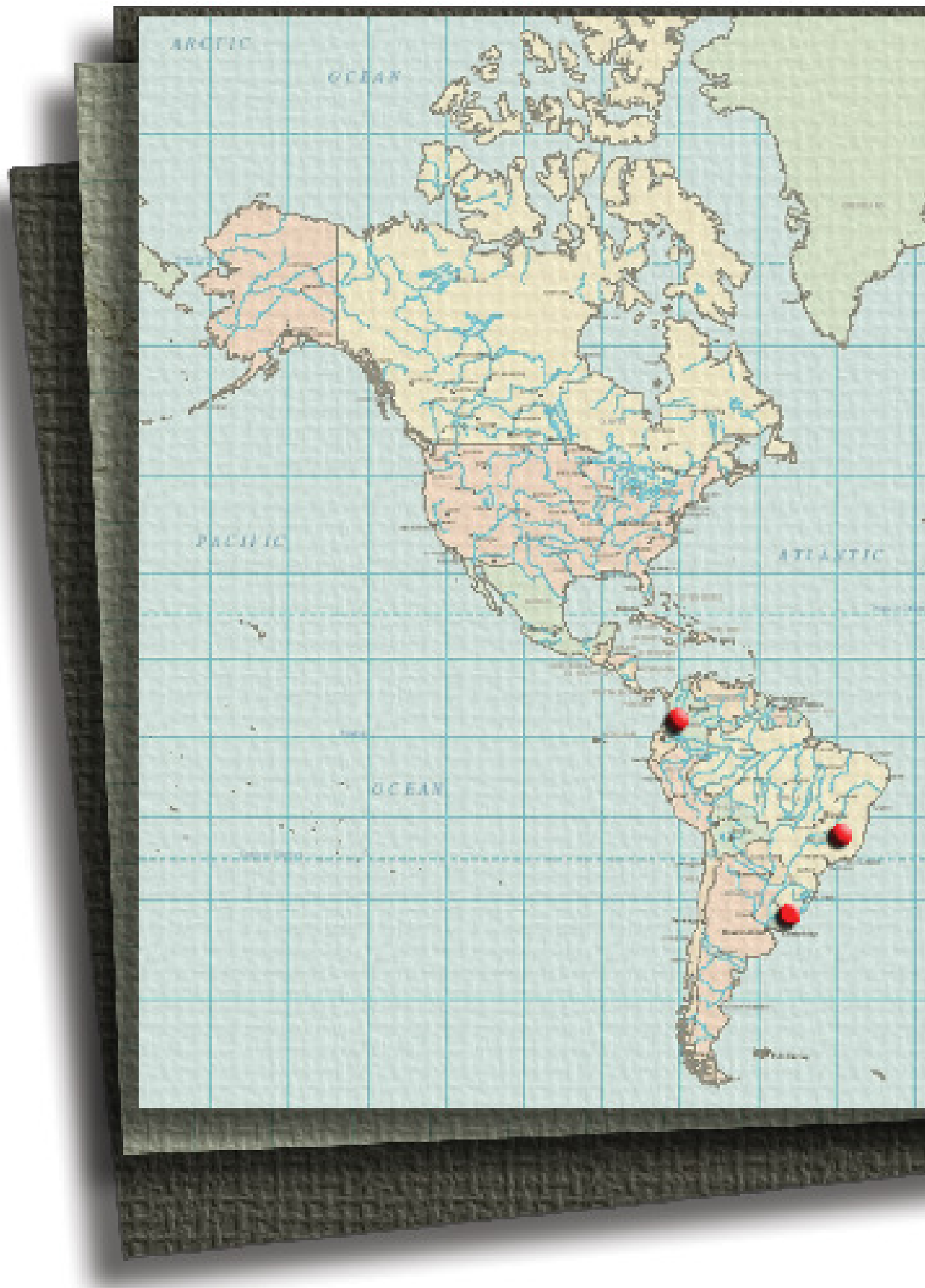
without arc duct  
(width x depth x height) (mm)  
1000-1600 x 3820 x 2310

with arc duct for arc proof version  
(width x depth x height) (mm)  
1000-1600 x 3820 x 2662

**Rated main busbar current (A)**  
1250/1600/2000/2500

Applicable maximum circuit current may vary for different configurations. In case of any specific application requirement, please contact ABB for detailed dimensioning and configuration.

# References in 5 continents ...







Notes

**Your sales contact: [www.abb.com/contacts](http://www.abb.com/contacts)**  
**More product information: [www.abb.com/productguide](http://www.abb.com/productguide)**

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