

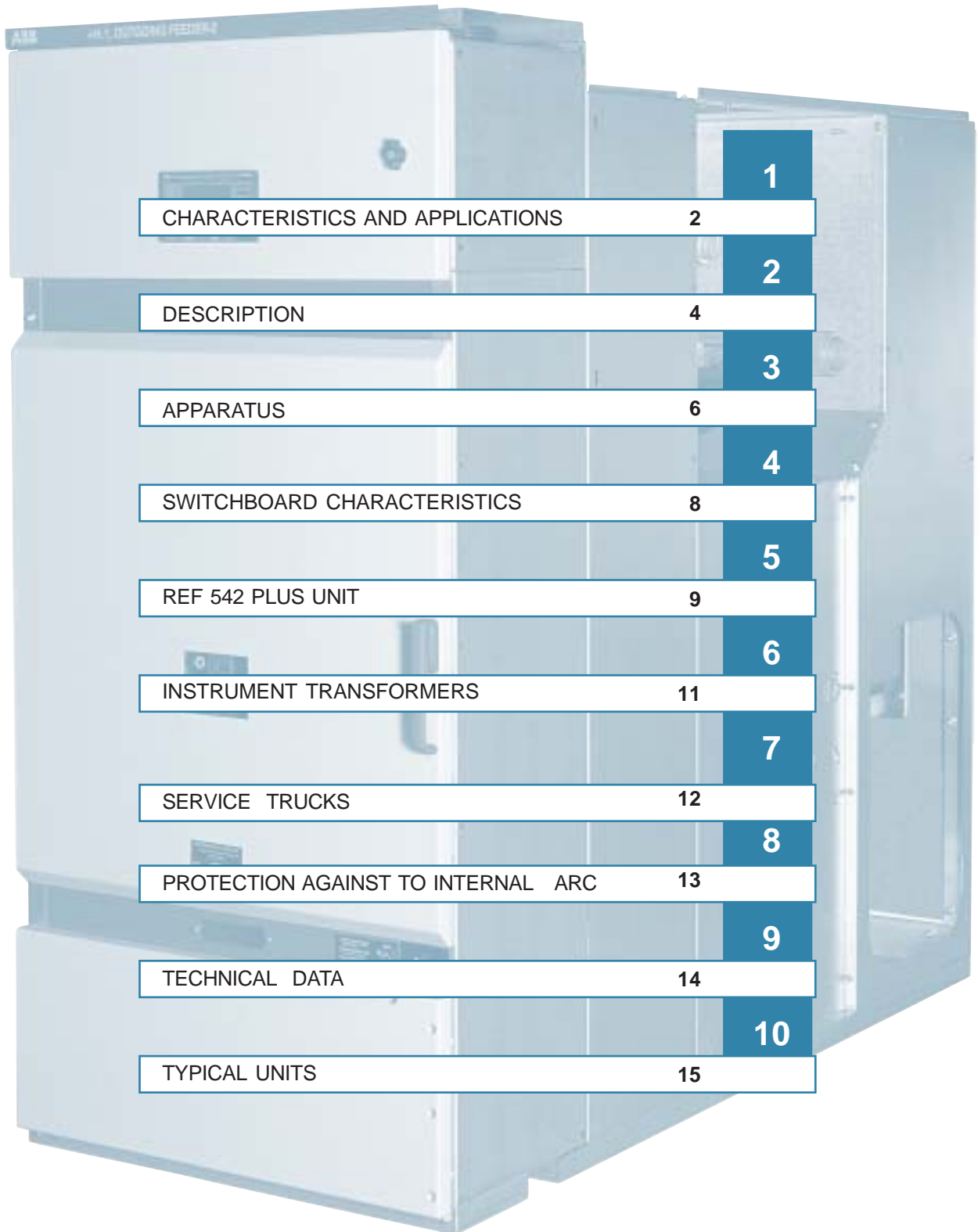
UniSafe 36

Medium voltage, arc-proof, air-insulated,
metal-clad switchboard



IndustrialIT
enabled

ABB



	1
CHARACTERISTICS AND APPLICATIONS	2
	2
DESCRIPTION	4
	3
APPARATUS	6
	4
SWITCHBOARD CHARACTERISTICS	8
	5
REF 542 PLUS UNIT	9
	6
INSTRUMENT TRANSFORMERS	11
	7
SERVICE TRUCKS	12
	8
PROTECTION AGAINST TO INTERNAL ARC	13
	9
TECHNICAL DATA	14
	10
TYPICAL UNITS	15

CHARACTERISTICS AND APPLICATIONS

UniSafe 36 characteristics

- Metal-clad air insulated switchboard
- Designed for medium voltage distribution
- Factory-tested for indoor installations
- Arc-proof switchboard
- 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.





Transports

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

Services

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



Applications

Utilities and Power Plants

- Power stations
- Transformer stations
- Switching stations
- Main and auxiliary switch-boards.

Industry

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



DESCRIPTION

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

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

Thanks to compactness (all the units are only 1000 mm wide), reduced footprint and the possibility of placing the switchboard against the installation room walls of Unisafe 36.

All the operations can be carried out from the front of the switchboard.

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 made with insulated round bars.

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 have been tested in compliance with IEC 60298 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

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 IP51) can be manufactured upon request.



Compliance with Standards

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

	IEC
Switchboard	60694 60298
Circuit breakers	62271
SF6 gas	60376
Earthing switches	60129

Ambient conditions

The switchboard ratings are guaranteed under the following ambient conditions:

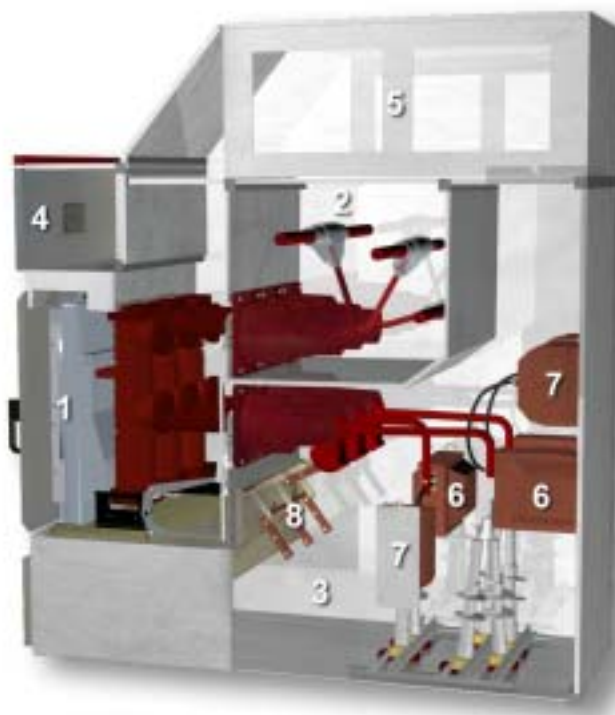
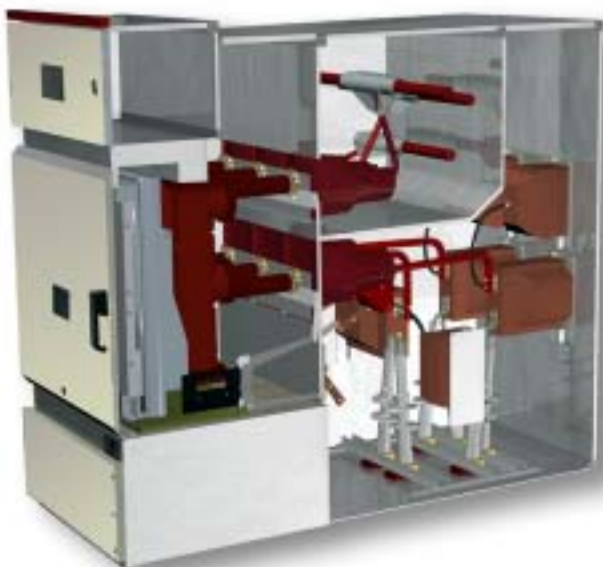
Minimum ambient temperature	- 5 °C
Maximum ambient temperature	+ 40 °C
Maximum relative humidity	95 %
Maximum altitude	1000 m a.s.l.
In presence of unpolluted and not corrosive atmosphere.	

Main electrical characteristics

Rated voltage	36 kV
Rated current	... 2500 A
Rated short time withstand current	... 25 kA*

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

* Please contact ABB for 31.5kA solution.



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

- 5 Arc channel
- 6 Current transformers
- 7 Voltage transformers
- 8 Earthing switch

APPARATUS

HD4 SF6 Circuit breaker

UniSafe 36 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 Unisafe 36 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 Standards.



Compartments

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

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 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.



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

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.

SWITCHBOARD CHARACTERISTICS

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.

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.



Automatic shutters



Access to the cable compartment is achieved either from front or from side during the installation of the cubicles at site

Interlocks

The switchboard is equipped with all the interlocks necessary to prevent any incorrect operation that might jeopardise the personnel safety and put at risk the installation functionality.

In particular the following interlocks are provided to prevent these operations:

- circuit breaker closing (undefined truck position)
- circuit breaker racking-out (circuit breaker closed)
- circuit breaker racking-in (circuit breaker closed)



Withdrawable circuit breaker control wiring plug&socket

If the unit is equipped with an earthing switch, the following interlocks are also provided:

- earthing switch closing (circuit breaker in service or undefined position)
- circuit breaker racking-in (earthing switch closed)



Interlocks on earthing switch operating mechanism

REF 542 PLUS UNIT



REF 542 Unit Plus.

REF 542 Plus unit integrates all the switchboard secondary functions in a single, self-checking module. Thanks to its versatile software, the unit provides a wide range of different installation applications. The remarkable functional efficiency of the REF 542 Plus unit is enhanced by a simple, easy-to-use interface. Thanks to the use of REF 542 Plus, each

medium voltage UniSafe becomes an integrated and independent unit to meet any customer need. Main characteristics:

- integration of all the functions (protection, measurement, controls, signalling, interlock, automation and communication) in a single device;
- single interface between switchboard and operator for all the units: line, transformer, motor, generator, capacitor banks, bus-tie and measurement units;

- standard set of spare parts and accessories in a single hardware unit;
- reduced maintenance. The use of REF 542 Plus drastically reduces the routine maintenance and limits the damage caused by tampering and misuse;
- easy function modification and updating by means of the unit configuration software even when the switchboard is energised.

UniSafe advanced technology along with the outstanding performances of REF 542 Plus, ensures a real-time, throughout control of the plant and significantly increases ease of use, with considerable benefits for running costs and efficiency.

The direct connection between apparatus and switchboard control system fully implements the concept of an integrated installation at the highest level.

REF 542 PLUS UNIT

Integrated control system

Communication protocols

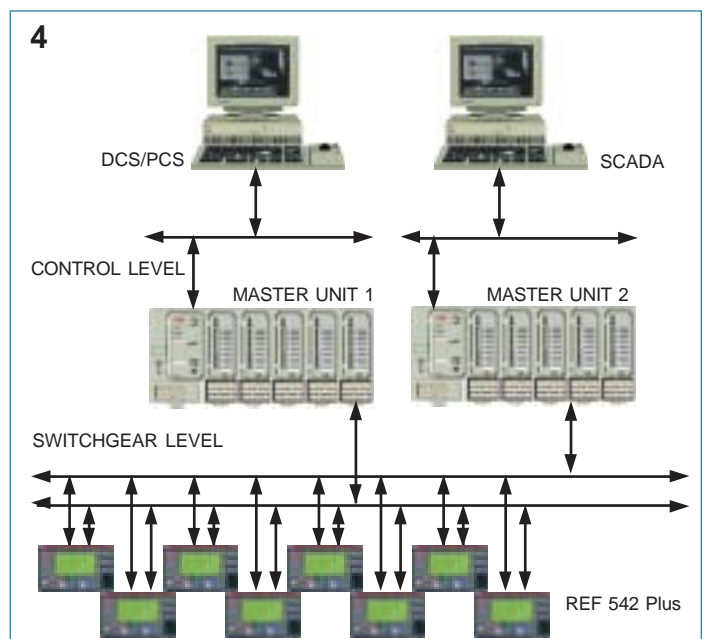
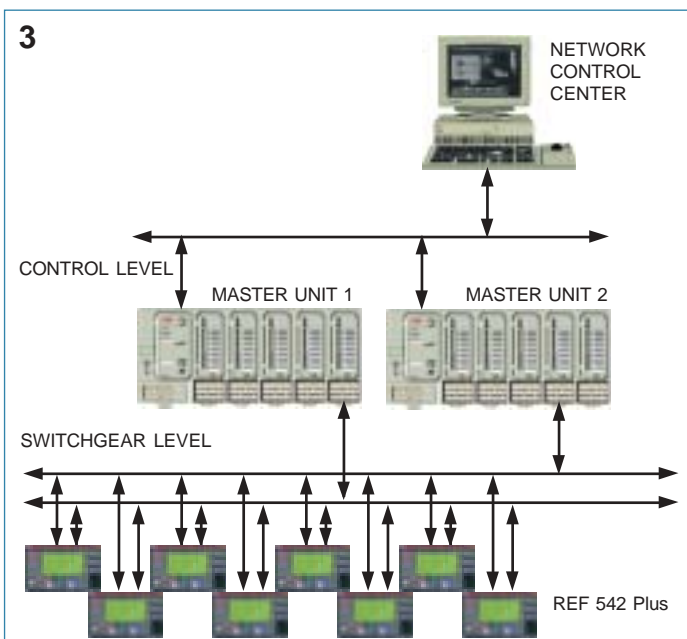
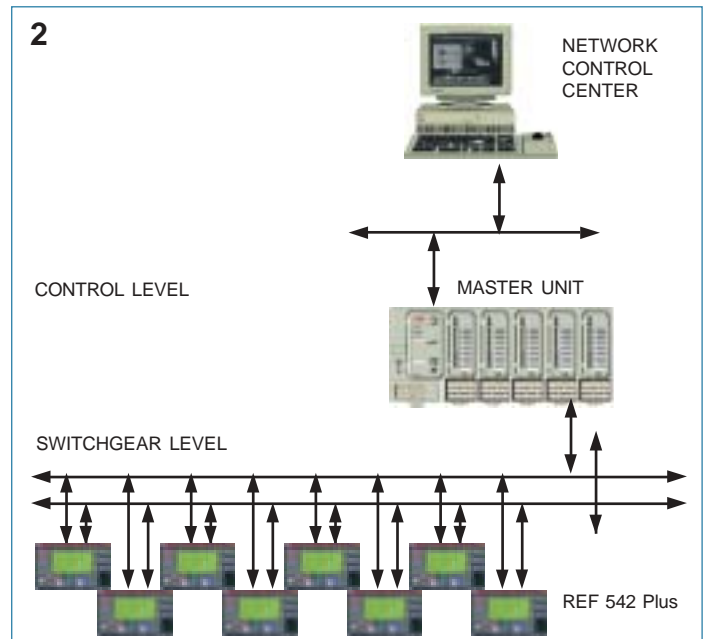
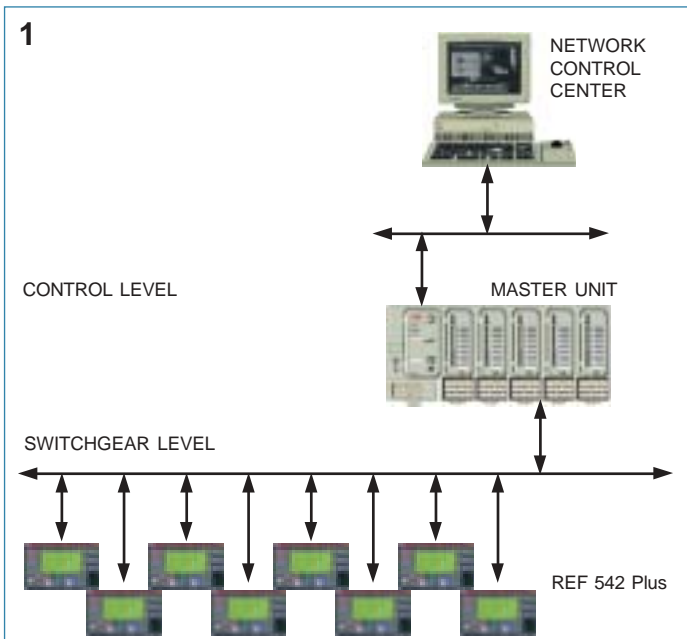
- SPABUS
- LON
- MODBUS RTU
- IEC 60870-5-103

Communications cabling

- Serial RS485
- Optic fiber

System Layout

- 1 Single communication gate on single bus
- 2 Double communication gates on redundant bus
- 3 Double communication gates on redundant bus and master units
- 4 Two systems architecture: SCADA and DCS/PCS.



Voltage transformers

The 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.

The withdrawable version equipped with fuses is custom-made.

The 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.

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

Current transformers

The 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.

The current transformers comply with IEC 60044-1 Standards.

The switchboard units can be equipped with one or two transformer sets, in accordance with the following combinations:



Withdrawable Voltage transformers for busbar side with primary fuses

The current transformers can be equipped also with a capacitive socket for being connected to voltage indicator lamps.

Toroidal current transformers

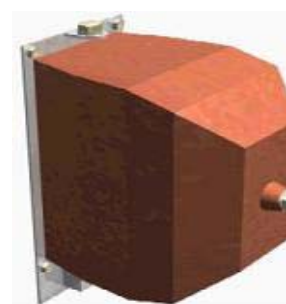
The toroidal current transformers are resin-insulated and suitable for the feeding of measuring instruments and protections.

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.



Current transformers block type
Dimensions according to DIN standards
Optionally Toroidal CT's available



Fixed type for cable side

SERVICE TRUCKS

The UniSafe 36 can be fitted with the service truck required to complete the switchboard and needed in service operations and during maintenance work.

The truck has earthing with making capacity.

Earthing truck with making capacity

These trucks carry out the same function as the earthing switches with making capacity.

They consist of circuit-breakers only fitted with top (main busbar earthing) or bottom (power cables earthing) terminals. The contacts without terminals are short-circuited by means of a copper bar and connected to earth by means of the apparatus truck.

They keep all the characteristics of the circuit-breakers, such as full making capacity and opening of the live circuits under fault conditions.

They are used to ensure extremely efficacious earthing on circuits stressed by a fault. They allow opening and closing operations to be carried out rapidly with remote electric control.

The use of these trucks foresees removal of the switching device from the switchboard (circuit-breaker or contactor) and its replacement with the truck. The units preset for use of earthing trucks are fitted with a key lock which, if activated, prevents their racking-in.

This truck is available in two versions:

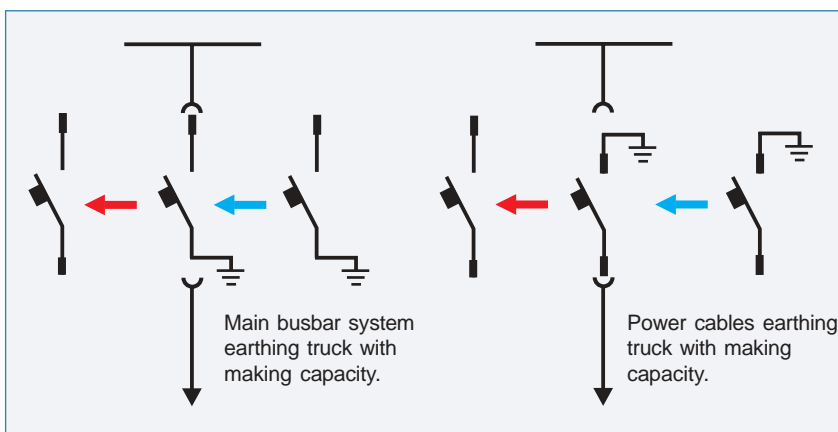
- main busbar system earthing;
- power cables earthing.

During the racking-in phase, the main busbar earthing truck only lifts the top shutter and presets the contacts connected to the top branches (and therefore to the main

busbar system) for closing to earth by means of a control. During the racking-in phase, the power cables earthing truck only lifts the bottom shutter and presets the contacts connected to the bottom branches (and therefore to the power cables) for closing to earth by means of a control. These trucks can also be used in bus-tie units. In this case, they earth the two sides of the main busbar system



Power cables earthing truck with making capacity.



PROTECTION AGAINST INTERNAL ARC

An internal arc is extremely rare in metal-clad switchboards since the apparatus is manufactured so as to prevent such an occurrence. Anyway, UniSafe36 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 60298 Standards, enclosure AA, class accessibility A, criteria 1 to 6.

IEC 60298 Standards for internal arc test – Criteria definitions

- 1 The switchboard doors must remain closed and the covering units must never open up
- 2 Any component that may result hazardous for the personnel must never be ejected
- 3 The outside enclosure should never get pierced in the parts accessible to the personnel
- 4 Vertically arranged indicators outside the switchboard must not get burnt
- 5 Horizontally arranged indicators outside the switchboard must not get burnt
- 6 All the earthing connectors must remain effective.

Fast Recovery

UniSafe 36 switchboards can be equipped with Fast Recovery, a specific protection system. This system is based on pressure sensors suitably located into the switchboard and directly connected to the opening releases. The sensors detect the pressure rise at the moment of the internal arc outburst and promptly open the circuit breaker. Thanks to the Fast Recovery System only the part involved in the fault is selectively excluded in less than 100 ms (including the circuit breaker opening time).

A rapid elimination of the fault along with the metal segregation between compartments and the use of self-extinguishing materials drastically reduces any possible damage.



Fast Recovery pressure sensor.



Internal arc test indicators arrangement.



Test carried out by means of an infrared camera.

TECHNICAL DATA

ELECTRICAL CHARACTERISTICS

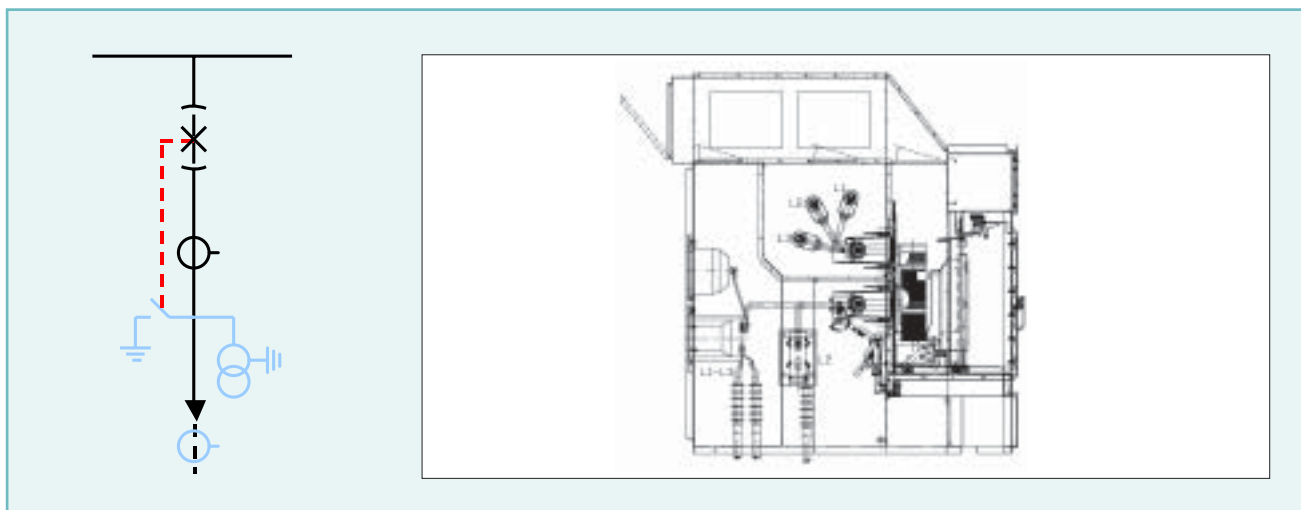
Switchboard		
Rated Voltage	kV	36
Rated insulation voltage	kV	36
Rated power frequency withstand voltage	kV (1 min)	70
Rated lightning impulse withstand voltage	kV	170
Rated short time withstand current	kA (3s)	25
Peak current	kA	63
Internal arc withstand current	kA (1s)	25
Main busbar rated current	A	...2500
Branch connector rated current	A	...2500



TYPICAL UNITS

IF unit

Circuit Breaker Cubicle, 1250A



Dimensions

without arc duct (width x depth x height) (mm) : 1000 x 2310 x 2161
 with arc duct (width x depth x height) (mm) : 1000 x 2310 x 2662

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

Rated circuit current (A) : 1250

- Block type current transformers ¹ : Yes
- Fixed type voltage transformers without fuses : Optional
- Cable core current transformers ² : Optional
- Earthing switch : Optional
- Arc duct : Optional

¹ Post insulators replace block type current transformers whenever latter is not required

² Cable connection is typically one cable per phase when cable core current transformers are used

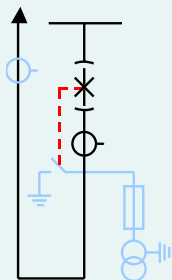
Top Cable entry versions

Rated main busbar current (A) : upto 2500

Rated circuit current (A) : 1250

Dimensions

without Arc duct
 WxDxH (mm) : 1000x2960x2161
 with Arc duct
 Please contact ABB

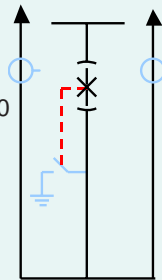


Feeding two separate lines with two set of current transformers

Rated main busbar current (A) : upto 2500
Rated circuit current (A) : 1250

Dimensions

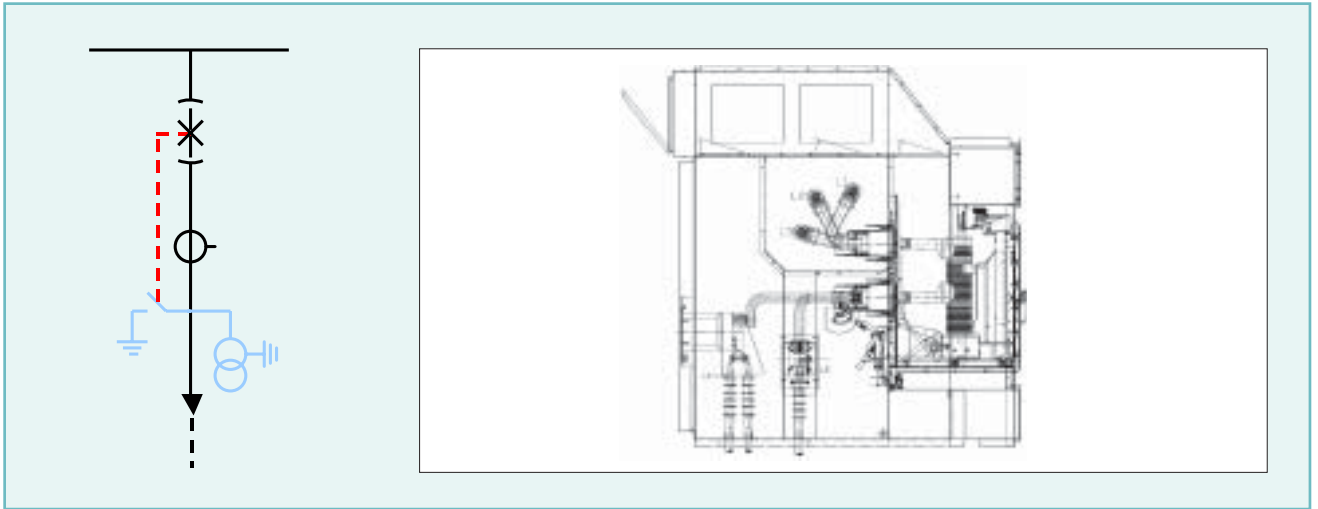
without Arc duct
 WxDxH (mm) : 2000x2310x2161
 with Arc duct
 WxDxH (mm) : 2000x2310x2662



TYPICAL UNITS

IF unit

Circuit Breaker Cubicle, 1600A / 2000A



Dimensions

without arc duct (width x depth x height) (mm) : 1000 x 2370 x 2161

with arc duct (width x depth x height) (mm) : 1000 x 2370 x 2662

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

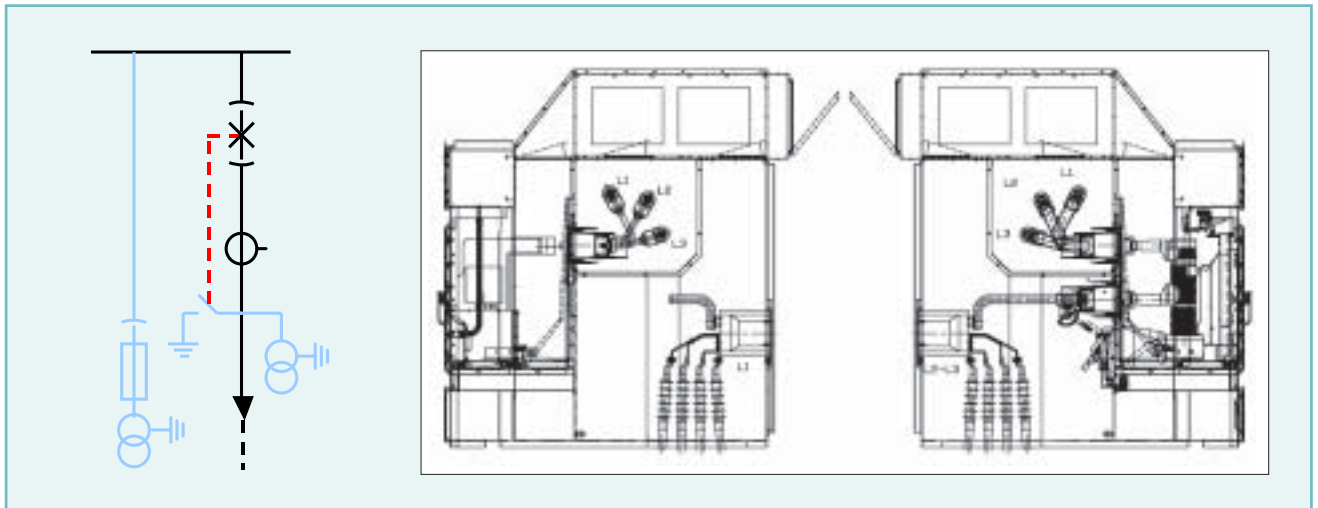
Rated circuit current (A) : 1600 / 2000

Block type current transformers ¹	: Yes
Fixed type voltage transformers without fuses	: Optional
Earthing switch	: Optional
Arc duct	: Optional

¹ Post insulators replace block type current transformers whenever latter is not required

IF unit

Circuit Breaker Cubicle, 2500A



Dimensions ¹

without arc duct (width x depth x height)	(mm) : 2000 x 2310 x 2161
with arc duct (width x depth x height)	(mm) : 2000 x 2310 x 2662

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

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

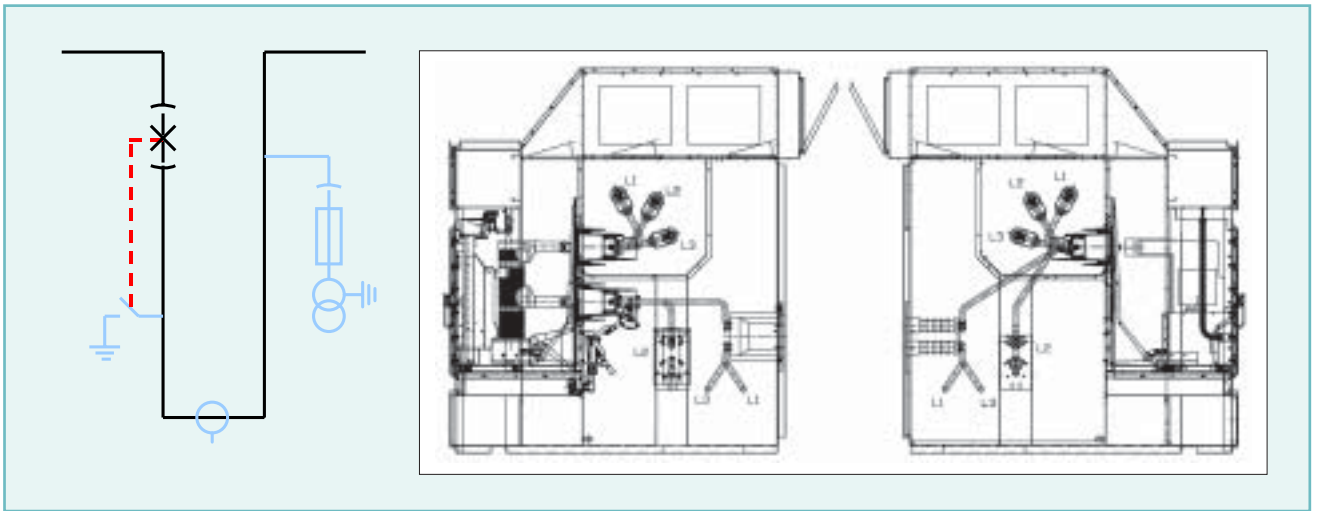
Block type current transformers ²	: Yes
Fixed type voltage transformers without fuses (cable side)	: Optional
Withdrawable type voltage transformers with fuses (busbar side)	: Optional
Earthing switch	: Optional
Arc duct	: Optional

¹ Narrow version of UniSafe 36 is available for 4x cable per phase connections. Dimensions of this version are without arc duct WxDxH (mm) : 1000x2965x2161, with arc duct WxDxH (mm) : 1000x2965x2662

² Post insulators replace block type current transformers whenever latter is not required

BT & R unit

Bus tie and Riser Cubicle, 1250A



Dimensions

without arc duct (width x depth x height) ¹ (mm) : 1000 x 2310 x 2161

with arc duct (width x depth x height) ¹ (mm) : 1000 x 2310 x 2662

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

Rated circuit current (A) : 1250

Block type current transformers ² : Yes

Withdrawable type voltage transformers with fuses : Optional

Earthing switch : Optional

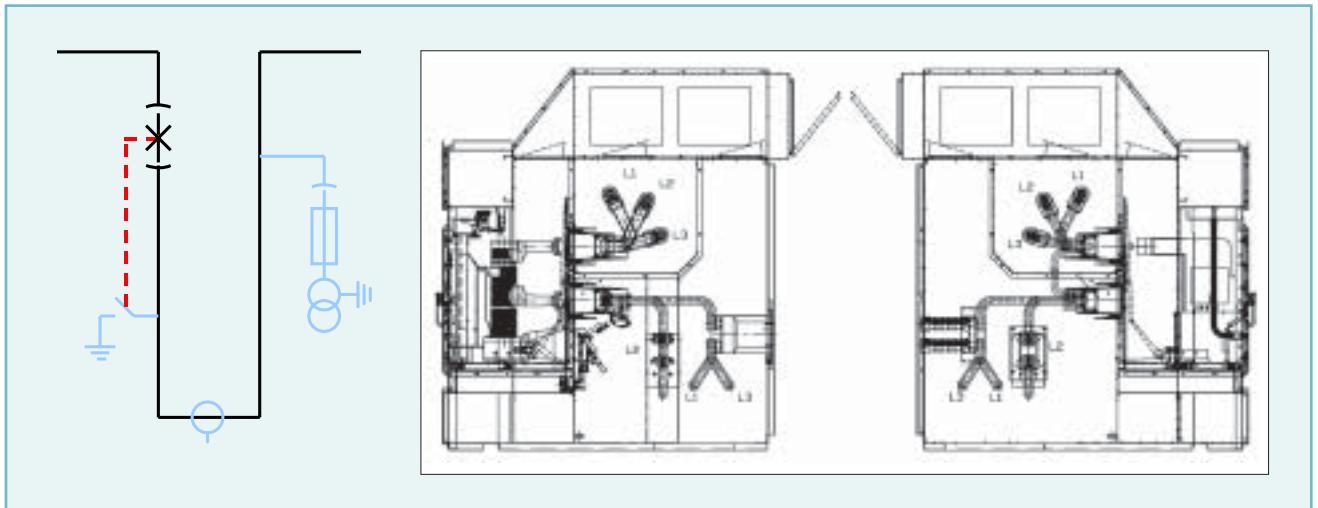
Arc duct : Optional

¹ The width of each Bus tie and Riser cubicle is 1000 mm. Each panel can be used separately for various combinations

² Post insulators replace block type current transformers whenever latter is not required

BT & R unit

Bus tie and Riser Cubicle, 1600A / 2000A / 2500A



Dimensions

without arc duct (width x depth x height) ¹ (mm) : 1000 x 2310 x 2161

with arc duct (width x depth x height) ¹ (mm) : 1000 x 2310 x 2662

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

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

Block type current transformers ²	: Yes
Withdrawable type voltage transformers with fuses	: Optional
Earthing switch	: Optional
Arc duct	: Optional

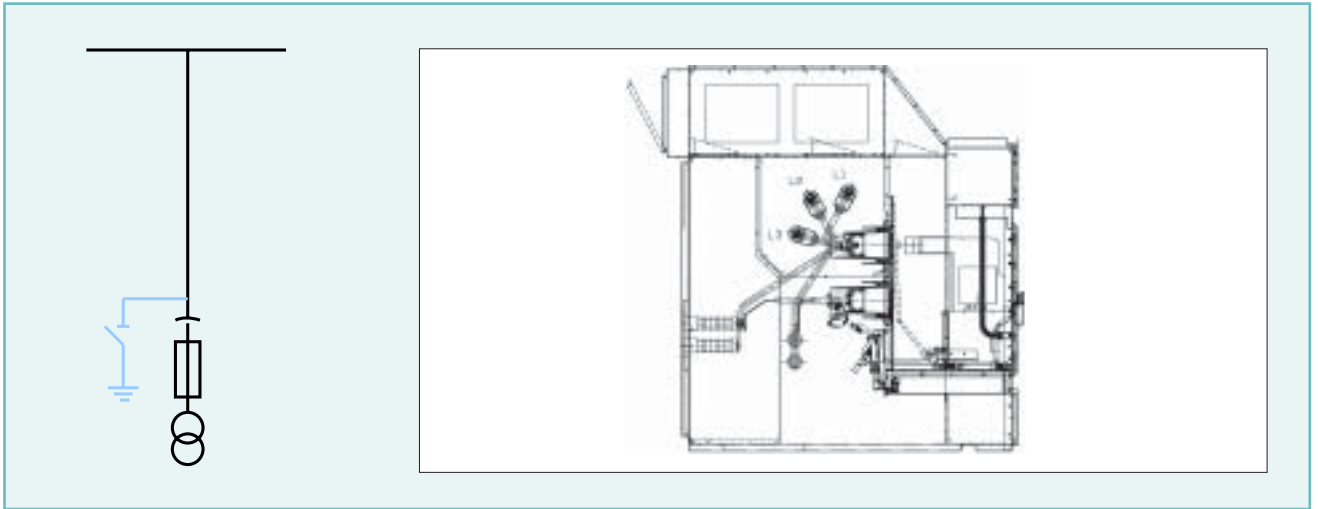
¹ The width of each Bus tie and Riser cubicle is 1000 mm. Each panel can be used separately for various combinations

² Post insulators replace block type current transformers whenever latter is not required

TYPICAL UNITS

M unit

Measuring Cubicle, 1250A



Dimensions

without arc duct (width x depth x height)

(mm) : 1000 x 2310 x 2161

with arc duct (width x depth x height)

(mm) : 1000 x 2310 x 2662

Rated main busbar current

(A) : 1250 / 1600 / 2000 / 2500

Rated circuit current

(A) : 1250

Withdrawable type voltage transformers with fuses

: Yes

Earthing switch

: Optional

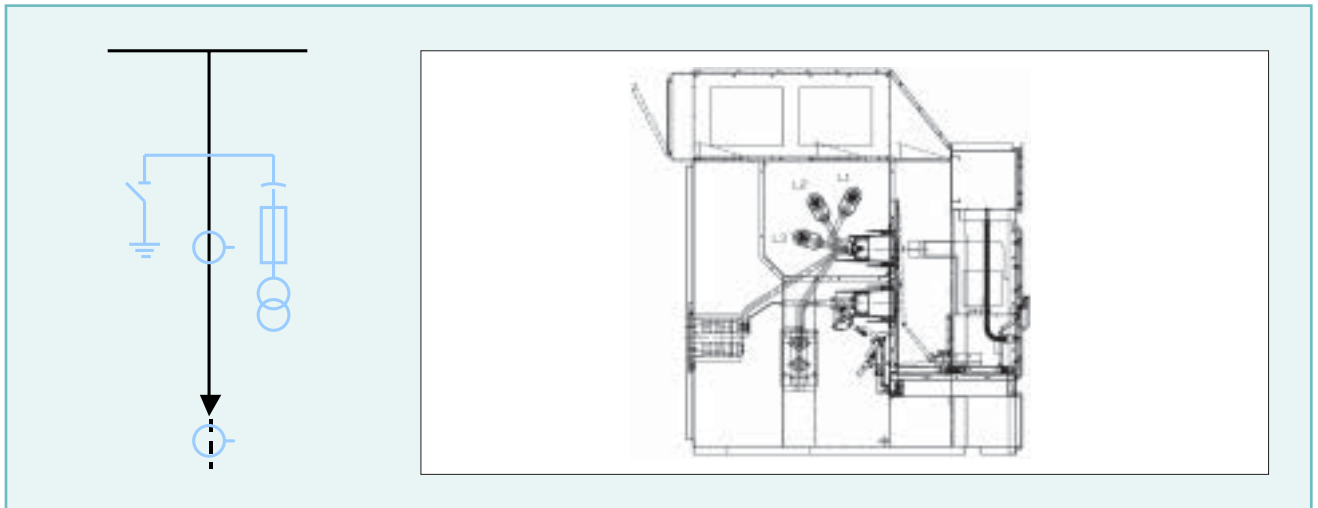
Arc duct

: Optional

TYPICAL UNITS

IFD unit

Direct Cable Connection Cubicle



Dimensions

without arc duct (width x depth x height) (mm) : 1000 x 2310 x 2161

with arc duct (width x depth x height) (mm) : 1000 x 2310 x 2662

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

Rated circuit current ¹ (A) : 1250

Block type current transformers ² : Yes

Withdrawable type voltage transformers with fuses : Optional

Fixed type voltage transformers without fuses : Optional

Cable core current transformers ³ : Optional

Earthing switch : Optional

Arc duct : Optional

¹ Rated circuit current 1600A / 2000A / 2500A versions are available. Please consult ABB for details

² Post insulators replace block type current transformers whenever latter is not required

³ Cable connection is typically one cable per phase when cable core current transformers are used

Direct busbar connection to main busbar

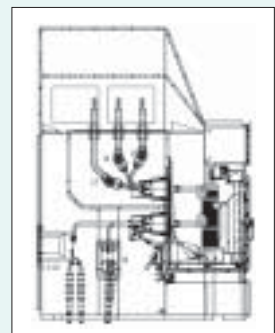
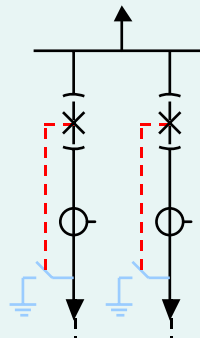
(with Duresca brand Busbars)

Rated main busbar current (A) : upto 2500

Dimensions

without Arc duct
WxDxH (mm) : 2000x2310x2662

with Arc duct
WxDxH (mm) : 2000x2310x3177



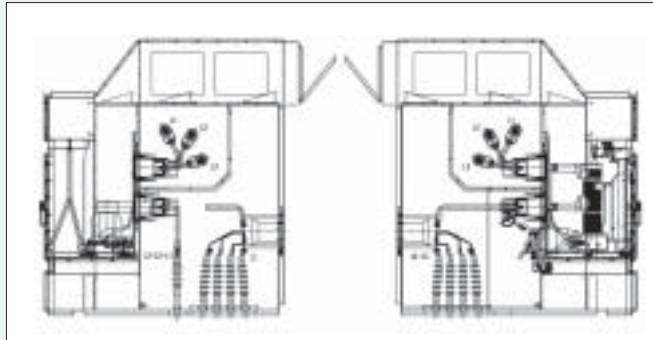
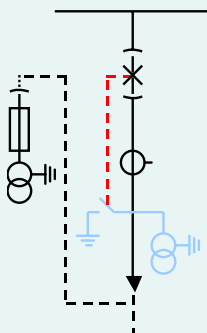
TYPICAL UNITS

IFM unit

Circuit Breaker Cubicle with Measurement

Version with withdrawable fused voltage transformers connected to cable side

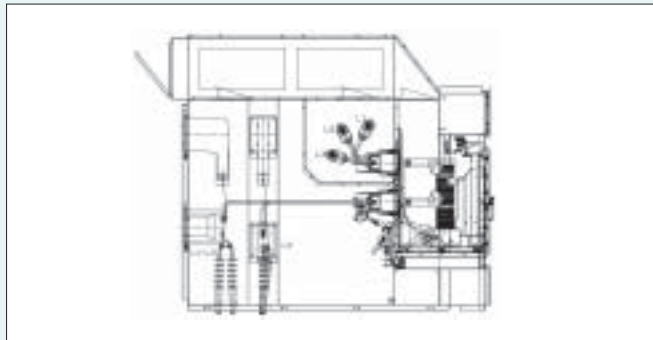
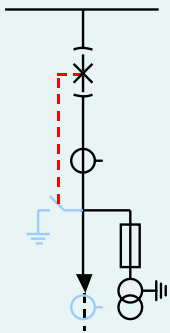
Rated main busbar current (A) : 1250 / 1600 / 2000 / 2500
 Rated circuit current (A) : 1250 / 1600 / 2000 / 2500



Dimensions
 without arc duct
 WxDxH (mm) :2000x2310x2161
 with arc duct
 WxDxH (mm) :2000x2310x2662

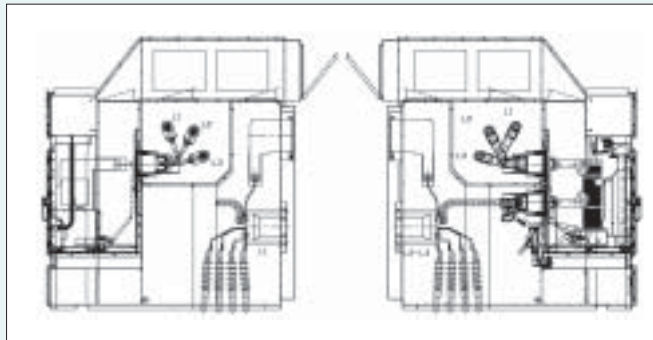
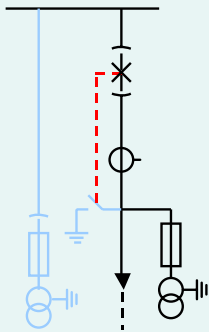
Version with fixed type fused voltage transformers connected to cable side

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



Dimensions
 without arc duct
 WxDxH (mm) :1000x2960x2161
 with arc duct
 WxDxH (mm) :1000x2960x2662

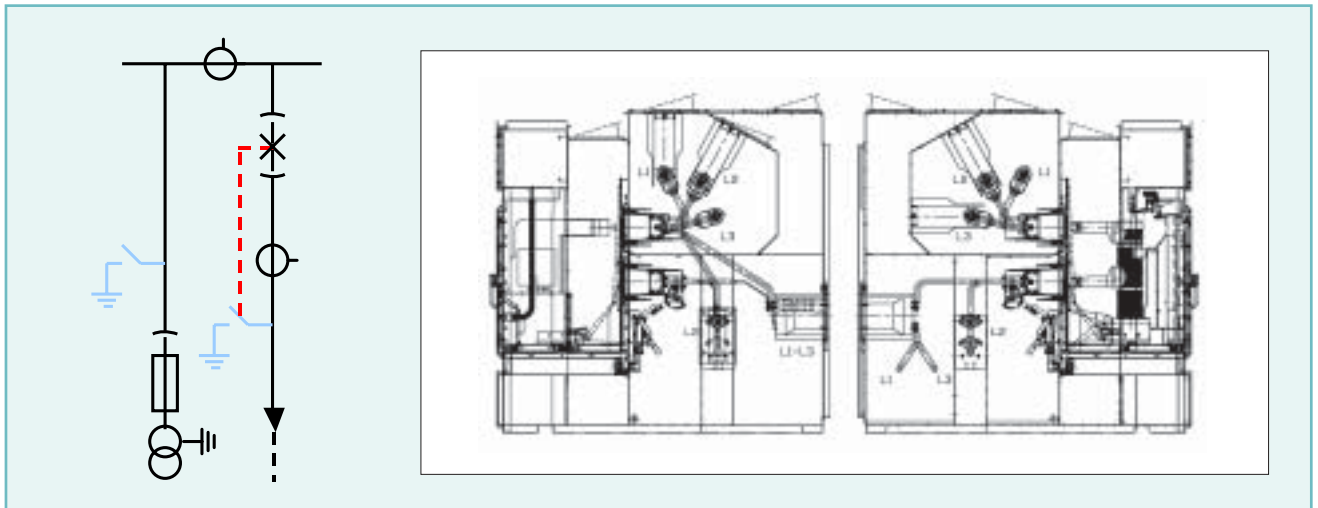
Rated main busbar current (A) : 1250 / 1600 / 2000 / 2500
 Rated circuit current (A) : 1600 / 2000 / 2500



Dimensions
 without arc duct
 WxDxH (mm) :2000x2310x2161
 with arc duct
 WxDxH (mm) :2000x2310x2662

BM unit

Busbar Measuring with Busbar Current Transformers



Dimensions

without arc duct (width x depth x height) (mm) : 2000 x 2310 x 2244
 with arc duct (width x depth x height) Please contact ABB

Rated main busbar current (A) : 1250

Rated circuit current (A) : 1250

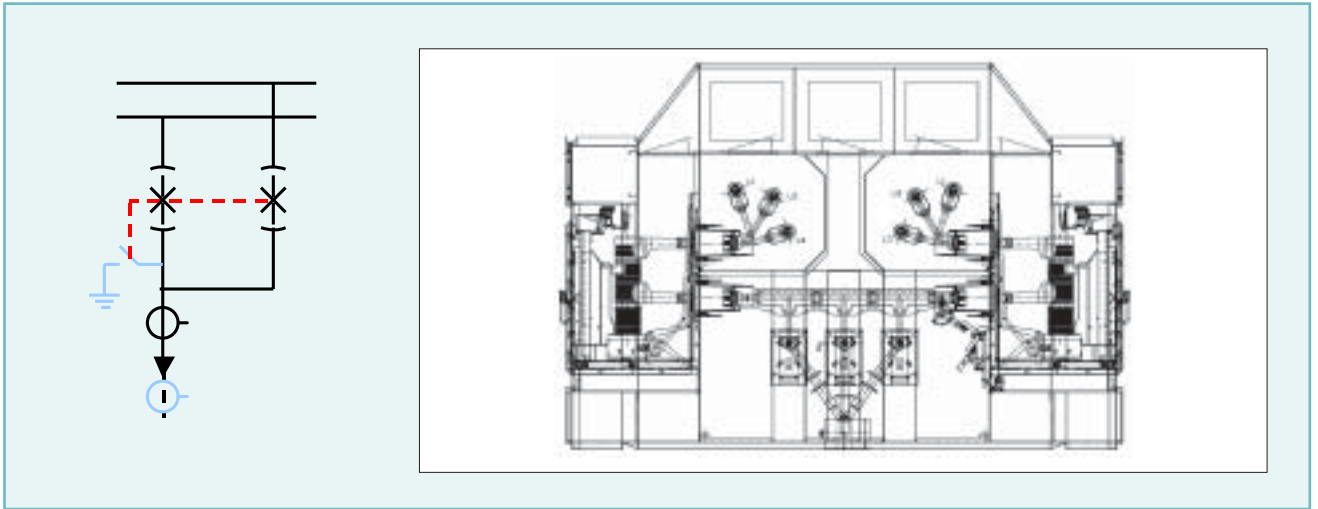
Block type current transformers : Yes

Arc duct : Optional

Above single line diagram and sectional drawing is given for information and illustration purpose only. In accordance with the requirement, busbar current transformers can be placed between any type of cubicles. Please contact ABB for detailed information.

DIF unit

Duplex Circuit Breaker Cubicle



Dimensions

without arc duct (width x depth x height) (mm) : 1000 x 3820 x 2161
 with arc duct (width x depth x height)¹ (mm) : 1000 x 3820 x 2671

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

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

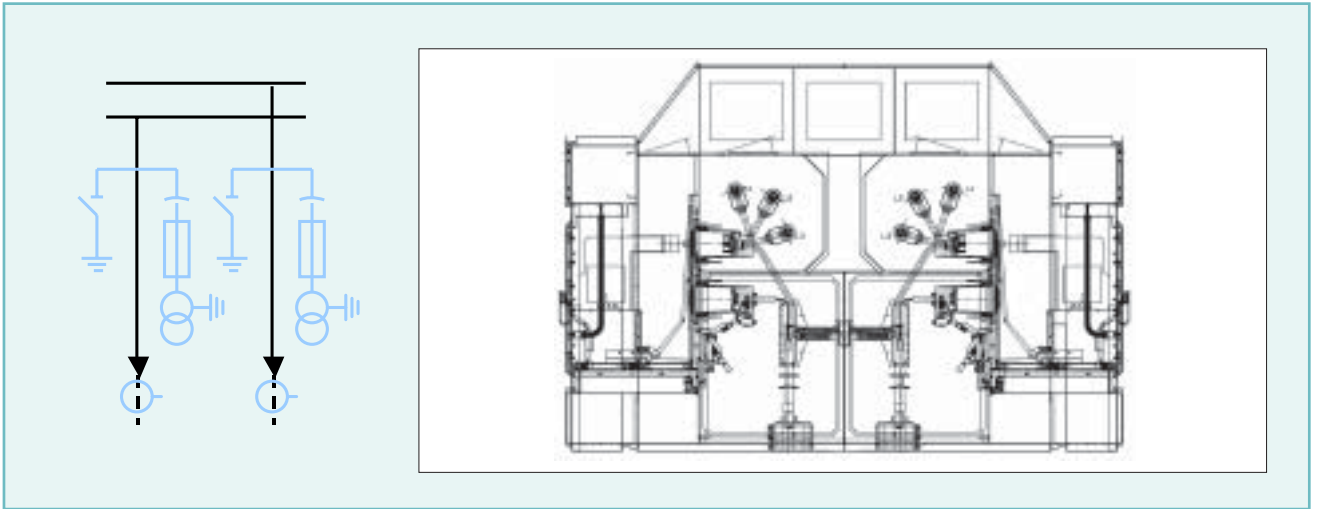
Block type current transformers ¹	: Yes
Fixed type voltage transformers without fuses	: Optional
Cable core current transformers ²	: Optional
Earthing switch	: Optional
Arc duct	: Optional

¹ Post insulators replace block type current transformers whenever latter is not required

² Cable connection is typically one cable per phase when cable core current transformers are used

DIFD unit

Duplex Direct Cable Connection Cubicle



Dimensions

without arc duct (width x depth x height)	(mm) : 1000 x 3820 x 2161
with arc duct (width x depth x height)	(mm) : 1000 x 3820 x 2671

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

Rated circuit current (A) : 1250

Withdrawable type voltage transformers with fuses : Optional

Cable core current transformers ¹ : Optional

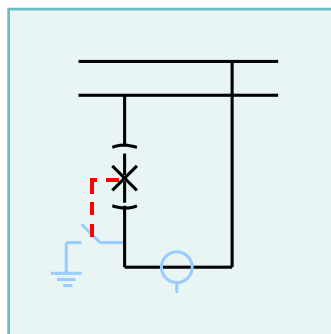
Earthing switch : Optional

Arc duct : Optional

¹ Cable connection is typically one cable per phase when cable core current transformers are used

Other duplex solutions

DBT unit
Duplex Bus tie
and riser cubicle



DM unit
Duplex measuring
cubicle

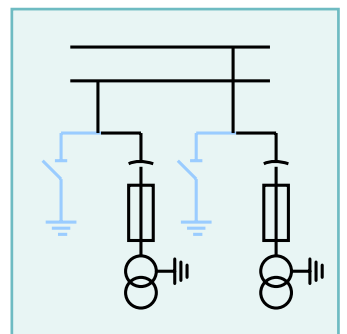




ABB Elektrik Sanayi A.S.

Organize Sanayi Bölgesi
2. Cadde No. 16 Yukari Dudullu
81260 Istanbul Turkey

Phone No. : +90 216 528 22 00

Fax No. : +90 216 365 29 43

e-mail: unisafe36.mail@tr.abb.com

Web site://www.abb.com

The data and illustrations are not binding. We reserve the right to make changes in the course of technical development of the product.

1YTS030001-en