




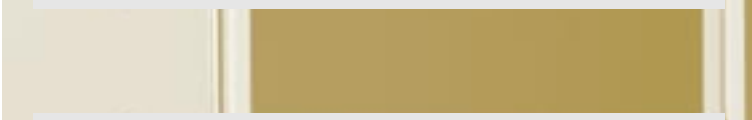

Medium Voltage Products

UniAir

Medium voltage metal-enclosed air insulated switchboards

Power and productivity
for a better world™



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GENERAL CHARACTERISTICS

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GENERAL CHARACTERISTICS



General

UniAir medium voltage metal-enclosed switchboards for indoor use are constructed by placing standardised units side by side in a coordinated way.

Insulation of all live parts is guaranteed in air. Construction and testing are carried out entirely in the factory.

UniAir switchboards are preset for the following apparatus:

- HD4 type circuit-breakers in SF6 gas
- Airswitch AM rotary switch-disconnectors
- Airswitch AR and AS rotary isolators
- Airswitch AT earthing switches

Available versions

UniAir switchboards are available in the following versions:

- standard
- arc-proof in compliance with IEC 298 - App. AA Standards.

Fields of application

UniAir switchboards are used in medium voltage secondary power distribution. In particular, they can be used for transformer substations and for control and protection of feeders and power transformers.

Compliance with Standards

UniAir switchboards comply with the following Standards:

- International IEC 60298
 - Italian CEI EN 60298, file 4973
 - CENELEC HD 187 S5
 - Italian Accident Prevention Laws (D.P.R. 547).
- The single pieces of apparatus comply with the relative Standards.





Normal service conditions

The rated service characteristics are guaranteed under the following limit conditions:

Minimum ambient temperature	- 5 °C
Maximum ambient temperature	+ 40 °C
Maximum relative humidity	95 %

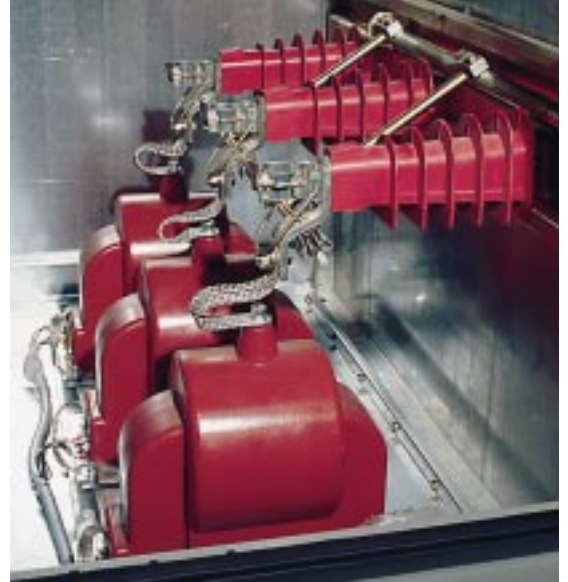
N.B. For operation under other conditions, please consult us.



GENERAL CHARACTERISTICS

Protection against internal arc

UniAir switchboards in the arc-proof version ensure maximum personnel safety even when an internal arc occurs inside the unit. The switchboards are constructed to resist the overpressures caused by the internal arc and special ducts guide the gases produced by the arc away from areas accessible to operators.



Main characteristics

UniAir switchboards are characterised by:

- complete insulation in air of all the live parts of the switchboard
- possibility of being placed against the wall
- segregation between the busbar and feeder compartments
- possibility of constructing many different solutions and simple extension of existing switchboards
- easily accessible apparatus controls
- personnel safety guaranteed by:
 - segregation of the compartments with IP2X degree of protection. With the isolator open, this prevents accidental contact with live parts
 - insulating parts with large exhaust escape routes to guarantee insulation even in rooms with a high degree of pollution
 - earthing of both the structure and components.
- On request, the UniAir switchboard can be fitted with a REF 542 Plus microprocessor unit. This unit combines all the protection, control, measuring, etc. functions usually entrusted to several devices in a single piece of apparatus. The REF 542 Plus unit also makes it possible to dialogue with the installation control and automation systems, allowing plant data acquisition and processing.



Surface treatment

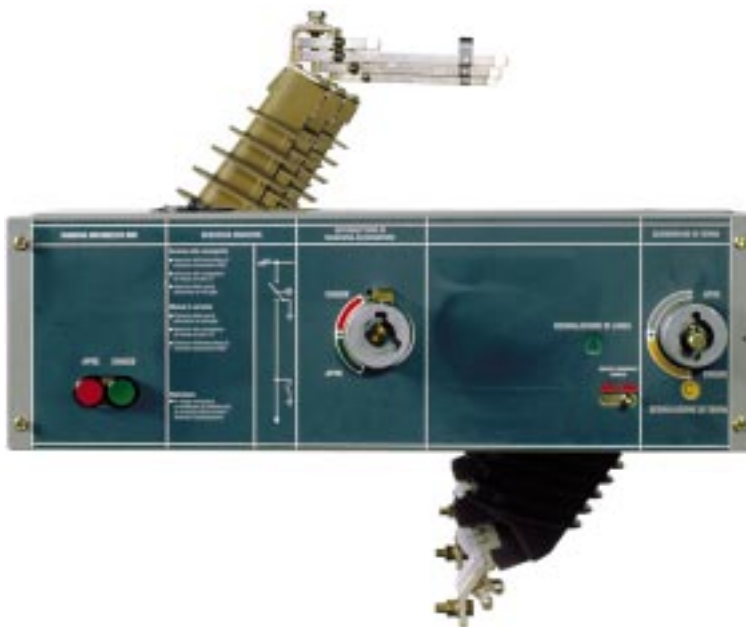
The UniAir units are made of pre-galvanized sheet. The doors and front panels are painted grey RAL 7035. The surface appearance is semi-gloss.

The standard version switchboards have their sides made of pre-galvanized sheet (on request, RAL 7035 painted versions are available). The arc proof version switchboards have their side sheets painted RAL 7035.

Technical documentation

To obtain in-depth information about technical and application aspects of UniAir switchboards, please ask for the following publications:

• HD4/R circuit-breakers	Code 649405
• Airswitch switching and isolating apparatus	Code 649210
• PR512 relay	Code 649092
• REF 542 Plus unit	Code 649423



Degrees of protection

- IP2X inside the switchboard
- IP3X on the external housing
- IP4X on the external housing (on request).

GENERAL CHARACTERISTICS

Quality Assurance system

Complies with ISO 9001 Standards, certified by an independent organisation.

Environmental Management System

Complies with ISO 14001 Standards, certified by an independent organisation.

Test laboratory

Complies with ISO 45001 Standards, accredited by an independent organisation.

Electrical characteristics

Rated voltage	kV	24
Rated insulation voltage	kV	24
Test voltage (50-60 Hz/1 min)	kV	50
Impulse withstand voltage	kV	125
Rated frequency	Hz	50-60
Rated main busbar current ⁽¹⁾	A	400/630/800/1250
Rated normal current ⁽¹⁾		
• circuit-breakers	A	630/800/1250
• switch-disconnectors	A	400/630
• isolators	A	400/630/800/1250
Rated short-time withstand current (1 s)		
• P1/A, P1/E, P1E/2R, ASR, A, R, M, M1/A	kA	12,5 - 16 - 20 - 25 ⁽²⁾
• P2, P3, P2/A, P3/A, P1/F	kA	12,5 - 16
Peak current		
• P1/A, P1/E, P1E/2R, ASR, A, R, M, M1/A	kA	31.5 - 40 - 50 - 63 ⁽²⁾
• P2, P3, P2/A, P3/A, P1/F	kA	31.5 - 40
Internal arc withstand current		
	kA x 0,5s	16 (basic version)
	kA x 1s	16 (on request)
	kA x 0,5s	25 (on request)

⁽¹⁾ The values indicated are valid for a maximum ambient temperature of 40 °C.

⁽²⁾ 25/63 kA at 12 kV.

TYPICAL UNITS

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TYPICAL UNITS

Compartments

The structure of each unit is entirely constructed using pre-galvanized metal sheets. Each unit consists of several compartments with metal segregations between them. Each unit is preset with special holes for fixing to the floor and is provided with bottom closure fitted with special openings for medium voltage and auxiliary circuit cable passage. All the units fitted with a door have an interlock which only allows door opening under safe conditions. The busbar compartment is accessed from the roof or from the front by dismantling the special metal cover. There is a special metal wiring duct in each unit to segregate the low voltage circuits from the medium voltage circuits.

Busbar compartment (A)

This contains the main busbar system. The busbars, made of electrolytic copper, are fixed to the terminals of the insulation isolator or of the switch-disconnector. Insulation is guaranteed in air.

Feeder compartment (B)

This is normally segregated from the busbar compartment by means of a rotary insulation isolator or a switch-disconnector. It contains the apparatus shown in the figure below.

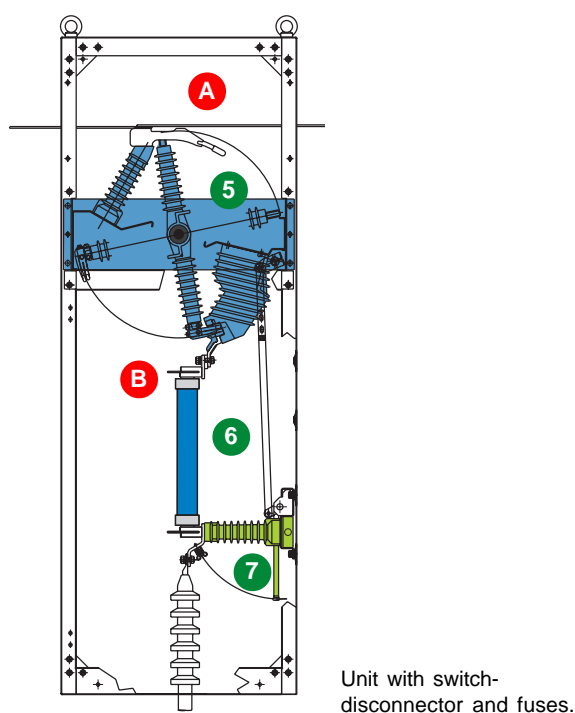
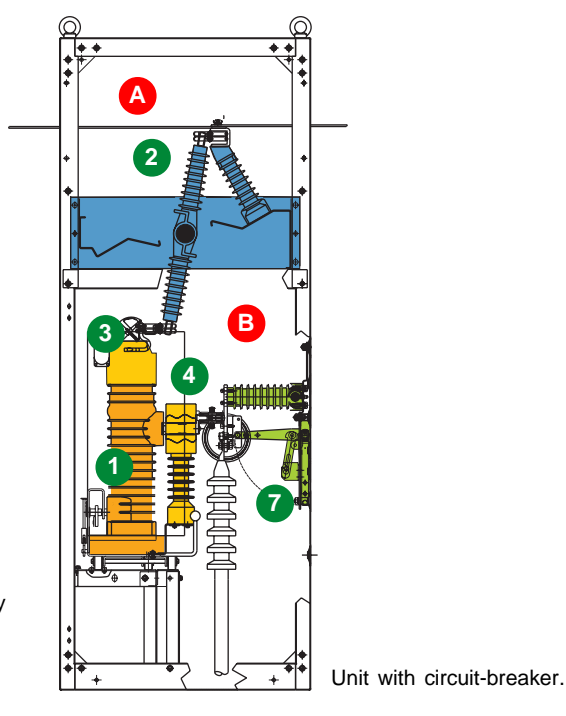
Auxiliary circuits

A box containing all the low voltage apparatus normally used can be provided in front of the busbar compartment.

In particular:

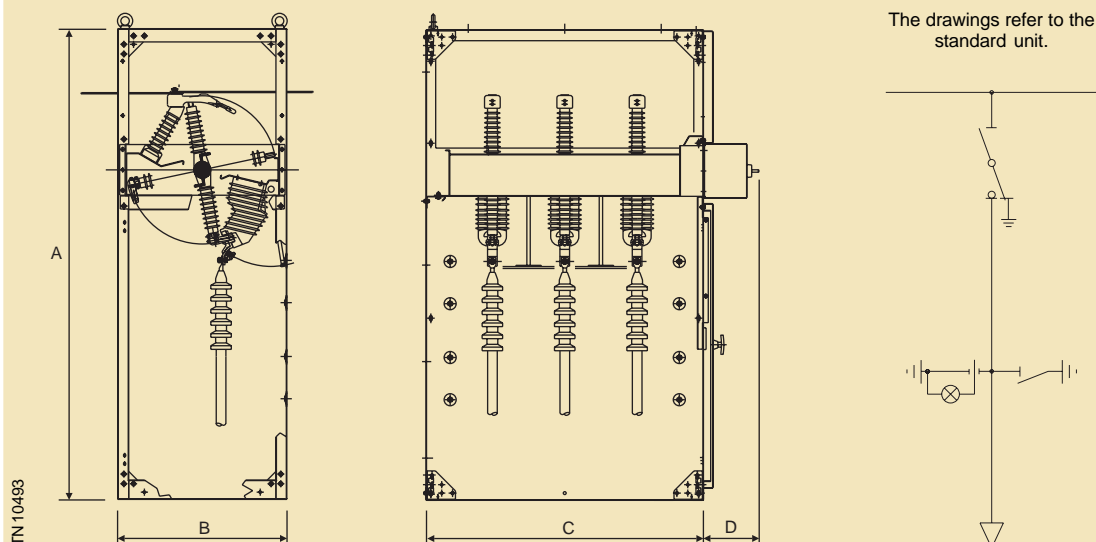
- terminal boxes, wiring ducts and cables to connect the auxiliary circuits of the unit;
- auxiliary accessories of the circuit-breaker and unit (measuring instruments, protection relays, control and signalling devices, fuses, auxiliary circuit protection circuit-breakers, etc.).

Cable passage for inter-panel connections is made by means of special holes provided in the walls of the box itself.



- 1 Circuit-breaker
- 2 Isolator
- 3 PR521 protection relay
- 4 Current sensors
- 5 Switch-disconnector
- 6 Fuses
- 7 Earthing switch

P3 - Unit with switch-disconnector

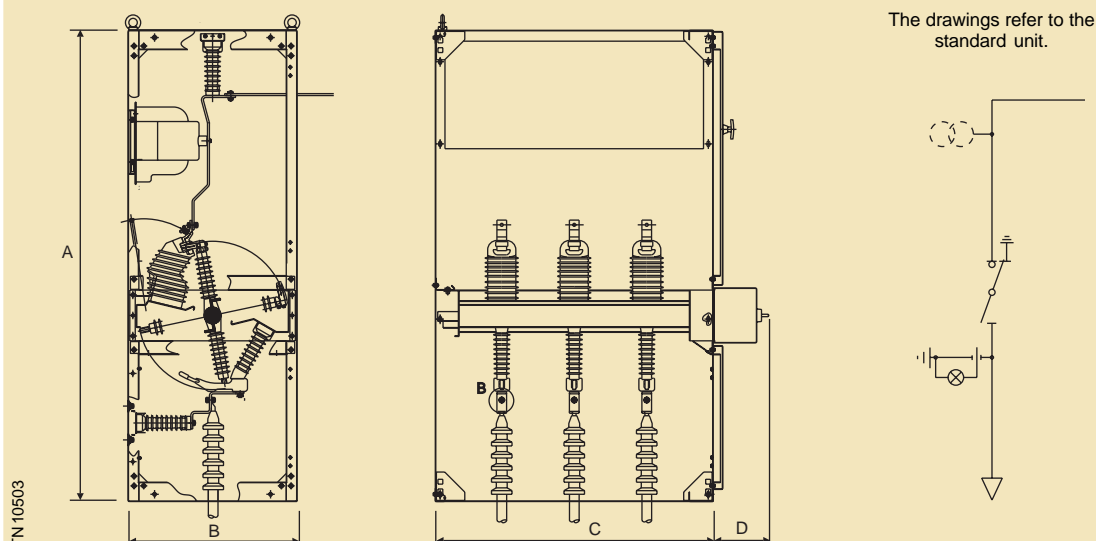


Types available

Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	700 mm	700 mm
C	1150 mm	1250 mm
D	235 mm	235 mm

P3/A - Unit with “upside-down” switch-disconnector (*)



Types available

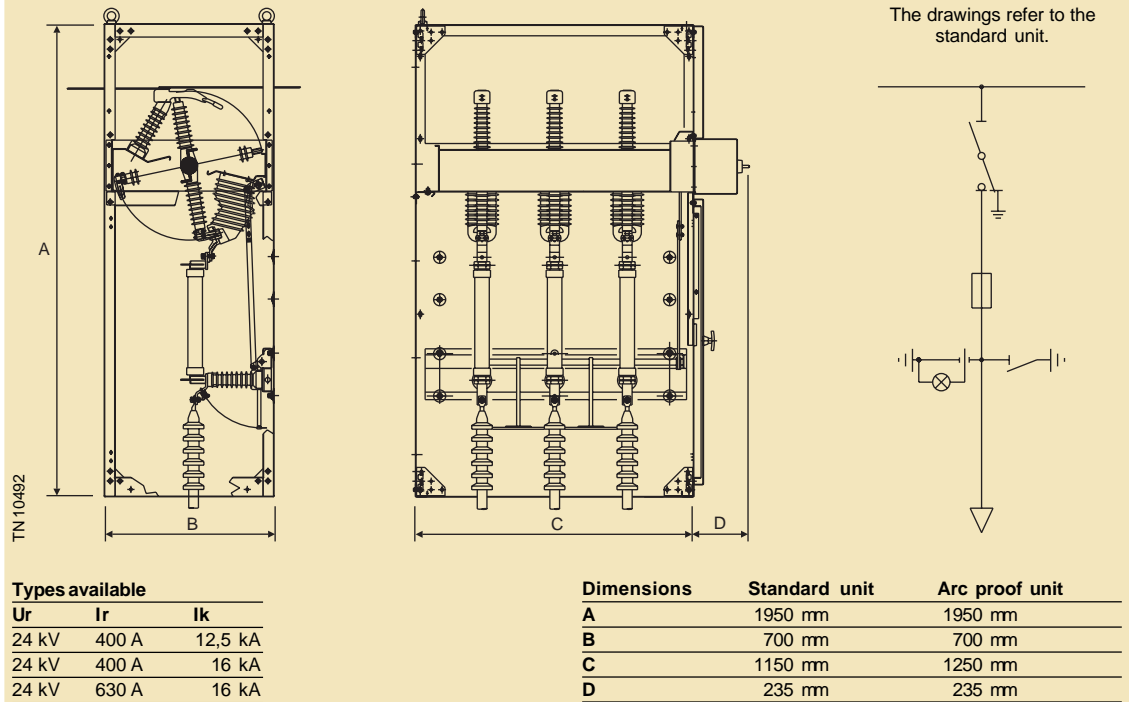
Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	700 mm	700 mm
C	1150 mm	1250 mm
D	235 mm	235 mm

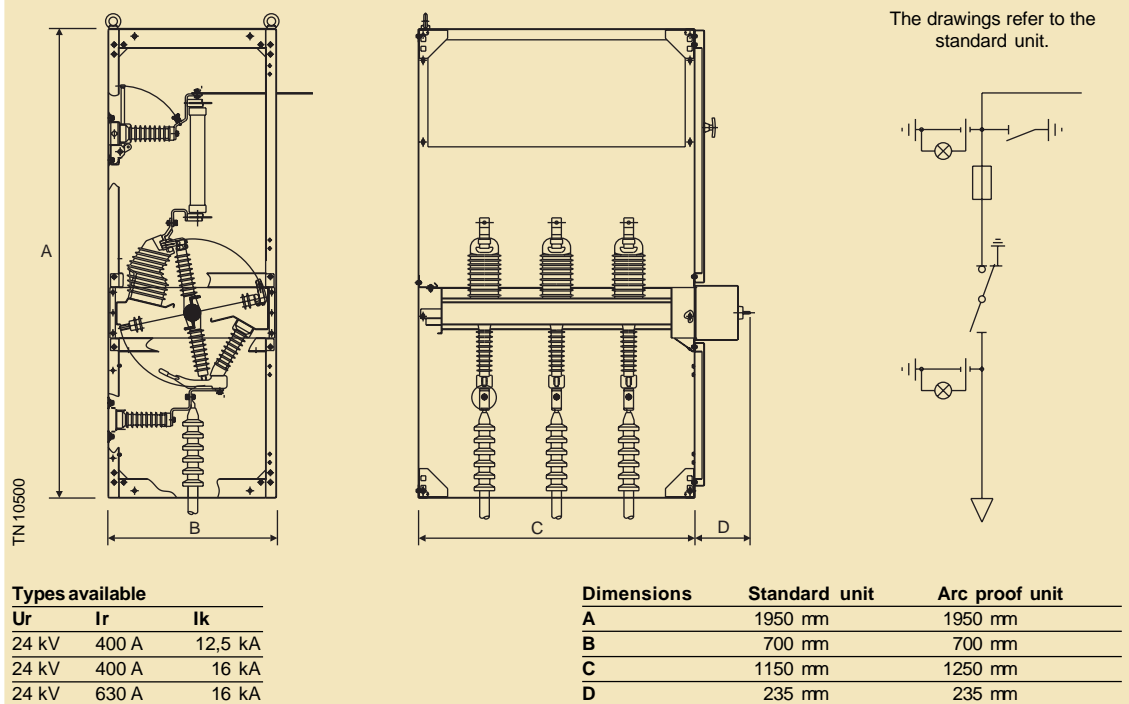
(*) Also available in the P3/A - M version with busbar CTs.

TYPICAL UNITS

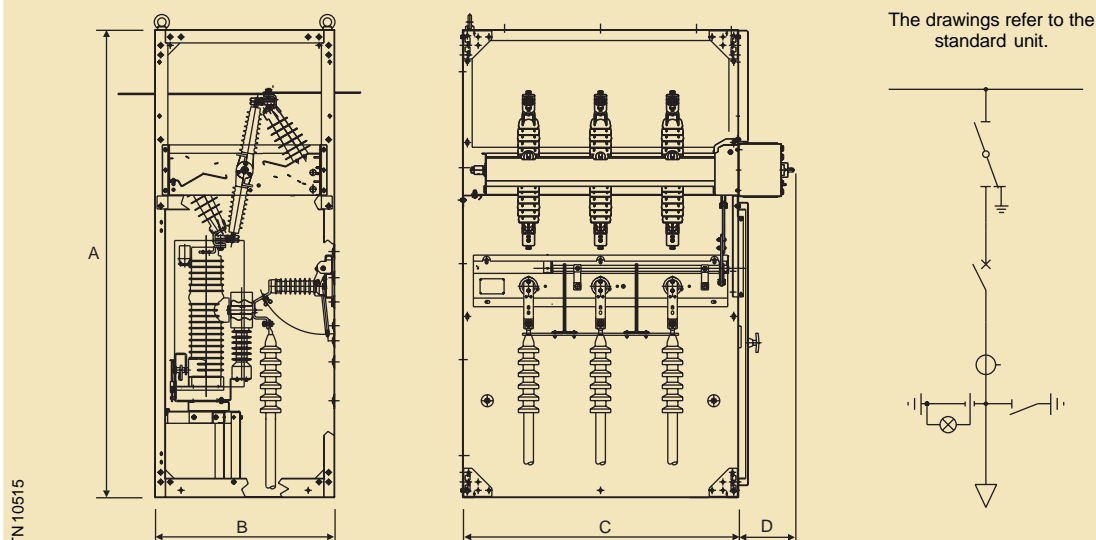
P2 - Unit with switch-disconnector and fuses



P2/A - Unit with “upside-down” switch-disconnector and fuses



P1/F - Unit with fixed circuit-breaker



Types available

Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

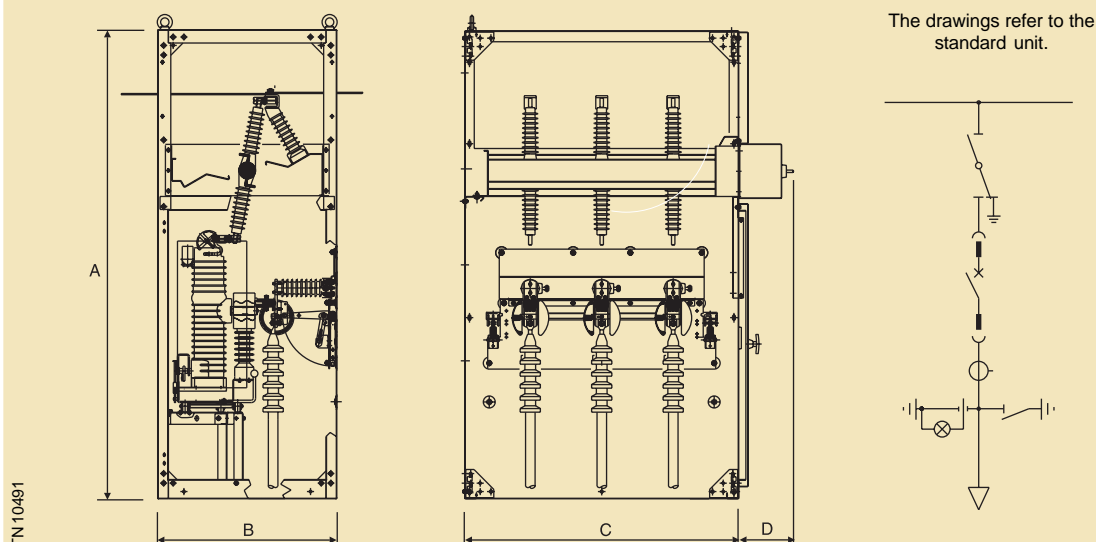
Dimensions Standard unit

Dimensions	Standard unit
A	1950 mm
B	750 mm
C	1150 mm
D	235 mm

Note

Unit only available in standard version

P1/E - Unit with removable circuit-breaker



Types available

Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

Types available

Ur	Ir	Ik
24 kV	800 A	20 kA
24 kV	1250 A	20 kA
12 kV	1250 A	25 kA

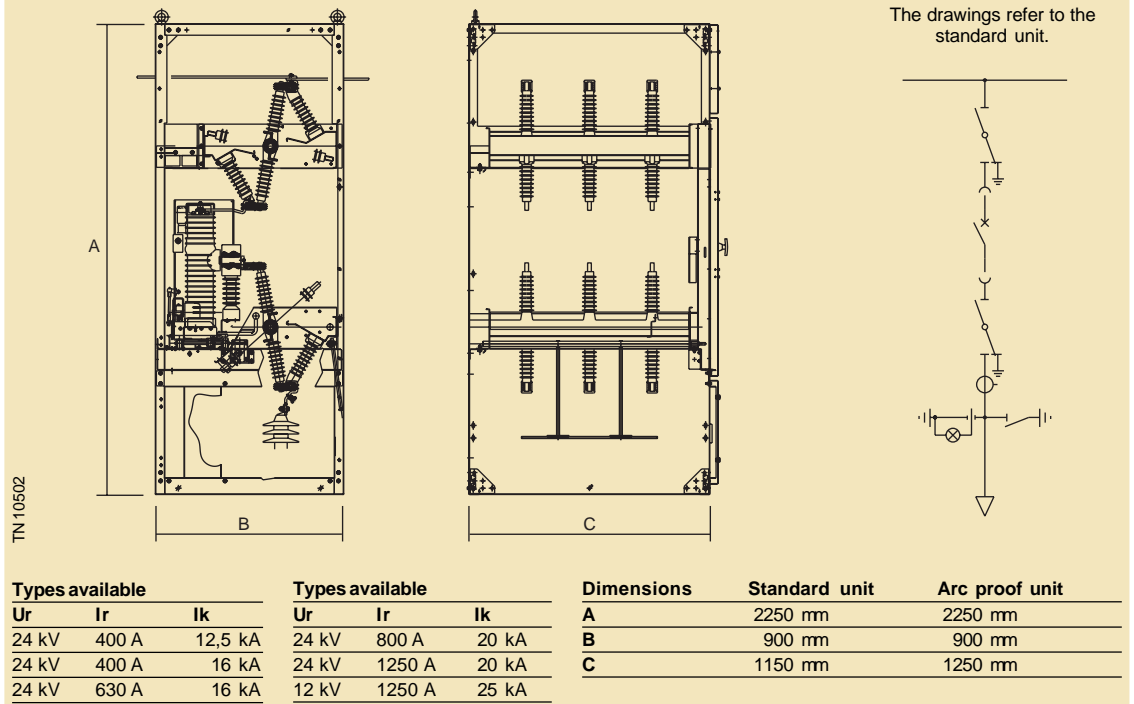
Dimensions

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	750 mm	750 mm
C	1150 mm	(*)
D	235 mm	

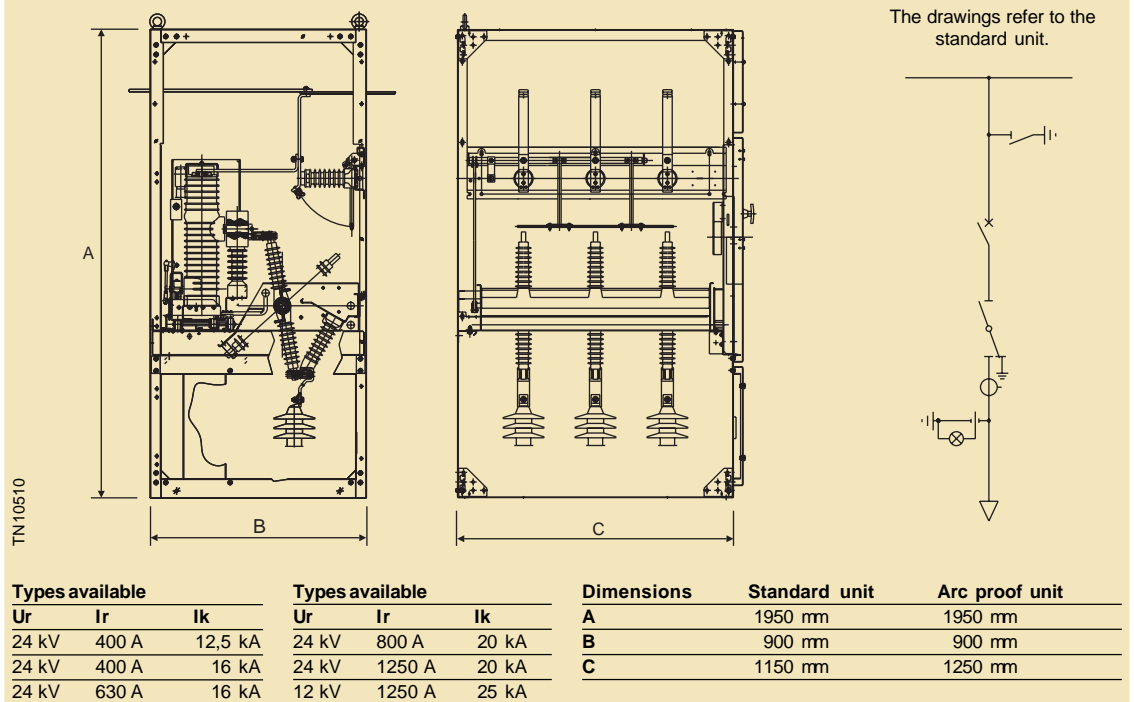
(*) C + D = 1485 mm
(overall dimensions on ground, operating mechanism not extending)

TYPICAL UNITS

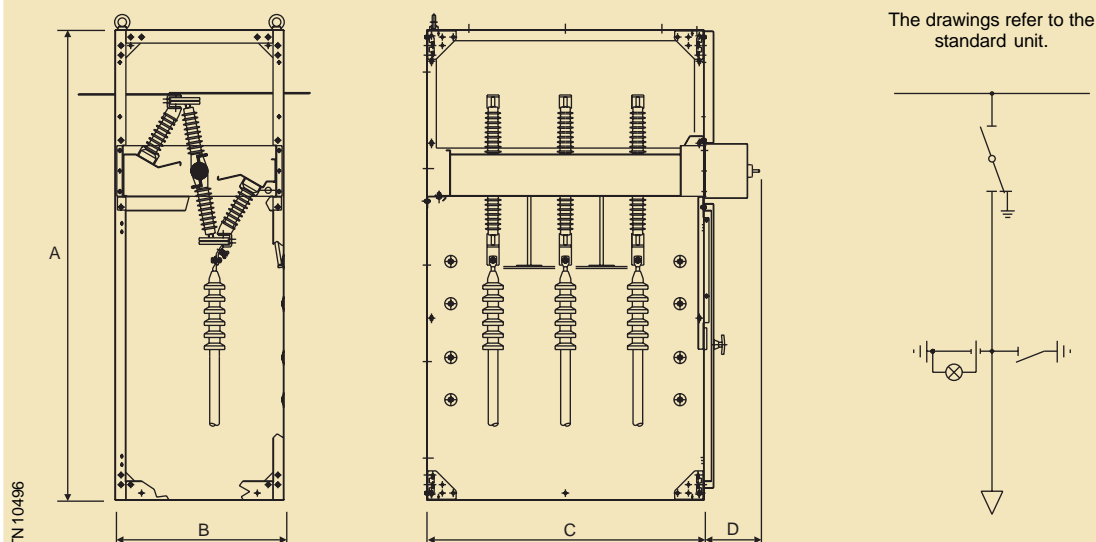
P1E/2R - Unit with supply and load side withdrawable circuit-breaker



P1/A - Unit with fixed “upside-down” circuit-breaker



ASR - Unit with isolator



Types available

Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

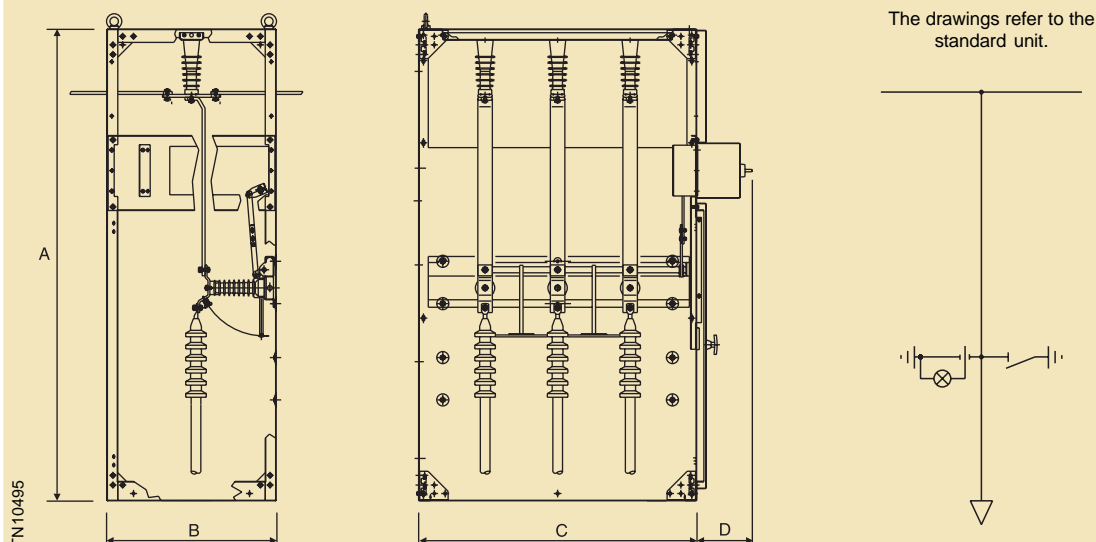
Types available

Ur	Ir	Ik
24 kV	800 A	20 kA
24 kV	1250 A	20 kA
12 kV	1250 A	25 kA

Dimensions

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	700 mm	700 mm
C	1150 mm	1250 mm
D	235 mm	235 mm

A - Unit with earthing switch



Types available

Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

Types available

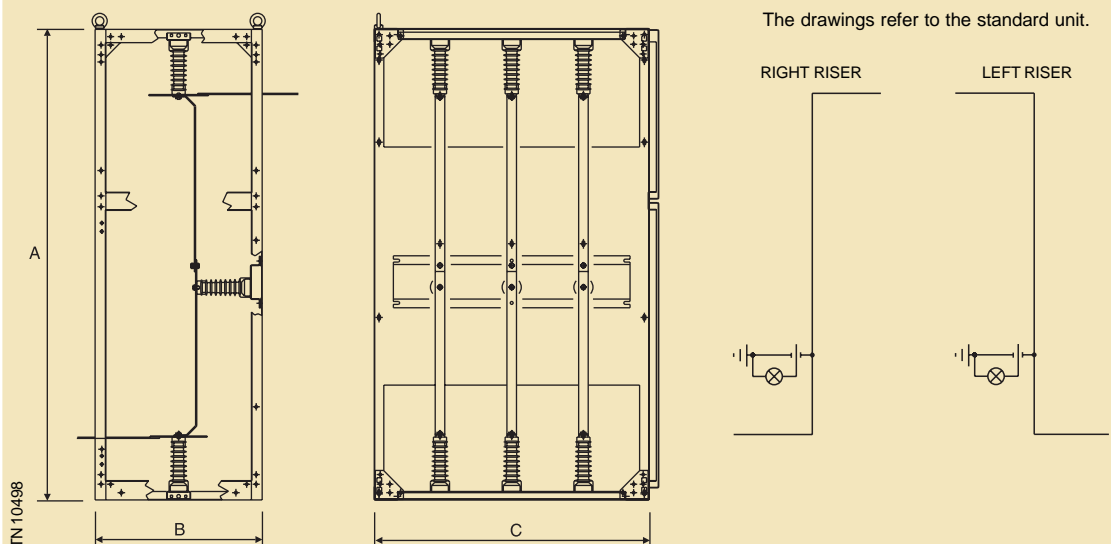
Ur	Ir	Ik
24 kV	800 A	20 kA
24 kV	1250 A	20 kA
12 kV	1250 A	25 kA

Dimensions

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	700 mm	700 mm
C	1150 mm	1250 mm
D	235 mm	235 mm

TYPICAL UNITS

R - Riser unit (*)



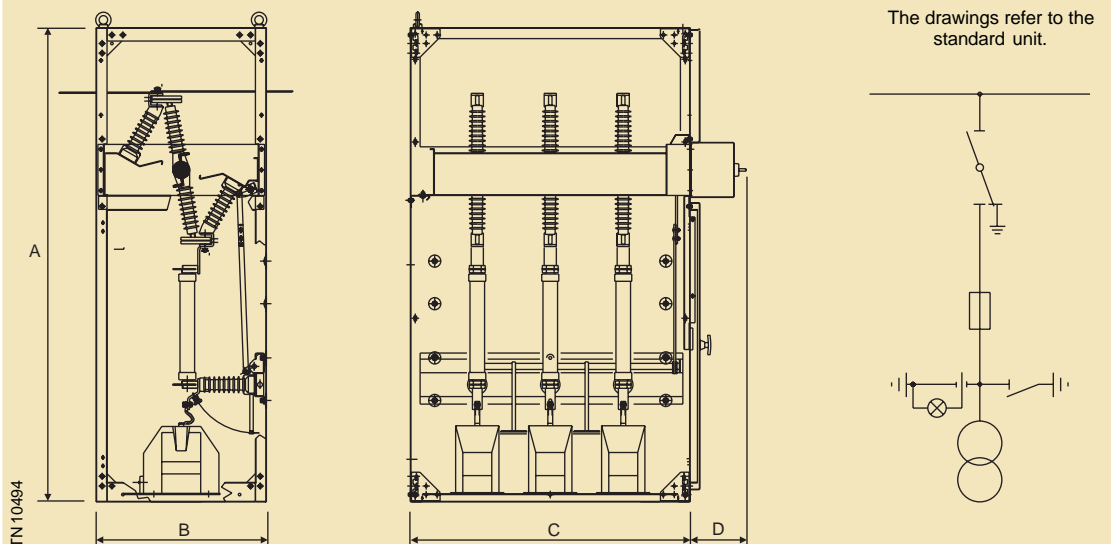
Types available		
Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

Types available		
Ur	Ir	Ik
24 kV	800 A	20 kA
24 kV	1250 A	20 kA
12 kV	1250 A	25 kA

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	700 mm	700 mm
C	1150 mm	1250 mm

(*) Also available in the Rac version, with incoming cable unit.

M - Measurement unit (*)



Types available		
Ur	Ir	Ik
24 kV	400 A	12,5 kA
24 kV	400 A	16 kA
24 kV	630 A	16 kA

Types available		
Ur	Ir	Ik
24 kV	800 A	20 kA
24 kV	1250 A	20 kA
12 kV	1250 A	25 kA

Dimensions	Standard unit	Arc proof unit
A	1950 mm	1950 mm
B	700 mm	700 mm
C	1150 mm	1250 mm
D	235 mm	235 mm

(*) Also available in the M1/A version with busbar CT, and MV version, empty measurement unit.

TR - Transformer box unit

The transformer box unit is only available in the standard version.

The transformer box is made of RAL 7035 painted sheet, is supplied in an assembly kit and can be fitted with internal lighting.

For transformer boxes of different sizes, please contact us.

Data needed to select the transformer box units

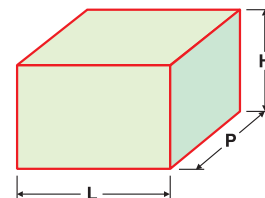
After having defined the type of transformer box unit according to the total transformer losses, it is necessary to check that the transformer box unit dimensions are sufficient to ensure adequate insulation distances.

Maximum operating temperature of transformer	T [°C]
No-load losses	Wo [W]
Load losses	Wcc [W]
Load factor	a
Rated current	In [A]
Total losses	Ptot. = Wo + a2 x Wcc

Types available

Unit	L [mm]	P [mm]	H [mm]
TR1	1600	1150	1950
TR2	2000	1150	1950
TR3	2000	1300	2250
TR4	2200	1500	2250
TR5	2200	1800	2250

Type of box	Total losses [W]		
	T=100 °C	T=120 °C	T=140 °C
TR1	5,000	6,000	7,000
TR2	6,000	7,000	8,500
TR3	7,500	9,000	10,500
TR4	8,500	10,000	11,500
TR5	9,000	10,500	12,500



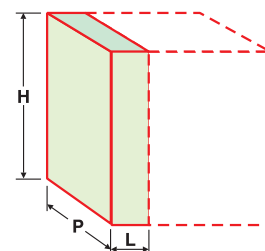
CL - Lateral cable riser unit

The lateral cable riser unit is only available in the standard version.

The lamps for the lateral cable riser with voltage divider are inserted in the adjacent panel.

Types available

Unit	L [mm]	D [mm]	H [mm]
Left lateral cable riser	350	1150	1950
Right lateral cable riser	350	1150	1950
Left lateral cable riser with voltage dividers	350	1150	1950
Right lateral cable riser with voltage dividers	350	1150	1950



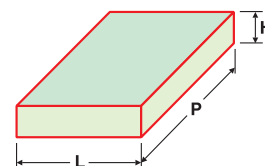
AC - Box for incoming cables from the top

The box for incoming cables from the top is normally used to make an incoming/outgoing feeder directly from the busbar area.

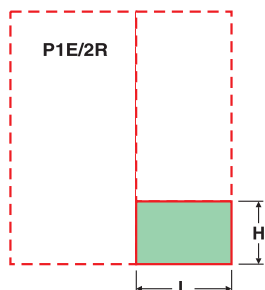
The box for incoming cables from the top is made of pre-galvanized sheet.

Types available

Unit	L [mm]	H [mm]
AC 700	690	250
AC 750	740	250



TYPICAL UNITS



RL - 300 mm riser unit

The RL 300 mm riser unit is needed when other units 1950 mm high are to be placed to the side of the P1E/2R unit (2250 mm high).

Types available

Unit	L [mm]	H [mm]
RL 700	700	300
RL 750	750	300

Installation room

The installation room must be prepared according to the switchboard dimensions and version. Observance of the distances indicated guarantees correct operation of the apparatus.

Switchboard	A [mm]	B [mm]	C [mm]
Standard	> 50	> 50	> 800 (1)
Internal arc	> 600	> 50	> 800 (1)

(1) for P1E, P1/F, P1/A and P1E/2R units = 1400 mm.

Indicative weight of typical units

Unit version	Standard [Kg]	Internal arc [Kg]
A	225	290
ASR	300	365
P2	320	385
P3	310	375
P2/A	340	405
P3/A	330	395
P1/F	470	—
P1/E (CT in switchboard)	480	545
P1E/2R (CT in switchboard)	550	650
M	430	495
M1/A	490	555
R	230	295
MV	200	265

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MAIN COMPONENTS



Circuit-breakers

The HD4 series circuit-breakers are used in the P1/F, P1/E, P1/A and P1E/2R type units.

The circuit-breakers of the P1/F and P1/A units are in the fixed version, those of the P1/E units are in the removable version.

The circuit-breaker of the P1E/2R unit on the supply and load side is withdrawable.

Racking-out of the circuit-breakers can only take place under safe conditions, i.e. with insulation isolators open and earthing switches closed. Furthermore, both the removable and withdrawable circuit-breakers are fitted with a release lever which prevents racking-out with the circuit-breaker closed.

Racking-out of the circuit-breakers is only possible using the special truck.

The breaking system of these circuit-breakers requires limited energy for the operation and helps spontaneous arc breaking without causing re-striking.

The HD4 series circuit-breakers are particularly suitable for transformer protection and control, for protection of distribution lines, for motor control and protection, etc.

For further indications, please see technical catalogue ITNIE 649405.

Circuit-breakers performances

		HD4/R 12			HD4/R 17			HD4/R 24		
Rated and insulation voltage	kV	12			17.5			24		
Withstand voltage	kV (50Hz)	28			38			50		
Impulse withstand voltage	kV	75			95			125		
Rated frequency	Hz	50-60			50-60			50-60		
Corrente nominale	A (40 °C)	630	800	1250	630	800	1250	630	800	1250
Breaking capacity	kA	12.5	–	–	12.5	–	–	12.5	–	–
		16	16	16	16	16	16	16	16	16
		20	20	20	20	20	20	20	20	20
		25	25	25	–	–	25	–	–	–
Making capacity	kA	31.5	–	–	31.5	–	–	31.5	–	–
		40	40	40	40	40	40	40	40	40
		50	50	50	50	50	50	50	50	50
		63	63	63	–	–	63	–	–	–
Operation sequence		O-3min-CO-3min-CO / O-0,3s-CO-15s-CO								
Opening time	ms	45			45			45		
Arc duration	ms	10-15			10-15			10-15		
Total breaking time	ms	55-60			55-60			55-60		
Closing time	ms	80			80			80		
SF6 rated pressure	kPa	380			380			380		

Switch-disconnectors

Airswitch AM series switch-disconnectors are used in the P2, P2/A, P3 and P3/A units.

The Airswitch AM series switch-disconnectors are of the rotary type with box frame. Installation of this type of apparatus carries out segregation between the busbar compartment and the circuit-breaker/feeder compartment of the unit.

The operating mechanism can be accessed directly from the front and allows installation/replacement of accessories.

They are available with a manual operating mechanism or motor operator with operation independent of the operator (AM/X) or with manual operating mechanism with stored energy (AM/Y).

The switch-disconnector can be used in combination with fuses, for example for protection of transformers.

For further indications, please see technical catalogue ITNIE 649210.



Isolators

The Airswitch AR and AS series of isolators are used in the M, M1/A, P1/F, P1/E, P1/A, P1/E2R and ASR units.

The Airswitch series of isolators are of the rotary type with box frame. Installation of this type of apparatus carries out segregation between the busbar compartment and the circuit-breaker/feeder compartment of the unit.

The operating mechanism can be accessed directly from the front and allows installation/replacement of accessories.

The rotary isolators are used:

- in combination with fuses, for protection of instrument transformers
- in combination with an HD4 series circuit-breaker.

For further indications, please see technical catalogue ITNIE 649210.

Switch-disconnector performances

AM		
Rated voltage	kV	24
Withstand voltage (50-60 Hz/1 min) towards earth and between phases	kV	50
Impulse withstand voltage towards earth and between phases	kV	125
Rated frequency	Hz	50-60
Rated normal current (40 °C)	A	400/630
Rated short-time current (1 s)	kA	12.5 16
Rated making capacity under short-circuit (peak current)	kA	31.5 40
Breaking capacity		
• Mainly active load	A	400/630
• No-load transformers	A	4 ... 16
• No-load cables/feeders	A	25
• Ring circuits	A	400 / 630

Isolator performances

AR - AS		
Rated voltage	kV	24
Withstand voltage (50-60 Hz/1 min) towards earth and between phases	kV	50
Impulse withstand voltage towards earth and between phases	kV	125
Rated frequency	Hz	50-60
Rated normal current (40 °C)	A	400 630 800 1250
Rated short-time current (1 s)	kA	12.5 16 20 25

MAIN COMPONENTS

Earthing switches

The A, ASR, P1/F, P1/E2R, P2, P3, M and M1/A units are fitted with an earthing switch mounted in the circuit-breaker-feeder compartment which connects the incoming or outgoing cables of the switchboard to earth.

On the other hand, in the P1/A, P2/A and P3/A units, earthing is carried out on the busbar side. For the P1/E units, the earthing switch is supplied with making capacity able to withstand the fault currents foreseen for the switchboard.

The operating device of the earthing switch is normally placed in the line-side isolator operating mechanism box. Operation of the earthing switch takes place from the front and is interlocked with the line-side isolator.

Main busbars

The busbars are made of flat bare electrolytic copper and are sized to withstand the thermal and electrodynamic stresses caused by the short-circuit currents.

The busbars pass from one unit to the adjacent one without interposing any partitions, so as to make a continuous duct.

Voltage transformers

The voltage transformers are of the type insulated in resin and are used to supply power to instruments and protections.

They comply with the IEC 60044-2 Standards.

Current transformers

The following applications are possible.

Current sensors. These are placed on-board the HD4 series circuit-breaker and are always combined exclusively with the PR521 protection relay.

Toroidal transformers. These are of the type insulated in resin and are used to supply power to instruments and protections.

They can be used both for measuring the phase currents and for determining the earth fault current.

They comply with the IEC 60044-1 Standards.

Transformers on-board the switchboard. These are of the type insulated in resin and are used to supply power to instruments and protections.

They comply with the IEC 60044-1 Standards.

The dimensions are in accordance with the DIN 42600 standard or are of dedicated type.



ABB KEVCD type combined voltage-current sensor.



Current transformer.

Combined current/voltage sensors

The introduction of digital technologies into electrical measuring and protection instruments has considerably modified the performances required of transformers.

The analogue input levels of the instruments have been notably reduced when compared with those of traditional systems.

For this reason, ABB has introduced a new range of sensors which best covers the characteristics of the new generations of instruments and in particular of the REF 542 Plus unit.

UniAir switchboards can be equipped with ABB KEVCD Block Type sensors.

The current sensors comply with the IEC 60044-8 (CDV) Standards, whereas the voltage sensors comply with the IEC 60044-7 Standards. The dimensions are in accordance with the DIN 42600 standard.

Both the current and voltage sensors or just the current sensor can be integrated simultaneously in the same resin body. The voltage divider for connection to the voltage signalling lamps is also inserted.

The measuring assembly consisting of the sensors and REF 542 Plus unit offers Cl. 1 precision.

Thanks to the use of the REF 542 Plus unit, each medium voltage UniAir panel becomes an integrated and independent unit able to carry out all the functions required.

Main characteristics:

- integration of all the functions in a single instrument: protection, measurement, switching, signalling, interlocking, automation and communication;
- a single interface between switchboard and operator for all the installation panels: feeder, transformer, motor, generator, power factor correction banks, bus-tie and measuring units;
- a 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;
- simple modification and adaptation of the functions: by means of the unit configuration software, even with the switchboard in service.

The possibility of connecting the switchboard directly to the installation management system fully carries out the concept of integrated installation and at the highest levels.

REF 542 Plus unit

The REF 542 Plus unit carries out integration of all the secondary functions relative to a switchboard unit in a single module fitted with watchdog.

Thanks to the flexibility of its software, the unit is able to satisfy a wide range of installation requirements.

The high functionality of the REF 542 Plus unit is supported by a simple and easy-to-use user interface.



REF 542 Plus unit.

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