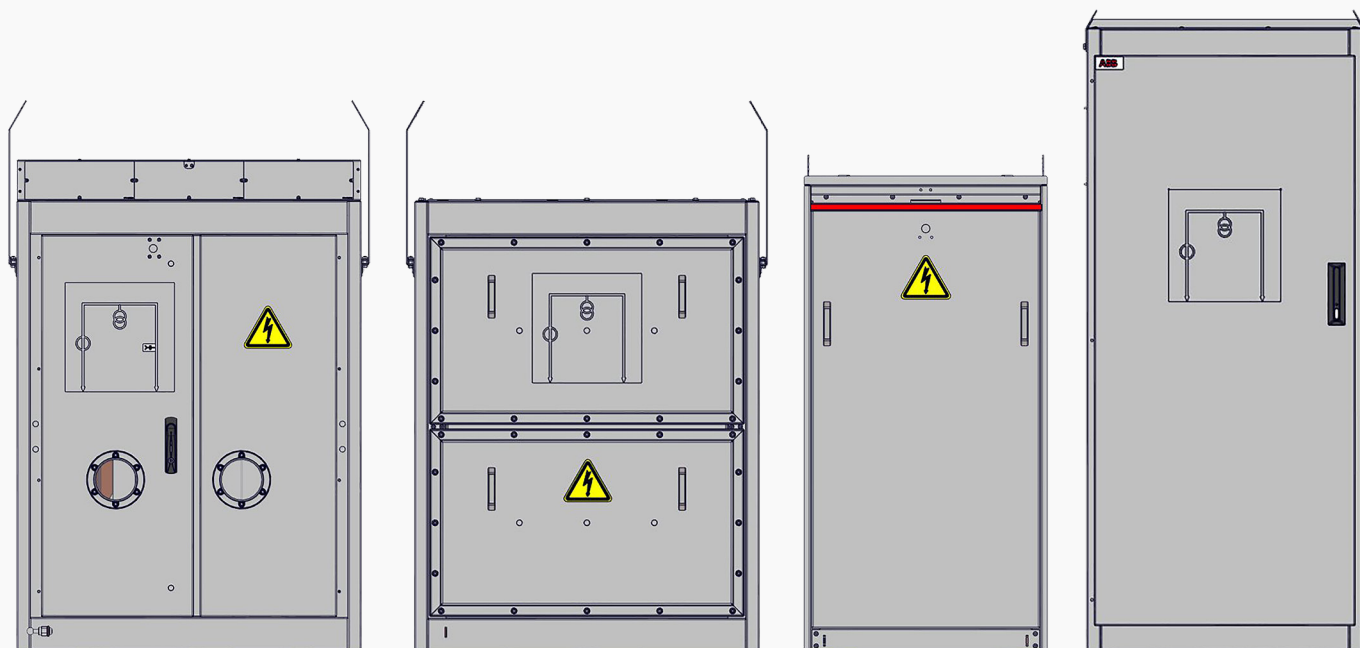


CATALOG

SafePlus 12-24kV

Metering modules



- RMT module with segregated design
- RMT module
- Metering module
- Metering tariff module



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Introduction

SafePlus is ABB's flexible, extendable compact switchgear portfolio and it contains both SF6-insulated switchgears and air insulated metering modules. Information in this document will only focus on the air insulated metering modules.

ABB's metering modules for our SafePlus 12- 24 range comes in three variants:

1. Metering module (M module)
2. Metering Tarif module (Mt module)
3. Rear Mounted Transformers

Metering module

The M module has diverse configuration options and are of a compact design. Our designed allows front access with the transformers placed on the side wall(s) of the module. This makes it our most flexible metering solution for the SafePlus 12-24 range.

Metering Tarif module

The Mt module has several configuration options and are designed for usage of a wider range of transformers.

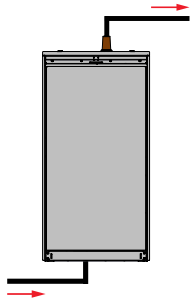
Rear Mounted Transformers module

The RMT metering module is constructed to give the operator easy access to the transformers and cable connections from the front side of the module.

This metering module type comes with two internal arc design philosophies, both based on the same physical design:

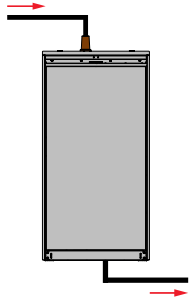
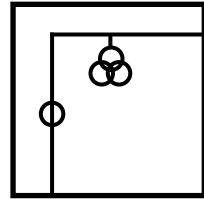
- RMT module
- RMT module with segregated design

Configurations



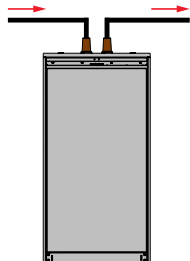
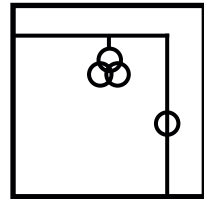
Configuration 1
Cable in - Busbar out

- M-module
- Mt-module



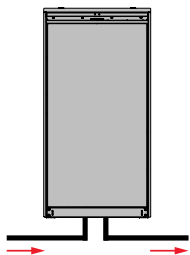
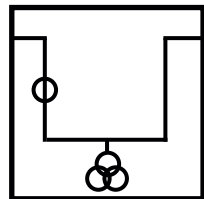
Configuration 2
Busbar in - Cable out

- M-module
- Mt-module



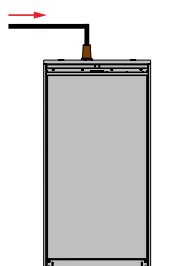
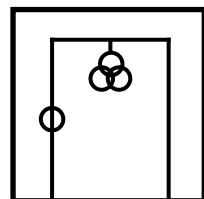
Configuration 3
Busbar in - Busbar out

- RMT-module
- M-module



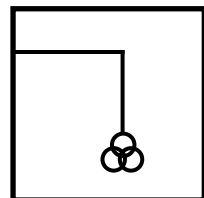
Configuration 4
Cable in - Cable out

- RMT-module
- Mt-module



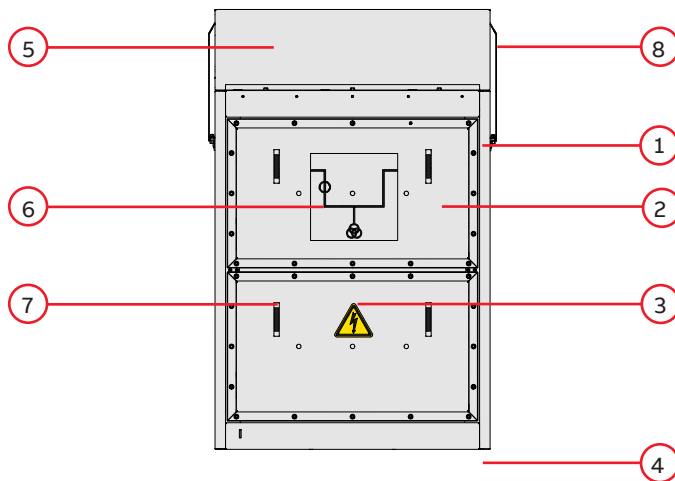
Configuration 5
Busbar in

- M-module



Arrangement

RMT modul



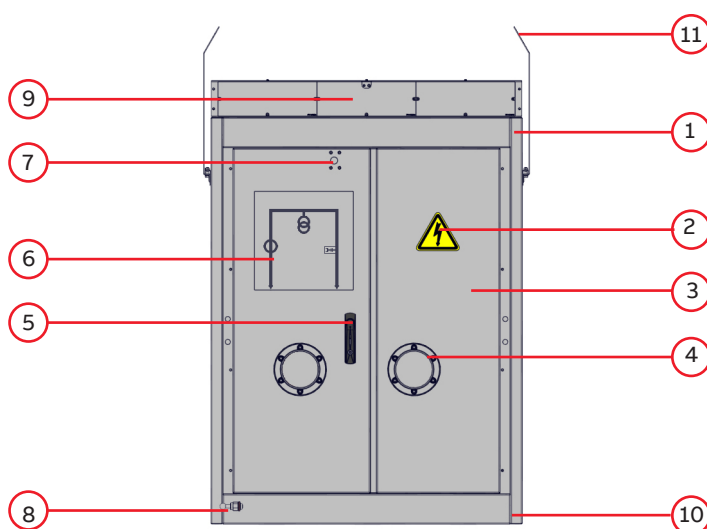
RMT module

1. Rear Mounted Transformer module enclosure
2. Two vertical separated bolted doors
3. Warning label
4. RMT module can be placed on a base frame, height 290mm or 450mm
5. Prepared for LV compartments, height 124mm, 470mm or 700mm
6. Single line diagram (mimic)
7. Door handles
8. Lifting lugs

Available connections:

- Configuration 3 (Busbar in/Busbar out)

RMT module with segregated design



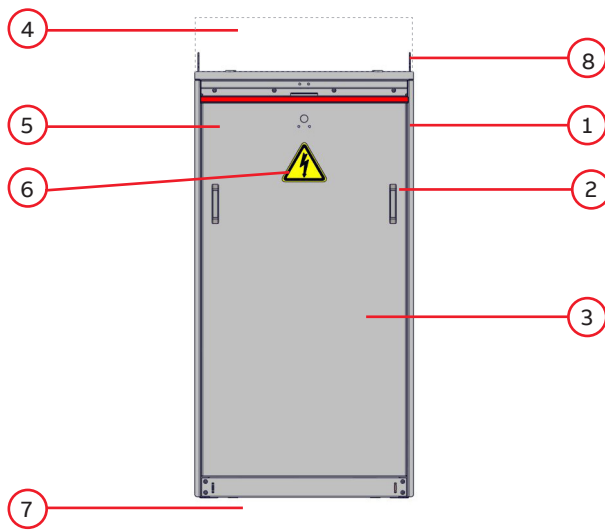
RMT Segregated module

1. Rear Mounted Transformer segregated module enclosure
2. Warning label
3. Two hinged doors (only available for RMT segregated version)
4. Inspection window for each door
5. Tool based door handle
6. Single line diagram (mimic)
7. Placement for key interlock system
8. Earthing point with option for spherical earth connection
9. LV compartments, height 124mm, 470mm or 700mm
10. RMT module can be placed on a base frame, height 290mm or 450mm
11. Lifting lugs

Available connections:

- Configuration 4 (Cable in/Cable out)

Metering module



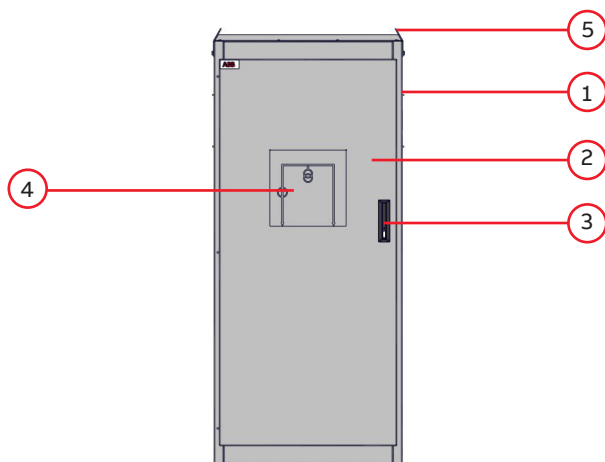
M module

1. Metering module enclosure
2. Handles on removable cover
3. Removable cover to access MV compartment
4. Prepared for LV compartments, height 124mm, 470mm or 700mm
5. Nameplate
6. Warning label
7. M-module can be placed on a base frame, height 290mm or 450mm
8. Lifting lugs

Available connections:

- Configuration 1 (Cable in/Busbar out)
- Configuration 2 (Busbar in/Cable out)
- Configuration 3 (Busbar in/Busbar out)
- Configuration 5 (Busbar in)

Metering tariff module



Mt module

1. Metering Tariff module enclosure
2. Hinged door
3. Single line diagram (mimic)
4. Door handle
5. Lifting lugs

Available connections:

- Configuration 1 (Cable in/Busbar out)
- Configuration 2 (Busbar in/Cable out)
- Configuration 4 (Cable in/Cable out)

Safety

Internal arc classification (IAC)

01 Arc duration and damage caused

During development of all ABB products, focus is on personnel safety. The SafeRing / SafePlus portfolio was designed and tested to withstand a variety of internal arc scenarios at the same current level as the maximum short circuit current. The tests show that the metal enclosure of SafeRing / SafePlus is able to protect personnel standing close to the switchgear during internal arc fault.

Causes and effects of internal arcs

Although an internal arc fault is highly unlikely it can theoretically be caused by various factors, such as:

- Insulation defects due to quality deterioration of the components. The reasons can be adverse environmental conditions and a highly polluted atmosphere.
- Inadequate training of the personnel in charge of the installation leading to incorrect installation of the cables.
- Broken or modified safety interlocks.
- Overheating of the contact area, e.g. when the connections are not sufficiently tightened.
- Short circuits caused by small animals that have entered into the cable compartment (i.e. through cable entrance).

The energy produced by the internal arc causes the following phenomena:

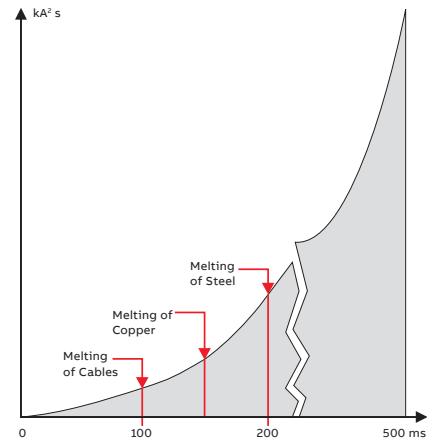
- Increase of the internal pressure.
- Increase of the temperature.
- Visual and acoustic effects.
- Mechanical stresses on the switchgear structure.
- Melting, decomposing and evaporation of materials.

Tested according to IEC standard 62271-200

The capability of SafeRing / SafePlus switchgear to withstand internal arc is proven by type tests performed according to internal arc classification (IAC) as described in the standard IEC 62271-200 as follows:

Accessibility: A and B (switchgear)

A=Accessible to authorized personnel only
300 mm safety distance on accessible sides of the switchgear (also distance to sensors during testing)



01

B=public access

100 mm safety distance on accessible sides of the switchgear (also distance to sensors during testing)

F-Front = Access from the front

L-Lateral = Access from sides

R-Rear = Access from the rear

Accessible sides of switchgear = Area that personnel can enter freely. For accessibility A this means a 300 mm safety distance + 500 mm or more in safe moving area.

Non-accessible side of switchgear = Area that is physically blocked or clearly marked as not safe for personnel.

All test specimens passed the following test criteria according to the standards:

1. Correctly secured doors and covers do not open
2. No fragmentation of the enclosure occurs within the time specified for the test. Projection of small parts up to an individual mass of 60 g are accepted
3. Arcing does not cause holes in the enclosure of the switchgear up to a height of 2 m
4. Indicators do not ignite due to the effect of hot gases
5. The enclosure remains connected to its earthing point

IAC AFLR or AFL - downwards ventilation

—
01 Accessible side of
the metering module

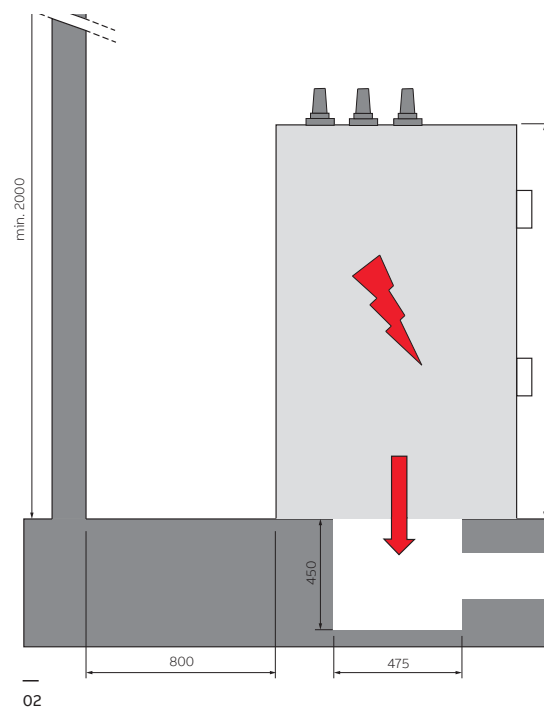
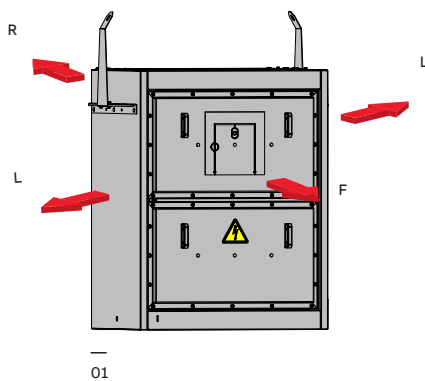
—
02 RMT modul with
downwards ventilations

With ventilation down to the cable trench.

With this setup, hot gases and pressure are evacuated downwards in the cavity in the floor beneath the metering module. Hot gases are led to the cable trench, forcing the hot gases down during an arc fault. The metering module must be arranged as instructed according to the basic parameters below.

Basic parameters of set-up:

- IAC AFLR or AFL up to 20 kA / 1s
- Minimum height of ceiling: 2000 mm
- Recommended distance to back wall:
 - 800 mm with accessible rear side
 - 100 mm recommended for non-accessible rear side
- Not allowed with gland plate between metering module and the cable trench.
 - Minimum width of cable trench: 475 mm
 - Minimum depth of cable trench: 450 mm
 - Minimum length of cable trench: 991 mm
- A pressure relief channel to a safe area is required and it must have a free opening area of 0,1m²
- The metering module needs to be installed and fixed to the floor in accordance with "Metering modules Installation and operating instructions".



Segregated phase design – RMT segregated module

01 Phase segregation plates

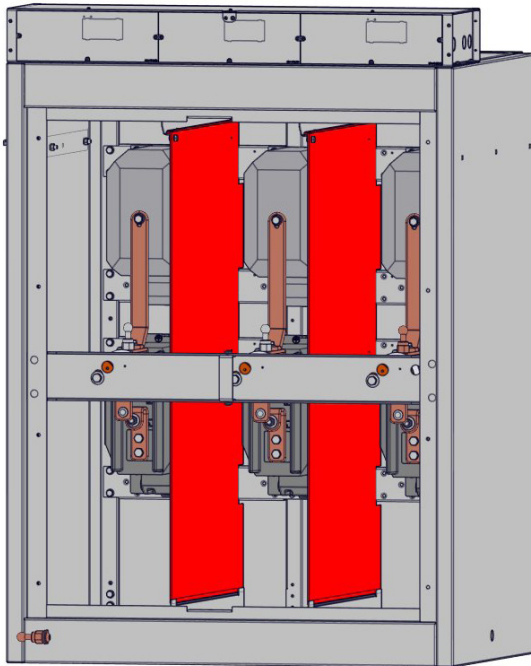
The RMT module panel are available with a segregated phase design. This means that all three phases are segregated by metal plates. Effectively preventing it from becoming a multiphase arc fault. If an arc fault where to accrue would it be limited to a phase-earth fault, hence a lower amount of energy in the fault.

Internal arc test for this RMT segregated module has been done in accordance with IEC 62271-200 ed.2 as a single-phase test, described in subclause 6.106 and annex AA.5.1.2 – Single phase tests.

The test method and segregated design of our RMT module limits an arc fault in the energy released due to single phase-to-earth fault limitations set by the network neutral earth philosophy.

This philosophy can result in limitation of possible arc fault currents hence, strictly limiting the evacuation of hot gasses and pressure during an arc fault.

The RMT module with segregated design has been tested at single phase-to-earth currents of 2kA for a duration of 1 sec and it did not evacuate any hot gasses or pressure during the testing.



01

Technical description

Normal service conditions according to IEC 62271-200

Ambient temperature ¹⁾					
Maximum value	°C	+40	+40	+40	
Maximum value of 24 hours mean	°C	+35	+35	+35	
Minimum value ²⁾	°C	-25	-25	-25	
Altitude for installation above sea level ³⁾	m	1500	1500	1500	
Relative humidity max. 24 hour mean		95%	95%	95%	

¹⁾ De-rating allows for higher maximum temperature

²⁾ Lower temperature available upon request

³⁾ For installation above 1500 m, reduced gas pressure is required

SafePlus RMT Module

Rated voltage	U _r	kV	12	17,5	24
Rated power frequency withstand voltage	U _d	kV	28	38	50
Impulse withstand voltage	U _p	kV	95	95	125
Rated normal current	I _r	A	630	630	630
Rated short time current 1 sec.	I _k	kA	20	20	20
Rated short time earth circuit	t _{ke}	s	1	1	1
Rated peak withstand current	I _p	kA	52,5	52,5	52,5
Internal arc classification IAC AFLR/AFL, 1s	I _A	kA, s	20kA, 1s	20kA, 1s	20kA, 1s
IAC AFLR/AFL - gas ventilation direction	NA, None, Up, Down, Back		Down		
Degree of protection					
Front, Lateral, Rear and Top side of enclosure	IP xx		IP 3X		
Current Transformers			TPU 4x.xx/ TPU 6x.xx	TPU 6x.xx	TPU 6x.xx
Voltage Transformers			TJC 4/ TJC 6	TJC 6	TJC 6
Connection configuration	Configuration 3 (Busbar in/Busbar out)				

SafePlus RMT Module with segregated design

Rated voltage	U _r	kV	12	17,5	24
Rated power frequency withstand voltage	U _d	kV	28	38	NA
Impulse withstand voltage	U _p	kV	95	95	NA
Rated normal current	I _r	A	630	630	NA
Rated short time current 1 sec.	I _k	kA	25	20	NA
Rated short time earth circuit	t _{ke}	s	1	1	NA
Rated peak withstand current	I _p	kA	62,5	52,5	NA
Internal arc classification AFL	I _{Ae}	kA, s	2kA, 1s	2 kA, 1s	NA
IAC AFL - gas ventilation direction	NA, None, Up, Down, Back		None		
Degree of protection					
Front, Lateral, Rear and Top side of enclosure	IP xx		IP 2XD		
Low Voltage Compartment (LVC)	IP xx		IP 2XD		
* Bottom side of enclosure	IP xx		IP 3X		
* Between LVC and Medium voltage compartment	IP xx		IP 3XD		
Current Transformers			TPU 60.13, TPU 60.15		NA
Voltage Transformers			TJC 6		NA
Connection configuration	Configuration 4 (Cable in/Cable out)				

* Tested according to client instructions

SafePlus M Module					
Rated voltage	U _r	kV	12	17,5	24
Rated power frequency withstand voltage	U _d	kV	28	38	50
Impulse withstand voltage	U _p	kV	95	95	125
Rated normal current	I _r	A	630	630	630
Rated short time current 1 sec.	I _k	kA	25		
Rated short time current 3 sec.	I _k	kA	21	21	21
Rated short time earth circuit	t _{ke}	s	1	1	1
Rated peak withstand current	I _p	kA	62,5	52,5	52,5
Internal arc classification AF ¹⁾	I _A	kA, s		16kA, 1s	
IAC AF - gas ventilation direction	NA, None, Up, Down, Back			Back	
Internal arc classification AFL ¹⁾	I _A	kA, s		20kA, 0,5s	
IAC AFL - gas ventilation direction	NA, None, Up, Down, Back			Back	
Degree of protection					
Front, Lateral, Rear and Top side of enclosure	IP xx			IP 3X	
Current Transformers			TPU 41.13/ TPU 61.13	TPU 61.13	TPU 61.13
Voltage Transformers			TJC 4/ TJC 6	TJC 6	TJC 6
Connection configuration			Configuration 1(Cable in/Busbar out) Configuration 2 (Busbar in/Cable out) Configuration 3 (Busbar in/Busbar out) Configuration 5 (Busbar in)		

¹⁾ Only available for Configuration 3

SafePlus Mt Module					
Rated voltage	U _r	kV	12	17,5	24
Rated power frequency withstand voltage	U _d	kV	28	38	50
Impulse withstand voltage	U _p	kV	95	95	125
Rated normal current	I _r	A	630	630	630
Rated short time current 1 sec.	I _k	kA	25		
Rated short time current 3 sec.	I _k	kA	21	21	21
Rated short time earth circuit	t _{ke}	s	1	1	1
Rated peak withstand current	I _p	kA	62,5	52,5	52,5
Internal arc classification	I _A	kA, s		NA	
IAC - gas ventilation direction	NA, None, Up, Down, Back			NA	
Degree of protection					
Front, Lateral, Rear and Top side of enclosure	IP xx			IP 3X	
Current Transformers			TPU 41.13 TPU 61.13 ACJ-24 CTA 24	TPU 61.13 ACJ-24 CTA 24	TPU 61.13 ACJ-24 CTA 24
Voltage Transformers			TJC 4/TJC 6 CTY24	TJC 6 CTY 24	TJC 6 UXL-24/ CTY 24
Connection configuration			Configuration 1(Cable in/Busbar out) Configuration 2 (Busbar in/Cable out) Configuration 4 (Cable in/Cable out)		

Transformers

Current transformers to DIN standards

The DIN current transformers are insulated in resin and are used for powering measuring and protection devices. These transformers can have a wound core with one or more cores and come with performance and precision classes that suit the requirements of the installation. These devices comply to standard IEC 61869-2. Their dimensions normally comply with standard DIN 42600-8 Narrow Type.

The current transformers can also be supplied with a capacitive socket for connection to voltage signalling devices. The ABB range of current transformers is called TPU.

TPU 4x.xx up to 12 kV

TPU 6x.xx up to 24 kV



Voltage transformers

The voltage transformers are insulated in epoxy resin and are used for powering measuring and protection devices. They are available for fixed assembly or on a plug-in plate for panels with withdrawable circuit-breakers. In this case, the transformers can be equipped with a medium voltage protection fuse. They comply to standard IEC 61869-3. Their dimensions comply with standard DIN 42600-9 Narrow Type. These transformers can have one or two poles and possess performance and precision classes that suit the functional requirements of the instruments to which they are connected. The ABB range of voltage transformers is called TJC.

TJC 4x.xx up to 12 kV

TJC 6x.xx up to 24 kV

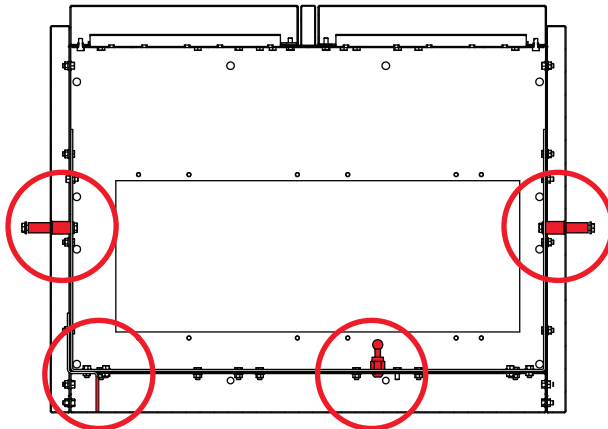


Earthing

Main earthing for the RMT modules is available in five options to comply with relevant standards.

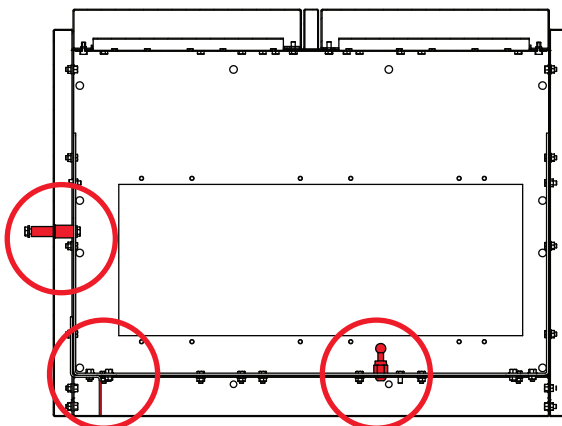
- 1) 2 off earthing connections for side extensions or external earthing, 1 off inside ball type earthing connection for individual phase earthing.
- 2) 1 off earthing connection for side extension or external earthing, 1 off inside ball type earthing connection.
- 3) 1 off inside ball type earthing connection.
- 4) 1 off external (front) earth connection, 1 off inside ball type earthing connection.
- 5) 1 off external (front) ball type earthing.

Option no. 1



2 off earthing connections for side extensions or 1 off external (front) earth connection, 1 off inside ball type earthing connection for individual phase earthing.

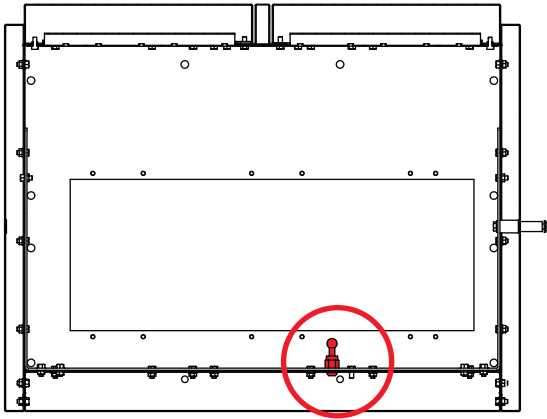
Option no. 2



1 off earthing connections for side extensions or 1 off external (front) earth connection, 1 off inside ball type earthing connection for individual phase earthing.

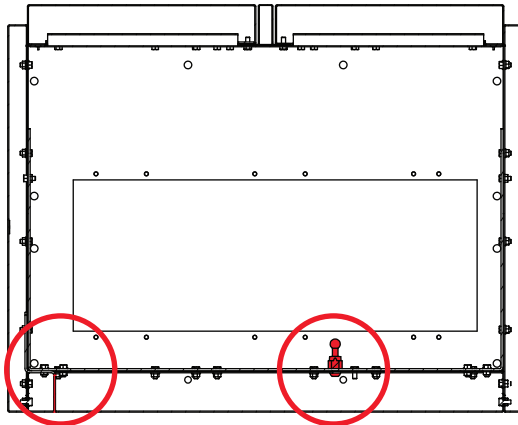
Earthing

Option no. 3



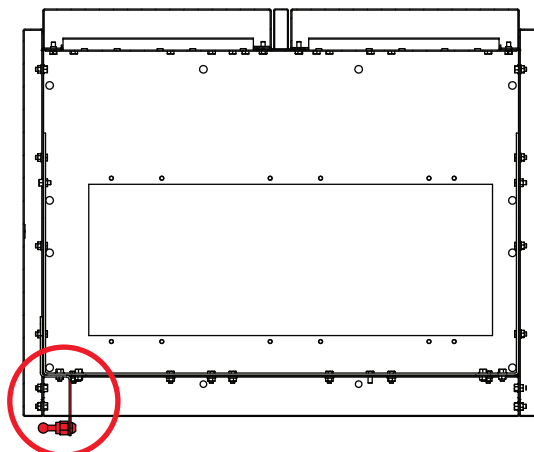
1 off inside ball type earthing connection for individual phase earthing.

Option no. 4



1 off external (front) earth connection, 1 off inside ball type earthing connection.

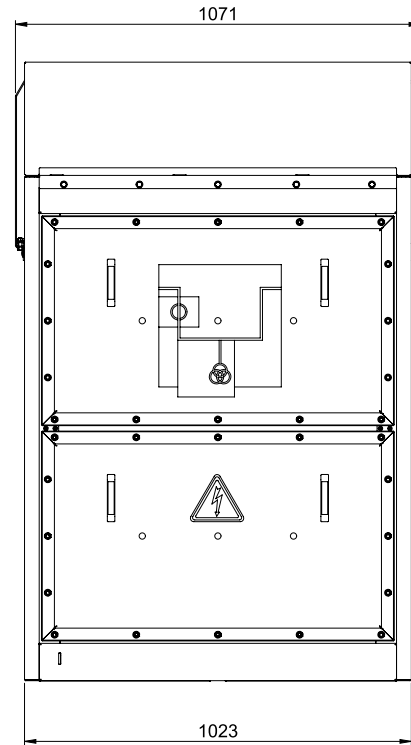
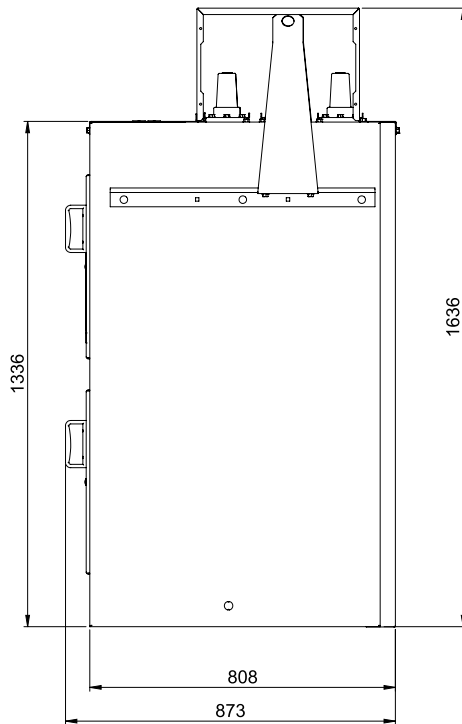
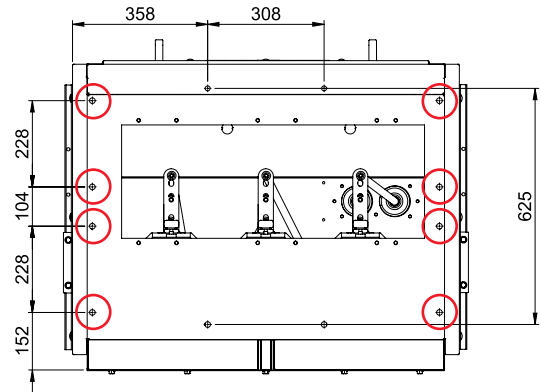
Option no. 5



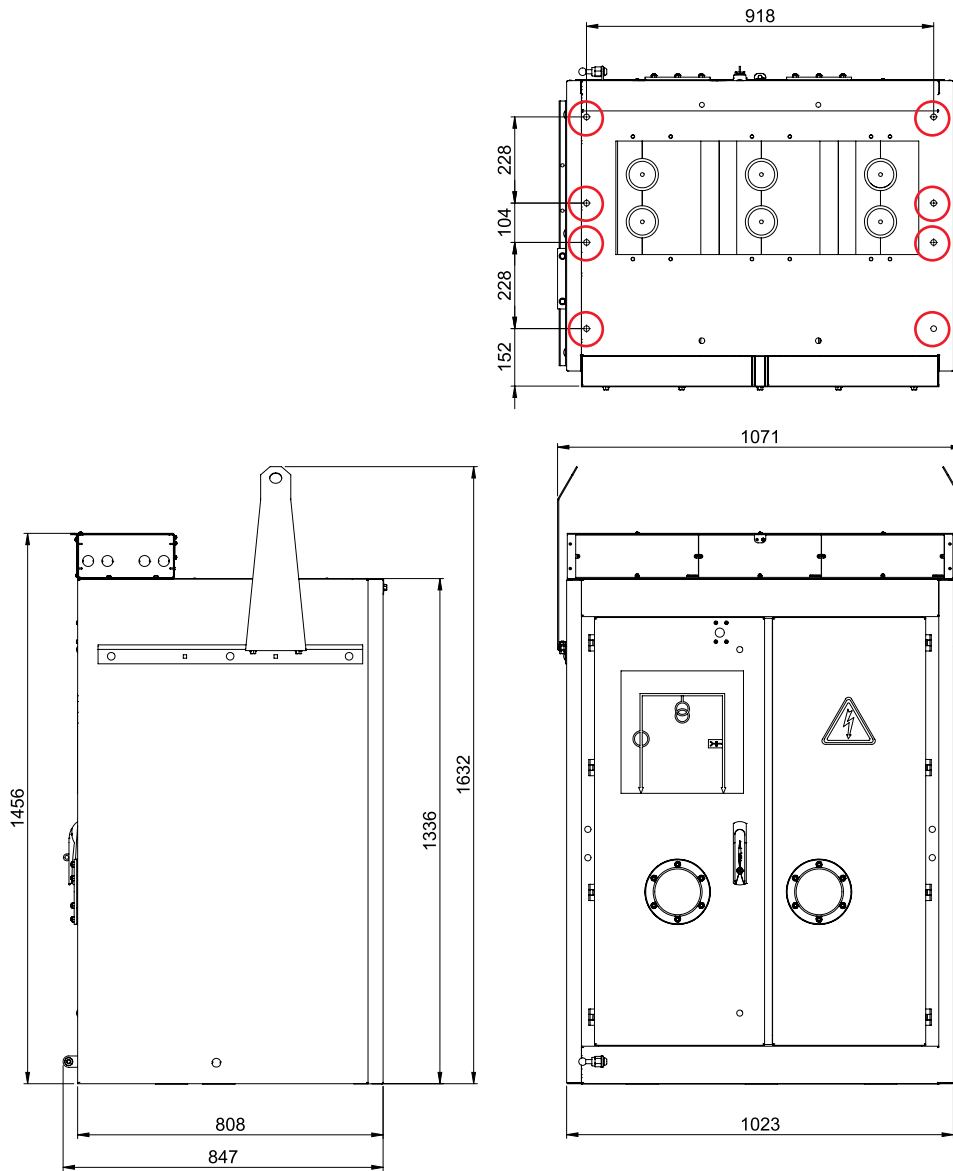
1 off external (front) ball type earthing.

Dimensions and footprint

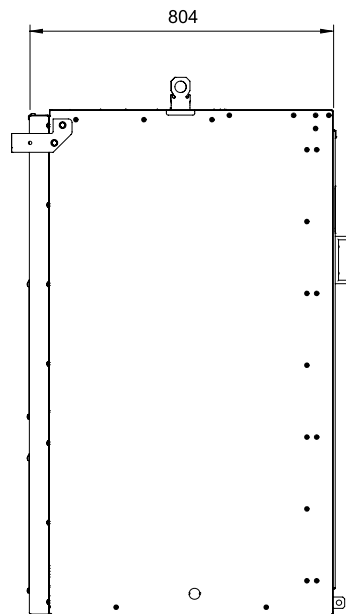
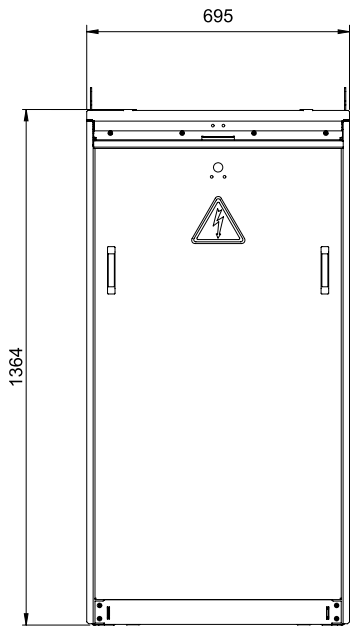
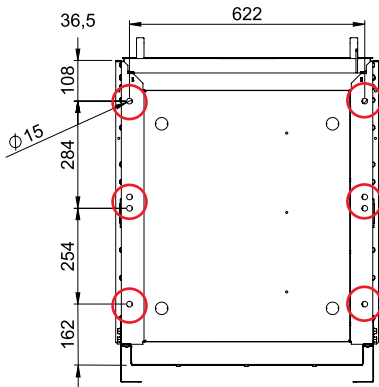
RMT module



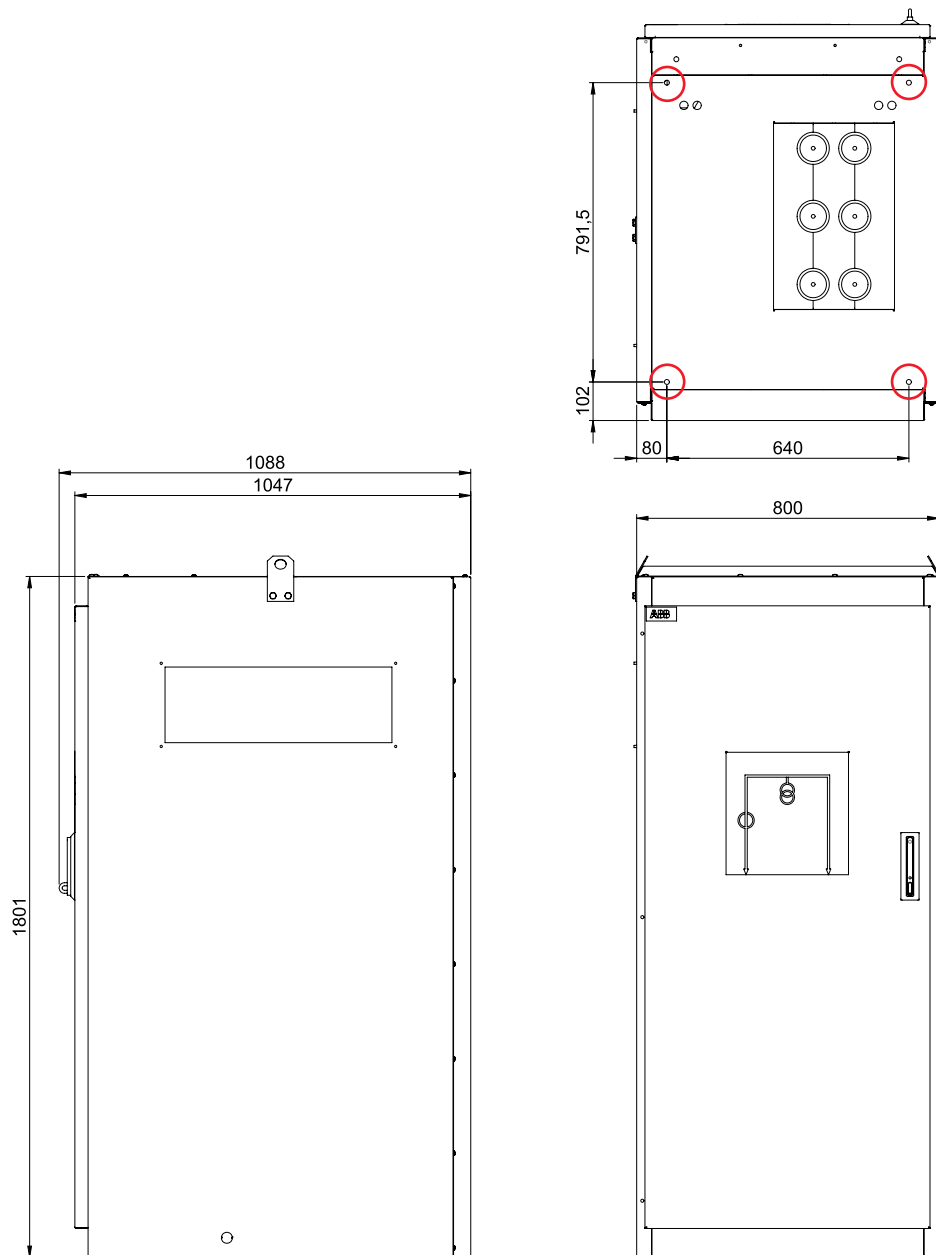
RMT module with segregated design



Metering module



Metering tariff module



Transport and handling

The metering units are delivered ready for installation.

ABB's metering modules can be delivered with or without transformers inside. All metering modules are clearly marked with a center of gravity sticker on the outside of the module.

Acceptance inspection

At receipt please check that the delivered equipment has not been damaged during transport. If any damages have occurred a claim must be submitted to the carrier immediately.

After unpacking, the following must be checked: Carry out a function test on the mechanical parts. Visual check of the Metering module. Any faults or omissions must be reported immediately to the supplier.

Maximum weight for metering modules	kg
RMT module incl. trafo	520 ¹⁾
RMT Segregated module incl. trafo	550 ¹⁾
Metering module incl. trafo	410 ¹⁾
Metering Tariff module incl. trafo	410 ¹⁾

¹⁾ Depending of the configuration

Handling

Metering modules are fitted with lifting lugs, but they should mainly be moved on a pallet with a forklift truck. The RMT module comes fixed to the pallet from factory for a more secure moving operation. However, always check that the metering modules are properly secured before moving them.

Storage

Metering modules must be stored under cover in a dry and well ventilated area until it is installed and put into operation.

Important precautions for installation



NOTE

The floor must be well leveled and the unit must be fixed by means of anchor bolts in accordance with the dimensional drawing for the number of modules or units as appropriate. The tolerance of the evenness is maximum 1 mm per meter.



CAUTION

For fixing all of the metering module to the floor M12 bolts (68Nm) or M10 bolts (45Nm) with washers and hexnuts shall be used.

Minimum fixation on left and right sides are marked with the red ring.

Protection class (IP3X) is maintained when all unused fixing holes have been properly sealed.

Approved slings shall be used when lifting. Maximum angle on lifting lugs is 60°.

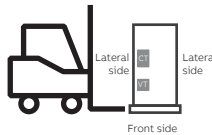
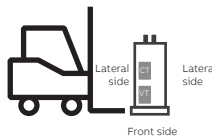
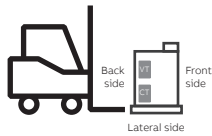




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