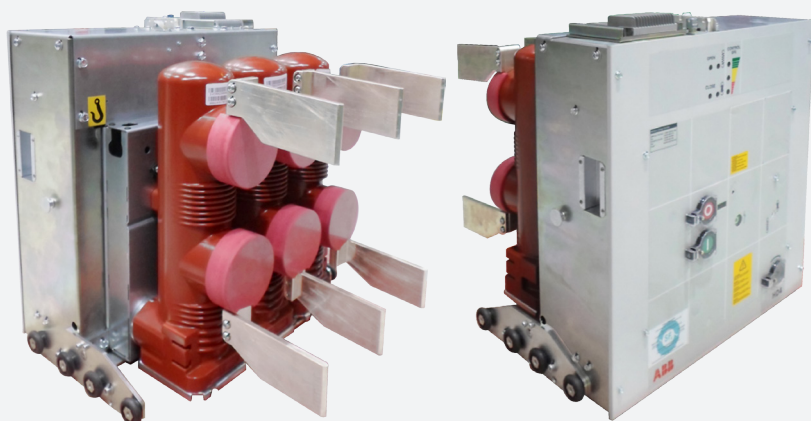


HD4-HPA retrofit solutions for HPA circuit breaker in Safesix enclosure

Addendum to HD4 installation and service instructions



01

02

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For your safety!

- Make sure that the installation room (available space, divisions and ambient) is suitable for the electrical apparatus.
- Check that all the installation, putting into service and maintenance operations are carried out by qualified personnel with sufficient knowledge of the apparatus.
- Make sure that the standards and laws in force are complied with when the apparatus is installed and put into service, and that the rules of good workmanship and safety in the workplace are applied.
- Check that the rated performance of the apparatus is not exceeded during service.
- Check that the personnel who operate the apparatus have this instruction manual to hand as well as all the information they need to operate correctly.
- Pay special attention to the danger notes indicated in the manual by the following symbol:



CAUTION

CAUTION indicates a hazardous situation that may result in minor or moderate injury and/or property damage.

NOTICE

NOTICE indicates a statement of company policy as it relates to the safety of personnel or protection of property.



WARNING

WARNING indicates a hazardous situation that has some probability of severe injury and substantial property damage.



DANGER

DANGER indicates a hazardous situation that has a high probability of death, severe injury, and substantial property damage.

I. Introduction

This publication contains the information required to install medium voltage circuit-breakers, as well as instructions for putting them into service. Carefully read this document to ensure the product is used correctly.

This apparatus allows further technical-construction modifications (at the customer's request) to be made so as to adapt it to special installation requirements. Consequently, the information given in this document may not contain instructions concerning special customized configurations.

Besides this manual, you must always consult the latest technical documentation (drawings, electrical circuit and wiring diagrams, assembly and installation drawings, applicable protection coordination studies, etc.), especially regarding any variants to the standard configurations that may be necessary. Only use original spare parts for maintenance operations. For further information, please also consult the technical catalog of the circuit-breaker and the spare parts catalog.

II. Environment Protection Scheme

HD4 circuit-breakers are manufactured in accordance with the ISO 14000 Standards (Guidelines for environmental management). The manufacturing processes are implemented in accordance with the environmental protection standards when it comes to reducing energy consumption and the production of waste. All this is achieved thanks to the environmental management system adopted in the production facility.



WARNING

All the installation, putting into service and maintenance operations must be performed by skilled personnel with in-depth knowledge of the equipment

1. HD4 characteristics and applicability

HD4 instructions

The HD4 Retrofit circuit-breaker is based on the HD4 free standing version.

So much so, most of the information in the HD4 instruction manual is also applicable to this retrofit version.

The contents of this supplement are common to the following sections. Please refer to the installation and operation manual of HD4 circuit-breaker code 1VCD601246 for specific information.

Please contact ABB for special installation requirements.

Specific information about the HD4 circuit-breaker retrofit device is given in this supplement.

This supplement contains the information necessary for HD4-HPA medium voltage circuit breakers, designed for Safesix switchgears.

The HD4-HPA circuit breakers are mechanical interchangeable with HPA series circuit breakers and guarantee the same performances (check interchangeability of the electric diagram).

Please, read carefully this manual and the instructions for installation, service and maintenance of the Safesix switchgear (1VES 580901-902). Ask to ABB if it was no longer available.

Regulatory framework

HD4 circuit-breakers conform to IEC 62271-100 Standards and to those in force in the major industrialized countries.

The circuit-breaker is shipped in special packing, in the open position and with the spring discharged. Each device is protected by a plastic wrapper to prevent water from infiltrating during the loading and unloading operations, and to keep out the dust during storage.

Also make sure that all the items described in the shipping note are included in the supply. If you discover any damage or discrepancy once the equipment has been unpacked, notify ABB (directly or through the agent or supplier) as soon as possible and in any case within five days of receipt. The apparatus is only supplied with the accessories specified at the time of ordering and validated in the order confirmation sent by ABB.

- instruction manual (this document).
- test certificate
- identification label
- copy of the shipping documents
- circuit diagram.

- order confirmation
- original shipping notification
- drawings or documents referring to special configurations/conditions (if applicable).

Caption

A	Circuit breaker rating plate
B	Operating mechanism rating plate
1	Type of apparatus
2	Symbols of compliance with Standards
3	Serial number
4	Circuit breaker characteristics
5	Characteristics of the operating mechanism auxiliaries

Fig. 3

2.3. Storage

When the apparatus must be stored for a certain period of time, our workshops can (on request) provide packing to suit the specified storage conditions.

On arrival, the apparatus must be carefully unpacked and checked as described in the Checking on receipt section (chap. 2.2).

If the apparatus cannot be installed immediately, it must be re-packed in its original packing materials. Insert at least one standard packet of hygroscopic substance per piece of apparatus inside the packing.

If the original packing is no longer available and the apparatus cannot be installed immediately, it should be stored indoors in a well-ventilated, dry, dust-free, non-corrosive place, well away from any easily flammable materials and at a temperature between -5 °C and +40 °C.

Avoid any accidental knocks or positions which could stress the structure of the apparatus.

2.4. Handling

Before proceeding with any operation, always make sure that the spring of the operating mechanism is discharged and that the apparatus is in the open position.

Proceed as described below to lift and handle the circuit-breaker (fig. 4):

- use lifting equipment (not supplied) with ropes and safety hooks (fig. 5)
- insert the hooks into the eyebolts fixed to the frame of the circuit-breaker and lift (fig. 6)
- once the operation has terminated (and in any case before putting into service), release the lifting equipment and remove the eyebolts from the frame

When handling the apparatus, take great care to prevent the insulating parts and terminals of the circuit-breaker from being stressed.



WARNING

**Do not handle the apparatus by inserting lifting devices directly under it.
If this is unavoidable, place the circuit breaker on a sturdy bearing surface (see figure 8).**

2. How to handle the retrofit kit

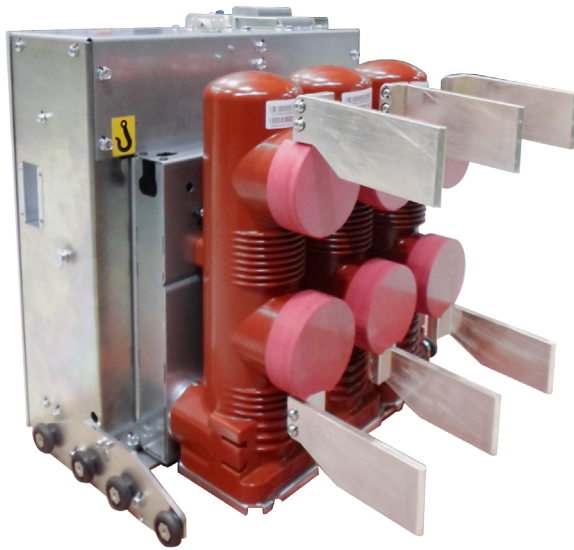


Fig. 4



Fig. 5

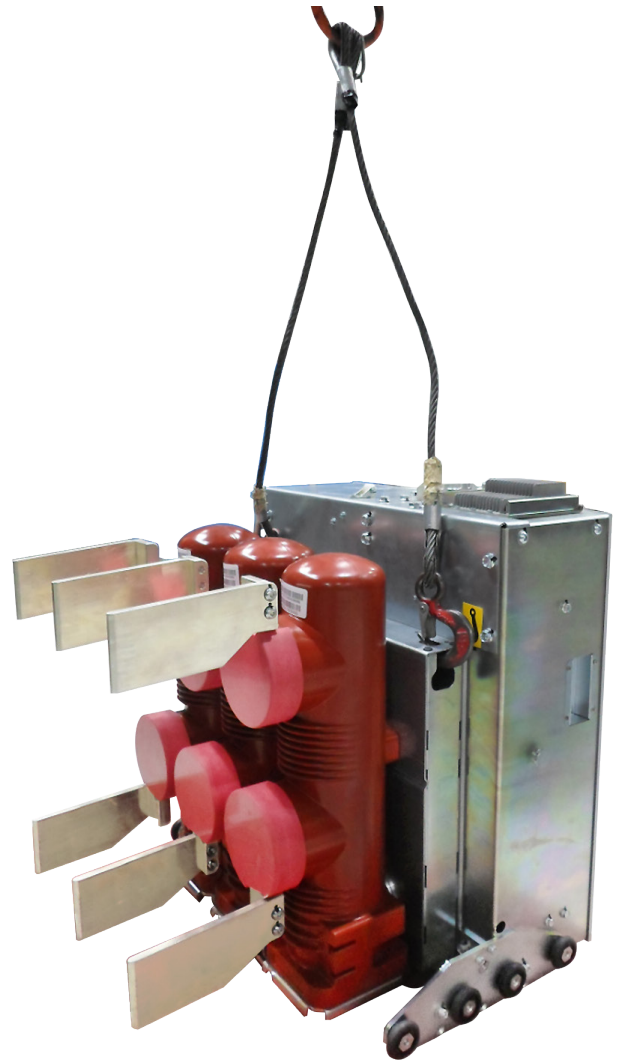


Fig. 6

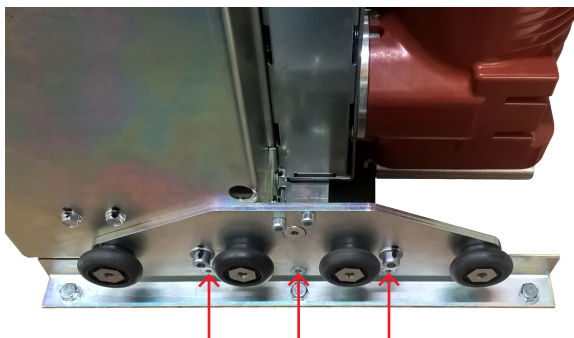


Fig. 7 Before handling, make sure that the circuit-breaker is fastened by the relative plates. To remove the angle support unscrew the three countersink screws indicated.

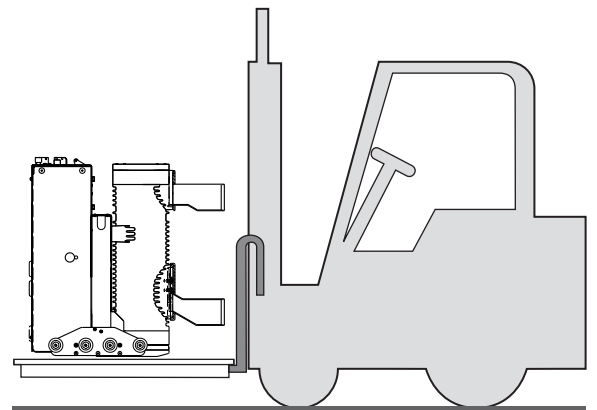


Fig. 8

3. Operation of the retrofit kit

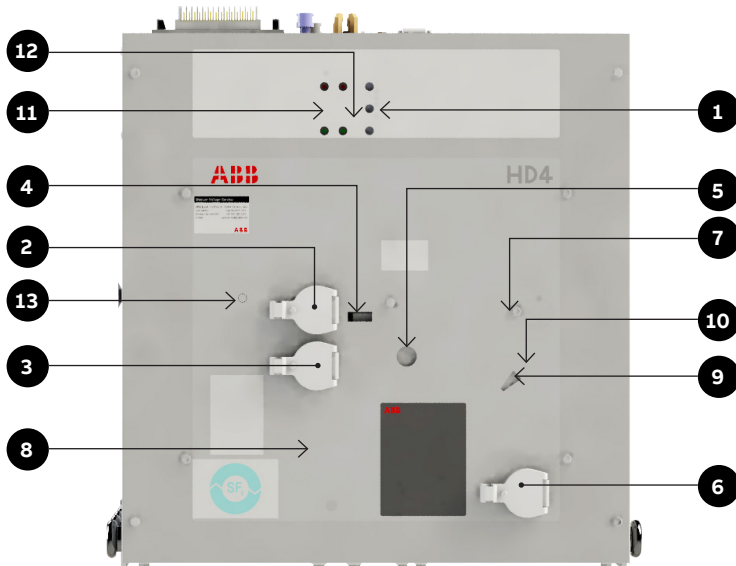


Fig. 9

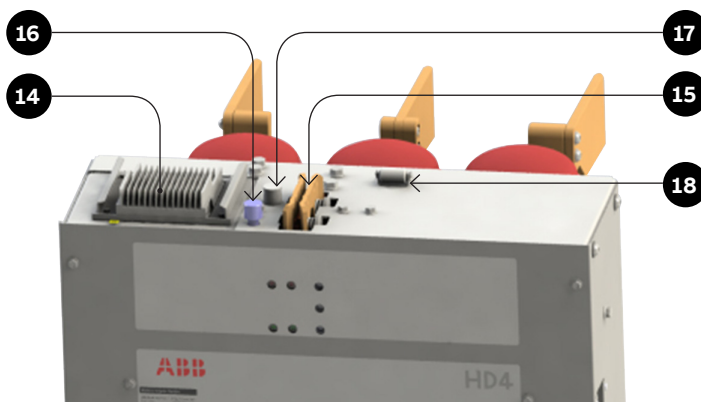


Fig. 10

Key

1. SF6 pressure signaling device (on request).
2. Opening pushbutton
3. Closing pushbutton
4. Operation counter
5. Signaling device for circuit-breaker Open / Closed.
6. Shaft for manual loading of closing spring
7. Open position key lock
8. Reset key to protect circuit-breaker of gear motor (on request)
9. Signaling device for closing spring loaded/discharged
10. Springs loaded / discharged
11. Device for showing open/closed
12. Device for showing springs charged/discharged
13. Undervoltage release override
14. Connector
15. Earthing contact
16. Emergency C.B. opening interlock
17. Interlock lever for auxiliary contact actuator
18. Roller

All HD4-HPA circuit-breakers provide at least the IP2X degree of protection when installed in switchgear.

In these conditions the operator is absolutely protected against accidental contact with moving parts. Pay great attention to moving parts if mechanical operations must be performed when the circuit-breaker is outside the switchgear. If the operations are obstructed in any way, do not force the mechanical interlocks but check that the operating sequence is correct.

The circuit-breaker must be racked in and out of the switchgear gradually so as to avoid knocks that could deform the mechanical interlocks.

Preliminary operations

Clean the insulating parts with a clean, dry cloth. Make sure that the upper and lower terminals are clean and free from deformation caused by knocks received during transport or storage.

How to install HD4-HPA Retrofit in the switchgear
Consult the technical documentation of the switchgear for instructions about how to install the circuit-breaker.

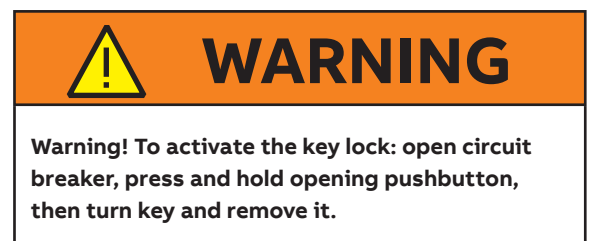
When the circuit-breaker has reached the isolated for test position, the switchgear can be considered isolated.

Before putting into service, you are advised to load the breaker operating mechanisms in the manual mode so as to prevent the auxiliary supply circuit from being overloaded.

Switching and signaling devices

Circuit-breaker HD4-HPA for operations
(see Figure 9 -10)

Consult installation and operation manual 1VCD601246 for instructions about how to operate the circuit-breaker.



3. Operation of the retrofit kit

For manual operation see Safesix switchgear manual 1VES 58901-902 pag.9-10-44-45-46-47



WARNING

Racking-in and out must always be performed with the circuit breaker open. Before proceeding with any of the operations, position the special racking-in/out plate in front of the enclosure or fixed part (if necessary) and place the circuit breaker correctly on the plate guides.

4. Overall dimensions of HD4-HPA retrofit

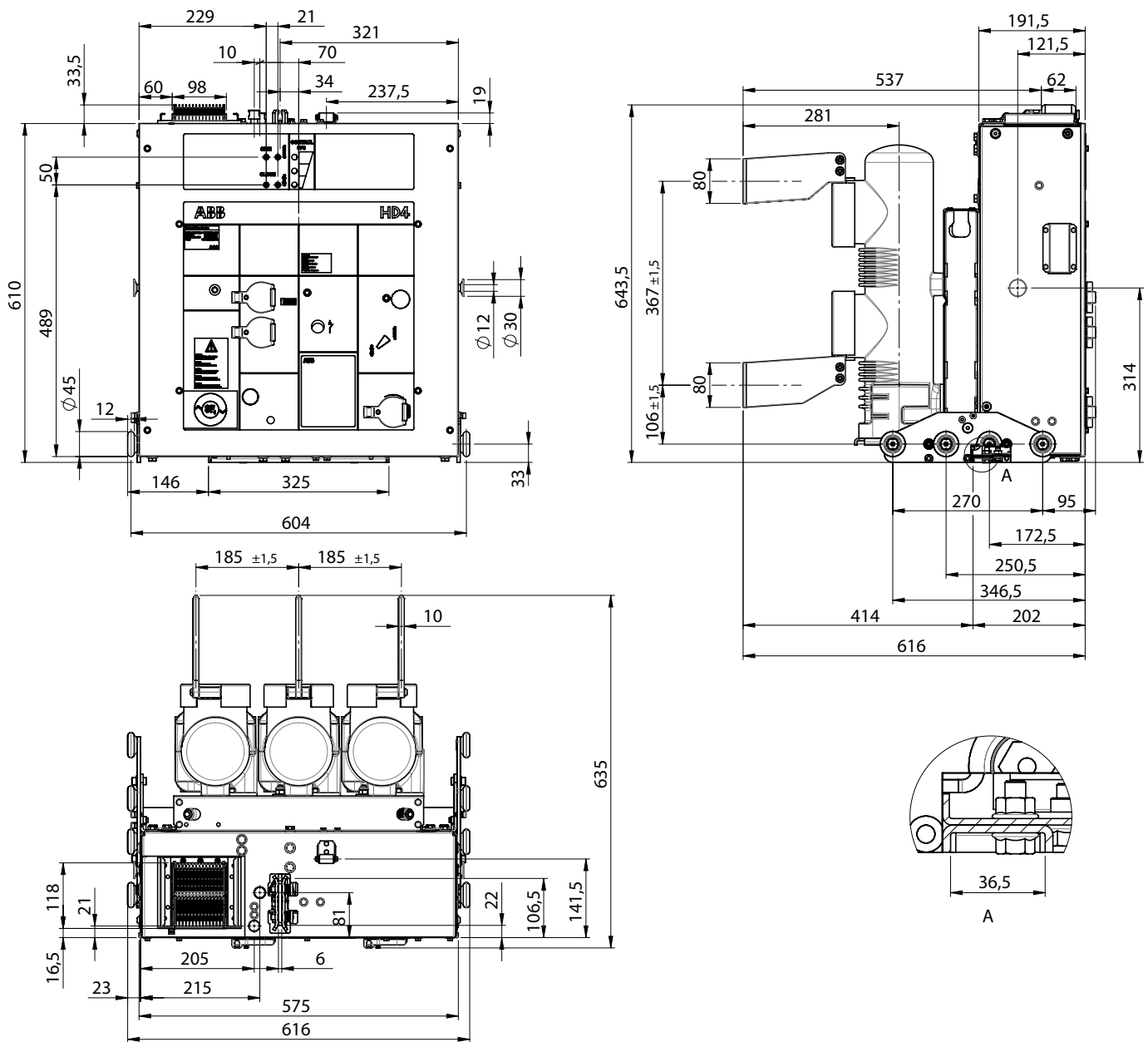


Fig. 11

TN Retrofit overall dimensions:	1VCS012640
Retrofit assembly:	1VCS012730
Fixed TN overall dimensions:	1VCD000226
Circuit diagram:	1VCS014195
Fixed rating:	12kV 1250A (31.5kA)
Rated voltage	Ur [kV] 12
Impulse withstand voltage	Up [kV] 75
Rated frequency	fr [Hz] 50
Rated normal current (40°C)	Ir [A] 1250
Rated-short time withstand current (3s)	Ik [kA] 31.5
Operation sequence	[0-0.3s-CO-3min-CO]
Switchgear	SafeSix
Unlock operation	HANDLE
Weight	110kg

4. Overall dimensions of HD4-HPA retrofit

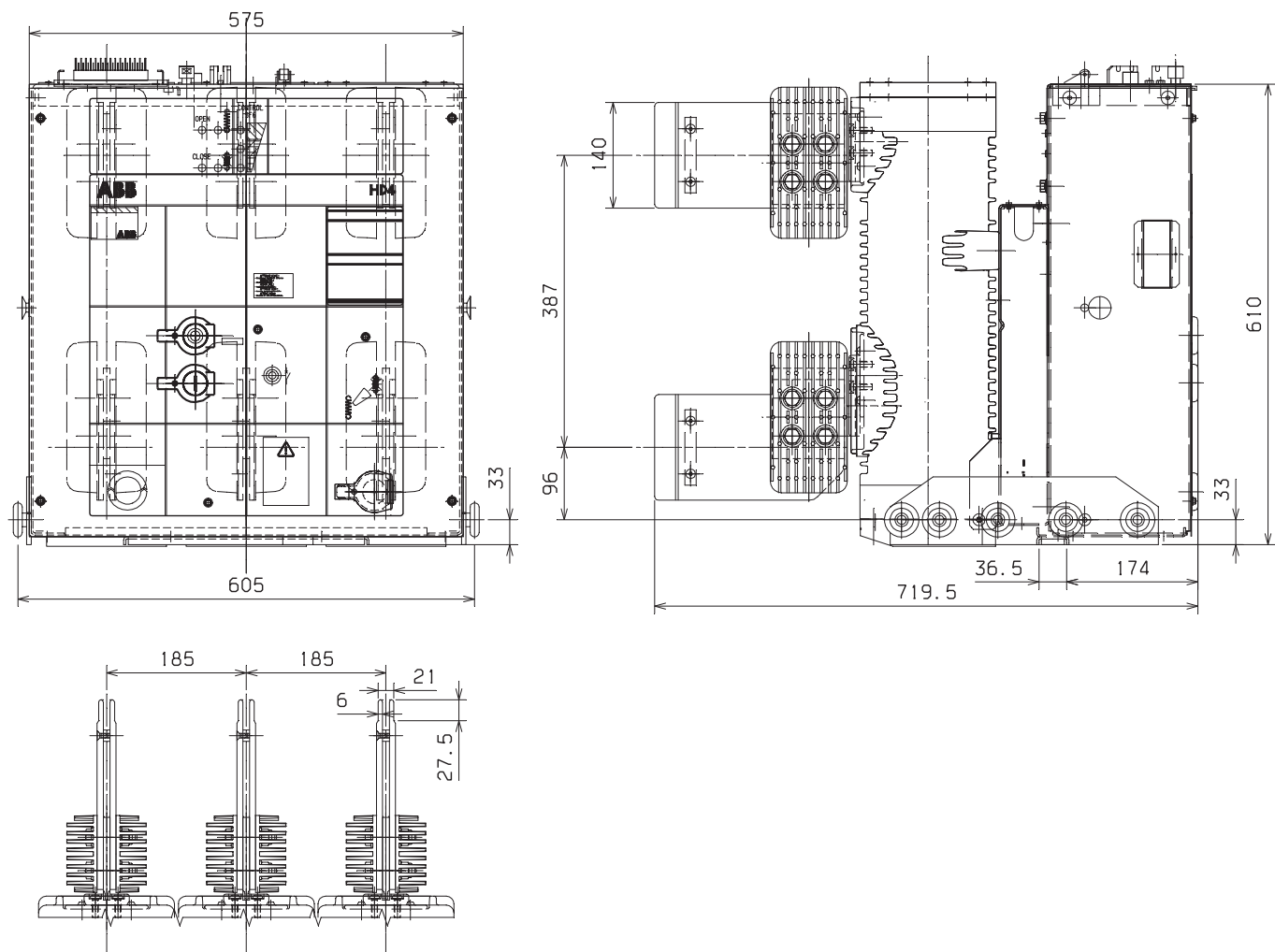


Fig. 12

TN Retrofit overall dimensions:	1VCS003515
Retrofit assembly:	1VCS003668
Fixed TN overall dimensions:	510337
Circuit diagram:	1VCS001801-1VCS001980
Fixed rating:	12kV 31.5A (40kA)
Rated voltage	Ur [kV] 12
Impulse withstand voltage	Up [kV] 75
Rated frequency	fr [Hz] 50
Rated normal current (40°C)	Ir [A] 3150
Rated-short time withstand current (3S)	Ik [kA] 40
Operation sequence	[0-0.3s-CO-3min-CO]
Switchgear	SafeSix
Unlock operation	HANDLE
Weight	215kg

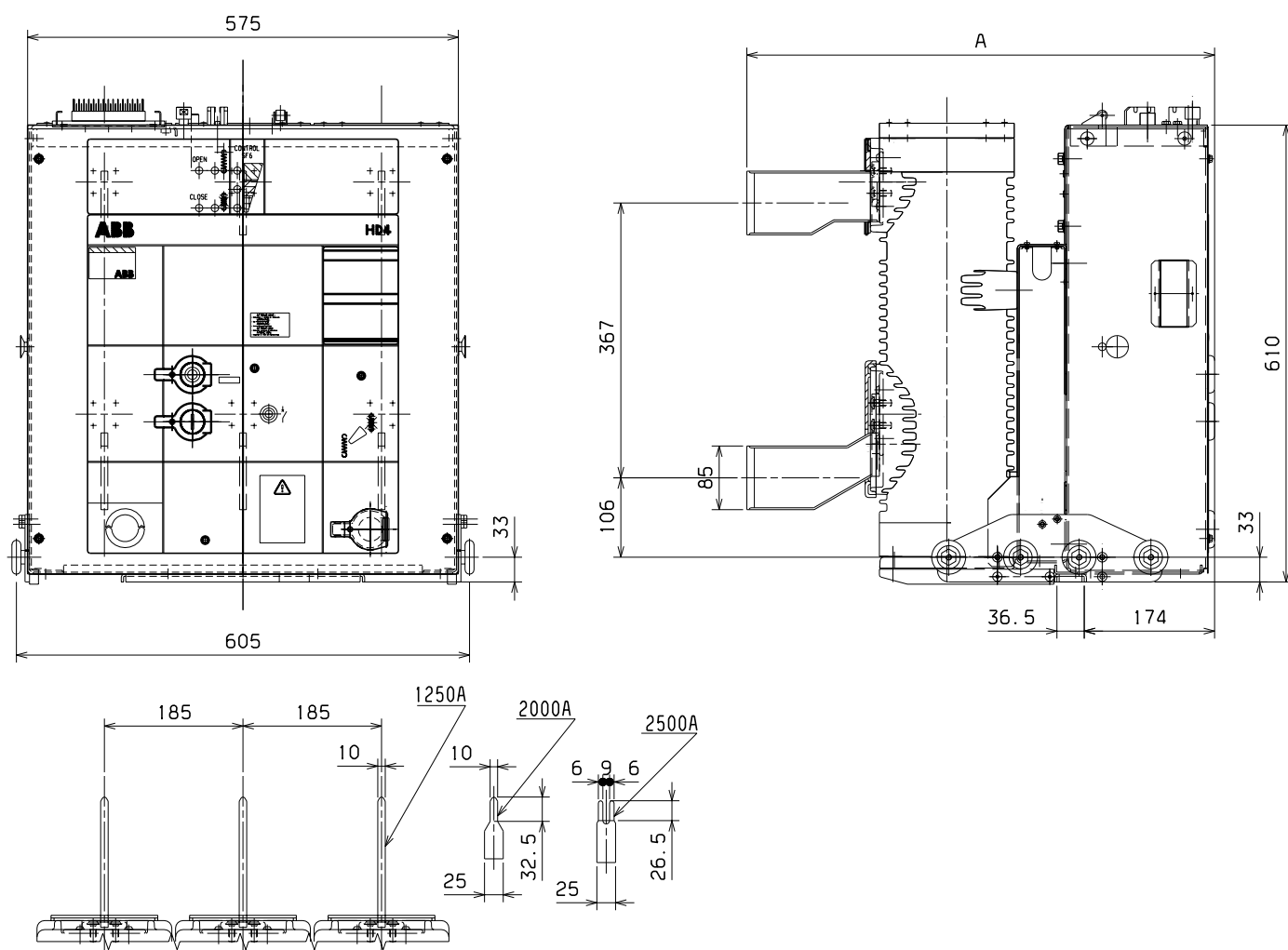


Fig. 13

TN Retrofit overall dimensions:	1VCS003774
Retrofit assembly:	1VCS001780
Fixed TN overall dimensions:	510337
Circuit diagram:	1VCS001801-1VCS001980
Fixed rating:	12.12-20-25.32
Rated voltage	Ur [kV] 12
Impulse withstand voltage	Up [kV] 75
Rated frequency	fr [Hz] 50
Rated normal current (40°C)	Ir [A] 1250-2000-2500
Rated-short time withstand current (3S)	Ik [kA] 40
Operation sequence [O-0.3-CO-3min-CO]	[0-0.3s-CO-3min-CO]
Switchgear	SafeSix
Unlock operation	HANDLE
Weight	160kg

4. Overall dimensions of HD4-HPA retrofit

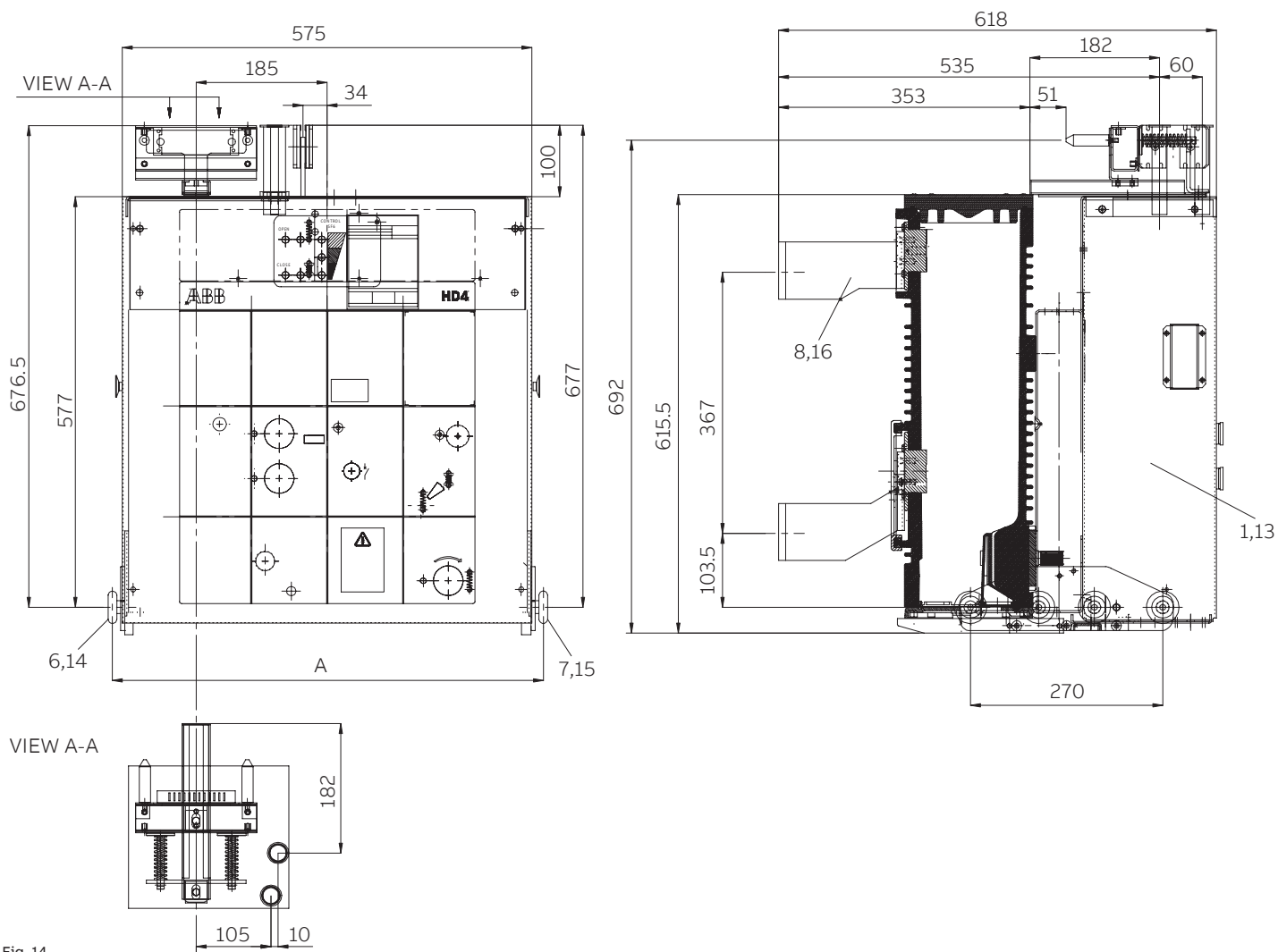


Fig. 14

TN Retrofit overall dimensions:	1VCS003850
Retrofit assembly:	1VCS003850
Fixed TN overall dimensions:	510337
Circuit diagram:	1VCS001801-1VCS001980
Fixed rating:	12.12-20
Rated voltage	Ur [kV] 12
Impulse withstand voltage	Up [kV] 75
Rated frequency	fr [Hz] 50
Rated normal current (40°C)	Ir [A] 1250-1600-2000
Rated-short time withstand current (3S)	Ik [kA] 31.5
Operation sequence	[0-0.3s-CO-3min-CO]
Switchgear	SafeSix
Unlock operation	HANDLE
Weight	180kg

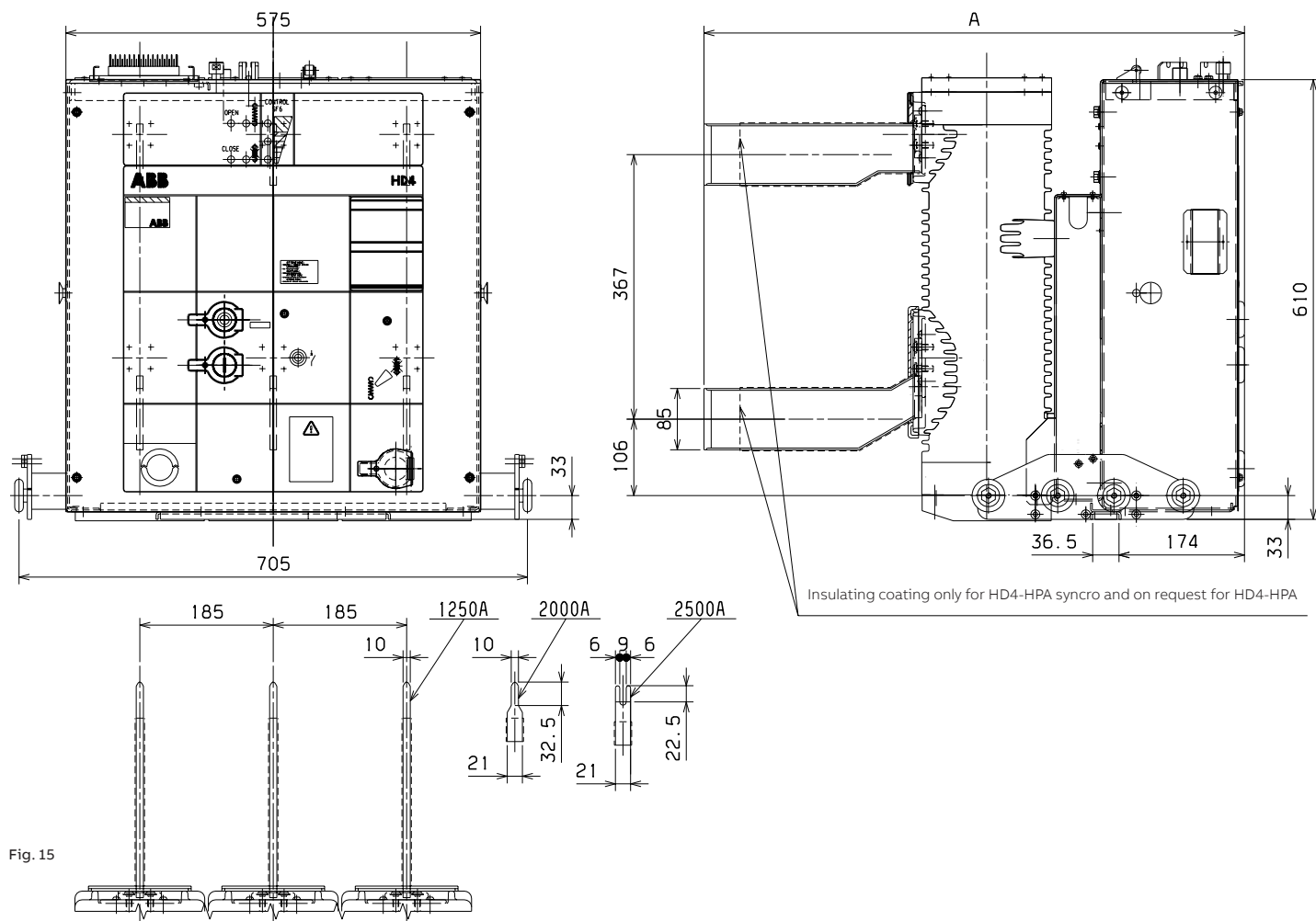


Fig. 15

TN Retrofit overall dimensions:	1VCS003775
Retrofit assembly:	1VCS001790
Fixed TN overall dimensions:	510337
Circuit diagram:	1VCS001801-1VCS001980
Fixed rating:	24.12-20-25.32
Rated voltage	Ur [kV] 24
Impulse withstand voltage	Up [kV] 125
Rated frequency	fr [Hz] 50
Rated normal current (40°C)	Ir [A] 1250-2000-2500
Rated-short time withstand current (3S)	Ik [kA] 31.5
Operation sequence	[0-0.3s-CO-3min-CO]
Switchgear	SafeSix
Unlock operation	HANDLE
Weight	180kg

5. Periodical checking

Inspection	Frequency	Criteria
Perform five mechanical closing and opening operations.	Once a year	Circuit-breaker must function normally, without stopping in intermediate positions
Visual inspection of the poles (resin parts) and all insulating parts.	Once a year or after every 5,000 operations	The resin parts must be free from built-up dust, dirt, cracks, discharges or traces of surface discharges
Visual inspection of operating mechanism and transmission.	Once a year or after every 5,000 operations	The elements must not be deformed in any way. Screws, nuts, bolts, etc., must be tight.
Visual inspection of the isolating contacts.	Every 5 years or 5,000 operations	The isolating contacts must neither be warped nor eroded. Lubricate the contact elements with industrial Vaseline grease
Measurement of insulation resistance.	Every 5 years or 5,000 operations	See user manual of standard apparatus.
Inspection of interlock operation.	Every 5 years.	The interlocks must function correctly.

You are advised to contact the ABB Assistance Service and have the circuit-breaker checked after 10,000 operations or after 10 years in polluted and aggressive environments.

6. Maintenance



DANGER

Maintenance must only be carried out by ABB personnel or in any case by suitably qualified customer personnel who have in-depth knowledge of the apparatus (IEC 62271-1, IEC 62271-100, IEC 62271-200). Should the maintenance be carried out by the customer's personnel, responsibility for any interventions lies with the customer. Before carrying out any operation, make sure that the operating mechanism springs are discharged and that the apparatus is in the open position.



DANGER

There are hazards of electrical shocks and/or burns whenever working in or around electrical equipment. Turn off power ahead of the switchgear before performing any inspection or maintenance operations. Check incoming line terminals to verify that the equipment is de-energized and grounded. Check out-going terminals to ensure that no back-feed condition exists.



DANGER

Always work with the circuit breaker open and locked so that it cannot be closed again, with the work area insulated and made safe. All power supply sources must be disconnected and made safe against any reclosing during removal and installation work.

Should the customer's personnel be in charge of maintenance, the customer is responsible for any operation performed on the apparatus. When performing routine checks and maintenance operations, de-energize all the components. Always work with the circuit breaker open and locked so that it cannot be closed again, with the work area insulated and made safe. All power supply sources must be disconnected and made safe against any reclosing during removal and installation work.



WARNING

Replacement of any parts not included in the "List of spare parts/accessories" must only be carried out by ABB personnel.

In particular:

- complete pole with bushings/connections
- operating mechanism
- closing spring unit
- opening spring.

7. Spare parts and accessories



DANGER

All assembly operations of spare parts/ accessories regarding installation, putting into service, service and maintenance must be carried out by ABB personnel or suitably qualified customer personnel with in-depth knowledge of the apparatus (IEC 62271-1, IEC 62271-100, IEC 62271-200).

Should the maintenance be carried out by the customer's personnel, responsibility for any interventions lies with the customer.

Before carrying out any operation, check that the circuit breaker open, the springs discharged and that there is no voltage (medium voltage circuit and auxiliary circuits).

To order accessories or spare parts, please refer to the commercial ordering codes given in the technical catalogue and always indicate:

- circuit breaker type
- circuit breaker rated voltage
- circuit breaker rated thermal current
- circuit breaker breaking capacity
- circuit breaker serial number
- rated voltage of any electrical accessories.

For availability and ordering of spare parts please contact our Service department.

9.1. List of spare parts

- Shunt opening release
- Additional shunt opening release
- Undervoltage release
- Undervoltage release delay device
- Locking electromagnet on operating mechanism
- Shunt closing release
- Spring charging geared motor with electric signalling of springs charged
- Geared motor thermomagnetic protection circuit breaker • Contact signalling geared motor protection circuit breaker open/closed
- Contact signalling closing springs charged/ discharged
- Auxiliary circuit breaker contacts
- Key lock in open position
- Protection for opening pushbutton
- Protection for closing pushbutton
- SF6 gas pressure switch.
- Contact signalling of socket connected
- Auxiliary relay for SF6 gas insufficient pressure (located on switchboard)



Notes

Grid of dots for notes.

For more information please contact ABB at:



More product information:

abb.com/mediumvoltage

Your contact center:

abb.com/contactcenters

More service information:

abb.com/service

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