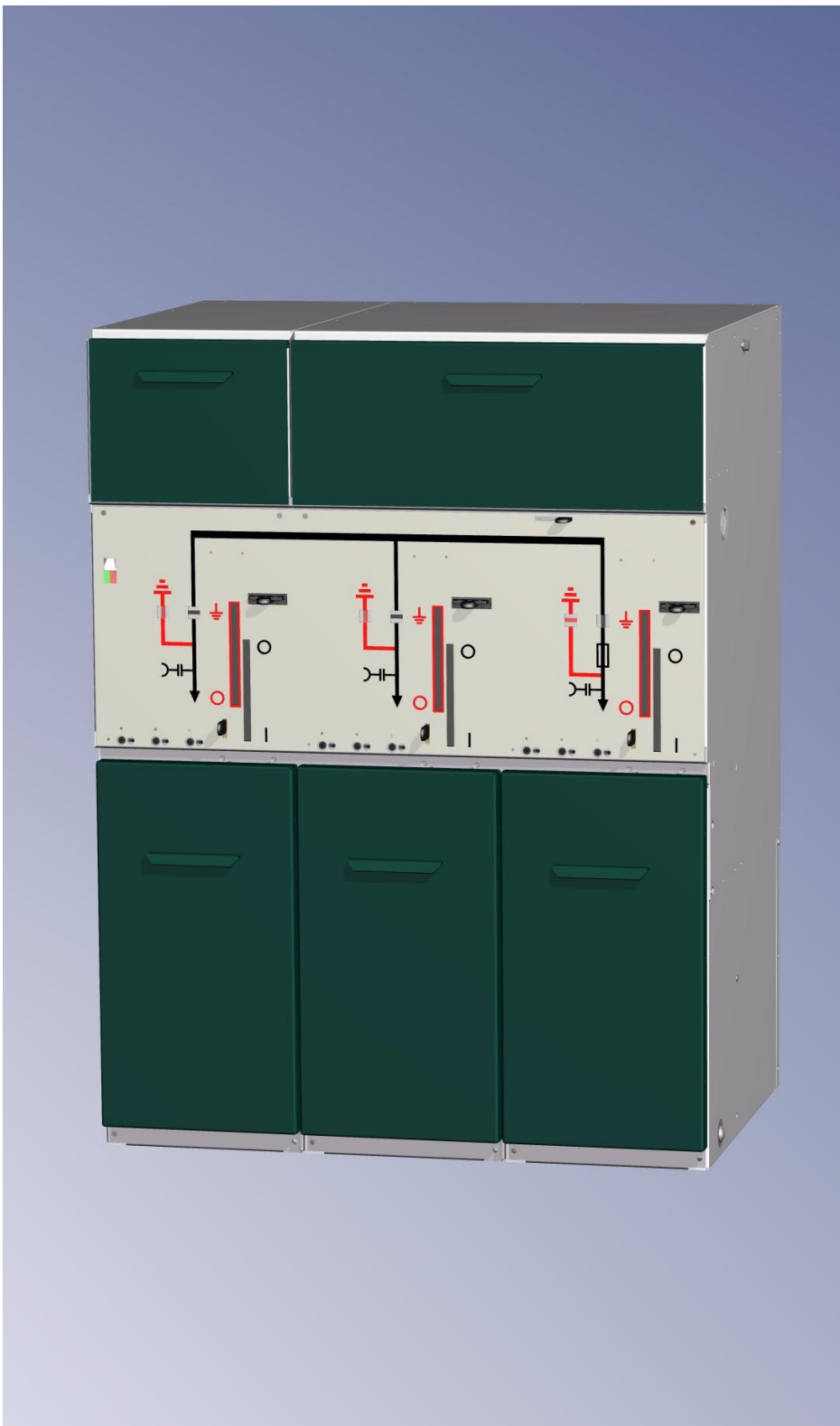


Secondary Distribution Switchgear Types 8DJ10/8DJ20 up to 24 KV, SF₆-Insulated



Medium-Voltage
Switchgear

OPERATING INSTRUCTIONS

Order no.: 817-6638.0

Revision: 00

Issue: 2001-03-05

Safety instructions 5

1	Signal terms and definitions.....	5
2	Due application	5

Description..... 6

4	About these instructions	6
5	Features	6
6	Switchgear versions.....	7
6.1	8DJ10: Different types.....	7
6.2	8DJ20: Different types.....	8
7	Switchgear design.....	9
7.1	Constructional features 8DJ10.....	9
7.2	Constructional features 8DJ20.....	10
8	Modules	11
8.1	Three-position switch-disconnector	11
8.2	Operating mechanisms	12
8.3	HV HRC fuse assembly.....	13
8.4	Cable connection.....	15
8.5	Ready-for-service indicator.....	16
9	Interlocking systems	17

Installation 26

14	Preparing installation	26
14.1	Packing.....	26
14.2	Checking for completeness and transport damage.....	26
14.3	Unloading and transport to the place of installation or intermediate storage.....	26
14.4	Intermediate storage.....	27
14.5	Necessary and suitable tools	28
14.6	Moving the switchgear to the place of installation	28
14.7	Removing the transport units from the wooden pallets.....	28
14.8	Further transport without wooden pallets	28
14.9	Checking the gas filling	28
15	Switchgear installation	29
15.1	Floor openings and fixing points	29
15.2	Pressure relief	29
15.3	Earthing the switchgear	30
15.4	Installation of cable brackets for switchgear with low subframe	31
16	Electrical connections	32
16.1	Connecting ring-main feeder cables (RK).....	32

3	Qualified personnel	5
---	---------------------------	---

10	Voltage indication systems	18
11	Accessories.....	18
11.1	The following accessories are always supplied with the switchgear:	18
11.2	The following accessories are additionally available (selection):	18
11.3	Short-circuit/earth-fault indicators.....	19
12	Technical data	20
12.1	Complete switchgear	20
12.2	Rating plates	23
12.3	Allocation of HV HRC fuses and transformers.....	23
13	Servicing.....	25
13.1	Maintenance	25
13.2	Replacement of components.....	25
13.3	Disposal.....	25

16.2	8DJ20: Connecting transformer feeder cable (elbow plugs) series 200	33
16.3	8DJ10: Connecting transformer feeder cables (elbow plugs) series 200	35
16.4	Verification of correct terminal-phase connections.....	38
16.5	Connecting auxiliary circuits	40
17	Final assembly work.....	41
17.1	Checking the rating plate / type plate.....	41
17.2	Checking high-voltage connections.....	41
17.3	Checking bolted joints.....	41
17.4	Checking control cable connections.....	41
17.5	Cleaning the switchgear.....	41
18	Mechanical commissioning	42
18.1	Safety instructions	42
18.2	Checking the assembly work and the accessories	42
18.3	Test operation	42
19	Instructing the operating personnel	43

20	Switching on operational high-voltage	44
Operation		46
21	Safety instructions	46
22	Overview detachable lever mechanism	47
23	Overview rotary lever mechanism	48
24	Control elements	49
25	Disconnecting and earthing	51
25.1	Closing the switch-disconnector	52
25.2	Opening the switch-disconnector	53
25.3	Earthing	54
25.4	De-earthing	55
26	Verification of safe isolation from supply	56
26.1	Verification of safe isolation from supply with the HR voltage indication system	56
26.2	Verification of safe isolation from supply with the integrated voltage detection system CAPDIS-S1	58
27	Indications and their handling	59
27.1	Ready-for-service indicator in the red area	59
27.2	Red bar in the switch position indicator of the switch-disconnector in the transformer feeder	60
27.3	Short-circuit indicator red	61
28	Replacing HV HRC fuse links	62
29	Cable testing	64
30	Index	66

Siemens AG
Power Transmission and Distribution Group
Medium-Voltage Switchgear and Transmission Division

1992

Evaluation of the **Technical Testing Station** by DATech (German Accreditation Body for Technology) in accordance with **DIN EN 45 001** and accreditation of the **Technical Testing Station** for the testing areas High-Voltage Switching Devices and Switchgear by DATech as **Testing Laboratory Switchgear Factory Frankfurt/M., Siemens AG** DAR (German Accreditation Council) registr. number: DAT-P-013/92-00 and as **PEHLA Testing Laboratory Frankfurt/M.** DAR registr. number: DAT-P-013/92-50

1995

Introduction and application of a quality and environmental management system for the **Medium-Voltage Switchgear and Systems Division** in accordance with **DIN EN ISO 9001** and **DIN EN ISO 14001** Quality and environmental systems - Model for quality assurance in design, development, production, installation and serving. Certification of the quality and environmental management system by DQS (German Association for the Certification of Quality and Environmental Management Systems) DQS registr. number: 3473-02

About these instructions

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation or operation. For details about technical design and equipment like e.g. technical data, secondary equipment, circuit diagrams, please refer to the order documents.

The switchgear is subject to continuous technical development within the scope of technical progress. If not stated otherwise on the individual pages of these instructions, we reserve the right to modify the specified values and drawings. All dimensions are given in mm.

For further details, e.g. about additional equipment and information about other switchgear types, please refer to catalogues HA 45.11 (8DJ10), HA 45.31 (8DJ20) and HA 40.1 (Switchgear 8DJ and 8DH: General Part)

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Service Centre.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any

statements contained herein do not create new warranties or modify the existing warranty.

Safety instructions

1 Signal terms and definitions



Danger!

as used in these instructions, this means that personal injuries can occur if the relevant precautionary measures are not taken.

⇒ Observe the safety instructions.



Caution!

as used in these instructions, this means that damage to property or environment can occur if the relevant precautionary measures are not taken.

⇒ Observe the safety instructions.

2 Due application

The switchgear corresponds to the applicable laws, prescriptions and standards applicable at the time of delivery. If correctly used, they provide a high degree of safety by means of logical mechanical interlocks and shockproof metal enclosure of live parts.

The perfect and safe operation of this switchgear is conditional on:

- Proper transportation and correct storage
- Correct installation and commissioning
- Diligent operation and maintenance by qualified personnel
- Observance of these instructions
- Observance of the instructions applicable at site for installation, operation and safety (e.g. DIN VDE 0101/0105)



Caution!

Principally, operating the switchgear can be dangerous.

⇒ Do only operate the switchgear if this is authorised.

3 Qualified personnel

as used in these instructions, these are persons who are familiar with the assembly, installation, commissioning, maintenance and operation of the product and have appropriate qualifications for their work, e.g.:

- Training and instruction or authorization to switch on, switch off, earth and identify power circuits and equipment / systems as per the relevant safety standards.
- Training and instruction or authorization in accordance with the relevant safety standards for the care and use of appropriate safety equipment.
- Training in first aids and behaviour in the event of possible accidents.

Description

1 About these instructions

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation or operation. For details about technical design and equipment like e.g. technical data, secondary equipment, circuit diagrams, please refer to the order documents.

The switchgear is subject to continuous technical development within the scope of technical progress. If not stated otherwise on the individual pages of these instructions, we reserve the right to modify the specified values and drawings. All dimensions are given in mm.

For further details, e.g. about additional equipment and information about other switchgear types, please refer to catalogues HA 45.11 (8DJ10), HA 45.31 (8DJ20) and HA 40.1 (Switchgear 8DJ and 8DH: General Part)

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Service Centre.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

2 Features

Technology

- Factory-assembled, type-tested, metal-enclosed switchgear for indoor operation
- Switchgear blocks with up to 6 feeders
- Welded switchgear vessel made of stainless-steel, without seals, with welded bushings for electrical connections and mechanical components
- Insulating gas SF₆
- Maintenance-free
- Independent of climate
- Three-position switch-disconnector with make-proof earthing function
- Cable connection for bushings with outside cone

- Fuse assembly with withdrawable HV HRC fuses for easy fuse replacement
- Extensive special equipment resp. accessories
- Easy installation without SF₆ gas work
- Ecological manufacture and disposal

Personal safety

- Safe-to-touch by metal enclosure of live parts
- Clear mimic diagram
- HV HRC fuses are only accessible when outgoing feeders are earthed
- Operation only possible when enclosure is closed
- Logical mechanical interlocking
- Capacitive voltage detection system to verify safe isolation from supply
- Resistance to internal arc faults
 - pressure-resistant connection compartments
 - optionally, increased protection against burning through the enclosure

Operational reliability and availability

- Hermetically sealed primary enclosure, independent of environmental effects such as dirt, humidity and small animals
- Welded switchgear vessel, gas-tight for life
- Switch operating mechanism accessible outside the switchgear vessel
- Continuous switchgear interlocking system with logical mechanical interlocks

Economy

Extremely low life-cycle costs and maximum availability thanks to:

- Maintenance-free concept
- Independence of climate
- Minimum space requirements

Application

Secondary distribution switchgear 8DJ10/8DJ20 are used for power distribution in utilities substations – also under adverse ambient conditions – such as:

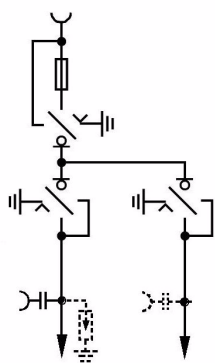
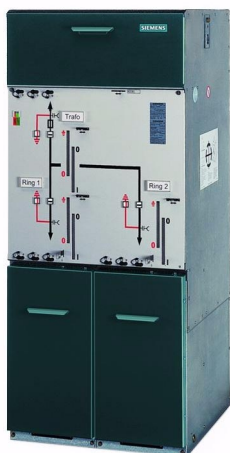
- Industrial plants
- Moist, sandy and dusty areas
- Simple outdoor substations

3 Switchgear versions

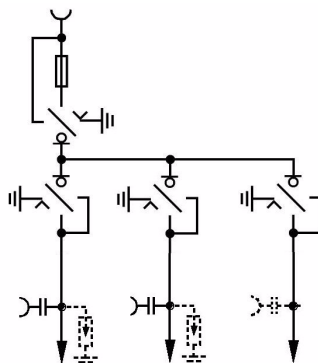
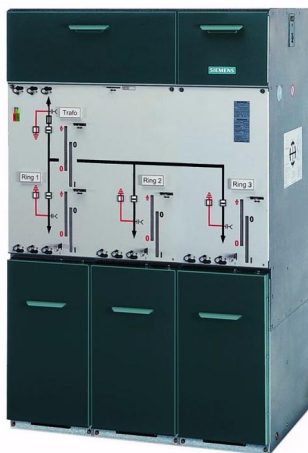
In the following sections we will show you various switchgear versions with the most important schemes. For more precise details, especially about

additional equipment and special versions as well as information about many other switchgear types, please refer to catalogues HA 45.31, 45.11 and 40.1.

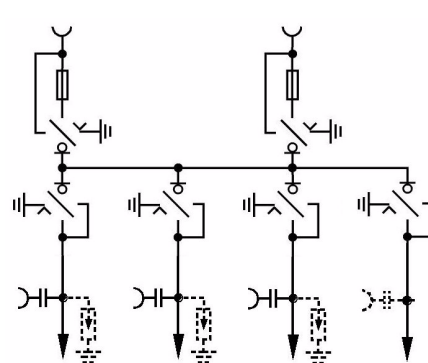
3.1 8DJ10: Different types



2 Ring-main feeders
1 Transformer feeder
Scheme 10



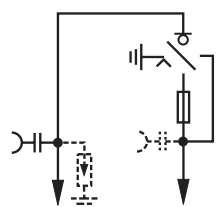
3 Ring-main feeders
1 Transformer feeder
Scheme 71



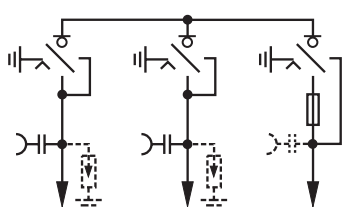
4 Ring-main feeders
2 Transformer feeders
Scheme 62

Description

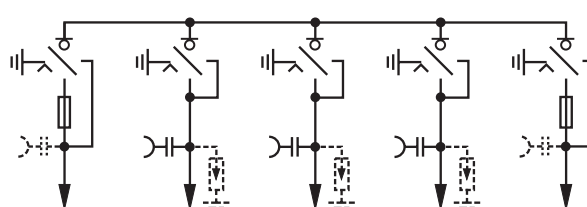
3.2 8DJ20: Different types



1 Transformer feeder
1 Radial cable connection
Scheme 01



2 Ring-main feeders
1 Transformer feeder
Scheme 10



3 Ring-main feeders
2 Transformer feeders
Scheme 82

4 Switchgear design

4.1 Constructional features 8DJ10

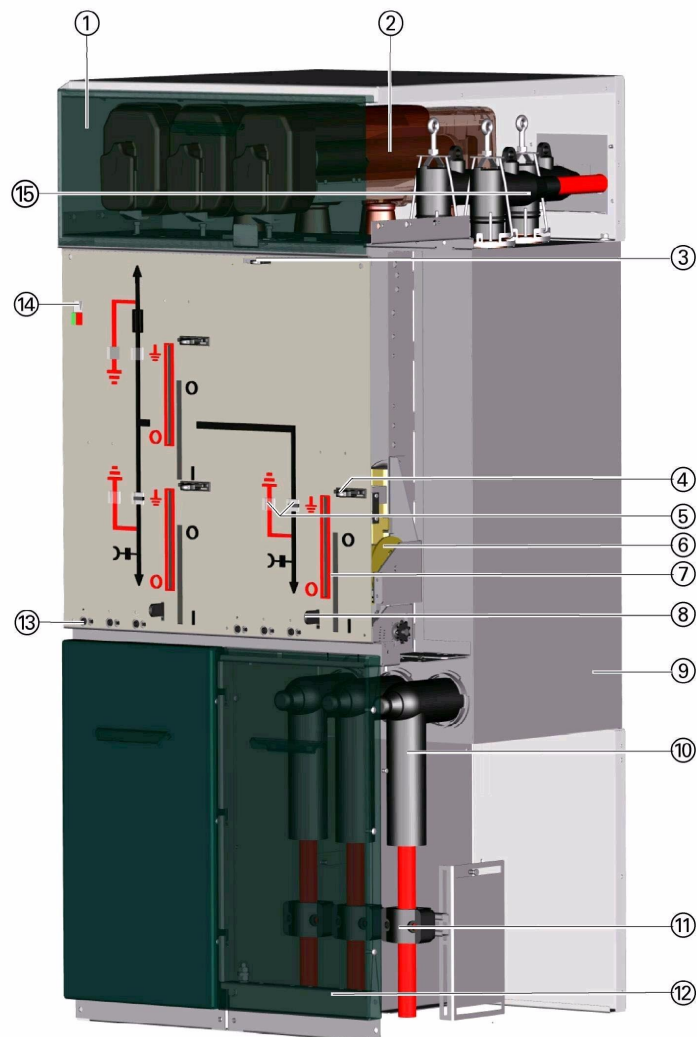


Bild 1: Switchgear design (partly dismantled)

- | | |
|---|--|
| ① Cover of HV HRC fuse compartment | ⑧ Lock of cable compartment cover |
| ② HV HRC fuse in fuse assembly | ⑨ Switchgear vessel filled with SF6 gas, with three-position switch-disconnector |
| ③ Lock for HV HRC fuse assembly | ⑩ Cable plug |
| ④ Locking device (option for the three-position switch-disconnector) | ⑪ Cable bracket, option: with cable clamp |
| ⑤ Switch position indicator for earthing switch function "OPEN-EARTHED" (left) and for switch-disconnector function "CLOSED-OPEN" (right) | ⑫ Cable compartment cover |
| ⑥ Spring-operated mechanism | ⑬ Sockets for voltage detection system |
| ⑦ Manual operating mechanism for earthing switch function (left) and switch-disconnector function (right) | ⑭ Ready-for-service indicator |
| | ⑮ Transformer cable connection with cable elbow plugs with plug-in contact |

Description

4.2 Constructional features 8DJ20

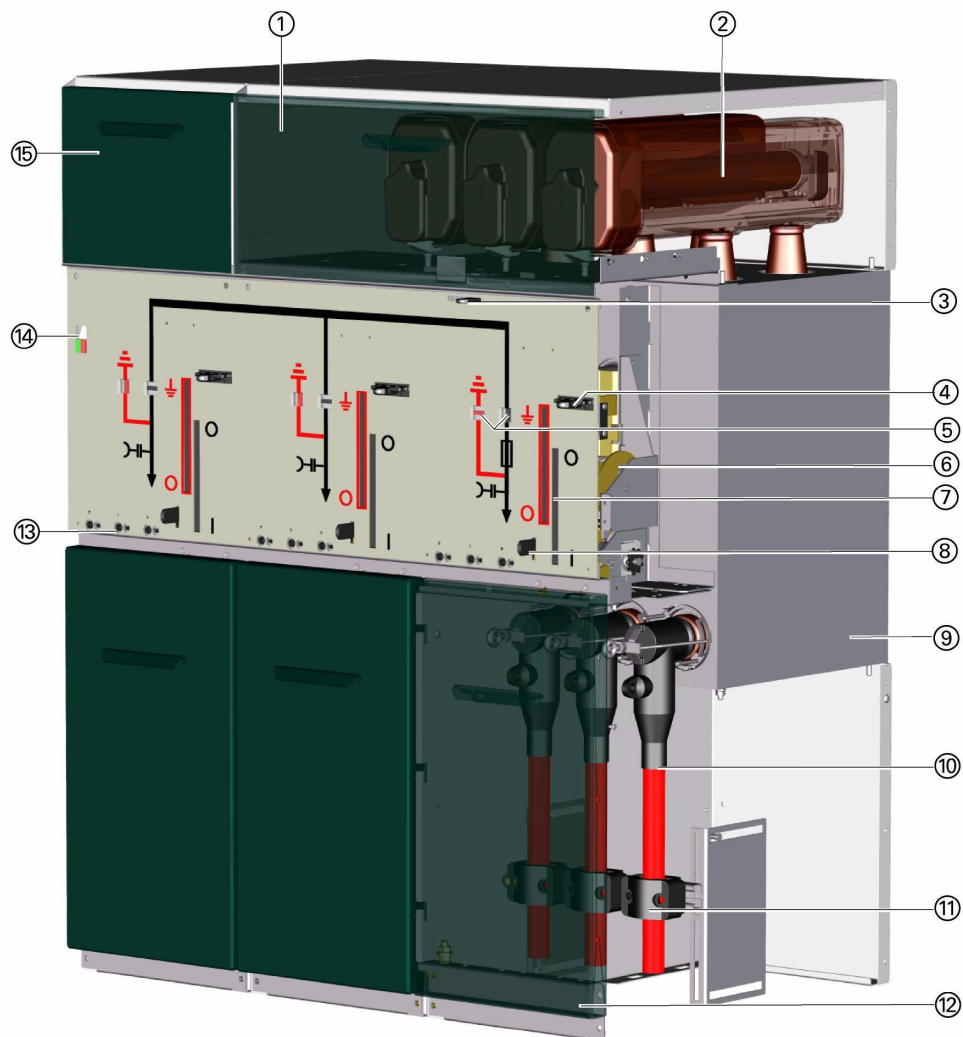


Bild 2: Switchgear design (partly dismantled)

- | | |
|---|--|
| ① Cover of HV HRC fuse compartment | ⑧ Lock of cable compartment cover |
| ② HV HRC fuse in fuse assembly | ⑨ Switchgear vessel filled with SF6 gas, with three-position switch-disconnector |
| ③ Lock for HV HRC fuse assembly | ⑩ Cable plug |
| ④ Locking device (option für den three-position switch-disconnector) | ⑪ Cable bracket, option: with cable clamp |
| ⑤ Switch position indicator for earthing switch function "OPEN-EARTHED" (left) and for switch-disconnector function "CLOSED-OPEN" (right) | ⑫ Cable compartment cover |
| ⑥ Transformer feeder with spring-operated/stored-energy mechanism | ⑬ Sockets for voltage detection system |
| ⑦ Manual operating mechanism for earthing switch function (left) and switch-disconnector function (right) | ⑭ Ready-for-service indicator |
| | ⑮ Niche for customer-side low-voltage equipment |

5 Modules

5.1 Three-position switch-disconnector

Characteristics

- Designed as a multi-chamber switch incorporating the functions of a switch-disconnector and a make-proof earthing switch with the switch positions: "CLOSED - OPEN - EARTHED"
- Operation via gas-tight welded bushing at the front of the switchgear vessel

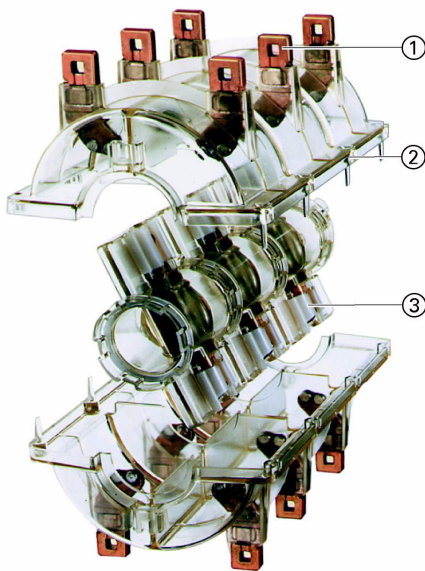


Bild 3: Sectional view of three-position switch-disconnector

- ① Fixed contact piece
- ② Arcing chamber
- ③ Switch shaft with compression vanes and nozzles

Mode of operation

The switch shaft with the moving contact pieces rotates inside the chamber containing the fixed contact pieces. Compression vanes, which rotate in conjunction with the switch shaft, divide the arcing chamber into two subchambers, each of which changes in conjunction with the rotation. During the switching movement, the compression vanes generate a pressure difference between the subchambers. The SF_6 gas flows through a nozzle, causes a directional blow-out of the breaking arc and quenches it rapidly. Interlocking is not necessary as the "CLOSED" and "EARTHED" functions cannot be implemented simultaneously.

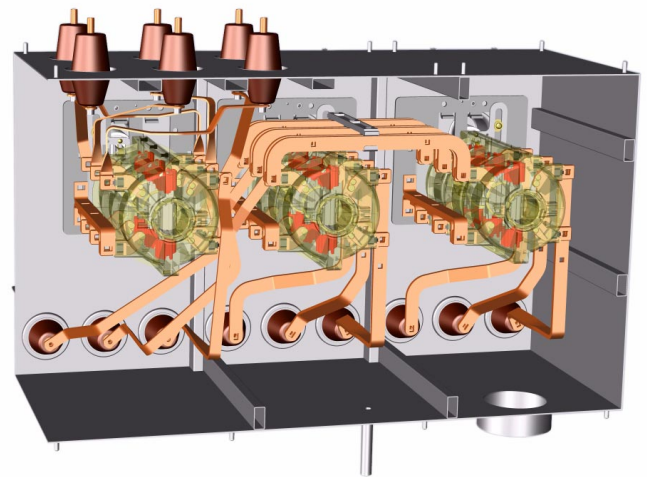
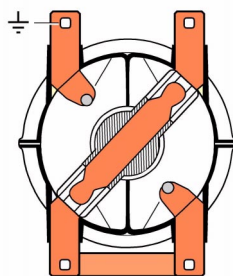
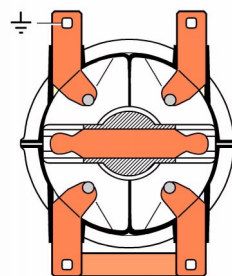


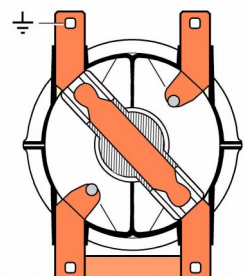
Bild 4: 8DJ20 installation example



"CLOSED"



"OPEN"



"EARTHED"

Switch positions
Three-position switch-
disconnecter:

Description

5.2 Operating mechanisms

The three-position switch-disconnector is operated from the switchgear front:

Detachable lever mechanism (standard)

- Spring-operated mechanism
 - with “spring-operated ON” and “spring-operated OFF” for installation in ring-main feeders



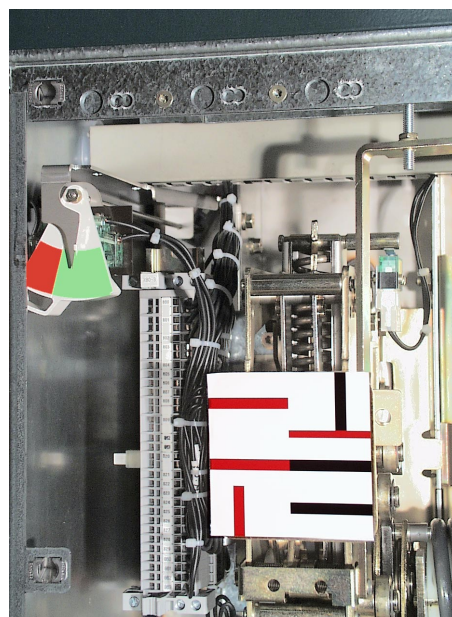
- Spring-operated/stored-energy mechanism
 - with “spring-operated ON” and “spring-operated OFF” for installation in transformer feeders
 - with additional energy store for the function “stored-energy OFF” after tripping by HV HRC fuse (striker pin tripping) or shunt release

Options

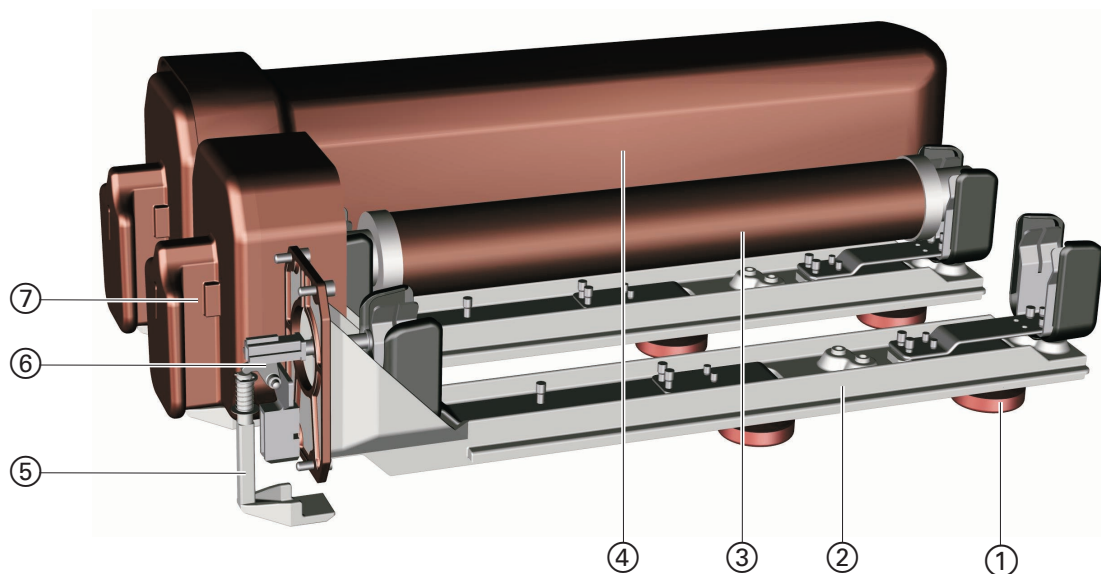
- Rotary operating mechanism



- Locking devices
- Closing lockout for ring-main and transformer feeders as per ATN recommendation
- Anti-reflex lever
- **Motor-operated mechanism**
 - Operating voltages for motor-operated mechanisms :
 - DC 24, 48, 60, 110, 220 V
 - AC 50/60 Hz 110 and 230 V
 - Operation:
 - Remote operation (standard) applied to terminal
 - Local operation by momentary-contact rotary control pushbutton (option)
- **Shunt release (f-release)**
 - Spring-operated/stored-energy mechanisms can be equipped with a shunt release. Remote electrical tripping of the three-position switch-disconnector is possible via the magnetic coil of the shunt release, e.g. transformer overtemperature tripping.
- **Auxiliary switch**
 - Each operating mechanism of the three-position switch-disconnector can optionally be equipped with an auxiliary switch for the switch position indication:
 - Standard for 8DJ secondary distribution switchgear: 1 NO +1 NC for “CLOSED/EARTHED,” 1 NO for “OPEN”
- **Wiring**
 - Auxiliary switches, motor-operated mechanisms or shunt-releases are wired to terminal strips. These are feeder-related and located next to the operating mechanism module of the feeder concerned. Customer-side cable routing is made from the side, if required from the rear, to the terminal strip arranged at the operating mechanism module (wire routing from the rear only possible if there is a low-voltage niche available.)



5.3 HV HRC fuse assembly

**Bild 5:** HV HRC fuse assembly

- | | |
|-----------------------------|---|
| ① Bushing | ⑤ Striker pin for spring-operated/stored-energy mechanism |
| ② Fuse slide (withdrawable) | ⑥ Striker pin of the HV HRC fuse link and articulation for tripping the spring-operated/stored-energy mechanism |
| ③ HV HRC fuse | |
| ④ Fuse compartment | ⑦ Cover with seal |

**Bild 6:** Inserting a HV HRC fuse link

Description

Characteristics

- HV HRC fuse links according to DIN 43 625 (main dimensions) with striker pin in "medium" version according to VDE 0670 Part 4/IEC 60 282
 - as a short-circuit protection before transformers,
 - with selectivity to higher-level and series-connected equipment,
 - single-pole insulation
- Requirements according to IEC 60420 fulfilled by combination of HV HRC fuses with the three-position switch-disconnector
- Thermal striker pin tripping when using the corresponding HV HRC fuse link, e.g. make Siemens, type 3GD1
- Independent of climate and maintenance-free, with fuse box made of cast-resin
- Fuse assembly arranged over the switchgear vessel
- Fuse assembly connected to the three-position switch-disconnector via welded bushings and connection bars
- Fuse can only be replaced if feeder is earthed
- Option: "Tripped indication" of the transformer switch for electrical remote indication with 1NO contact

Replacement of HV HRC fuse links

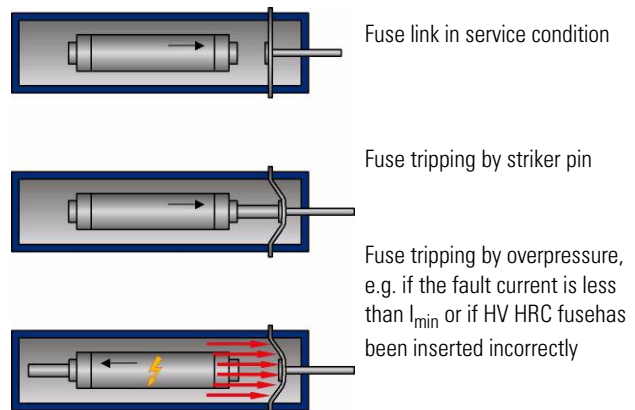
- Isolating and earthing of the transformer feeder
- Subsequent manual replacement of the HV HRC fuse link

Mode of operation

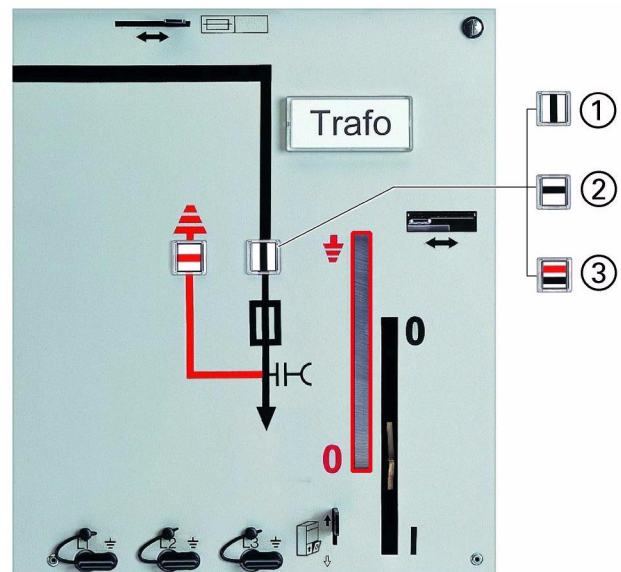
In the event that a HV HRC fuse link has responded, the switch is tripped via an articulation which is integrated into the cover of the fuse box.

In the event that the fuse tripping fails, e.g. if the fault current is less than I_{min} or if the fuse has been inserted incorrectly, the fuse box is protected by thermal protection. The overpressure generated in this way trips the switch via a diaphragm in the cover of the fuse box and via the articulation. This breaks the current before the fuse box incurs irreparable damage. The above thermal protection works independently of the type and design of the HV HRC fuse used. Like the fuse itself it is maintenance-free and independent of any outside climatic effects.

Schematic sketches for fuse tripping



Furthermore, the Siemens HV HRC fuses type 3GD release the striker pin independently of temperature and trip the switch-disconnector as early as in the fuse overload range. Impermissible heating of the fuse box can be avoided in this way.

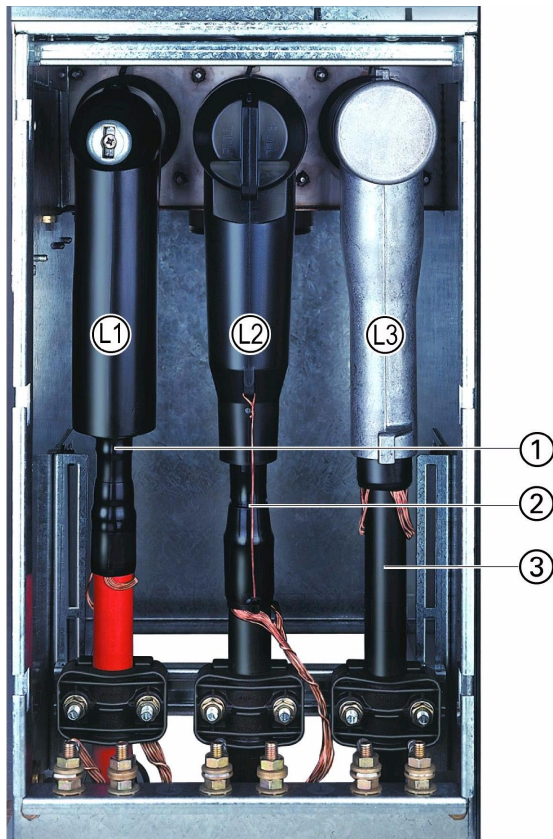


After isolating and earthing the transformer feeder, the HV HRC fuse links can be replaced by hand.

- ① "CLOSED" indication, manual operation or motor-operated
- ② "OPEN" indication
- ③ Indication "HV HRC fuse tripped" or "f-release tripped"

5.4 Cable connection

Ring-main cable connection



- ① Phase L1: Make Euromold, type K400LB as cable elbow plug
- ② Phase L2: Make Euromold, type K400 TB as cable T-plug
- ③ Phase L3: Make Euromold, type AGT 20/630 als cable T-plug

Characteristics

- With bolted contact (M16) as interface type "C" according to EN 50 181/DIN EN 50 181
- For thermoplastic-insulated cables
- For paper-insulated mass-impregnated cables with adapter systems
- For conventional cable sealing ends via elbow adapter AKE 20/630 (make Siemens)
- For cable T-plugs or cable elbow plugs
- For connecting cross-sections up to 300 mm² (standard)
- Cable connection at the front, cable routing to the bottom
- For rated normal currents 400/630 A

Options

- Suitable for connection of surge arresters

- Short-circuit/earth-fault indicators
- Cable clamps installed
- Double cable connection by means of the corresponding cable plug-in systems and deep cable compartment cover

Transformer cable connection

- With plug-in contact as interface type "A" according to EN 50 181/DIN EN 50 181
- For thermoplastic-insulated cables
- For cable elbow plugs

8DJ10:

- Upper cable elbow plugs to the rear (standard)
- Upper cable elbow plugs to the right for scheme 10 (optional)
- Cable routing to the top with straight plug (optional)

8DJ20:

- Cable elbow plugs to the bottom (standard)
- Cable elbow plugs to the bottom at the rear (optional)
- Straight plugs to the bottom (optional)

- For connecting cross-sections up to 120 mm²
- Rated normal currents 200 A

Description

5.5 Ready-for-service indicator

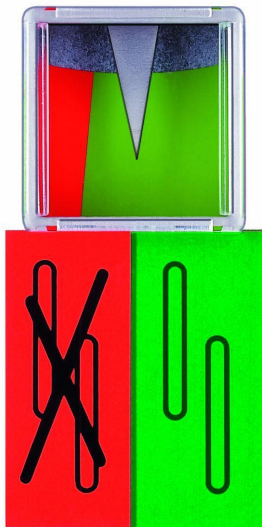


Bild 7: Ready-for-service indicator on the front cover

Characteristics

- Self-monitoring, easy to read
- Independent of temperature and pressure variations
- Only responds to changes in gas density
- Option: alarm switch 1 NO +1 NC for electrical remote indication

Mode of operation

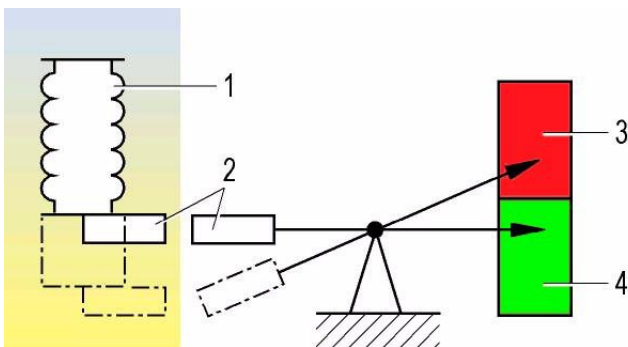


Bild 8: Principle of gas monitoring:
1 Measurement box in stainless-steel vessel filled with SF₆ gas
2 Magnetic coupling
3 Red indication: not ready for service
4 Green indication: ready for service

For the ready-for-service indicator, a gas-tight measurement box is installed on the inside of the switchgear vessel.

A coupling magnet, which is fitted to the bottom end of the measurement box, transmits its position to an

outside armature through the non-magnetisable switchgear vessel. This armature moves the ready-for-service indicator of the switchgear.

While changes in the gas density during the loss of gas, which are decisive for the insulating capacity, are displayed, temperature-dependent changes in the gas pressure are not. The gas in the measurement box has the same temperature as that in the switchgear.

The temperature effect is compensated via the same pressure change in both gas volumes.

6 Interlocking systems

- The switching gate prevents switching straightly from "CLOSED" to "EARTHED" resp. from "EARTHED" to "CLOSED", as the operating lever must be re-inserted in the "OPEN" position.
- Cable compartment covers can only be removed if the associated feeder is earthed.

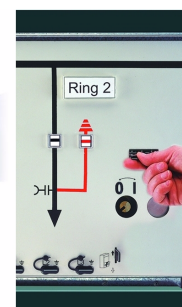


- A closing lock-out (option) prevents the three-position switch-disconnector from being switched to the "CLOSED" position if the cable compartment cover is removed.

- The cover of the HV HRC fuse compartment can only be removed if the transformer feeder is earthed and the operating lever is removed.



- The three-position switch-disconnector can only be switched from the "EARTHED" position to another position if the cover of the HV HRC fuse compartment is closed and locked.
- The locking device (option) of the switching gate can be padlocked in all three switch positions. Lever of the locking device **on the left**: switch-disconnector can be operated, **in the centre**: switching is not possible, **on the right**: earthing and de-earthing is possible.



Description

7 Voltage indication systems

For voltage detection according to VDE 0682 Part 415 and IEC 61243-5 with

- HR system (standard)
- LRM system (option)
- CAPDIS (option)

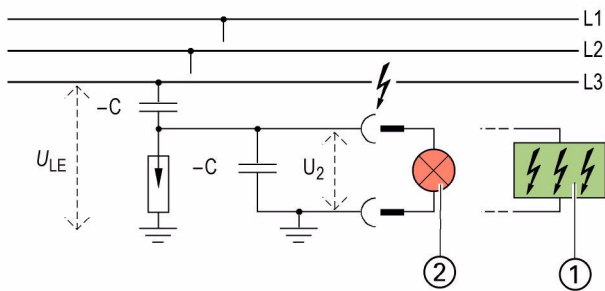


Bild 9: Voltage indication (principle)

- ① CAPDIS installed
- ② HR /LRM system plugged in

Features of the HR/LRM system

- With voltage indicator
 - HR system (standard) or
 - LRM system (option)
- Verification of safe isolation from supply phase by phase through insertion in each socket pair
- Indicator suitable for continuous operation
- Safe-to-touch
- Routine-tested
- Measuring system and voltage indicator can be tested
- Voltage indicator flashes if high voltage present
- Fixed-mounted capacitive voltage dividers in bushings

Features of CAPDIS-S1/-S2

- Maintenance-free
- Self-monitoring
- Without auxiliary power

- Option: with remote indication of potential (auxiliary power required)
- Sockets (LRM) for phase comparison

8 Accessories

8.1 The following accessories are always supplied with the switchgear:

- Operating lever for the three-position switch-disconnector
- Operating instructions

8.2 The following accessories are additionally available (selection):

Other accessories according to the order documents / order:

- HV HRC fuse links
- Cable plugs / adapter systems
- Surge arresters
- Test fuses for mechanical simulation of the striker pin of HV HRC fuse links in transformer feeders
- HR/LRM voltage indicators
- Test units to check the capacitive interface and the voltage indicators
- Phase comparison test units



Bild 10: Phase comparison test unit, make Pfisterer, type EPV

8.3 Short-circuit/earth-fault indicators

All ring-main feeders can **optionally** be equipped with a 3-phase short-circuit or earth-fault indicator.

Characteristics:

- Factory-assembled including sensor mounted on ring-main cable bushing
- Optical signal when a pre-selected pickup value is exceeded
- Display panel, withdrawable housing, depending on the type
- Short-circuit pickup values: e.g. 400, 600, 800 or 1000 A
- Option: electrical remote indication via contact 8 – 1 NO + 1 NC (passing contact)



Bild 11: Example: Short-circuit indicator ALPHA E (the short-circuit indicator has responded in phase L1)

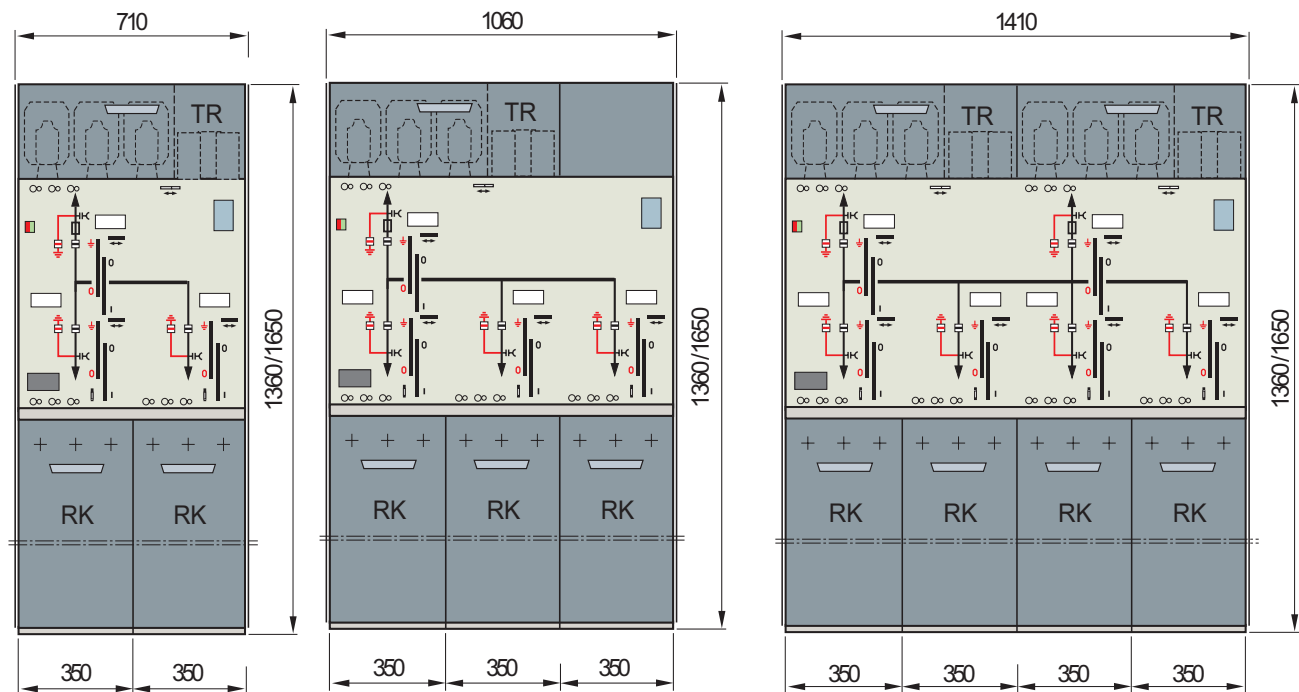
Indicator type	Reset	Short-circuit current (Standard values, further values available on request) A	Earth-fault current (Standard values, further values available on request) A
Short-circuit indicator make Horstmann (Further types and other makes available on request.) Option: Electrical remote indication (passing contact).			
ALPHA M	manually	400, 600, 800, 1000	–
ALPHA E	manually, automatically after 2 or 4 h	400, 600, 800, 1000	–
GAMMA 4.0	manually following the return of the power supply, after 2 or 4 h	400, 600, 800, 1000	–
ALPHA automatic (on request)	manually (by pushbutton), remote reset (by auxiliary voltage), automatically after 3 h	Change of current 150 A £ DI £ 300 A (depending on the load current) at t=20 ms	–
Earth-fault/short-circuit indicator			
EKA - 3 (external auxiliary voltage AC 240 V required)	following the return of the power supply	450	40, 80, 160
DELTA M	manually	400, 600, 800, 1000	200
DELTA E	manually, automatically after 2 or 4 h	400, 600, 800, 1000	200
Earth-fault indicator			
EKA - 3/1	following the return of the power supply	–	40, 80, 160

Description

9 Technical data

9.1 Complete switchgear

Dimensions 8DJ10



Scheme 10

Scheme 71

Scheme 62

Block versions, consisting of ring-main and transformer feeders, optionally in 2 heights,

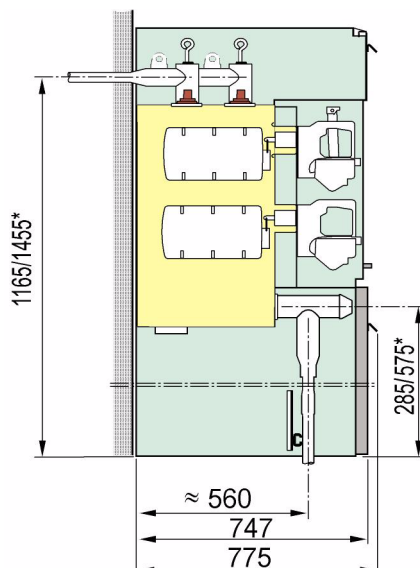
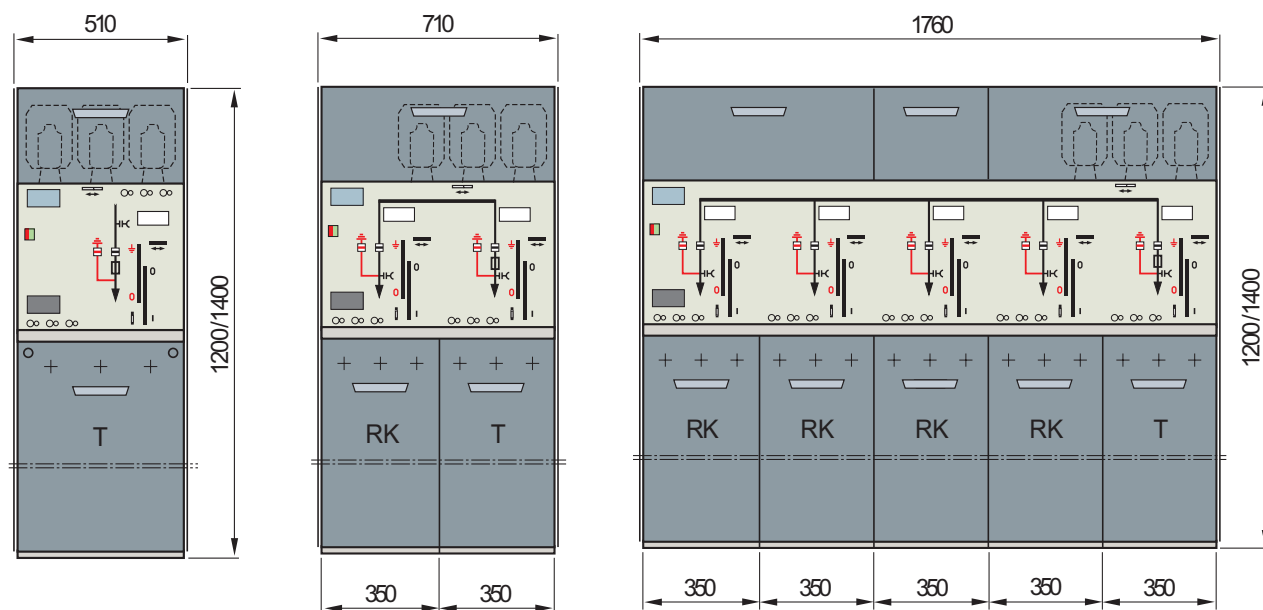


Bild 12: Sectional view

* Dimensions depending on the switchgear heights 1360 and 1650 mm, minimum deviations with respect to the different makes of cable elbow plugs are possible.

Dimensions 8DJ20

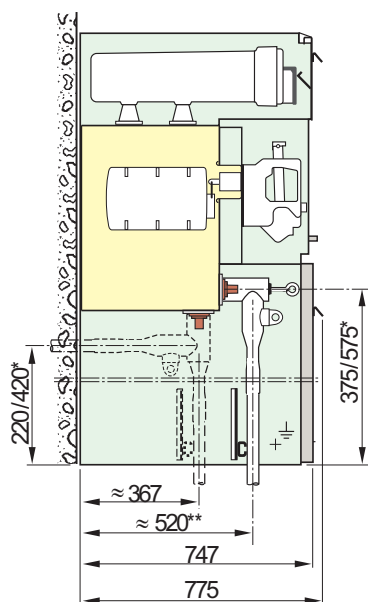
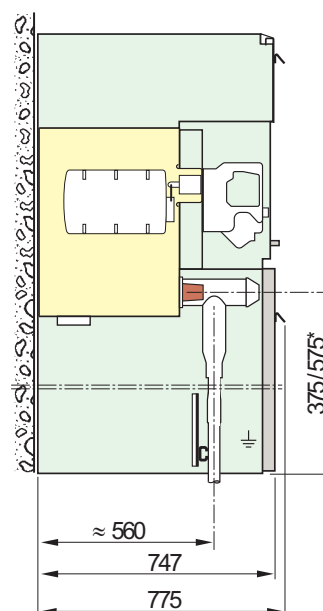


Scheme 01

Scheme 20

Scheme 72

Block versions, consisting of ring-main and transformer feeders, optionally in 2 heights,

**Bild 13:** Sectional view of transformer feeder**Bild 14:** Sectional view of ring-main feeder

* Dimensions depending on the switchgear heights 1200/1400 mm, minimum deviations with respect to the different makes of cable elbow plugs are possible.

** 560 mm with bushing for interface type "C" according to DIN EN 50 181 (optional)

Description

Elektrische Daten *

Rated voltage		U _r	kV	7.2	12	15	17.5	24
Rated insulation level	Rated short-duration power-frequency withstand voltage	U _d	kV	20	28	35	38	50
	Rated lightning impulse withstand voltage	U _p	kV	60	75	95	95	125
Rated frequency		f _r	Hz	50/60	50/60	50/60	50/60	50/60
Rated normal current for	Ring-main feeders	I _r	A	400/630	400/630	400/630	400/630	400/630
	Transformer feeders	I _r **	A		200	200	200	200
Rated short-time withstand current	for switchgear with t _k = 1 s	I _k	up to kA	25	25	25	25	20
	for switchgear with t _k = 3 s	I _k	up to kA	20	20	20	20	20
Rated peak withstand current		I _p	up to kA	63	63	63	63	50
	Transformer feeders	I _D ***	up to kA	25	25	25	25	25
Switching capacity for multi-purpose switches (class E3) according to IEC 60 265-1 and VDE 0670 Part 301								
Test duty 1	Rated mainly active load breaking current	100 operations	I ₁	A	630	630	630	630
	Rated mainly active load breaking current	20 operations	I ₁	A	31.5	31.5	31.5	31.5
Test duty 2a	Rated line closed-loop breaking current	20 operations	I _{2a}	A	630	630	630	630
Test duty 3	Rated transformer breaking current	20 operations	I ₃	A	40	40	40	40
Test duty 4a	Rated cable-charging breaking current	10 operations	I _{4a}	A	68	68	68	68
	Rated cable-charging breaking current	10 operations	(0,2...0,4)I _{4a}	A	15	15	15	15
Test duty 4b	Rated line-charging breaking current	10 operations	I _{4b}	A	68	68	68	68
Test duty 5	Rated short-circuit making current	5 operations	I _{ma}	up to kA	63	63	63	50
Test duty 6a	Rated earth-fault breaking current	10 operations	I _{6a}	A	60	60	60	60
Test duty 6b	Rated cable-charging breaking current and line-charging breaking current under earth-fault conditions	10 operations	I _{6b}	A	35	35	35	35
—	Cable-charging breaking current under earth-fault conditions with superposed load current	10 operations	I ₁ +I _{6b}	A	630+50	630+50	630+50	630+50
Switching capacity according to IEC 60 420, DIN EN 60 420 and VDE 0670 Part 303								
Rated transfer current			I ₄	A	1150	1150	830	830
Make-proof earthing switch according to IEC 60 129 and VDE 0670 Part 2								
Earthing function of the three-position switch-disconnector								
Rated short-circuit making current			I _{ma}	up to kA	63	63	63	50

* Technical data of ready-assembled switchgear is shown on the rating plate

** Depending on the fuse type used

*** Maximum cut-off current of the fuse

Auxiliary and control voltages

24 to 220 V DC or
110 to 230 V AC (50 to 60 Hz)

9.2 Rating plates

SIEMENS	
Typ 8DJ20.10	Baujahr: 2001
Fabrik-Nr.: CV	710103-00010 / 001
$U_r = 24 \text{ kV}$	$U_p = 125 \text{ kV}$
$U_d = 50 \text{ kV}$	$f = 50 / 60 \text{ Hz}$
KABELABZWEIG	
Lasttrennschalter	Erdungsschalter
$I_r = 630 \text{ A}$	$n = 100$
$I_{ma} / I_k = 50 / 20 \text{ kA } 1\text{s}$	$50 / 20 \text{ kA } 1\text{s}$
TRANSFORMATOR-ABZWEIG	
Lasttrennschalter	Erdungsschalter
$I_r = 200 \text{ A}^{1)}$	
$I_{ma} / I_k = 50 / 20 \text{ kA } 1\text{s}$	$25 / 10 \text{ kA } 1\text{s}$
¹⁾ abhängig vom Sicherungseinsatz siehe Betriebsanleitung	
Nenn-Fülldruck: $0.5 \text{ bar} / 20^\circ \text{C}$ (Überdruck)	
Zul.Umgeb. -temp.: $-40 / 70^\circ \text{C}$	
MADE IN GERMANY	
	

Bild 15: Data on the rating plate provided at the front (example)

	Type designation and year of manufacture
	Serial number (order reference)
U_r	Rated voltage
U_d	Rated short-time power-frequency withstand voltage
U_p	Rated lightning impulse withstand voltage
U_a	Auxiliary voltage

SIEMENS	
Typ 8DJ20.10	Baujahr: 2001
Fabrik-Nr.: CV	710103-00010 / 001
DIN VDE 0111	
0670 T2/T301/T303/T6/T1000	
IEC 71/129/265-1/298/420/694	
$U_a = \text{AC}230 \text{ V}$	
Nenn-Fülldruck:	$0.5 \text{ bar} / 20^\circ \text{C}$ (Überdruck)
Zul. Betriebsüberdruck:	$0.8 \text{ bar} / 80^\circ \text{C}$
Zul.Umgebungstemperatur:	$-40 / 70^\circ \text{C}$
SF6-Füllung:	max. 390 l (1 bar)
Behälterinhalt:	max. 260 l

Bild 16: Data on the rating plate provided inside the operating mechanism boxes (example)

I_{SC}	Rated short-circuit breaking current
I_r	Rated normal current
$n100$	Increased switching frequency
I_{ma}	Rated short-circuit making current
I_k	Rated short-time withstand current

9.3 Allocation of HV HRC fuses and transformers

Recommendation

The three-position switch-disconnector in the transformer feeder (transformer switch) was combined with Siemens HV HRC fuse links of type 3GD and tested in accordance with IEC 60 420.

Furthermore, Siemens 8DJ and 8DH switchgear also permit the fuse protection of transformers up to ratings of 2000 kVA. Please contact us for such applications.

Standards

HV HRC fuse links with striker pin "medium" version according to

- DIN 43 625 principal dimensions
- VDE 0670 Parts 4 and 402
- IEC 60 282

Use of HV HRC fuse links of other manufacturers on request.

Description

Recommendation for allocation of HV HRC fuse links of type 3GD and transformers

The following table shows recommended 3GD HV HRC fuse links (electrical data valid for ambient temperatures of up to 40 °C) for fuse protection of transformers.

kV	Transformer			Rated currents and voltages of HV HRC fuse links at an ambient temperature of 40 °C		
	S _N kVA	U _K %	I ₁ A	min. A	max. A	U _r kV
6 - 7.2	50	4	4.8	16	16	12
	75	4	7.2	16	16	
	100	4	9.6	20	25	
	125	4	12	25	25	
	160	4	15.4	32	32	
	200	4	19.2	40	40	
	250	4	24	50	50	
	315	4	30.3	50	63	
	400	4	38.4	63	100	
	500	4	48	63	100	
	630	4	61	80	100	
10 - 12	50	4	2.9	10	10	12
	75	4	4.3	10	10	
	100	4	5.8	16	16	
	125	4	7.2	16	16	
	160	4	9.3	20	20	
	200	4	11.5	25	25	
	250	4	14.5	25	32	
	315	4	18.3	32	40	
	400	4	23.1	40	50	
	500	4	29.0	50	63	
	630	4	36.4	63	80	
	800	5-6	46.2	63	80	
	1000	5-6	58.0	80	100	
13.8	50	4	2.1	6	6	24
	75	4	3.2	10	10	
	100	4	4.2	10	10	
	125	4	5.3	16	16	
	160	4	6.7	16	16	
	200	4	8.4	16	20	
	250	4	10.5	20	25	
	315	4	13.2	25	32	
	400	4	16.8	32	32	
	500	4	21.0	40	50	
	630	4	26.4	50	50	
	800	5-6	33.5	50	50	
	1000	5-6	41.9	63	63	

Note

HV HRC fuse links with dimension e = 292 mm **must not** be used at U_r > 17,5 kV .

kV	Transformer			Rated currents and voltages of HV HRC fuse links at an ambient temperature of 40 °C		
	S _N kVA	U _K %	I ₁ A	min. A	max. A	U _r kV
15 - 17.5	50	4	1.9	6	6	24
	75	4	2.9	10	10	
	100	4	3.9	10	10	
	125	4	4.8	10	10	
	160	4	6.2	16	16	
	200	4	7.7	16	20	
	250	4	9.7	20	25	
	315	4	12.2	25	25	
	400	4	15.5	32	32	
	500	4	19.3	32	40	
	630	4	24.3	40	50	
	800	5-6	30.9	50	50	
	1000	5-6	38.5	63	63	
24	50	4	1.5	6	6	24
	75	4	2.2	6	6	
	100	4	2.9	10	10	
	125	4	3.6	10	10	
	160	4	4.7	10	10	
	200	4	5.8	16	16	
	250	4	7.3	16	16	
	315	4	9.2	20	20	
	400	4	11.6	20	25	
	500	4	14.5	25	32	
	630	4	18.2	32	40	
	800	5-6	23.1	32	32	
	1000	5-6	29	40	40	
	1250	5-6	36	50	50	
	1600	5-6	46.5	63	80	

S_N: Apparent power

U_K: Relative impedance voltage

I₁: Rated current

S_N: Apparent power

U_K: Relative impedance voltage

I₁: Rated current

Applicable standards and specifications

Secondary distribution indoor switchgear 8DJ10/8DJ20 correspond to the following standards and specifications:

DIN VDE, IEC and EN Standards:

IEC Standard	VDE Standard
IEC 60 071	VDE 0111
IEC 60 694	VDE 0670 Part 1000
IEC 60 298	VDE 0670 Part 6
IEC 60 129	VDE 0670 Part 2
IEC 60 265-1	VDE 0670 Part 301
IEC 60 420	VDE 0670 Part 303
IEC 60 243-5	VDE 0682 Part 415, EN 61 243-5 (E)

- Copper (conductor bars)
- Silver (contacts)
- Cast-resin based on epoxy resin (bushings and fuse boxes)
- Plastic material (arcing chamber and fuse slide)
- Sulphur hexafluoride (SF₆)
- Silicon rubber

The switchgear does not contain hazardous materials. As for disposal of SF₆ gas, please contact your Siemens Service Centre.

Should you require further information, please contact your Siemens Service Centre.

10 Servicing

10.1 Maintenance

Secondary distribution switchgear 8DJ10/20 is maintenance-free.

10.2 Replacement of components

Due to the fact that all parts of this switchgear type have been optimized to last the normal service life, it is not possible to recommend particular spare parts.

Information required for spare part orders of single components and devices:

- Type and serial number of the switchgear (see rating plates)
- Precise designation of the device or component, if applicable on the basis of the information and illustrations in the associated instructions, a drawing, sketch or circuit diagram.

10.3 Disposal

The 8DJ10/20 switchgear assemblies are environment-compatible products.

At the end of the service life, the switchgear material should be recycled. The switchgear can be disposed of in environment-compatible manner in compliance with existing legislation.

The components of the switchgear can be recycled as mixed scrap; however, dismantling as far as possible into sorted scrap is the more environmental-compatible way.

The switchgear consists of the following materials:

- Sheet-steel, galvanized (enclosure and operating mechanisms)
- Stainless steel (vessel)

Installation

1 Preparing installation

1.1 Packing

The transport units can be packed as follows:

- on pallets, covered with PE protection sheeting (if delivered by road) or
- in seaworthy crates (the switchgear is sealed in PE protection sheeting containing dessicant bags),
- other packing types in special cases (e.g. wooden crate, cardboard box for airfreight)

1.2 Checking for completeness and transport damage

Checking for completeness

- ⇒ Check whether the delivery is complete and correct using the delivery note and packing lists .
- ⇒ Compare the serial number of the switchgear on the delivery note with that on the packing and the rating plate.
- ⇒ Check whether the accessories in the switchgear subframe are complete.

Transport damages

- ⇒ Temporarily open the packing in a weatherproof place. (Do not remove the PE sheeting until reaching the mounting position in order to keep the switchgear as clean as possible).
- ⇒ Check the switchgear regarding damages.
- ⇒ Check the gas filling (see Section 1.9, Page 28)
- ⇒ Re-pack the switchgear as far as possible and reasonable.
- ⇒ Immediately determine any defects and transport damages and document them photographically (e.g. consignment-note).
- ⇒ Repair transport damage or have it repaired.

1.3 Unloading and transport to the place of installation or intermediate storage



Danger!

If incorrectly transported, the switchgear can fall down and endanger people or damage the transport units.

- ⇒ Please ensure that the lifting and transport gear used meets the requirements as regards construction and load-bearing capacity.
 - ⇒ Ensure even weight distribution.
 - ⇒ Weight: see delivery note
-

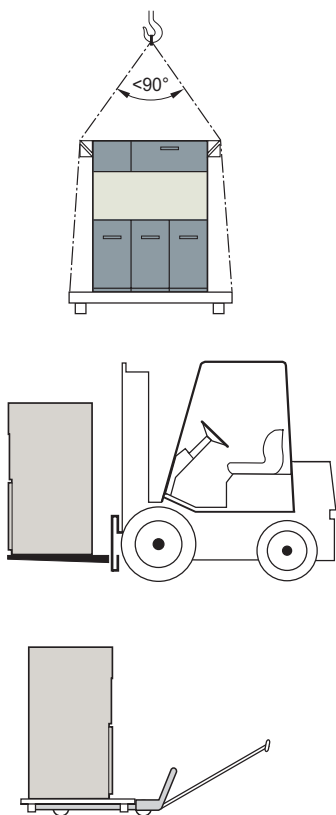


Caution!

During transport, the switchgear can easily be damaged.

- ⇒ Attach ropes far enough on the hoisting tackle so that they cannot exert any forces on the switchgear walls under load.
 - ⇒ Do not climb onto the roof of the switchgear.
 - ⇒ Unload the transport units in packed condition and leave packed for as long as possible.
 - ⇒ Do not damage the PE protection sheeting.
-

⇒ Unload the switchgear as shown and transport it to the place of installation or intermediate storage.



⇒ Hang in the hook or insert rods.



⇒ Transport the switchgear.

⇒ After reaching the final position of the switchgear, bring the lugs to their initial position again.

Switchgear transport by means of transport lugs

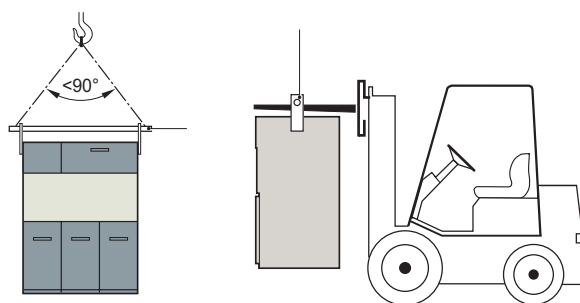


Bild 17: Switchgear transport with crane or fork-lift truck

⇒ Undo the fixing bolts of the transport lugs.

⇒ Lift transport lugs and bolt tight again.

1.4 Intermediate storage

If the transport units have to be stored in between, the following items should be observed.

Storage:

- As far as possible, in original packing (refit the packing if it was opened in the meantime.)
- In a weatherproof place
- Protected against damage

Installation

1.5 Necessary and suitable tools

- Standard tools, such as e.g. torque wrenches
- Shims with a thickness of 0.5 - 1 mm to compensate floor unevenness
- Cleaning agent ARAL 4005 or HAKU 1025/90 (containing hydrocarbons)

1.6 Moving the switchgear to the place of installation

⇒ Move the transport units as far as possible on their wooden pallets.

1.7 Removing the transport units from the wooden pallets

The transport units are screwed onto the wooden pallets. If they can no longer be transported together with the pallets, they can be removed as follows:

- ⇒ Remove the PE sheeting; remove seaworthy crate or crate before, if required
- ⇒ Remove the front cable compartment cover from the switchgear subframe. To do this, push the unlocking lever down and lift the cover to remove it (see Section 6, Page 17).
- ⇒ Undo the fixing screws.
- ⇒ Refit the cable compartment cover.

1.8 Further transport without wooden pallets

If the transport units cannot be directly lifted from the wooden pallets onto their mounting position:

- ⇒ Lower the transport unit onto boards placed on roller pads (reinforced rollers) or tubes, i.e. one board placed on two roller pads or tube.
- ⇒ Lift one side, then the other side of the transport unit with roller crowbars and slowly lower it on the mounting position. Place the roller crowbars at the corners of the transport units only.

1.9 Checking the gas filling

The switchgear is filled with SF₆ gas at gauge pressure (0.5 bar). Before installation, check the correct filling of the switchgear on the ready-for-service indicator located on the left side of the control board.

⇒ Read the ready-for-service indicator.



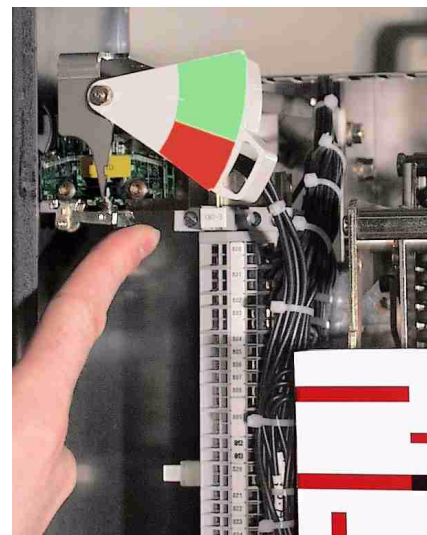
If the pointer is in the green area, the gas filling is in order. Otherwise:

- ⇒ Indicator in red area: Check auxiliary switch for gas (see following Section).
- ⇒ Stop installation and inform responsible Siemens Service Centre.

Checking the ready-for-service indicator

During transport, the auxiliary switch of the ready-for-service indicator can latch tight due to vibrations. Then, the ready-for-service indicator is in the red area.

- ⇒ Remove the front plate.
- ⇒ In this case, push the lever of the auxiliary switch (located behind the red/green indication element) carefully towards the switch, so that the indication element can return to the left to its initial position.



2 Switchgear installation

2.1 Floor openings and fixing points

To achieve sufficient pressure resistance, the switchgear must be fastened to the foundation at as many points as possible. Fix the switchgear with at least 4 screws M8 for each end panel and at least 2 screws M8 for each intermediate panel. To do this:

- ⇒ Remove the front cable compartment cover from the switchgear subframe. To do this, push the unlocking lever down and keep it in this position, then remove the cover upwards.
- ⇒ For direct fastening to the concrete, drill holes into the foundation and insert dowels.
- ⇒ Place shims in the spaces between the switchgear frame and the foundation in the area of the fastening cut-outs, so that the switchgear is not distorted when it is bolted together.
- ⇒ Bolt the switchgear to the foundation or the foundation rails.

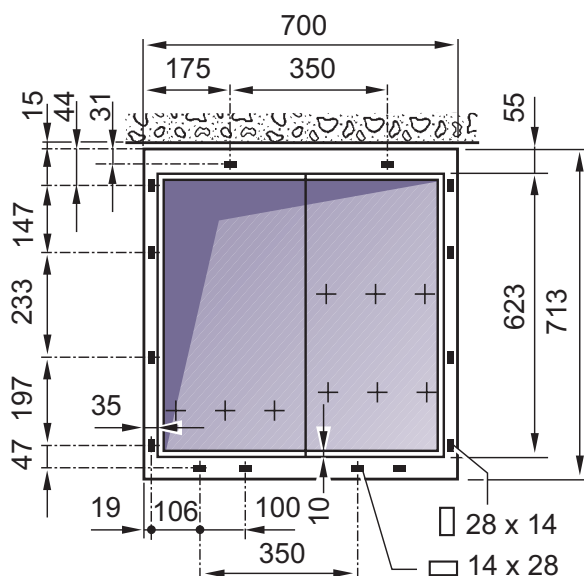


Bild 18: Panel width 700 mm

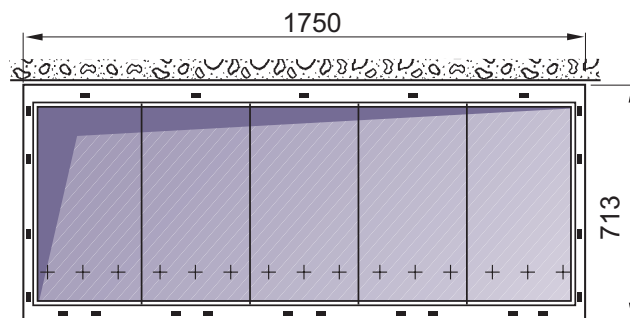


Bild 19: Panel width 1750 mm (missing dimensions as per Fig. 18)

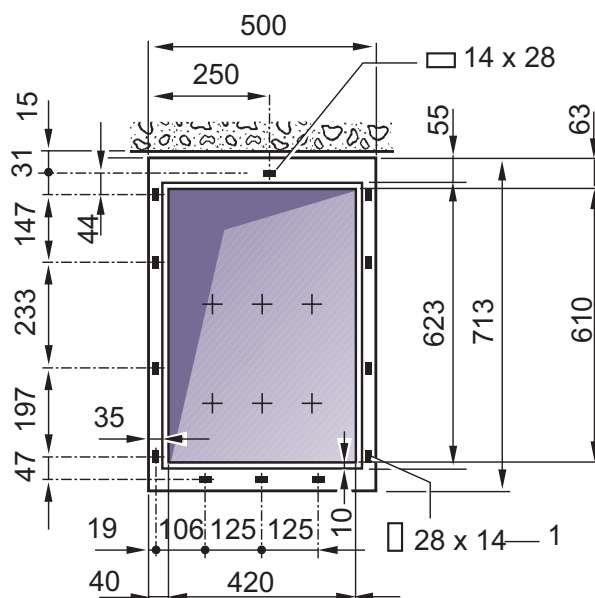


Bild 20: Panel width 500 mm (only 8DJ20)

2.2 Pressure relief

For pressure relief there are three different possibilities:

- To the bottom into the cable duct or cable basement (standard version). Minimum volume 0.7 m³
- To the rear, e.g. into the transformer room (switchgear installed on concrete floor or a floor plate from the accessories).
- To the rear/top using pressure relief ducts or absorber systems
 - Observe space requirements behind the switchgear

Installation

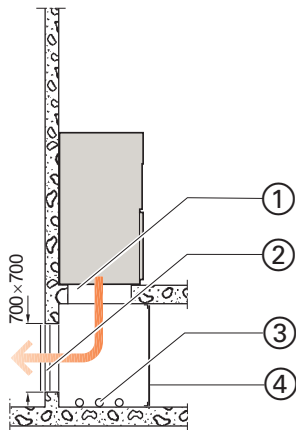


Bild 21: Pressure relief to the bottom into the cable basement

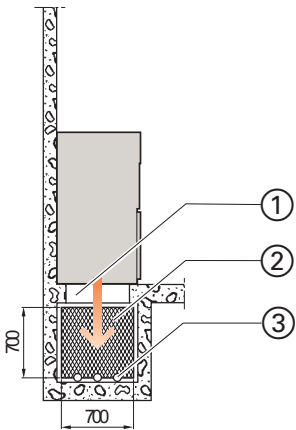


Bild 22: Pressure relief to the bottom into the cable duct

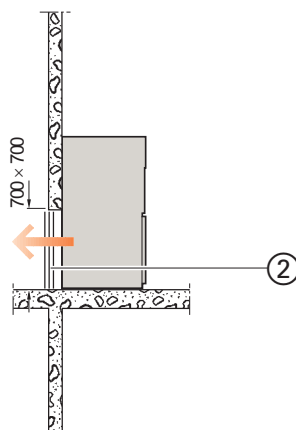


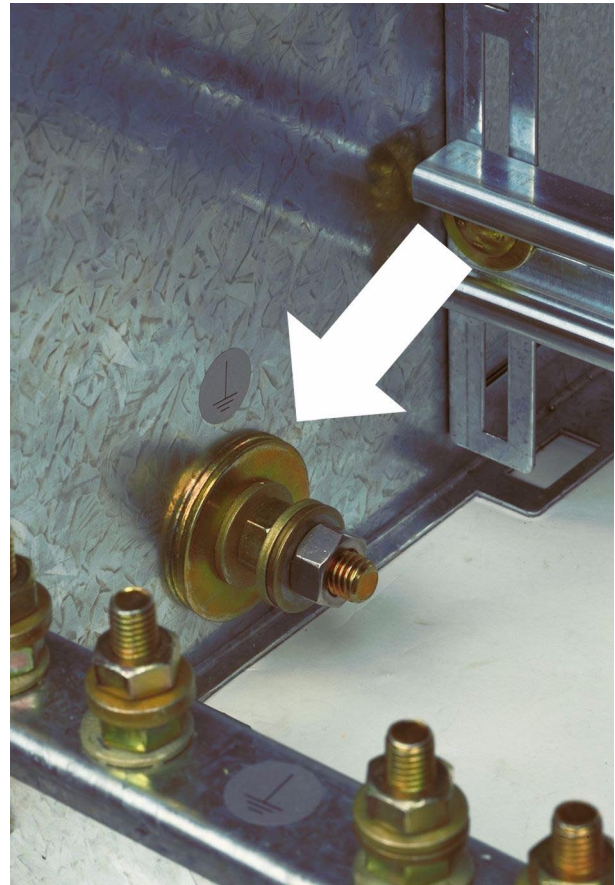
Bild 23: Pressure relief to the rear into the transformer room

- ① Floor opening into the cable duct
- ② Cooling plates made of expanded metal (not included in scope of supply)

- ③ Cable
- ④ Partition made of sheet-metal (not included in scope of supply)

2.3 Earthing the switchgear

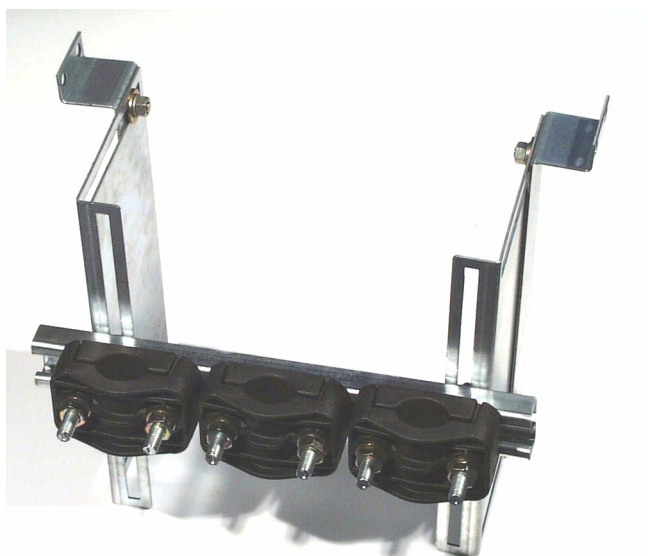
⇒ Connect the earthing terminal (bolt M12) to the sub-station earth.



2.4 Installation of cable brackets for switchgear with low subframe

To install a cable bracket (accessories), the side walls are extended by means of supporting plates. Parts of the supporting plates reach into the cable duct.

- ⇒ Remove the front cable compartment cover from the switchgear subframe. To do this, push the unlocking lever down and keep it in this position, lift the cable compartment cover and remove it to the front.
- ⇒ Undo cross members and web to make installation easier.



- ⇒ Fasten separation wall at the three fixing points.

3 Electrical connections

3.1 Connecting ring-main feeder cables (RK)

Ring-main feeder (RK)

Make	Type
Euromold	(K)400 TB, (K) 400 LB
Kabel & Draht	SEHDT 12 (22/23)
Felten & Guillaume	ASTS 10 (20)/630
Euromold	AGT 10 (20)
	AGTL 10 (20)/400
3M	93-EE9...
Raychem	RICS 5..., RSTI 10/20 kV
Pirelli	FMCTs-400

Further plug types on request.



Caution!

The surfaces of high-quality joints and the plug sets can easily be damaged by incorrect handling.

- ⇒ Observe extreme cleanliness.
- ⇒ Avoid damages caused by the threaded bolt when pushing on.

- ⇒ Earth the feeder.
- ⇒ Push the unlocking lever of the cable compartment cover down, lift the cable compartment cover and remove it to the front.
- ⇒ Pre-adjust the cable bracket and the lower part of the cable clamps.
- ⇒ Fit the plugs on the conductor ends according to the manufacturer's instructions.
- ⇒ Carefully coat the push-on surfaces (high-quality joints) in the plug sets with mounting paste (supplied with the plug set).
- ⇒ Fit the plug on the bushing and fix it.
- ⇒ Tighten the threaded bolt for the cable lug attachment according to the manufacturer's instructions.
- ⇒ Coat the screw insert with mounting paste (supplied with the plug set).
- ⇒ Vent the screw insert with a cable strap when inserting.
- ⇒ Mount the screw insert.
- ⇒ Pull out the cable strap slowly.
- ⇒ Tighten the screw insert with 30 Nm.
- ⇒ Fit the cap.
- ⇒ Align the cable bracket and bolt it tight.

- ⇒ Fit the upper part of the cable clamps.
- ⇒ Connect the earthing facility of the cable screen and the plug housing.
- ⇒ Refit the cable compartment cover.

Installation of adapters for conventional cable sealing ends

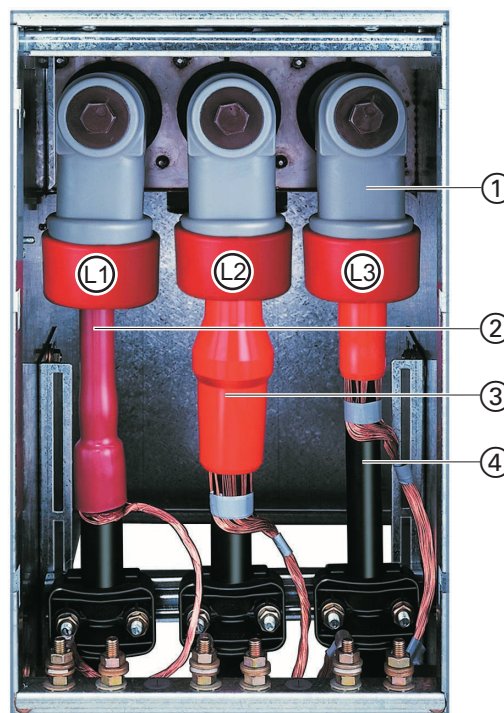


Bild 24: Adapter AKE 20/630 with different conventional cable sealing ends

- ① Adapter AKE 20/630
- ② RXS IAES10
- ③ RXA IAE20
- ④ Raychem EPKT

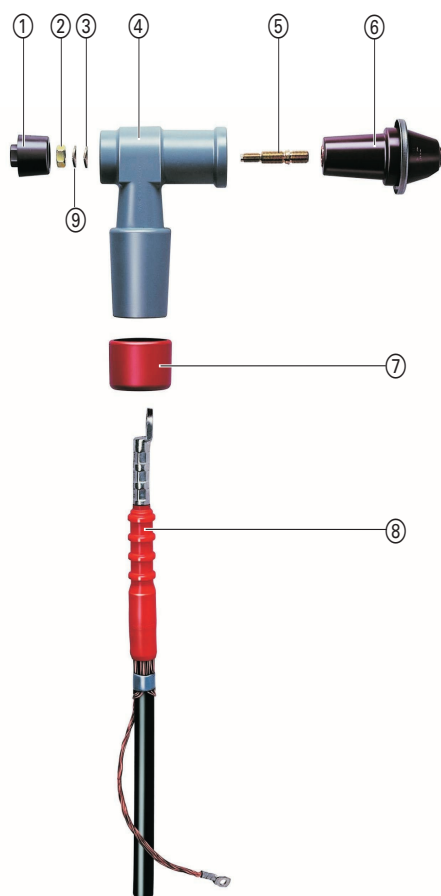


Bild 25: Adapter for conventional cable sealing end

- ① Stopper
- ② Nut M12
- ③ Washer
- ④ Elbow adapter
- ⑤ Connection bolt
- ⑥ Bushing (in the switchgear)
- ⑦ Cup
- ⑧ Sealing end (not included in scope of supply)
- ⑨ Spring washer

- ⇒ Earth the feeder.
- ⇒ Push the unlocking lever of the cable compartment cover down, lift the cable compartment cover and remove it to the front.
- ⇒ Fit the sealing end according to the manufacturer's instructions.
- ⇒ Insert the connection bolt by hand into the bushing bolt and tighten it with 25 Nm.
- ⇒ Coat the cup uniformly on the inside with silicon grease (included in the supply) and push it on the elbow adapter.

⇒ Coat the lower opening of the cup with silicon grease, too, and push the pre-assembled sealing end from below through the cup into the elbow adapter.

In case of sealing ends containing screens with large cross-sections, we recommend to push the cup onto the sealing end first (dimension of low edge of cup to centre of cable lug hole 160 mm +0/-5).

- ⇒ Coat the bushing and the associated inside cone of the elbow plug with silicon grease.
- ⇒ Push the elbow adapter together with the sealing end onto the bushing and fasten it with the washer, the spring washer and the M12 nut (50 Nm).
- ⇒ Coat the stopper and the associated inside cone of the elbow adapter with silicon grease.
- ⇒ Screw the stopper in as far as it will go.
- ⇒ Mount the cable fixing, align the cable bracket and bolt tight.
- ⇒ Connect the earthing facility of the cable screen.
- ⇒ Refit the cable compartment cover.

3.2 8DJ20: Connecting transformer feeder cable (elbow plugs) series 200

Transformer feeder (TR)

Make	Type
Euromold	(K)158 LR
Felten & Guillaume	ASW 10 (20)
Kabel & Draht	SEHDW 11 (21)
Euromold	AGT 10 (20) /400
	AGTL 10 (20) /400
3M	93-EE8...
Pirelli	FMCE-250

The transformer feeder cables can be brought out at the lower part of the switchgear in three different ways:

- To the bottom with cable elbow plugs
- To the rear with cable elbow plugs
- To the bottom with straight cable plugs

Installation

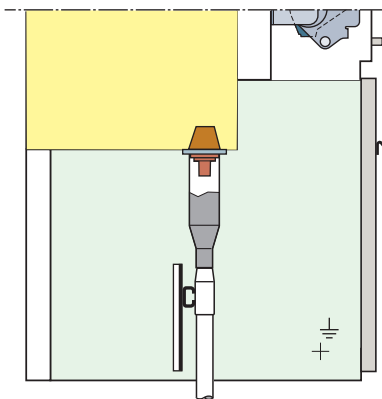
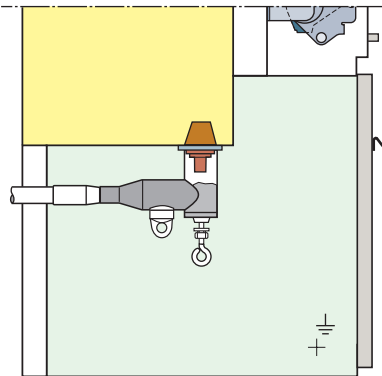
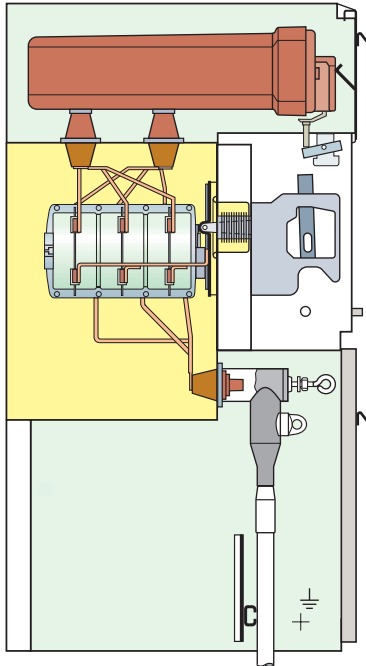
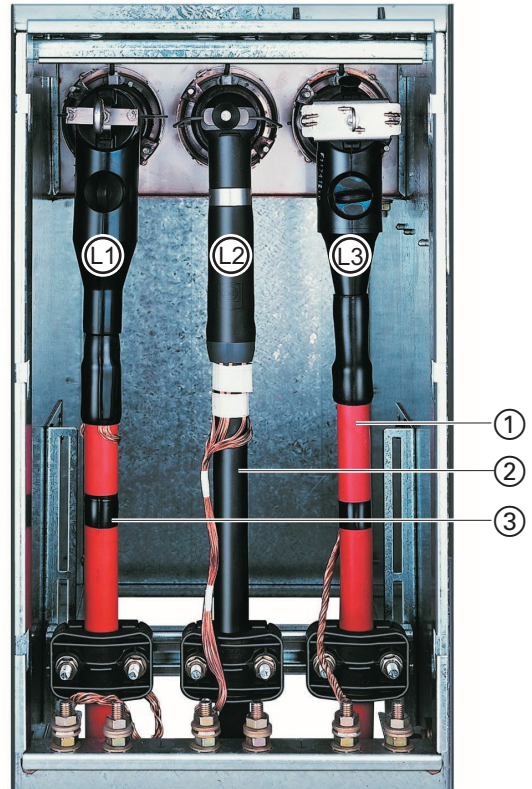


Bild 26: Transformer feeder with different cable routing: Cable T-plug, cable routing to the bottom (top). Cable elbow plug, cable routing to the rear (centre). Cable connection for straight cable plugs, cable routing to the bottom (bottom).



Cable connections in the transformer feeder:

- ① Make Euromold, type K158 LR
- ② Make Felten & Guileau, type EASW 20/250
- ③ Make Cooper, type DE 250-R-C

Work operations



Caution!

The surfaces of high-quality joints and the plug sets can easily be damaged by incorrect handling.

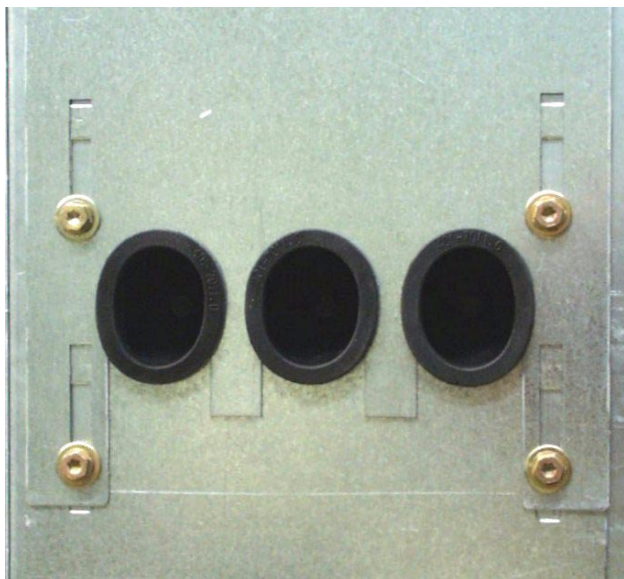
⇒ Observe extreme cleanliness.

⇒ Ensure that the mounted plug sets are not folded or twisted.

⇒ Earth the feeder.

⇒ Push the unlocking lever of the cable compartment cover down, lift the cable compartment cover and remove it to the front.

- ⇒ If the cables are brought out of the switchgear at the rear: remove both metal plates of the cable bushing.



- ⇒ Pre-assemble the cable bracket and the lower part of the cable clamps.
- ⇒ Fit the plug sets on the cables according to the manufacturer's instruction.
- ⇒ Align the plug contact element before pressing or bolting on.
- ⇒ Align the contact pin centrally in the plug.
- ⇒ Carefully coat the push-on surfaces (high-quality joints) in the plug sets with mounting paste (supplied with the plug set).
- ⇒ Push the plugs onto the bushings.
- ⇒ Fit the plug mounting elements according to the manufacturer's instructions.
- ⇒ If the cables are brought out at the rear of the switchgear: Mount tension relief for plugs and transformer cables at a distance of 500 mm from the bushing (outside the switchgear). This tension relief is not included in the scope of supply and must be provided by the customer.
- ⇒ Mount the upper part of the cable clamps.
- ⇒ Align the cable bracket and bolt it tight.
- ⇒ Connect the earthing facility of the cable screen and the plug housing.
- ⇒ If the cables are brought out at the rear of the switchgear: refit both metal plates of the cable bushing.
- ⇒ Refit the cable compartment cover.

3.3 8DJ10: Connecting transformer feeder cables (elbow plugs) series 200

- Cable routing to the rear/right(top according to the order documents

The following cable plus are suitable for bushings with outside cone, interface type A according to EN 50181 geeignet.

Transformer feeder (TR)

Make	Type
Euromold	(K)158 LR
Felten & Guillaume	ASW 10 (20)
Kabel & Draht	SEHDW 11 (21)
Euromold	AGT 10 (20) /400
	AGTL 10 (20) /400
3M	93-EE8...
Pirelli	FMCE-250

Matching with these makes, bushings of interface type A with outside cone and plug-in contact are supplied (according to DIN EN 50181).

These makes are suitable for connection of single-core thermoplastic-insulated cables according to DIN VDE 0273.

Installation

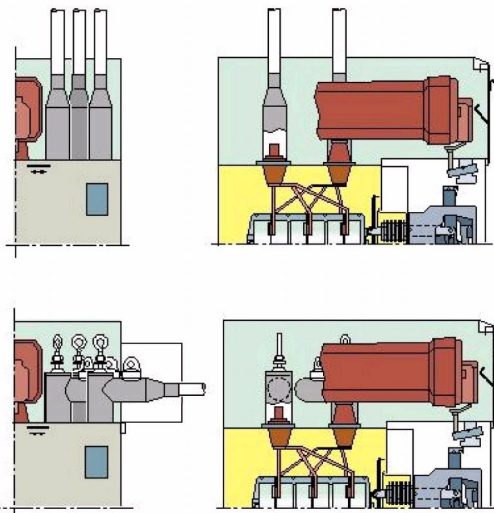
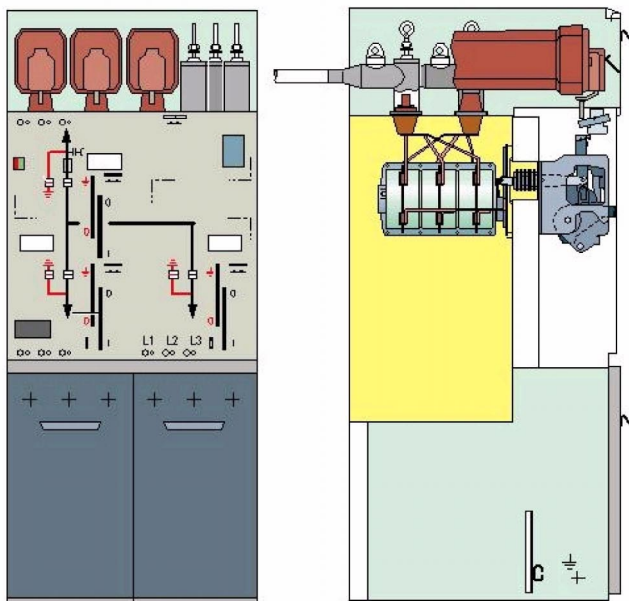


Bild 27: Transformer feeders with different cable routing: Cable elbow plug, cable routing to the rear (top). Optional cable connection for straight cable plugs with plug-in contact, cable routing to the top (centre). Optional cable connection for cable elbow plugs with plug-in contact, cable routing to the right (bottom).

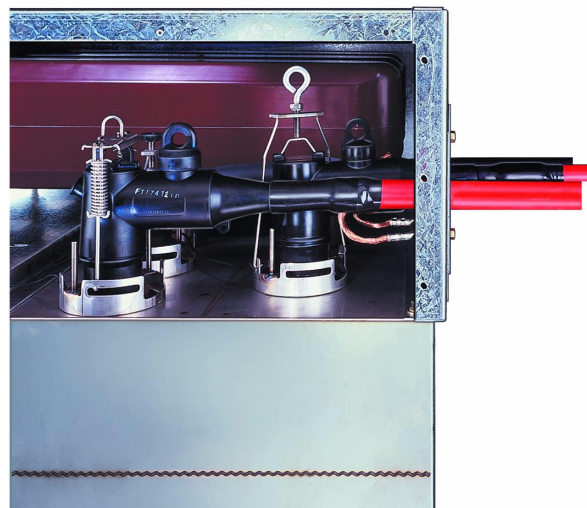


Bild 28: Various plug sets for transformer cables, ready-assembled (cable routing to the rear in the example).

Work operations



Caution!

The surfaces of high-quality joints and the plug sets can easily be damaged by incorrect handling.

⇒ Observe extreme cleanliness.

⇒ Ensure that the mounted plug sets are not folded or twisted.



Caution!

The vessel may be damaged when drilling into the side wall of the switchgear.

⇒ Do not drill into the vessel.



Caution!

Rust layers possible on the vessel.

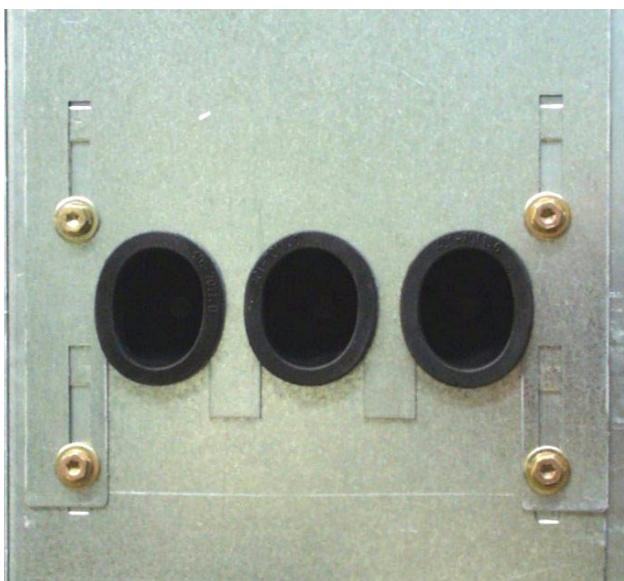
⇒ When working with sheet-metal, make sure that no metal cuttings will remain on the stainless steel vessel.

⇒ Earth the feeder.

⇒ Push the unlocking lever of the fuse cover to the left, undo the fuse cover and remove it (better accessibility for fastening the plugs).



⇒ Remove both metal plates of the cable bushing.



⇒ Fit the plug sets on the cables according to the manufacturer's instruction.

⇒ Align the plug contact element before pressing or bolting on.

⇒ Align the contact pin centrally in the plug.

⇒ Carefully coat the push-on surfaces (high-quality joints) in the plug sets with mounting paste (supplied with the plug set).

⇒ Push the plugs onto the bushings.

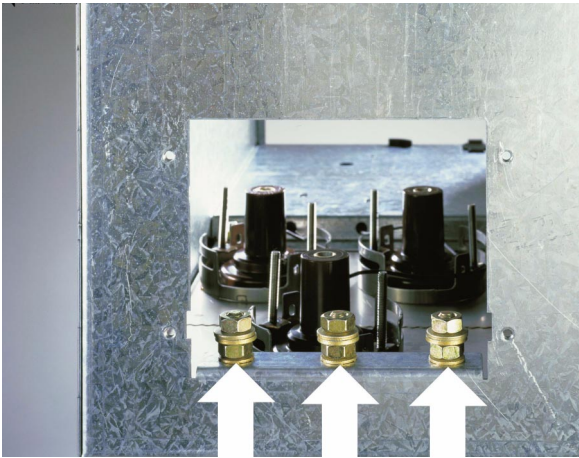
⇒ Fit the plug mounting elements according to the manufacturer's instructions (the following figure shows various plug types, cable routing to the rear).



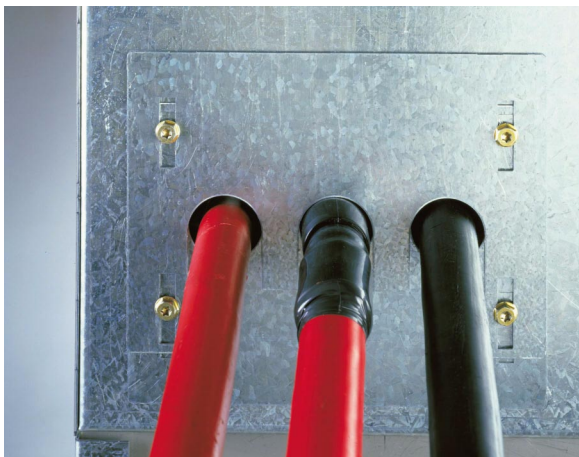
⇒ Mount tension relief for plugs and transformer cables at a distance of 500 mm from the bushing (outside the switchgear). This tension relief is not included in the scope of supply and must be provided by the customer.

Installation

- ⇒ Connect the earthing facility of the cable screen (support unscreened cables in an insulated way).



- ⇒ Connect the earthing facility of the plug housing.
⇒ Refit both metal plates of the cable bushing.



3.4 Verification of correct terminal-phase connections

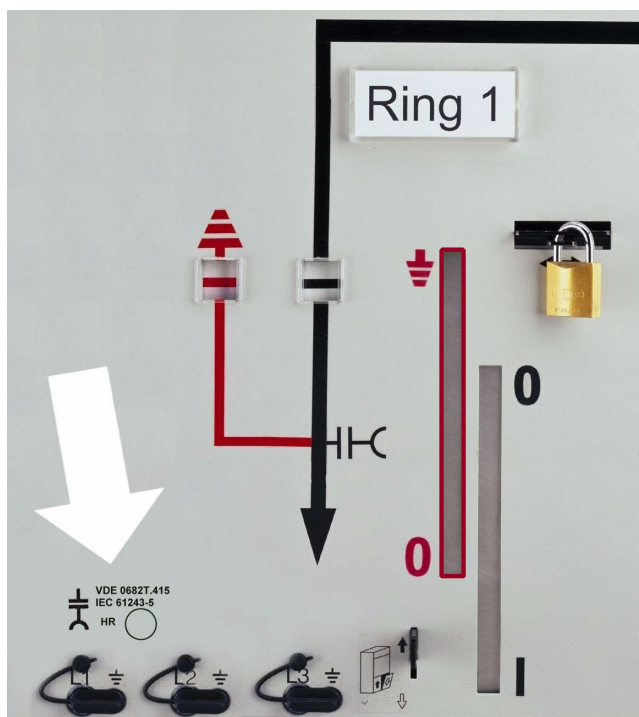
You must make sure that the phase sequence of the cables connected to a feeder is identical to the phase sequence of the rest of the switchgear, e.g., if you have connected new cables.

The three-position switch-disconnector of the feeder to be tested must be in "OPEN" position. The opposite substation must be de-earthed and live.

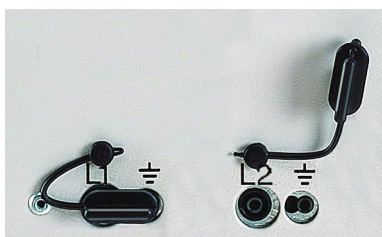
You will require a phase comparison test unit, e.g. make Pfisterer. To check the perfect operation of the unit, we recommend to test the correct indication of the unit on two already connected outgoing feeders on cables with identical and different phase sequence.



You can verify the correct terminal-phase connections at the capacitive test sockets of the feeder to be tested and at those of an already connected feeder. The test sockets are located near the feeder symbols of the mimic diagram and are arranged in the same order as the cable connections (from the left to the right: L1, L2, L3).



⇒ Remove the covers of the capacitive test sockets of both feeders.



⇒ Plug the measuring cables of the phase comparison test unit into the test sockets "L1" of the two feeders.

⇒ Read the indication.

⇒ Same procedure with the test sockets of phase "L2" and "L3."

⇒ Repeat the test.

⇒ Replace the covers of the test sockets to avoid pollution.

If the phase comparison test unit shows "correspondence" in any case, the terminal-phase connections of the tested feeder are correct. Now you can connect the feeder.

Installation

3.5 Connecting auxiliary circuits

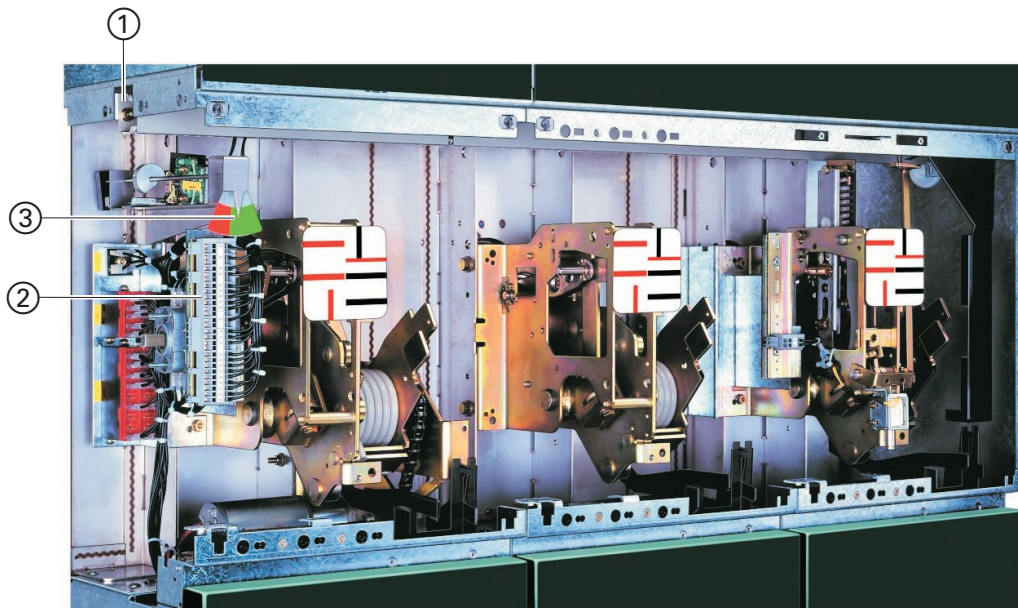


Bild 29: 8DJ20: Operating mechanism box: ① Wiring duct ② Terminal strip ③ Ready-for-service indicator.

You will require the circuit diagrams supplied with the switchgear.



Danger!

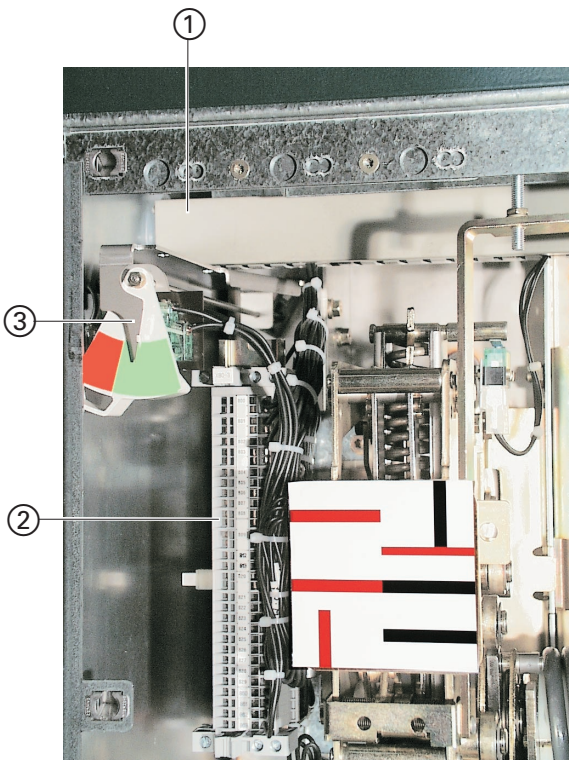
If the switch-disconnector is operated without the switchgear being ready for service, this can cause an arc fault which will endanger the life of present people and damage the switchgear.

⇒ Make sure that the transmission linkage of the ready-for-service indicator is not damaged.

⇒ Remove the front plate of the switchgear.

⇒ Connect the wires according to the circuit diagrams lay them cleanly. Use the existing wiring ducts and the openings shown in the figure. Observe polarization.

⇒ Do not apply auxiliary voltage yet.



8DJ10: Operating mechanism box:

- ① Wiring duct
- ② Terminal strip
- ③ Ready-for-service indicator

4 Final assembly work

4.1 Checking the rating plate / type plate

- ⇒ Check the data on the rating plate / type plate and the auxiliary voltage of the control and end devices regarding the requirements.

4.2 Checking high-voltage connections

- ⇒ Check earthing of cable termination on all connected high-voltage cables.
- ⇒ Make sure that the cable clamps of all single-core cables are anti-magnetic.

4.3 Checking bolted joints

Check the tightening torques of all bolted joints of the following parts of the switchgear:

- Earthing connections
 - Low-voltage connections
- ⇒ Check the tightening torques of the bolted joints of the low-voltage equipment at random.
 - ⇒ Check all parts of the switchgear that have been disassembled and assembled again at site during installation, or that have been installed subsequently, to verify correct assembly and completeness.

4.4 Checking control cable connections

- ⇒ Check correct wiring on all terminal blocks according to the circuit diagrams.
- ⇒ Make sure that all terminal blocks are equipped with labels.

4.5 Cleaning the switchgear

Requirements:

- Cleaning agent ARAL 4005 or HAKU 1025/90 (containing hydrocarbons)
- Rinsing agent
- Brush
- Lint-free cloth

Additionally we recommend a vacuum cleaner.

- ⇒ Remove any hanging instruction labels, documents, data that are not required anymore for operation.
- ⇒ Remove any tools, materials etc. that are not required anymore from the area of switchgear.
- ⇒ Remove any dirt from the area of the switchgear, e.g. with a vacuum cleaner.

- ⇒ Fit all covers.

- ⇒ Put the covers on the capacitive test sockets.
- ⇒ Touch up scratches and impacts in the surface painting. Available kit: Touch-up set (spatula and paint) and paint pen.

5 Mechanical commissioning

5.1 Safety instructions

The mechanical function is tested without high voltage.



Danger!

High voltage! Danger !

⇒ Do not apply high voltage to the switchgear!



Danger!

During operation of electrical equipment and switchgear, parts of this equipment are under dangerous electrical voltage (auxiliary voltage). Mechanical components may move quickly, even remotely controlled.

⇒ Do not remove covers.

⇒ Do not reach into openings.

5.2 Checking the assembly work and the accessories

Ensure that the following accessories are easily accessible:

- Operating instructions
- Operating lever to operate the switchgear
- Circuit diagrams
- Warning signs

Ensure that the assembly work has been performed correctly.

Ensure that

- all covers have been fitted
- the capacitive test sockets are equipped with covers

5.3 Test operation

Test operation helps you to verify the perfect operation of the switchgear before commissioning, without high voltage.



Danger!

⇒ Perform test operation with auxiliary voltage only!

⇒ Switch on all auxiliary and control voltages.

⇒ Switch the three-position switch-disconnector several times to the "CLOSED" and "OPEN" position.

⇒ Check whether the mechanical interlocking conditions are fulfilled without using excessive force.

⇒ Check the switchgear front and the control room, if applicable. The switch positions of the three-position switch-disconnector must be indicated correctly.

⇒ Check HV HRC fuse links.

⇒ Check readiness for service. The pointer must be in the green area.



⇒ Cover free cable connection bushings with dust-proof caps and earth the feeder.

Malfunction during test operation

If you have determined a malfunction during one of these tests:

⇒ Do not put the switchgear into operation.

⇒ Inform your Siemens Service Centre.

Completing test operation

⇒ Switch all switches to the "OPEN" position.

**Caution!**

If defective switchgear is put into operation this can damage or destroy parts of the switchgear.

- ⇒ Never put switchgear into operation if you notice during test operation that a part of it does not work as described in here.
-

6 Instructing the operating personnel

- ⇒ The operating personnel should be given the operating instructions in good time.
- ⇒ Instruct operating personnel in theory and practice of switchgear operation.
- ⇒ Ensure that the operating personnel are familiar with all operational details when commissioning takes place.

7 Switching on operational high-voltage

Electrical commissioning

The perfect and safe operation of this switchgear is conditional on:

- Proper transportation
- Correct storage
- Correct erection and installation
- Diligent operation

Installation and operation of this switchgear is conditional on observance of the following standards:

- DIN VDE 0100 – IEC 60 364
- DIN VDE 0101
- DIN VDE 0105

Preparations before switching on

The operating personnel must have been trained, the assembly work checked and test operation must have been successfully carried out without malfunctions.

⇒ Close all covers.

⇒ Make sure that the capacitive test sockets are covered.

⇒ If there is a feeder without connected cables, earth this feeder and, if available, padlock the locking device of the switching gate.

⇒ Switch the three-position switch-disconnectors of all the other feeders to "OPEN" position.

⇒ Reset the short-circuit indicators.

⇒ Ensure that all connected consumers on all outgoing feeders are switched off.

Now you can switch on the operational high voltage and put the switchgear into operation as described hereafter.

Switching on more incoming feeders



Danger!

Short-circuit on the busbar if the incoming feeders have different phase angles.

⇒ Ensure that all incoming feeders have the same phase angle.

⇒ Verify correct terminal-phase connections of the next incoming feeder.

⇒ Switch on checked incoming feeder.

Switching on outgoing consumer feeders

When all incoming feeders have been switched on:

⇒ Switch on only the outgoing feeders with connected consumers successively.

⇒ Connect the incoming feeders in the opposite substations.

All outgoing feeders are now switched on. The switchgear is now completely in operation.

Operation

8 Safety instructions



Danger!

High voltage! Danger!

- ⇒ Do not touch live components.
 - ⇒ Ensure that the switchgear is only operated by qualified personnel who are familiar with the operating instructions and observe the warnings.
-



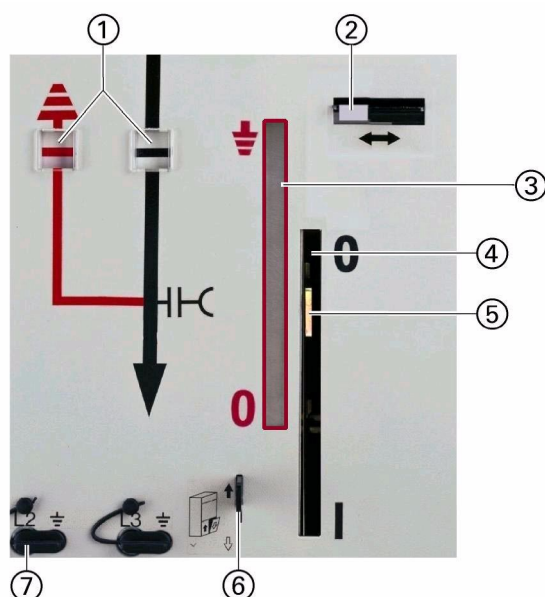
Danger!

During operation of electrical equipment and switchgear, parts of this equipment are under dangerous electrical voltage.
Mechanical components may move quickly, even remotely controlled.

- ⇒ Do not remove covers.
- ⇒ Do not reach into openings.

9 Overview detachable lever mechanism

Control elements and indicators (Please observe detailed information in the following sections)



- ① Mimic diagram with switch position indicators
- ② Locking device with locking lever and padlock (optional)
- ③ Switching gate to earth and de-earth (closed)
- ④ Switching gate for load switching (open)
- ⑤ Operating lever
- ⑥ Lock for cable compartment cover
- ⑦ Capacitive test socket with cover



Fig. 30: Detachable lever with red handle for earthing and de-earthing, with black handle for load switching (alternatively: one-lever operation)



Fig. 31: Ready-for-service indicator: READY position (pointer in green area) (see 14.1 Ready-for-service indicator in the red area, Page 59)

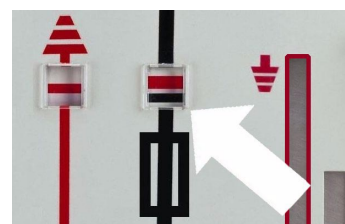


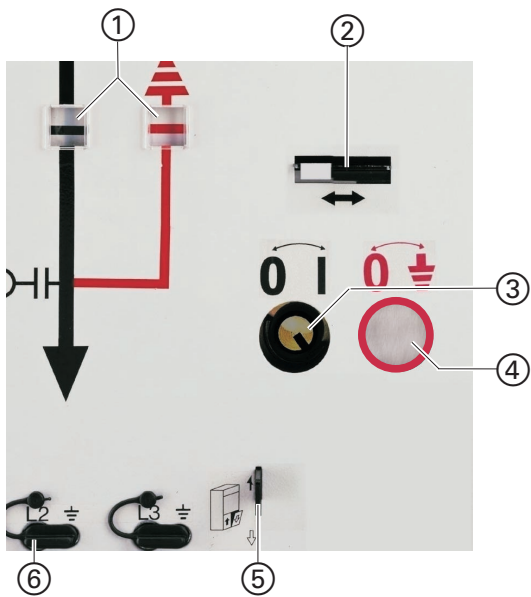
Fig. 32: Red and black bar in the switch position indicator: The switch-disconnector was tripped by a fuse link or a shunt release.

Switching functions

Load switching		Earthing and de-earthing	
Locking device to the left , operating lever for switching "ON" or "OFF" can be inserted.		Locking device to right , operating lever for "EARTHING" or "DE-EARTHING" can be inserted.	
Switching from "OPEN" to "CLOSED" : Operation from top to bottom Switching from "CLOSED" to "OPEN" : Operation from bottom to top		Switching from "EARTHED" to "OPEN" : Operation from top to bottom Switching from "OPEN" to "EARTHED" : Operation from bottom to top	
Switch position: "CLOSED"	Switch position: "OPEN"		Switch position: "EARTHED"
Detachable lever in lower position	Detachable lever in central position		Detachable lever in upper position

10 Overview rotary lever mechanism

Control elements and indicators (Please observe detailed information in the following sections)



- ① Mimic diagram with switch position indicators
- ② Locking device with locking lever and padlock (optional)
- ③ Switching gate for load switching (open)
- ④ Switching gate for earthing or de-earthing (closed)
- ⑤ Lock for cable compartment cover
- ⑥ Capacitive test socket with cover



Fig. 33: Rotary lever with red handle for earthing and de-earthing, with black handle for load switching (alternatively: one-lever operation)



Fig. 34: Ready-for-service indicator: READY position (pointer in green area) (see 14.1 Ready-for-service indicator in the red area, Page 59)

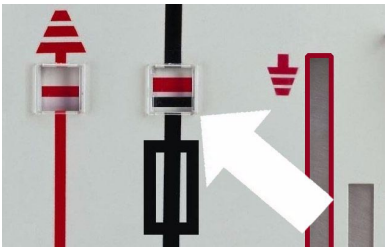
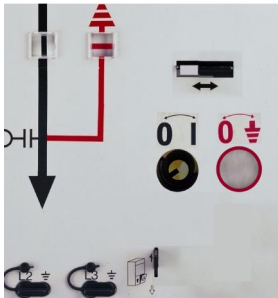
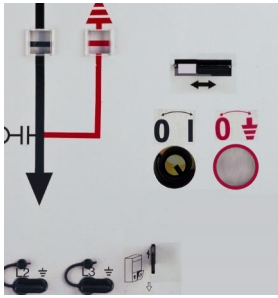
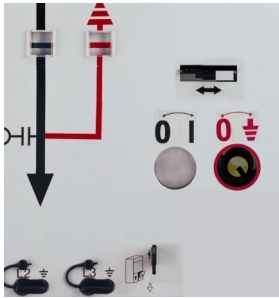
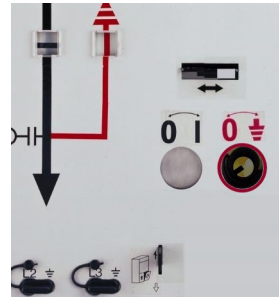


Fig. 35: Red and black bar in the switch position indicator: The switch-disconnector was tripped by a fuse link or a shunt release.

Switching functions

Load switching		Earthing and de-earthing	
Locking device to the left , operating lever for switching “ON” or “OFF” can be inserted.		Locking device to right , operating lever for “ EARTHING ” or “ DE-EARTHING ” can be inserted.	
Switching from “ OPEN ” to “ CLOSED ”: Clockwise operation		Switching from “ EARTHED ” to “ OPEN ”: Counter-clockwise operation	
Switching from “ CLOSED ” to “ OPEN ”: Counter-clockwise operation		Switching from “ OPEN ” to “ EARTHED ”: Clockwise operation	
Switch position: “CLOSED”	Switch position: “OPEN”		Switch position: “EARTHED”
			
Rotary lever turned clockwise	Rotary lever turned counter-clockwise	Rotary lever turned counter-clockwise	Rotary lever turned clockwise

11 Control elements

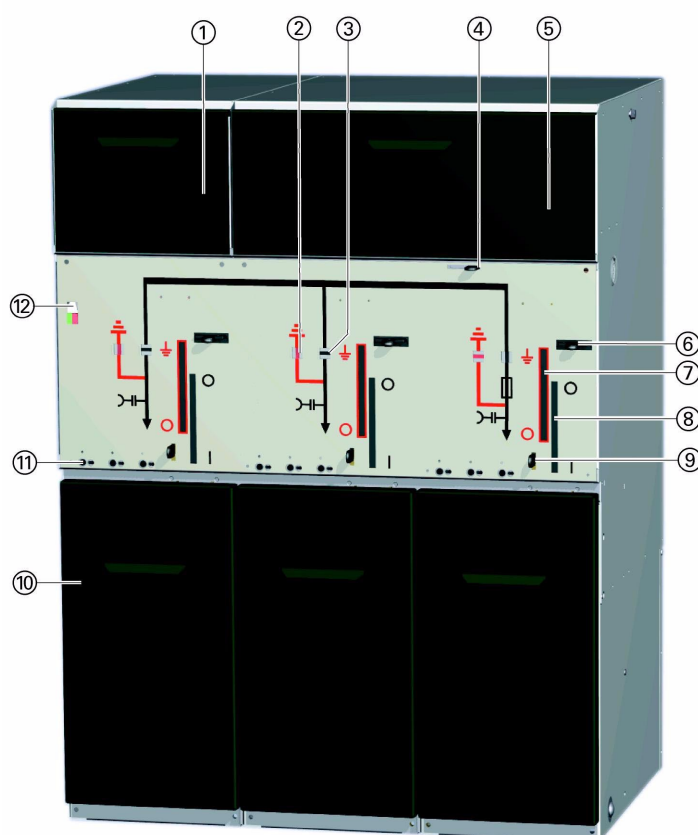


Fig. 36: Indicators and control elements 8DJ20

- | | |
|--|--|
| ① Cover of niche for customer-side low-voltage equipment | ⑦ Manual operation for earthing switch mechanism |
| ② Switch position indicator of the earthing switch | ⑧ Manual operation for switch-disconnector mechanism |
| ③ Switch position indicator of the switch-disconnector | ⑨ Lock of cable compartment cover |
| ④ Lock for HV HRC fuse assembly | ⑩ Cable compartment cover |
| ⑤ Cover of HV HRC fuse compartment | ⑪ Sockets of voltage detection system |
| ⑥ Locking device (option for three-position switch-disconnector) | ⑫ Ready-for-service indicator |

Operation

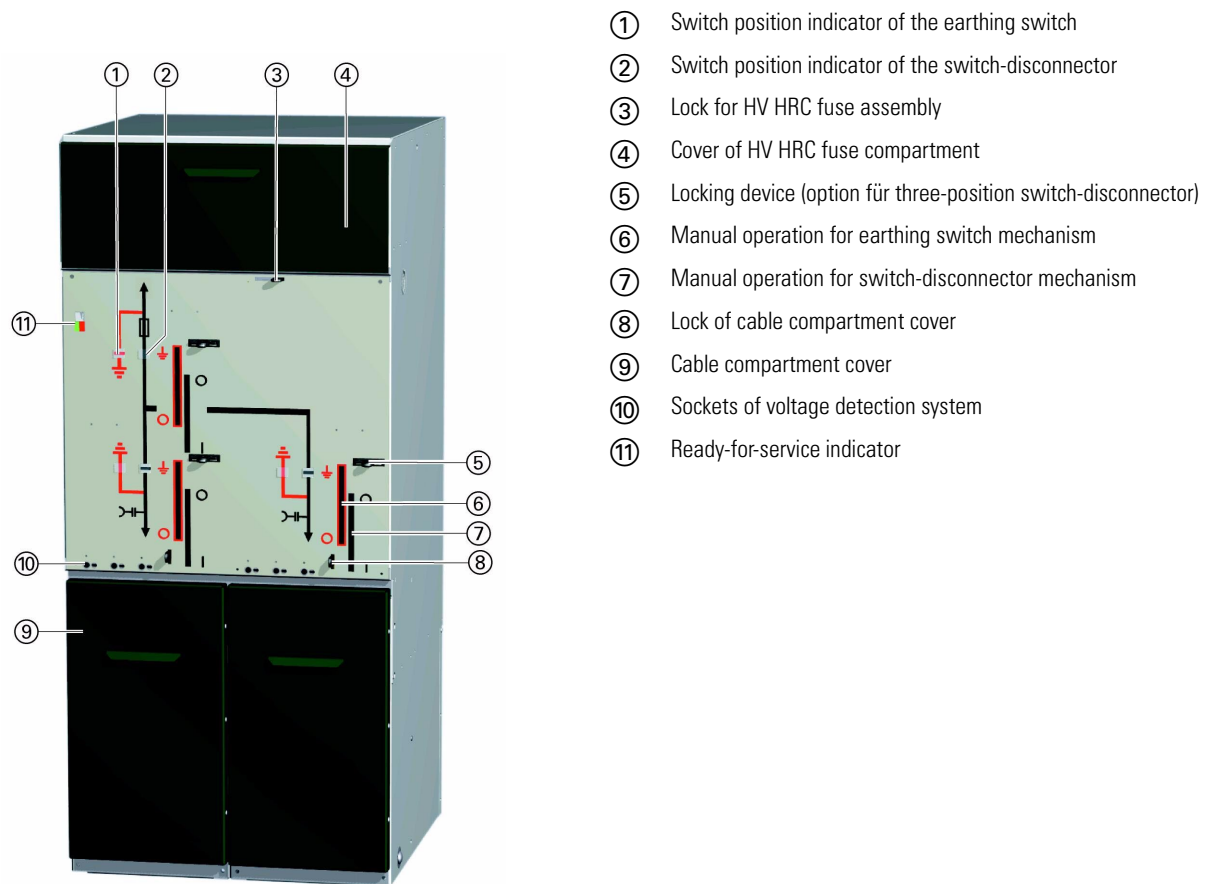


Fig. 37: Indicators and control elements 8DJ10

12 Disconnecting and earthing

Disconnecting and earthing can only be performed locally at the switchgear. As an additional equipment there is a motor-operated mechanism available for closing and opening the switch-disconnector.

For manual operation of the three-position switch there are several possibilities:

- Operation with one **universal lever** for closing or opening the switch-disconnector resp. for earthing and de-earthing
- Insertion block for operation with two different levers: For closing or opening the switch-disconnector: **lever with black handle**, for earthing or de-earthing: **lever with red handle**

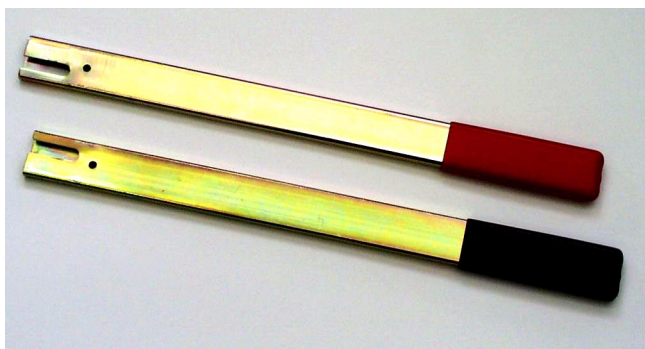


Fig. 38: Detachable lever: with red handle for earthing and de-earthing; with black handle for closing or opening the switch-disconnector.



Fig. 39: Rotary lever: with red head for earthing and de-earthing; with black head for closing or opening the switch-disconnector

Additionally there are anti-reflex levers available for detachable lever mechanisms (optionally; both as universal levers and as separate levers for earthing and de-earthing, and for closing or opening the switch-disconnector).



Fig. 40: Operation with detachable lever



Fig. 41: Operation with rotary lever

Operation

12.1 Closing the switch-disconnector

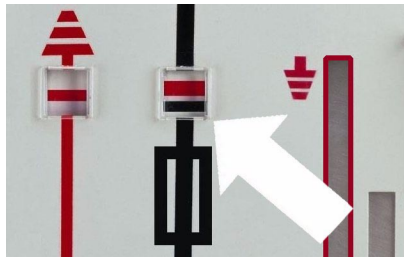
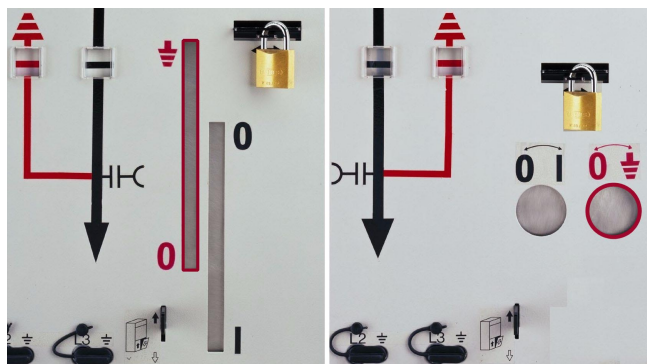


Fig. 42: Transformer feeder: If the red and black bar is visible, the switch-disconnector was tripped by a fuse link or a shunt release (see Section 14.2, Page 60)

For operation of the three-position switch there is an operating lever with black handle available.



Danger!

If the three-position switch-disconnector is operated with insufficient insulating gas pressure, this can cause an arc fault which will endanger the life of present people and damage the switchgear.

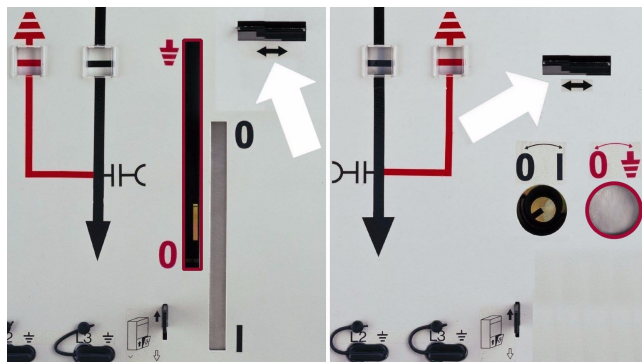
- ⇒ Do only switch if the ready-for-service indicator is in the green area.
- ⇒ If the ready-for-service indicator is in the red area, please observe Section 14.2, Page 60.

⇒ Check readiness for service.



⇒ Remove padlock (optional).

⇒ Push lever of locking device (if available) to the left and hold.



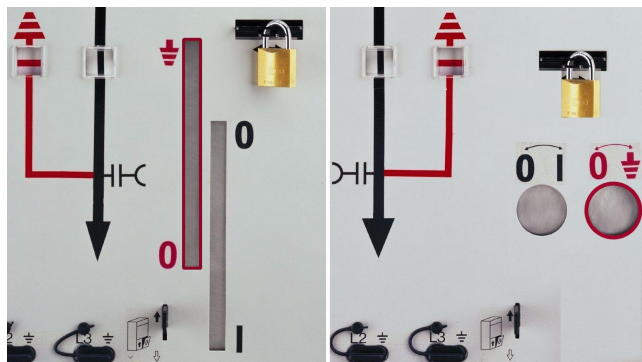
⇒ Insert operating lever into open switching gate at "0" position.

⇒ Move lever rapidly to "I".

⇒ Remove lever.

⇒ Push lever of locking device (if available) to the desired position and fix it there with the padlock (optional). Lever of locking device **on the left**: earthing and de-earthing is possible, **in the centre**: no switching operation possible, **on the right**: the switch-disconnector can be operated.

Now the feeder is closed. The switch-position indicator in the mimic diagram is in "CLOSED" position. The following figure shows the lever of the locking device in the centre position, i.e. no switching operations are possible.



12.2 Opening the switch-disconnector

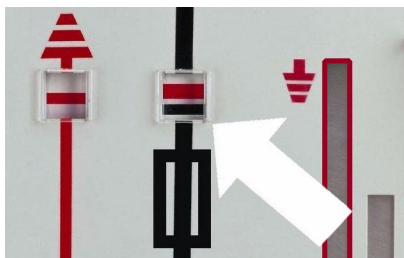
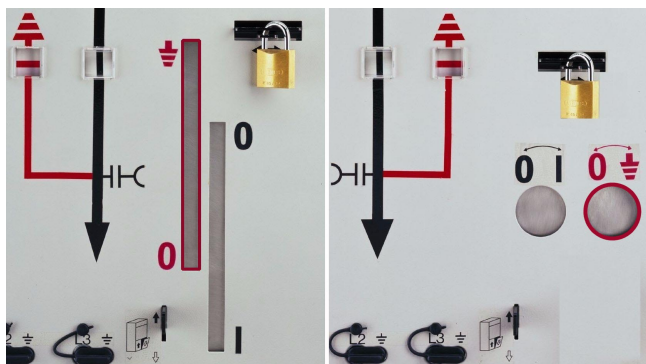


Fig. 43: Transformer feeder: If the red and black bar is visible, the switch-disconnector was tripped by a fuse link or a shunt release (see Section 14.2, Page 60).

For operation of the three-position switch there is an operating lever with black handle available.



Danger!

If the three-position switch-disconnector is operated with insufficient insulating gas pressure, this can cause an arc fault which will endanger the life of present people and damage the switchgear.

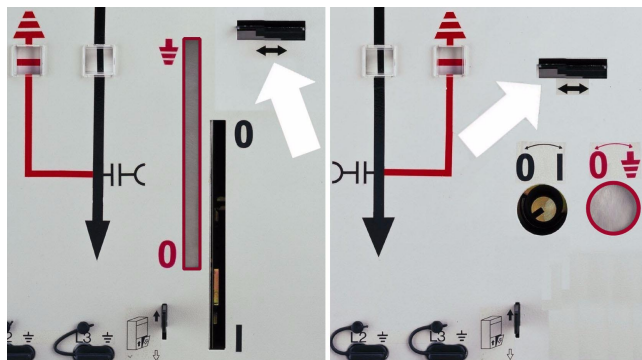
- ⇒ Do only switch if the ready-for-service indicator is in the green area.
- ⇒ If the ready-for-service indicator is in the red area, please observe Section 14.2, Page 60.

⇒ Check readiness for service.



⇒ Remove padlock (optional).

⇒ Push lever of locking device (if available) to the left and hold.



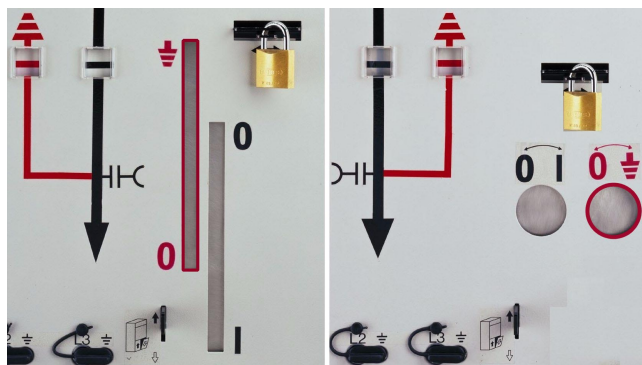
⇒ Insert operating lever into open switching gate at "I" position.

⇒ Move lever rapidly to "0."

⇒ Remove lever.

⇒ Push lever of locking device (if available) to the desired position and fix it there with the padlock (optional). Lever of locking device **on the left**: the switch-disconnector can be operated, **in the centre**: no switching operation possible, **on the right**: earthing and de-earthing is possible.

Now the feeder is open. The switch-position indicator in the mimic diagram is in "OPEN" position. The following figure shows the lever of the locking device in the centre position, i.e. no switching operations are possible.



Operation

12.3 Earthing

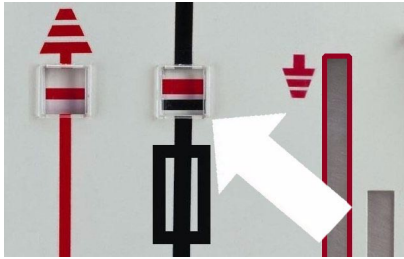
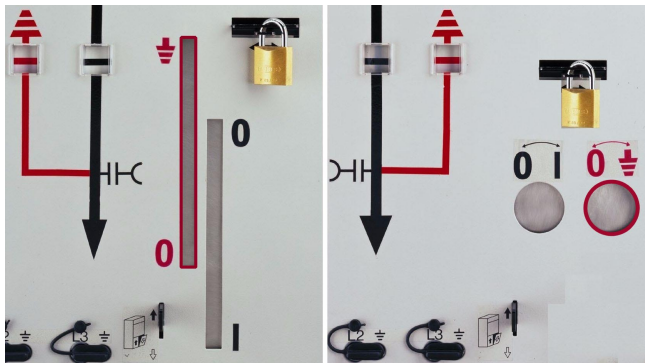


Fig. 44: Transformer feeder: If the red and black bar is visible, the switch-disconnector was tripped by a fuse link or a shunt release (see Section 14.2, Page 60).

For operation of the three-position switch there is an operating lever with black handle available. Optionally, the switchgear can be equipped with an insertion block for operation with different operating levers:

- Closing or opening the switch-disconnector: lever with black handle
- Earthing or de-earthing: lever with red handle



Danger!

If the three-position switch-disconnector is operated with insufficient insulating gas pressure, this can cause an arc fault which will endanger the life of present people and damage the switchgear.

- ⇒ Do only switch if the ready-for-service indicator is in the green area.
- ⇒ If the ready-for-service indicator is in the red area, please observe Section 14.2, Page 60.



Caution!

Earthing a live cable will cause a short circuit.

- ⇒ Verify safe isolation from supply of the feeder.
- ⇒ Check readiness for service.

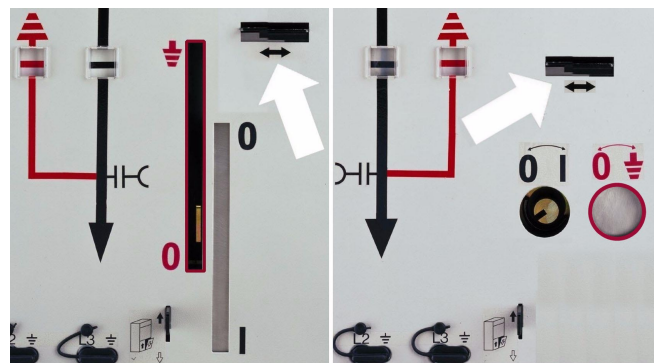
- ⇒ Check readiness for service.



- ⇒ Verify safe isolation from supply (see Section 13, Page 56).

- ⇒ Remove padlock (optional).

- ⇒ Push lever of locking device (if available) to the right and hold.



- ⇒ Insert operating lever into open switching gate at "0" position.

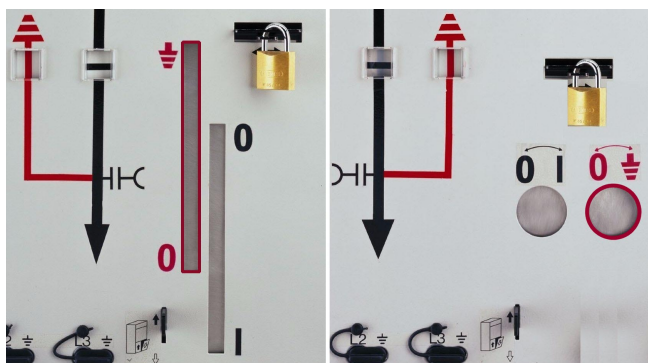
- ⇒ Move lever rapidly to the "EARTHED" position .

- ⇒ Remove lever.

- ⇒ Push lever of locking device (if available) to the desired position and fix it there with the padlock (optional). Lever of locking device **on the left:** the switch-disconnector can be operated, **in the centre:** no switching operation possible, **on the right:** earthing and de-earthing is possible.

Now the feeder is earthed. The switch position indicator of the earthing switch in the mimic diagram is in "EARTHED" position. The following figure shows the lever of the locking device in the

centre position, i.e. no switching operations are possible.



The cable compartment cover is unlocked at the same time and can be opened; in transformer feeders, the cover of the HV HRC fuse compartment too.

12.4 De-earthing

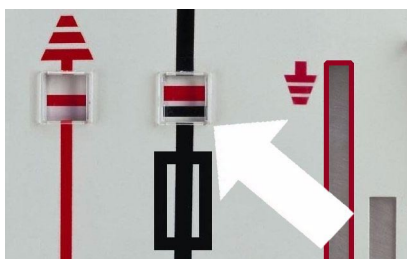
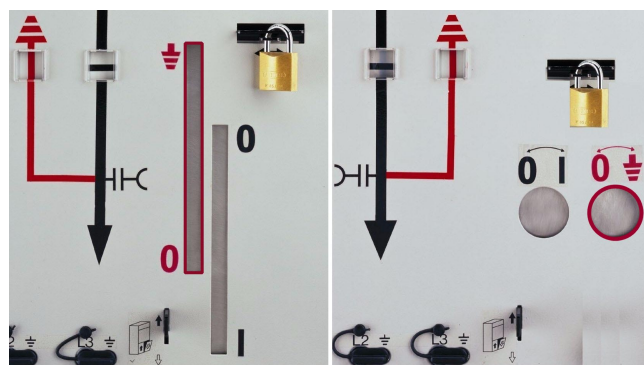


Fig. 45: Transformer feeder: If the red and black bar is visible, the switch-disconnector was tripped by a fuse link or a shunt release (see Section 14.2, Page 60).

For operation of the three-position switch there is an operating lever with black handle available. Optionally, the switchgear can be equipped with an insertion block for operation with different operating levers:

- Closing or opening the switch-disconnector: lever with black handle
- Earthing or de-earthing: lever with red handle

As a precondition for de-earthing after fuse replacement, the cover of the HV HRC fuse compartment and the cable compartment cover must be mounted and locked.



Danger!

If the three-position switch-disconnector is operated with insufficient insulating gas pressure, this can cause an arc fault which will endanger the life of present people and damage the switchgear.

⇒ Do only switch if the ready-for-service indicator is in the green area.

⇒ If the ready-for-service indicator is in the red area, please observe Section 14.2, Page 60.



Danger!

Touching live parts is dangerous for life. When the feeder is de-earthed, safe isolation from supply is not guaranteed anymore.

⇒ Ensure that the work on the equipment connected to the feeder has been completed and the equipment is insulated in a surge-proof way.

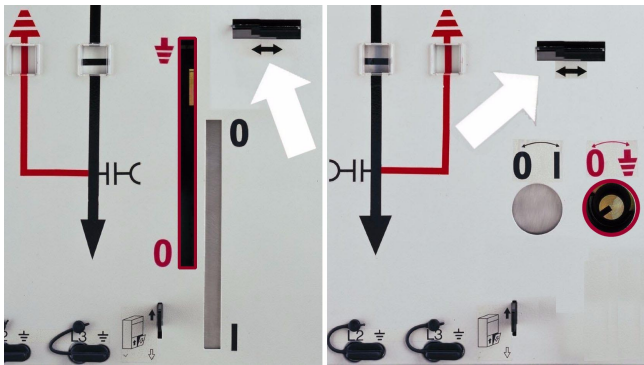
⇒ Check readiness for service.



⇒ Verify safe isolation from supply (see Section 13, Page 56).

Operation

⇒ Push lever of locking device (if available) to the right and hold.



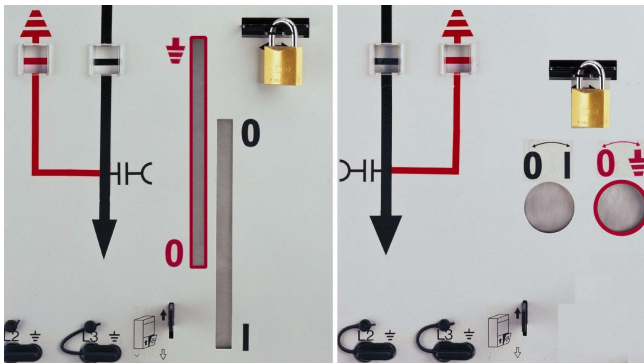
⇒ Insert operating lever into open switching gate at "EARTHED" position.

⇒ Move lever rapidly to the "0" position.

⇒ Remove lever.

⇒ Push lever of locking device (if available) to the desired position and fix it there with the padlock (optional). Lever of locking device **on the left**: the switch-disconnector can be operated, **in the centre**: no switching operation possible, **on the right**: earthing and de-earthing is possible.

Now the feeder is de-earthed. The switch position indicator of the earthing switch in the mimic diagram is in "OPEN" position. The following figure shows the lever of the locking device in the centre position, i.e. no switching operations are possible.



The cable compartment cover is locked at the same time; in transformer feeders, the cover of the HV HRC fuse compartment too. Both covers cannot be opened anymore.

13 Verification of safe isolation from supply

Safe isolation from supply can be verified either with a HR indicator or with a CAPDIS system.

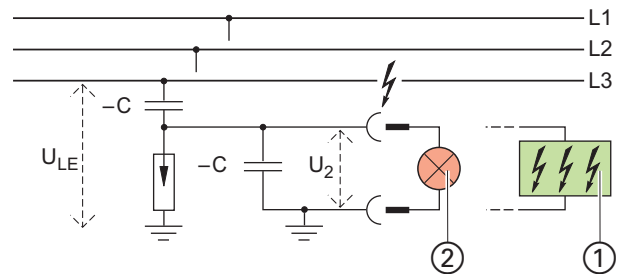


Fig. 46: Voltage indication via capacitive voltage dividers (principle)

① CAPDIS installed

② HR system plugged in

–C1 capacity integrated into bushing

–C2 capacity of connection leads and of the voltage indicator to earth

$U_{LE} = U_N / \sqrt{3}$ during rated operation in the three-phase system

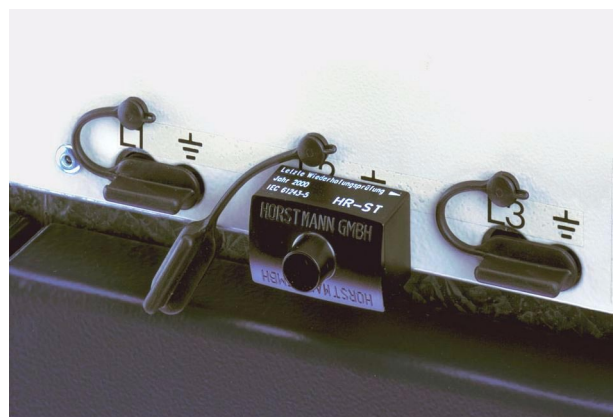
$U_2 = U_A$ = voltage at the capacitive interface of the switchgear or at the voltage indicator

13.1 Verification of safe isolation from supply with the HR voltage indication system

You must ensure that the feeder you want to work on is not live, e.g. for replacing fuse links on transformer feeders or for cable testing.

For this reason you need a voltage indicator (e.g. HR-ST, make Horstmann).

To test the perfect operation of the indicator it is recommended to verify isolation from supply with applied voltage.



You can verify the safe isolation from supply of the feeder at the capacitive test sockets. These are located below the switch position indicators of the feeder.

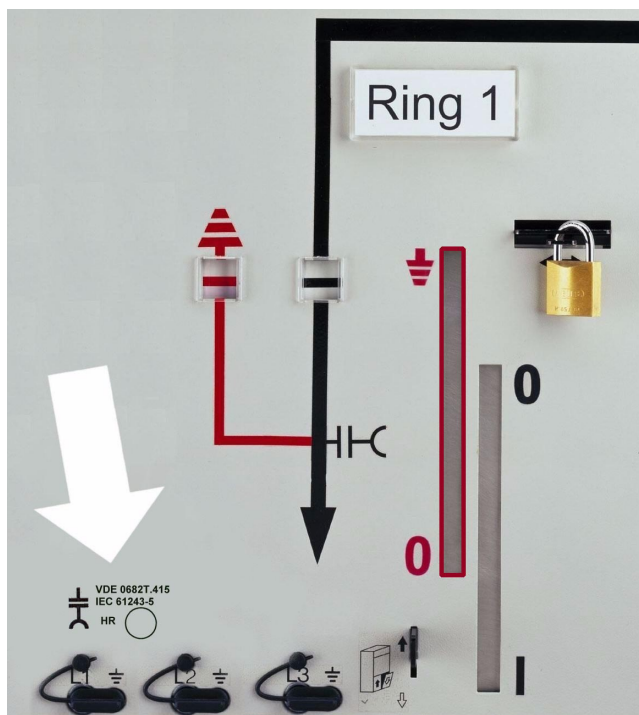


Danger!

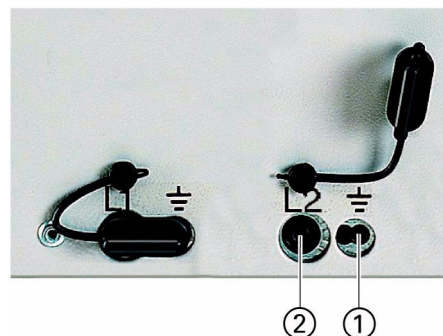
The function of the surge arrester installed is not guaranteed anymore if short-circuiting jumpers are used.

⇒ Use voltage indicators or devices for testing the function of the coupling section according to DIN VDE 0682, Part I 415 (Draft) only. (There have been no changes as against the old standard VDE 0681T7 regarding the interface conditions, so that the corresponding indicators can still be used)

⇒ Make sure that the repeat test according to VBG4 was carried out. The year of the first or last repeat test is shown over test socket L1. HR points at the high-resistance voltage indication system (the alternatively used low-resistance system is identified with LRM).



⇒ Remove the covers of the capacitive test sockets.
 ① Earthing socket, ② Capacitive test socket for L2



⇒ Insert the voltage indicator consecutively in all three test sockets. If the indicator does not flash or light up in any of the three test sockets, the feeder is not live.

⇒ Repeat the test in all three test sockets.

⇒ Refit the covers of the test sockets to protect them from pollution.

If the indicator does not flash or light up in any case, the feeder is not live. Now you can earth the feeder.

Operation

13.2 Verification of safe isolation from supply with the integrated voltage detection system CAPDIS-S1

Verification of safe isolation from supply with CAPDIS-S1 corresponds to IEC 61243-5 (VDE 0682 T 415). Behind a cover, the device contains one LRM test socket according to IEC 61243-5 per phase for phase comparison via standard LR or LRM phase comparison test unit. The test sockets can also be used to perform voltage testing with plug-in indicators.

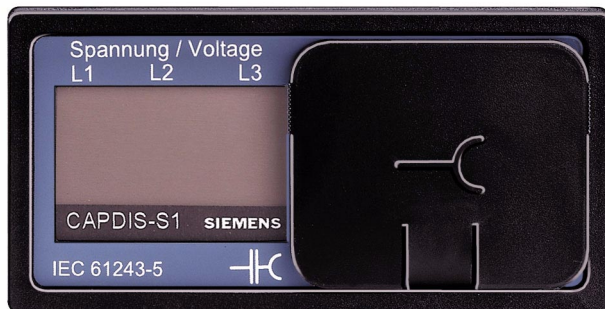
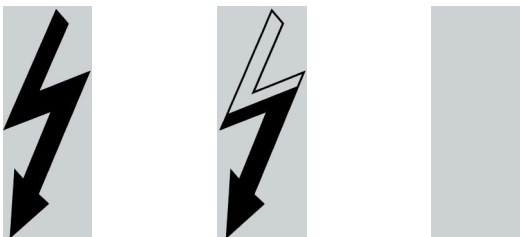


Fig. 47: Voltage detection system CAPDIS-S1



Rated voltage present on the corresponding phase. Repeat test passed.	Voltage present on the corresponding phase, but the measuring signal is not in order.	Corresponding phase is not live.
--	---	----------------------------------

⇒ If applicable, determine and eliminate source of fault.

14 Indications and their handling

14.1 Ready-for-service indicator in the red area

If the pointer of the ready-for-service indicator of the switchgear is in the red area, the SF₆ gas filling is not sufficient to operate the switchgear.

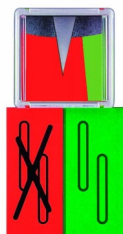


Fig. 48: Ready-for-service indicator in red area

The ready-for-service indicator is located on the left side of the control board.



Fig. 49: Location of ready-for-service indicator

The switchgear concerned must be isolated and taken out of operation.

Taking the switchgear out of operation



Danger!

If the three-position switch-disconnector is operated with insufficient insulating gas pressure, this can cause an arc fault which will endanger the life of present people and damage the switchgear.

⇒ Do not operate the three-position switch-disconnector of the feeder concerned under any circumstances as long as the feeder is live.

Procedure

- ⇒ Disconnect the feeders concerned **in the opposite substations** and secure them against reclosing.
- ⇒ Verify safe isolation from supply on the switchgear concerned with **closed switch-disconnector**.
- ⇒ Earth the corresponding feeders in the opposite substations leaving the switch-disconnector of the switchgear concerned closed.

The switchgear concerned is now isolated and out of operation. It represents no danger anymore.

Replacing the switchgear



Danger!

Reclosing parts of the switchgear that has been taken out of operation before the switchgear is replaced can cause an arc fault which will endanger the life of present people and damage the switchgear.

⇒ Do not reclose parts of switchgear that have been taken out of operation.

⇒ Please contact the Siemens Service Centre to replace the switchgear concerned.

Operation

14.2 Red bar in the switch position indicator of the switch-disconnector in the transformer feeder

If the switch position indicator of the switch-disconnector in the transformer feeder shows an additional red bar to the black bar, the switch-disconnector was tripped by a fuse link or a shunt release.

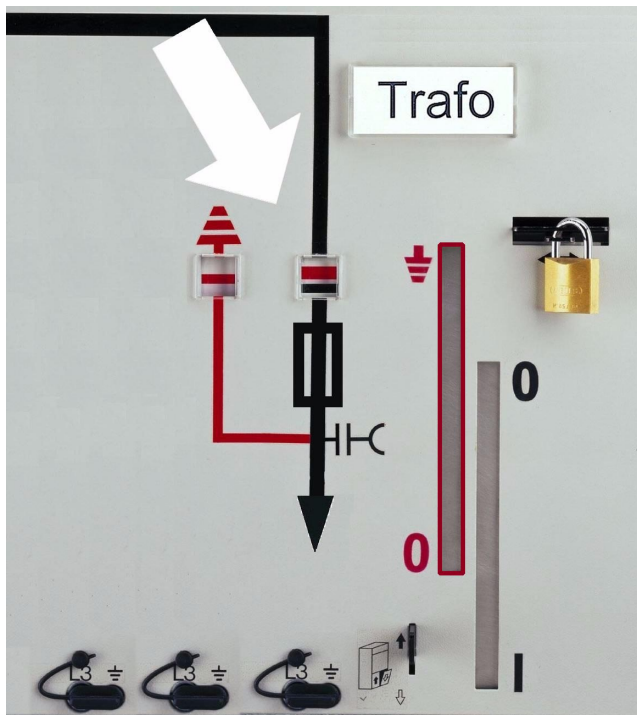


Fig. 50: Additional red bar in the switch position indicator of the switch-disconnector in the transformer feeder

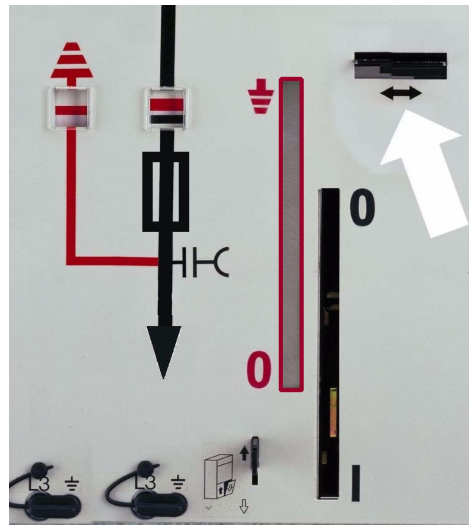
If this indication appears, normally there is a fault (e.g. short-circuit in the transformer).

The switch-disconnector was tripped by a stored-energy mechanism. The position of the operating mechanism does not correspond to the position of the switch-disconnector.

Trouble shooting

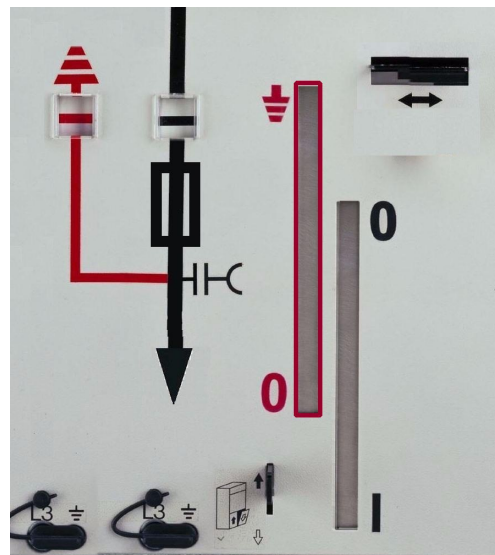
- ⇒ Determine which of the protection devices (e.g. the shunt release) has tripped the switch-disconnector and why.
- ⇒ Clear the fault.
- ⇒ Check readiness for service.
- ⇒ Remove padlock (optional).

- ⇒ Push lever of locking device (if available) to the left and hold.



- ⇒ Insert operating lever into open switching gate at "I" position.
- ⇒ Move lever rapidly to "0".
- ⇒ Remove lever.

Now the position of the operating mechanism corresponds to the position of the switch-disconnector again. The stored-energy of the switch-disconnector is charged again and the switch position indicator of in the transformer feeder shows just a black bar.



- ⇒ Push lever of locking device (if available) to the right and hold.
- ⇒ Insert operating lever into open switching gate at "0" position.
- ⇒ Move lever rapidly to the "EARTHED" position .

⇒ Push lever of locking device (if available) to the desired position and fix it there with the padlock (optional). Lever of the locking device **on the left**: the switch-disconnector can be operated, **in the centre**: no switching operation possible, **on the right**: earthing and de-earthing is possible.

Checking fuse links

⇒ Should one or more fuse links have responded, replace all three fuse links in any case (see Section 15, Page 62).

After that you can reclose the feeder.

14.3 Short-circuit indicator red

The short-circuit indicator available as additional equipment is located on the front cover. It shows which phase had or still has a short circuit with a current exceeding the operating threshold. The operating threshold is marked on the indicator with a point.

Depending on the version, the short-circuit indicator can be reset manually or automatically after a specified time.

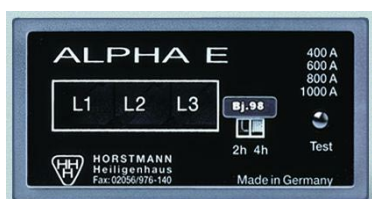


Fig. 51: Example: short-circuit indicator Alpha E

The short-circuit indicator is located close to the corresponding feeder symbol in the mimic diagram.



⇒ Determine and clear the cause of short circuit.

15 Replacing HV HRC fuse links

The fuse links of a transformer feeder must be replaced, e.g. after fuse tripping.

An overview of applicable HV HRC fuse links is given in the description (see Section 9.3, Page 23).

Isolating

- ⇒ Disconnect the transformer feeder (see Section 12.2, Page 53).
- ⇒ Verify safe isolation from supply (see Section 13, Page 56).
- ⇒ Earth the feeder (see Section 12.3, Page 54).

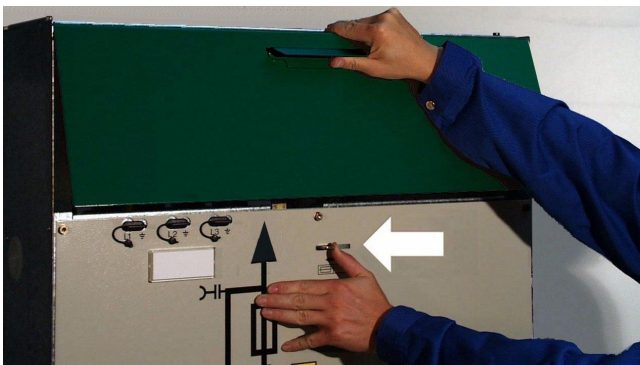
Removing the cover of HV HRC fuse compartment

The cover of the HV HRC fuse compartment can only be unlocked if the earthing switch is in "EARTHED" position.

When the cover is unlocked, the earthing switch is locked in the "EARTHED" position.

The cover of the HV HRC fuse compartment is located over the control board.

- ⇒ Push unlocking lever of the cover of the HV HRC fuse compartment to the left, lift the cover of the HV HRC fuse compartment and remove it to the top.



Withdrawing the fuse slide

The HV HRC fuse links are mounted on slides in the individual fuse boxes.

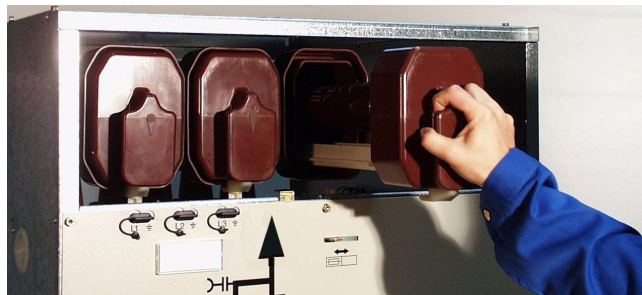


Danger!

HV HRC fuse links can be hot.

- ⇒ Do not touch fuse links.
- ⇒ Let hot fuse links cool down.

- ⇒ Withdraw HV HRC fuse slide with fuse link.



- ⇒ Proceed in the same way with the HV HRC fuse slides of the two other phases.

Replacing HV HRC fuse links

- ⇒ Take HV HRC fuse links out of the contact springs.



- ⇒ Fit new HV HRC fuse links into the contact springs observing the striker pin position. The arrow on the HV HRC fuse points at the housing cover.
- ⇒ If extension tubes are necessary, they must always be mounted on the opposite side of the housing cover.

Inserting the HV HRC fuse slide



Caution!

Incorrectly mounted fuse links can damage the fuse box or the switchgear.

⇒ Do not mount fuse links with dimension $e=292$ mm at $U_r > 17.5$ kV.

⇒ Push the HV HRC fuse slide through the guide slot into the HV HRC fuse box until it latches tight.



⇒ Same procedure with the HV HRC fuse slides of the two other phases.

Closing the cover of the HV HRC fuse compartment

⇒ Fit the cover of the HV HRC fuse compartment from above and let it slip down. The cover of the HV HRC fuse compartment will protrude approx. 3 cm at the bottom.

⇒ Push the cover of the HV HRC fuse compartment in at the bottom. Due to the rail provided at the rear, the cover can only be closed if the HV HRC fuse slides have latched correctly.



⇒ Push the lock on the control board to the right. In this way, the cover is locked again and the interlock of the earthing switch is released.

Operation

16 Cable testing

This section describes how to prepare and perform a cable test, e.g. to detect a fault on the cable.



Danger!

Cable test with connected cables means a special stress for the isolating distance.

⇒ If the busbar of the testing station or the opposite station is live through the feeder that does not have to be tested, you must take special measures (e. g. surge arresters) in order to prevent surges (e. g. lightning impulse voltages).

Isolating



Danger!

Switching operations on circuit 01 (scheme transformer panel) have no influence on the condition of the incoming cable! The same applies to switching operations on scheme 02 for the right cable feeder. Before removing the covers of the cable compartment

⇒ isolate the incoming cable in opposite station,
⇒ secure it against switching on again,
⇒ check safe isolation from supply,
⇒ earth and
⇒ short the feeder (DIN VDE 0105)!

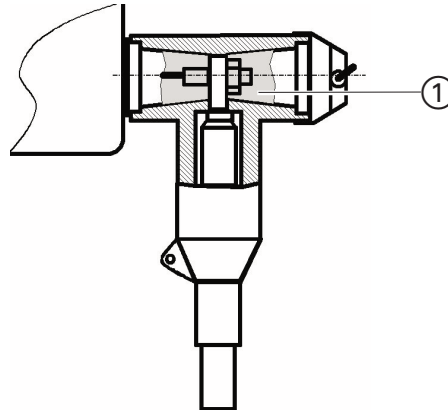
⇒ Disconnect the feeder to be tested.
⇒ Ensure that the feeder in the opposite substation is also isolated.
⇒ Secure the feeder against reclosing.
⇒ Verify safe isolation from supply.
⇒ Earth the feeder.

Preparations

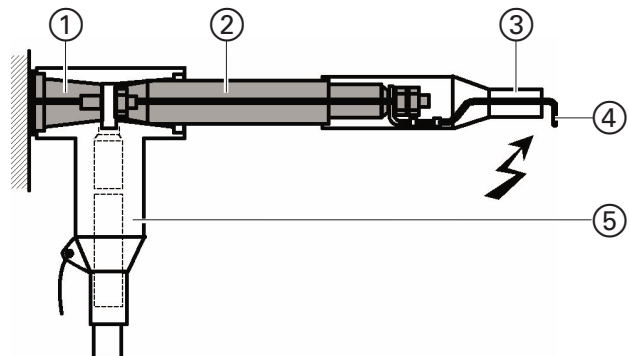
⇒ Remove the cable compartment cover. To do this, press the unlocking lever down and keep it in this position, lift the cable compartment cover and remove it to the front.

⇒ Undo the screw-type cone at the T-plug.

① Screw-type cone (to be removed for cable testing).



⇒ Fit cable testing equipment (e.g. measuring bolts) according to the operating instructions of the plug manufacturers (items ② - ④ are from the product range of the plug suppliers). ① Bushing ② Measuring bolt ③ Insulating cap ④ Test cable ⑤ T-plug



Testing

- ⇒ De-earth.
- ⇒ Perform test in accordance with DIN VDE 0298 Part 1, 15 minutes as a maximum.
The DC test voltage for switchgear with a rated voltage of 12 kV is 48 kV as a maximum, for switchgear with a rated voltage of 24 kV, 70 kV as a maximum.
- ⇒ Disconnect DC test voltage.

After test completion

- ⇒ Verify safe isolation from supply.
- ⇒ Earth the feeder to be tested.
- ⇒ Remove cable testing equipment.
- ⇒ Fix screw-type cone on T-plug.
- ⇒ Fit and lock cable compartment cover.
Now you can de-earth and reclose the feeder.

Index

A

Adapters for conventional cable sealing ends	32
Austauschen, Anlage	59
Auxiliary voltages	20

C

Cable connection	15
Cable testing	64
CAPDIS	58
Checking final assembly work	41
Checking the gas filling	28
Checking the rating plate	41
Checking the type plate	41
Closing the switch-disconnector	52
Commissioning	42
Completeness	26
Connecting auxiliary circuits	40
Control voltages	20

D

Data	20
De-earthing	55
Disconnecting and earthing	51
Disposal	25

E

Earthing	54
Earthing and disconnecting	51
Earthing the switchgear	30
Electrical data	20

F

Final assembly work	41
Fuse links, replacing	62

H

High voltage, switching on (commissioning)	44
HV HRC fuse assembly	13
HV HRC fuse links, replacing	62

I

Indications	59
Interlocking systems	17

L

Locking devices	17
Low subframe	31

M

Maintenance	25
Mechanical commissioning	42

O

Opening the switch-disconnector	53
Operating mechanisms	12
Overview, levers	47, 48

R

Rating plates	23
Ready-for service indicator in the red area	59
Ready-for-service indicator	16
Red bar in the switch position indicator of the switch-disconnector in the transformer feeder	60
Red short-circuit indicator	61
Removing from the wooden pallets	28
Replacement of components	25
Replacing HV HRC fuse links	62

S

Safety instructions	46
Servicing	25
Short-circuit indicator, red	61
Spring-operated mechanism	12
Stored-energy mechanism	12
Switch-disconnector, closing	52
Switch-disconnector, opening	53
Switching on high voltage	44
Switching on incoming feeder (commissioning)	44
Switching on outgoing feeder (commissioning)	44

T

Technical data	20
Test operation	42
Testing cables	64
Three-position switch-disconnector	11
Tools	28
Transformer feeder cable	33, 35
Transport damages	26

V

Verification of correct terminal-phase connections ..	38
Verification of safe isolation from supply	56, 58
Voltage detection system	58

Impressum

Produktion

Eine Produktion der

Siemens AG

PTD M TI C

Power Transmission and Distribution, Medium
Voltage, Technique&Innovation, C-Technologies

Schaltanlagenwerk Frankfurt)

Carl-Benz-Str. 22

D-60386 Frankfurt

© Siemens AG 2001