

**Instructions for Assembly,
Operation and Maintenance of
DRIESCHER - Indoor
Vacuum Circuit-Breakers**

- Rated voltage
12 kV to 38.5 kV
- Rated current
630 A to 2500 A



V625

**ELEKTROTECHNISCHE WERKE
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DRIESCHER - Indoor Vacuum Circuit-Breaker

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Warning

During the operation of these electrical switchgears certain parts are inevitably exposed to dangerous voltage and mechanical parts may move very quickly, also via remote control.

There is a risk of serious injury to the body or to property if the warning instructions are not correctly observed.

Only appropriately trained personnel are to work on this equipment or in the vicinity thereof.

These persons are to be completely familiar with all warnings as well as repair and maintenance measures as specified in these operating instructions.

Correct transport and appropriate storage, mounting and assembly as well as the correct operation and maintenance are prerequisites for the satisfactory and safe operation of this equipment.

General

The Driescher vacuum circuit-breakers are in compliance with the regulations IEC 62271-100 + A1, IEC 60694 and DIN VDE 0671.

The three-pole indoor circuit-breakers are designed for a rated voltage ranging from 12 to 38.5 kV and a rated current ranging from 630 to 2500 A.

Transport and Storage

Once you have received the delivery please carefully unpack the switch and check for any transportation damage.

Should you determine any damage please report this immediately to us and the carriers.

After unpacking clean the switchgears and accessories to remove any contamination from packing material and protect against moisture and contamination prior to installation. To transport the switchgears only hold at the frame and never touch the vacuum poles.

Operating Conditions

The switches are designed for normal operating conditions in compliance with DIN VDE 0670, Part 1000, and IEC 60694 Class "Minus 5 Indoors".

The max. ambient temperature is 40°C; the average value over 24 hours is max. 35°C. The values on insulation strength are related to sea level.

For altitudes of up to 1000 m any reduction in insulation caused by the reduced insulating property of the

air is insignificant and can be ignored.

For installation at altitudes above 1000 m it is necessary to correct the values given for the rated power-frequency withstand voltage and the rated lightning impulse withstand voltage.

According to VDE 0670 / Part 6 the insulating property of the clearance at an altitude of e.g. 2000 m is reduced by the factor 0.81.

Technical Data

DRIESCHER - Indoor Vacuum Circuit-Breakers

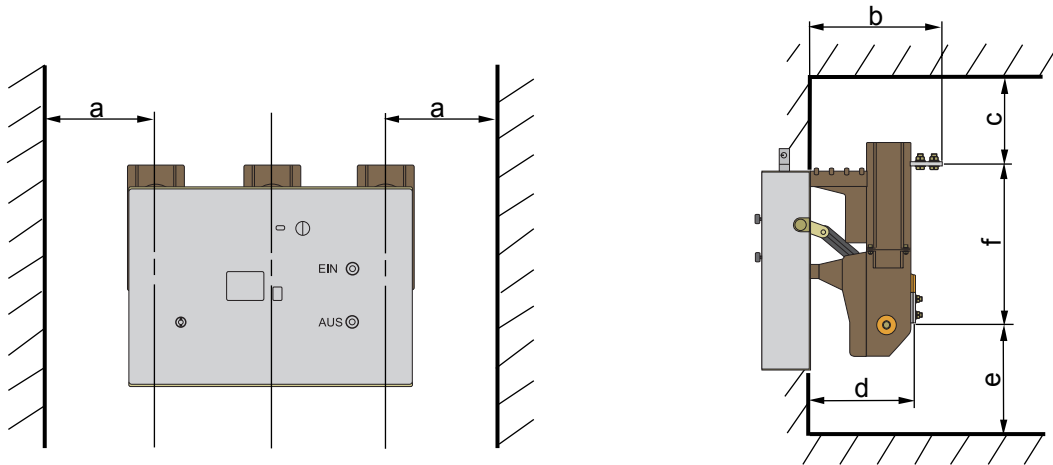
The type tests and also tests corresponding to the EVS thunderstorm cycle have been carried out by independent accredited testing organizations (FGH Mannheim and IPH Berlin). The circuit-breakers conform with the requirements of VDE 0671 and IEC 62271-100 + A1.

Rated voltage	Rated power frequency withstand voltage	Rated impulse withstand voltage	Rated frequency	Transient recovery voltage	Rate of rise of TRV	Closing time approx.	Arcing time	Opening time approx.	Rated short circuit breaking current	Rated short circuit making current	Rated short-time current	Rated short-circuit duration	Rated peak withstand current	Rated current A						
														kV	kV	kV	Hz	kV	kV/ μ s	ms
12	28	75	50	21	0,34	65	<17	65	25	62,5	25	2	62,5	●						
									25	62,5	25	3	62,5		●					
									32	80	32	2	80	●						
									32	80	32	3	80		●	●	●	●	●	
24	50	125	50	41	0,47	65	<17	65	25	62,5	25	2	62,5	●						
									25	62,5	25	3	62,5		●	●	●			
36	70	170	50	66	0,57	65	<17	65	20	50	20	3	50	●						
									20	50	20	3	50		●					
38,5	80	180	50	66	0,57	65	<17	65	20	50	20	3	50	●						
									20	50	20	3	50		●					

Types:

	V...KUF with motorized actuator for front-panel mounting	V..25 KUF	V..25 KUF	V..20 KUF	V..20 KUF
	V...BKF with coil spring stored energy mechanism for front-panel mounting	V..32 BKF			
Rated voltage	kV	12	24	36	38,5
Mechanical service life (number of operating cycles)					
- of the vacuum interrupter		30 000	30 000	15 000	15 000
- of the breaker mechanism		10 000	10 000	10 000	10 000
Possible operating cycles of the vacuum interrupter					
- at rated current		30 000	30 000	15 000	15 000
- at rated short circuit making current		50	50	30	30
max. contact erosion	mm	2	2	2	2
Rated switching action sequence		O - 0.3 s - CO - 15 s - CO for manual actuator O - 3 min - CO for motorized actuator			

Terminal Zones



Marked: Circuit-Breaker 12 kV / 1250 A

For circuit-breakers with a rated voltage of 24 kV, 36 kV or 38.5 kV the terminal zones increase in size on the basis of the busbar connection, as shown in this table.

Rated voltage kV	Rated current A	a mm	b mm	c mm	d mm	e mm	f mm
12	630	145	265	145	260	230	367
	1250		305				
	1600						
	2000		205				
	2500						
24	630	245	365	245	360	330	367
	1250		405				
	1600						
	2000						
36	630	355	475	355	470	440	492
	1250		515				
38,5	630	355	475	365	470	440	492
	1250		515				

Weight

The weight of a vacuum circuit-breaker is approx. 95 kg.

Assembly

All breakers of the V... Type series are suitable for vertical installation (related to the vacuum interrupters). For assembly in switchgear cubicles or on switchgear trucks, always observe the following: The switchgears must always be mounted on an adequately stable framework structure.

The switchgears can be attached at 8 bores on the lower and upper side of the breaker frame. Two holes are provided with M12 installer nuts respectively. Do not distort the base frame of the circuit breaker when fastening.

Compensate any unevenness with shims.

Adjust the busbars in such a way that they rest flat without constraint and with overlapping holes on the contact surfaces of the vacuum circuit breaker, prior to tightening.

Prior to tightening the screws, carefully treat the mating surfaces of the busbars and vacuum circuit breaker by applying strokes with a steel brush in crosswise action until bright and wipe of any residue with a clean cloth.

Apply a thin coat of acid-free Vaseline to the bright contact surfaces and then screw together immediately. For this connection use bolts and nuts M12 – property class 8 – and the appropriate spring elements and washers.

Attention! When tightening the connecting bolts to a tightening torque of 70 Nm, always hold in place using an appropriate second wrench or box wrench.

To prevent vibrations of the vacuum circuit-breaker from reaching other sensitive system elements we recommend inserting flexible intermediate pieces between the breaker connections and busbars. This applies in particular when the busbar connections to the next device are very short. (Flexible connection pieces can also be provided upon request)

Earthing

Use the marked bore on the upper side of the circuit breaker frame to earth the circuit breaker.

Interlocking Mechanisms

General

Electrical and mechanical interlocking mechanisms make sure that it is only possible to switch on the circuit breaker when the spring-loaded energy storage mechanism is loaded and thus has energy stored to carry out a On-Off switching operation.

This ensures that the last possible switching operation is always an opening operation, even if the motor or control voltage should fail.

In circuit-breakers of withdrawable design always make sure that the switchgear truck can only be driven into operating or disconnecting position when the circuit breaker is switched off and with connected plug connector.

Interlocking mechanisms also ensure that the truck cannot be removed from the switch panel before the plug connector has been disconnected.

Mechanical interlocking mechanism

Operating mechanisms of disconnecting switches can be equipped with a mechanical switchgear interlocking. For this purpose the disconnecting switch is mechanically interlocked with the associated circuit-breaker.

The scanning parts scan the position of the circuit breaker and block its mechanical and electrical closing if the associated disconnecting switch is in intermediate position.

On the other hand, it prevents any actuation of the disconnecting switch when the circuit-breaker is closed.

Electrical interlocking mechanism

Circuit breakers can be incorporated in electromagnetic branch or system interlocking mechanisms. In the case of the electrical interlocking there is a magnetic lockout mechanism attached to the disconnecting switch or its operating mechanism, where the lockout mechanism is actuated via an auxiliary contact of the circuit-breaker in such a way that the disconnecting switch can only be operated when the circuit breaker is open.

On the other hand, the circuit breaker is actuated by the disconnecting switch or its operating mechanism in such a way that it can only be closed in the end positions of the disconnecting switch. For this purpose the electrical manual actuation must be provided in the circuit breaker operating mechanism.

Auxiliary switches

For control and signalling purposes the circuit-breakers are fitted with auxiliary switches.

These are installed in the covered base frame and are wired to the terminal board (page 10, para. 9). Their individual contacts are set at the factory to be make or break contacts or pulse contact elements, according to the details supplied.

To achieve the longest possible pulse duration for pulse contact elements, one break contact and one make contact are connected in series and are set to overlap.

Should it be necessary for one or the other contact to serve the opposite function, it is possible to make the necessary changes in a few simple steps.

Shunt releases

can be provided for DC or AC. They are applied in most cases as they are suitable for both remote control and automatic protection. However, a pre-condition for their use is the availability of an auxiliary voltage supply which, for protection purposes, must be independent of the network.

The coil is designed for a short-time current only, so the circuit is looped through an auxiliary contact actuated by the operating shaft, and this breaks the circuit after the switching operation has been effected.

Under-voltage releases

These tend to be used when circuit-breakers are to be opened automatically if the mains voltage should drop too low or fail completely.

As soon as the voltage drops below 35 % of the rated level, the releases operate and unlock the opening operation of the circuit-breaker.

Indirect releases

The sole function of these releases is automatic fault clearing in cases of overload or short-circuit fault. This type of release is used if no auxiliary voltage supply is available independent of the mains supply.

Indirect releases are included in the secondary circuit of feeder current transformers and are energised when the associated protective relay is activated. To protect the release contacts of the protective relays from overload it is usually necessary to interpose an auxiliary transformer which reduces the current of the main transformer and limits it to an acceptable level by means of saturation. (auxiliary transformers are installed separately from the circuit-breaker are not supplied as standard).

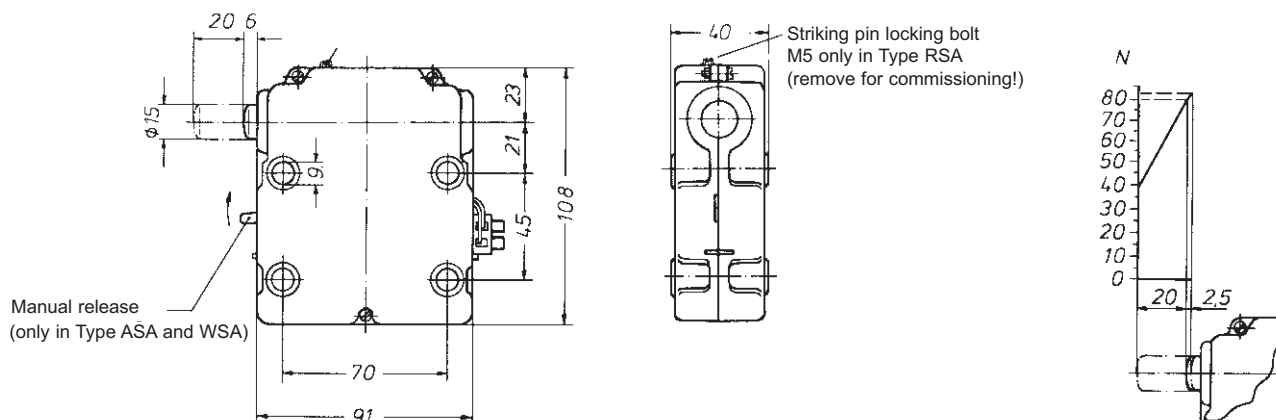
Breaker tripping signal

When switching off the vacuum switch by means of a release, the position switch makes a brief contact. This contact making can be used for a signal. For intentional mechanical opening, a cut-out switch breaks the contact.

Varistor module

The disconnection of inductive loads in DC circuits can cause switching surges which endanger the electronic control equipment. In order to prevent this hazard the inductance of the breaker operating mechanism and the control (motor, closing coil, shunt release and auxiliary protection) is connected to varistors in the case of DC operation.

Illustration of the Release



Type	Rated current (A)	Rated voltage (V)	AC operation		DC operation		
			Consumption (VA)	Part no.	Rated voltage (V)	Consumption (W)	Part no.
• Shunt release							
ASA	-	-	-	-	12	56	772 04012
ASA	-	-	-	-	24	56	772 04024
ASA	-	-	-	-	48	88	772 04048
ASA	-	-	-	-	60	56	772 04060
ASA	-	100/110	105	772 03110	110	57	772 04110
ASA	-	230	110	772 03220	220	50	772 04220
• Under-voltage release							
RSA	-	-	-	-	24	10	772 05024
RSA	-	-	-	-	48	10	772 05048
RSA	-	100/110	19,5	772 05110	60	10	772 05060
RSA	-	-	-	-	110	10	772 05115
RSA	-	230	19,5	772 05220	220	10	772 05225
• Transformer-operated release							
WSA	0,5	-	18	772 06005	-	-	-
WSA	1,0	-	18	772 06010	-	-	-
WSA	5,0	-	18	772 06050	-	-	-

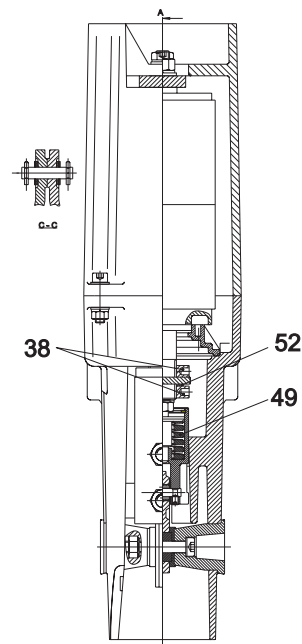
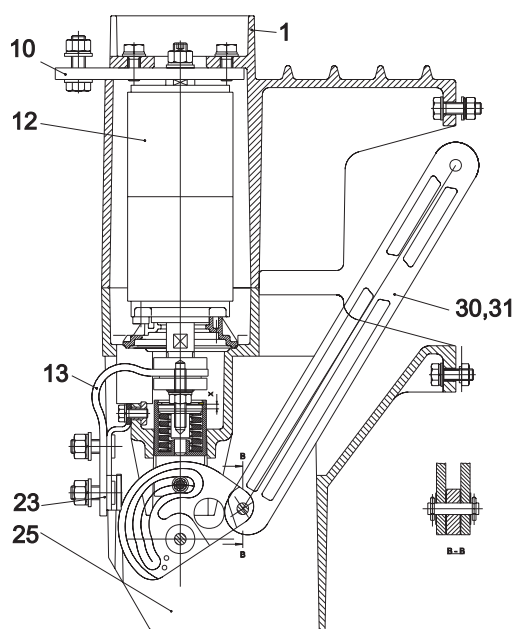
Motor Operating Mechanism

Motors can optionally be delivered for AC or DC systems.

The motors operate in short-time duty (S2).

The supply voltage should not deviate from the rated supply voltage by more than -15% to +10%.

Motor voltage (V)	Current input (A)	Consumption (VA)	Consumption (W)	Charging time (s)	Motor protection switch	
					..A	(A)
110 AC	2,2	242		8,2	2,5 - 4	2,5
230 AC	1,2	276		7,8	1 - 1,6	1
24 DC	8,8		211	9,3	10 - 16	11
48 DC	4,5		216	7,3	4 - 6,3	4,4
60 DC	4,5		270	5,7	4 - 6,3	4,6
110 DC	2,2		242	8,2	2,5 - 4	3
220 DC	1,3		286	8,8	1 - 1,6	1,1



The Driescher vacuum circuit-breakers are three-pole indoor circuit-breakers for a rated voltage ranging from 12 to 38.5 kV.

The switchgear comprises an operating mechanism with spring-loaded energy storage mechanism and control elements as well as the three circuit-breaker poles with vacuum interrupters.

Operating mechanism (refer to page 10)

The operating mechanism is closed by a removable cover. The circuit-breaker is switched on via the operating linkage B by actuating the On push-button (1) or through the operation of a release (7).

The motion transmission to the vacuum interrupter chambers is carried out via insulating bars (S.8, 30). The motor (2) immediately charges the spring-loaded energy storage mechanism (3) via the screw gearing (F). If the supply voltage should fail, the spring-loaded energy storage mechanism can be charged by means of a crank (4).

The energy storage state is indicated (5).

The circuit-breaker is switched off by actuating the Off push-button (6) or upon operation of a release (7.1). The electrical components (8) (e.g. auxiliary switches) are arranged above the spring-loaded energy storage mechanism.

The 50-pin plug connector (9) is mounted on the outside of the breaker frame.

Vacuum interrupters (see above)

The vacuum interrupters are housed in moulded parts of Duroplast insulating material on epoxide glass-fibre basis (1) and (25).

This protects them against damage during transport, assembly etc. The design of the moulded parts means that insulators can be omitted and thus enables a very compact circuit-breaker design.

A further advantage of this design is that the breaker pole can be removed in one piece.

The kinematics described also has the advantage that in both open and closed state the poles are free of forces from the stored energy mechanism, nor do they apply any forces (e.g. those of the opening springs or contact pressure springs) to the operating bars (30, 31). The spring (49) ensures that the necessary contact pressure is maintained and compensates for the contact burn which is permissible over the entire life span of the circuit-breaker.

The current flow in the breaker pole flows from the upper connection (10) to the fixed contact of the vacuum interrupter (12). The laminated contact ribbon (13) is bolted with perforated nuts to the moving contact of the vacuum interrupter with interposed safety element (52). The pressure welded end of the contact ribbon forms the lower pole contact surface which is supported by the contact arm (23).

The burn of the contacts in the vacuum interrupter can be monitored using the "M" mark (refer also to page 11).

With withdrawable switchgears on trucks this can be carried out without necessitating further dismantling.

The installed vacuum interrupters are type approved in compliance with the X-ray ordinance of the Federal Republic of Germany.

Commissioning and Operation



Vacuum-Circuit Breaker

Commissioning

Each and every switch is adjusted and tested prior to leaving the factory! Nevertheless, satisfactory operation of the switchgear should be checked prior to commissioning. When doing this, please observe the following points.

1. Carefully clean vacuum poles to remove swarf from the assembly and any dust. Wipe all insulating parts with a dry cloth.
2. Check switchgear for external damage (control cables, vacuum poles).
3. Charge the energy storage mechanism using crank, then switch on with the ON push-button and subsequently switch off by actuating the OFF push-button.
4. In circuit-breakers with under-voltage releases, please make sure to remove the locking screw (page 7).
5. For trial operation with motor operated mechanism, the control and signalling lines must be connected as shown in the circuit diagram glued to the cover flap and the circuit diagram of the system.



Immediately after connection to the control voltage the motor charges the energy storage mechanism!

6. Prior to commissioning the circuit-breaker please always check all possible forms of actuation such as manual or manual emergency actuation, electrical remote control, tripping of faults as well as auxiliary switches and shunt releases for satisfactory operation.

Operation

Always observe the following when operating the circuit-breaker:

The position display ⑩ indicates whether the circuit breaker is in switched on or switched off state.

The circuit breaker can be switched on or off by actuating the push-buttons ①, ⑥.

The stored energy mechanism position ⑤ indicates whether the breaker is in a charged state.

In this case, the last operation is always an opening operation in order to be able to switch the circuit-breaker off in the event of control voltage failure.

The stored energy mechanism ④ can be recharged using a crank if the supply voltage should fail.



Only charge the stored energy mechanism using original crank!

The total number of switching operations of the circuit-breaker can be read from counter ⑪.

General

Our products have been on the market for many years and hundreds of thousands of these switching devices are used successfully. We are able to say that the quality of our products is distinguished by a high level of ruggedness and operational safety and reliability. To guarantee that the requirements put to the switching devices are met and to avoid any possible power failures, appropriate maintenance, inspection and possible repair measures are necessary to provide a reliable power supply, wherein the measures taken depend on the age of the switching devices, its switching frequency and the level of the operated rated current.

Inspection and maintenance

This vacuum circuit-breaker is extremely low in maintenance.

It is merely necessary to grease the stored energy unit every 1000 switching operations (refer to b).

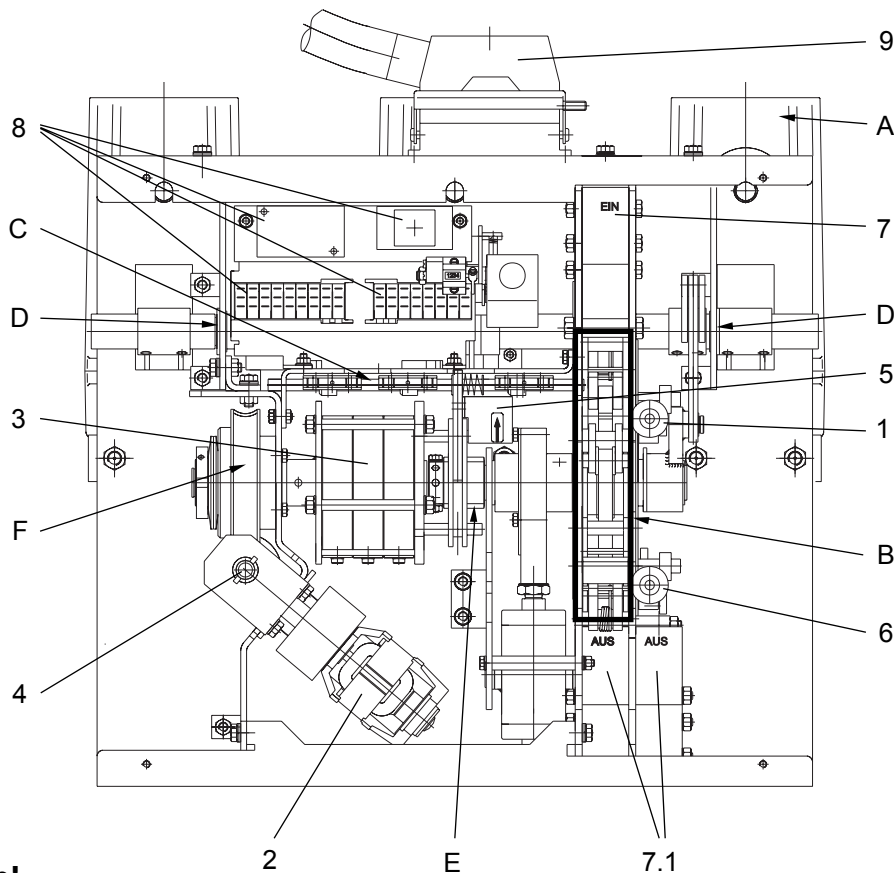
It is also recommended to carry out a visual inspection once a year, even if the breaker is seldom operated and only under low load.

A general overhaul should be carried out by the Driescher Service after 10,000 switching operations. negative impact from the environment, such as:

- corrosive atmospheres, air with a high dust content, damp plant facilities etc.
- high operating frequency (see chart on page 3)
- high breaking capacity (see chart on page 3)

⚠ Prior to starting any work the working area must be isolated and secured in compliance with VBG 4. Always observe the local safety regulations (e.g. 5 safety rules), then switch off the circuit breaker manually.

⚠ Based on the required skilled adjustment all maintenance, repair, servicing and subsequent conversion work is only to be carried out by the Driescher Service or skilled personnel authorised by us.



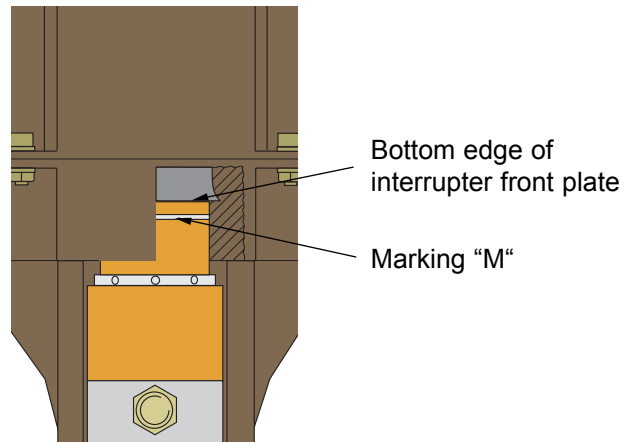
⚠ Caution!

Touching live parts has fatal consequences or leads to severe injury. The device is only to be operated by qualified persons who are familiar with the operating instructions and always observe the warning information.

Inspection • Maintenance • Repair

The following must be observed during maintenance work:

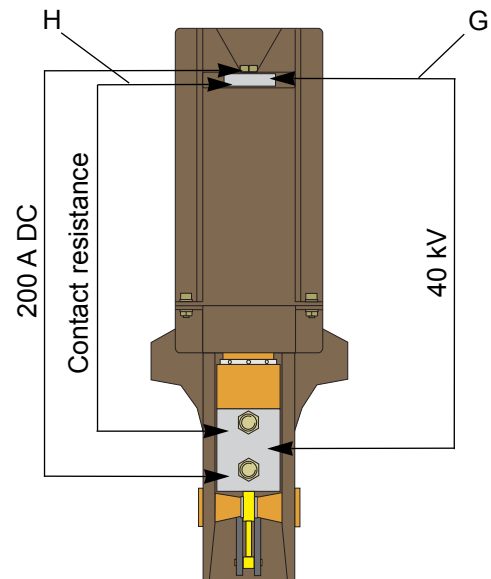
- a) Clean the vacuum poles **A** on the back with a clean and dry cloth to remove dust and swarf.
- b) Lubricating the stored energy unit; coat
 - all bearings and joints of the operating mechanism **B**
 - control shaft **C**
 - operating shaft bearing **D**
 with Molykote grease TTF 52, lubricate places with difficult access using Omnigliss Spray. Grease
 - threaded bush **E**
 - screw gearing **F**
 with Klüber ISOFLEX NBU15.



- c) The contact burn in the vacuum interrupters depends mainly on the number of short-circuit breaks and the respective levels of current applied (see chart).
The marking on the moving contact of the interrupter permits a visual check of the amount of contact burn when the circuit-breaker is switched on. If the upper edge of the marking is level with the lower edge of the front plate of the interrupter the limit of permissible burn has been reached.

- d) Check the vacuum by applying a voltage test (40kV) across the contact gap **G** of each pole in switched Off condition.
For this purpose we use the vacuum tester "VIDAR" of

Programma-Electric GmbH
Postfach 2043
61290 Bad Homburg
Telefon 06172/98650



- e) Measure contact resistance **H** of the main current at a test current of 200 A DC. The permissible voltage drop differs depending on the manufacturer of the vacuum interrupters and are therefore only available upon request.
If the permissible voltage drops are exceeded during the measurement, switch the circuit breaker on and off several times at zero current and then repeat the measurement. If the permissible voltage drop is still exceeded the switchgear in question cannot be accepted.

Repair and maintenance



Wear parts or defective parts, i.e. broken, fractured, cracked or bent parts (of plastic, metal, NF metals) are not to be repaired or touched up (welded, soldered, riveted, etc.). Only install DRIESCHER genuine parts and accessories or parts approved by us, which we have tested for safety, function and suitability.

You can reach our trained personnel at any time, also outside office hours, under Tel. +49 87 61 6 81-0, for assistance in troubleshooting or information on compatibility, assembly or maintenance.

Our range of products includes:

Medium-voltage systems

- Single-bus and duplicate-bus switchgear
- Non-withdrawable, withdrawable, and truck-type units
- Compact switchgear assemblies
- Custom-made models
- Industrial systems

Medium-voltage switchgear

- Indoor switches, disconnectors, and earthing switches (single and triple pole)
- Indoor circuit breakers (low oil content and vacuum)
- Outdoor switches (low oil content and vacuum)
- High-voltage high-breaking-capacity fuses

Low-voltage systems

- Open-framework design
- Enclosed break devices (up to 6,000 A)
- Cable and fixed-station distribution cabinets

Low-voltage switchgear

- Switch disconnectors
- Switch and fuse blocks
- Low-voltage high-breaking-capacity fuses

Driving gear

- Hand-operated and motor-operated mechanisms
- Indoor and outdoor driving gear

Accessories

- For medium and low voltages
- For station equipment
- Insulators (0.5 kV - 38.5 kV)
- Plastic and glass-reinforced plastic screening

Dimensions, weights, diagrams and descriptions in the list are non-binding. Subject to change without notice.

switching • electricity • safety

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