DW-2

AIR-INSULATED METAL-CLAD, ARC PROOF

MEDIUM-VOLTAGE SWITCHGEAR

Technical Manual - Addendum

MEDIUM VOLTAGE SWITCHGEAR, BUILT TO LAST

SGC nv - SwitchGear Company - Moorstraat 24 - B-9850 Nevele

Tel: +32 (0)9/321.91.12 - Fax: +32 (0)9/321.91.13 - e-mail: info@switchgearcompany.be - www.switchgearcompany.be

CONTENTS

1 SWITCHING AND CONTROL FUNCTIONS

1.1 Charging of the capacitors

Closing and trip capacitors of the CM are charged when CM is applied to the auxiliary power supply. The charged closing capacitors correspond with the charged springs of a conventional circuit breaker. After the failure of auxiliary power supply any pending trip or any trip command arriving the CM up to 30 s after failure of auxiliary power supply will be executed.

1.2 Ready-LED and ready-relay output

While charging the capacitors, the Ready-LED blinks. When the capacitors are charged the Ready-LED flashes continuously and Ready-relay contact X2:1, X2:2 (for these contact designation and for given below - see pages 69, 70) is closed. With blinking or extinguished Ready-LED, the Ready-relay contact X2:1, X2:2 is open. The Ready-relay output, for instance, can be used as release condition for switch control.

1.3 Malfunction-LED and malfunction-relay output

If the CM detects an internal or external malfunction, the Malfunction-LED will blink according to the type of malfunction (see chapter: “Signalling”). At the same time the Malfunction-relay contact X2:4, X2:5 will close. In this way a collective CM-Malfunction can be transmitted to an alarm or SCADA system. In case of malfunction the Ready-LED is extinguished and the Ready-relay contact X2:1, X2:2 is opened. The Malfunction-relay contact X2:4, X2:5 is closed, if CM is powered off.

1.4 Switching the ISM on and off via the dry contact Inputs of the CM

The ISM can only be switched on electrically via the CM. Dry contact inputs are available at all CMs for close and trip operations. Each of these inputs can be connected with one or more parallel-switched dry contacts. Under no circumstances shall external voltage be applied to these inputs as this will destroy the CM.

1.5 Antipumping duty

For close and trip inputs the following rule is applicable: During close operation, if a trip instruction is received before the close instruction becomes passive then the close instruction will be blocked. For the next close operation the close instruction must be reapplied after the trip instruction has become passive (Figure 1).

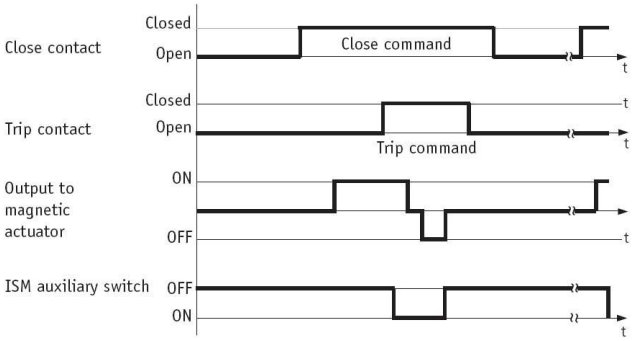


Figure 1

1.6 Blocking duty

For close and trip inputs the following rule is applicable: If a close instruction is received whilst a trip instruction remains active then the close instruction is blocked. For the next close operation the close instruction must be reapplied after the trip instruction has become passive (Figure 2).

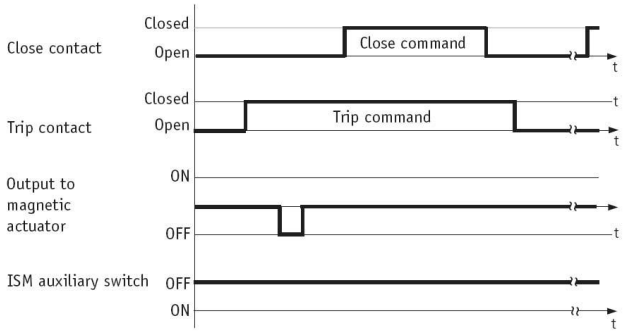


Figure 2

1.7 Combined blocking and antipumping duty

A close command during a pending trip command is not executed (blocking duty) even it is pending longer than the trip command (antipumping duty) (Figure 3).

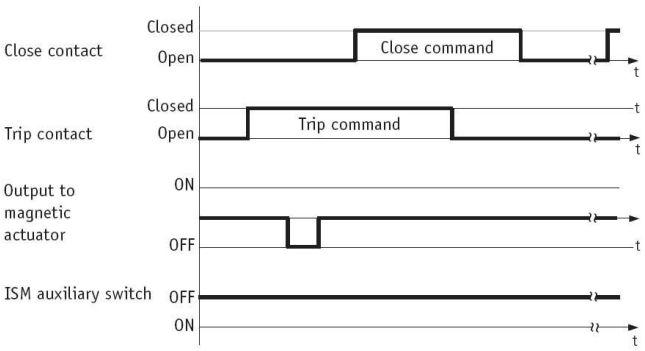


Figure 3

1.8 Output to magnetic actuator and input for ISM position indication

The cables between the ISM and CM, the coil of the magnetic actuator and ISM position position switch are monitored permanently. In case of malfunction of these circuits CM indicates about malfunction. Type of malfunction can be defined with help of indication table (see pages 2-3, 2-4, 2-5 and 2-6).

2 SIGNALLING

2.1 LED indicators and dry contacts

Functionality	Results	LED indicators	Dry contacts
			CM/TEL...-12-01A
Switch on auxiliary power supply	Power supply On	·	
CM is ready to carry out control commands	Operational readiness	·	·
Malfunction CM or ISM	Malfunction	·	·

LED indicators are situated at the front side of the CM (Figure 4).

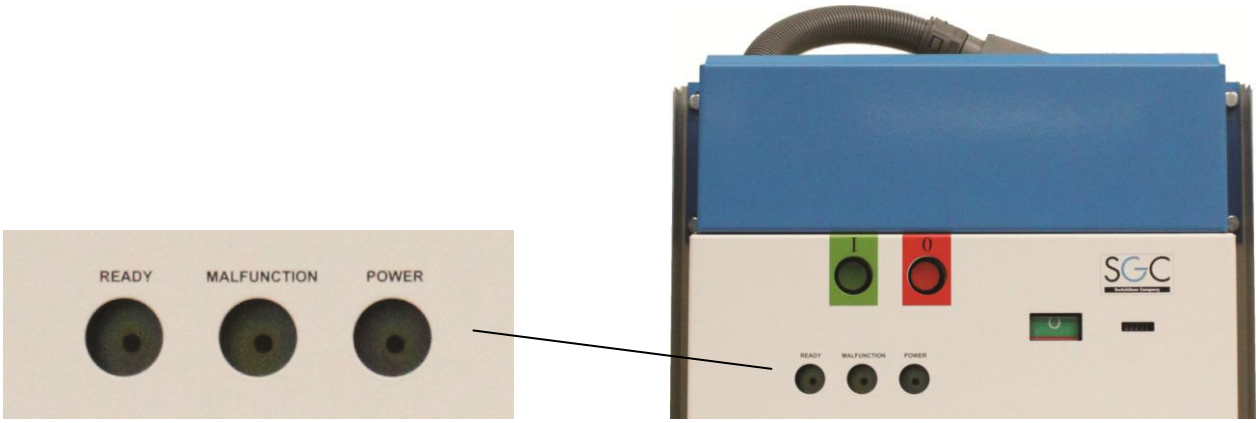


Figure 4

2.2 Malfunction indication table

The self-monitoring system inside the CM detects eventual malfunctions and report them via the MALFUNCTION LED with various blink signals. The meaning of the blink codes and the variations per type of malfunction are shown in the following table.

Error Group	Malfunction LED blinks	Function, type of malfunction	Description of malfunction variants	Recommendation for malfunction elimination
External Group	1 blink signal, then 1.5 s pause, periodic (about 4 min for CM/TEL...-12 series)	The power supply has failed for >1.5 s or has been out-side the operating range.	The operating range of the power supply of the CM, depending on the type of voltage, its value and switch command, is between 65-70% and 125% (Trip commands) and 80-	- Switch on MCB - Check for cable break - Check terminal connections

			125% (Close commands) of the nominal voltage. With continuous failure of the power supply, the blink signals continue until the capacitors are unloaded.	
	2 blink signals, then 1.5 s pause, periodic	The Close or Trip-command of the CM is carried out but the corresponding ISM position signal is missing.	**Malfunction variant 1:** The Close command of the CM is carried out by the ISM. The normally open ISM auxiliary switch S13 (see circuit diagrams - pages 69, 70) has been bridged already due to a malfunction before the Close command was given (despite the existing malfunction, the ISM can be switched off again by the CM. This deletes the malfunction indication although the malfunction still exists).	- Check for short circuit in the cable - Check for short circuited terminals - Check ISM posi tion switch S13
			Malfunction variant 2: The Trip command of the CM is carried out by the ISM. The normally closed ISM auxiliary switch S13 has been interrupted due to a malfunction (the ISM can only be placed in the close position after the malfunction has been eliminated).	- Check for cable break - Check terminal connections - Check ISM posi tion switch S13
	2 blink	The Close	**Malfunction**	Closing of the ISM

	signals, then 1.5 s pause, periodic	command of the CM is not carried out as the ISM is electrically locked in OFF position.	**variant 3:** The Close command of the CM is not carried out by the ISM as the closing lock-out contact in ISM S13 auxiliary switch circuit is open. The malfunction indication has been purposely taken into account.	is only possible if closing lock-out contact is closed.
	3 blink signals, then 1.5 s pause, periodic	The magnetic actuator coil circuit is interrupted.	**Malfunction variant 1:** Possible causes: cable break, loose terminal connections, defect magnetic actuator coils.	- Check for cable break - Check terminal connections
			Malfunction variant 2: In ISM position “opened and mechanically locked“ the electrical interlock contact is opened. The malfunction indication has been purposely taken into account.	Closing of the ISM is only possible if interlocking square head is in “unlocked position“.
		CM-internal malfunction.	**Malfunction variant 3:** CM-defect.	- CM must be replaced
	4 blink signals, then 1.5 s pause, periodic	The magnetic actuator coil circuit is short circuited.	Possible causes: Short circuited cable strands, short circuited terminal connections.	- Check for short circuit in the cable - Check for short circuited terminals
	5 blink signals, then 1.5 s pause, periodic	without CM command, the ISM trips.	**Malfunction variant 1:** Mechanical emergency trip. Indication: After mechanical emergency trip the 3 blink	Delete the malfunction indication at not mechanically locked ISM with the CM Trip command.

			signal instead 5 blink signal is indicated due to its higher priority.	
		ISM is closed, a trip is simulated.	**Malfunction variant 2:** The ISM was properly closed by the CM and the close position feedback exists. Then a malfunction occurres in the ISM auxiliary switch S13 circuit in which the normally open switch S13 is bridged (the ISM can still be tripped again via the CM despite the existing malfunction. This deletes the malfunction indication but the cause of the indication is still there).	- Check for short circuit in the cable - Check for short circuited terminals - Check ISM position switch S13
Internal error	17 or more blink signals, then 1.5 s pause, periodic	Various internal malfunctions of the CM.		- CM must be replaced

2.2.1 Explanatory notes to malfunction indications and operational readiness

- If the ISM is in OFF position and malfunction indications exist, ISM can be closed only after all malfunctions have been eliminated.
- If several malfunctions appear at the same time malfunctions regarding the magnetic actuator are indicated with priority otherwise the last malfunction that occurred.
- Usually failures need to be cancelled to stop malfunction indication.
- During several malfunction variants of 2- or 5- blink failures, the malfunction indication will disappear with a trip CM command.
- In case of internal CM failures please contact your nearest Tavrida Electric partner.

- Turn interlocking square head back into unlocked position only if you really want to unlock the withdrawable ISM.

3 INSTALLATION

3.1 Primary part

3.1.1 General preparation

The following regulations must be adhered to during installation, commissioning and operation:

- IEC 62271-1/DIN VDE 0101, General specification for high-voltage switchgear and control gear standards.
- VDE 0105, Operation of electrical installations.
- DIN VDE 0141, Earth systems for electrical power installations with nominal voltages above 1 kV.
- All rules for accident prevention applicable in the respective countries.

The wearing of gloves for handling the parts during installation is recommended.

Insulating material surfaces must be cleaned with clean and dry rags. The contact surfaces of connections must be cleaned before installation. If the contacts have become oxidized during transport or storage then the following sequence must be followed:

- Clean contact surfaces with a rough, dry cloth.
- With hard oxidation, clean with a hard plastic sponge, the upper layer must not be removed.

3.1.2 Protective earthing

The draw-out unit is earthed by means of truck wheels.
Optionally the earthing can be arranged via the earthing bar which is connected to the bottom of the truck. In this case corresponding earthing has to be made in the switchgear (not part of the delivery).

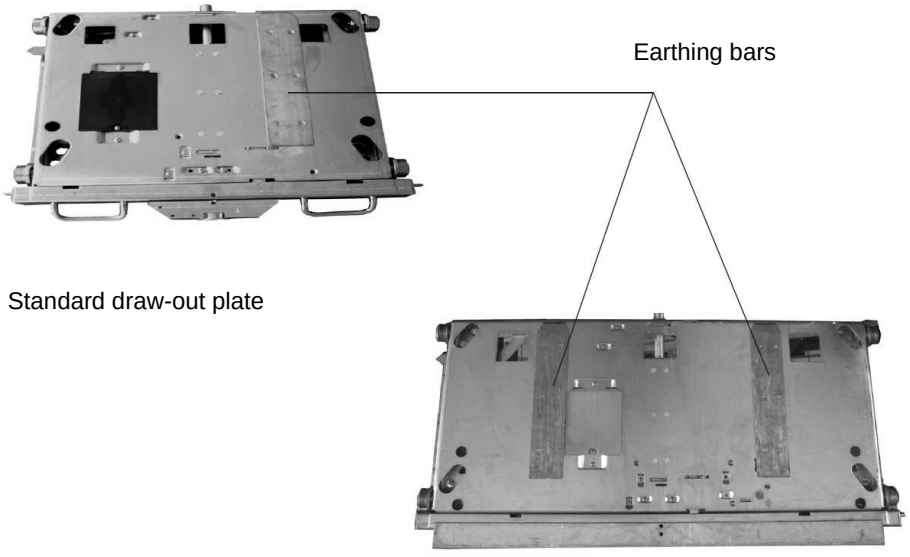


Figure 5

3.1.3 Mechanical interlocking

The draw-out unit provides all the interlocks needed to guarantee the high level of safety and reliability both for the installation commissioning and operation.

3.1.3.1 Standard safety interlocks

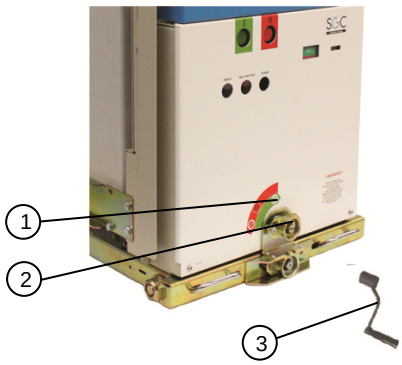
- The draw-out unit can only be moved if the ISM is open and locked.
- The ISM can only be unlocked and operated if the draw-out unit is precisely in the test or service position.
- As for DISCONNECTOR, it can only be moved if electromechanical interlocks is at locked position.
- The electromechanical interlocks can only be unlocked and operated if the draw out unit is precisely in the test or service position.

3.1.3.2 Interlocks which is connected with switchgear (the draw-out unit inserted into switchgear)

- The draw-out unit can only be moved when the earth switch is open.
- The earth switch can only be closed when the draw-out unit is in test/disconnected position

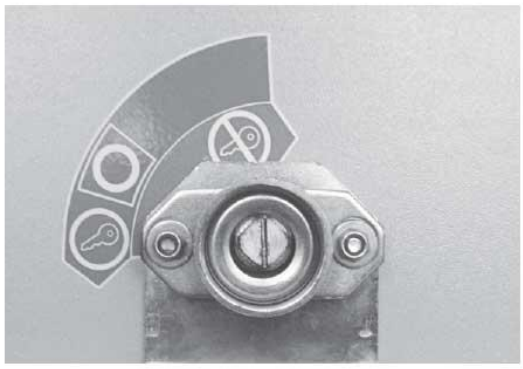
3.1.3.3 The mechanical interface of the base set of interlocks includes

- Interlocking square head(Fig. 6) that can be operated by special tool via turning.
- Sticker for function “Turn to open and lock ISM” has red colour and shows direction counterclockwise and for function “Turn to unlock ISM” has green colour and shows direction clockwise

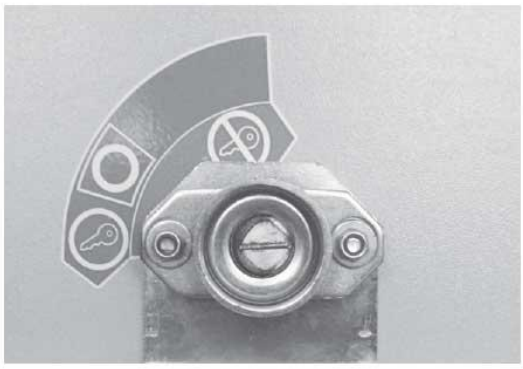


1. Sticker
2. Interlocking system
3. Operating handle

Figure 6



ISM stays unlocked, when the slot is at vertical position. It is impossible to rack draw-out unit in and out.



ISM stays locked, when the slot is at horizontal position. It is possible to rack draw-out unit in and out.

Figure 7

3.1.3.4 Basically there are two stages of the interlocking system: "Locked" and "Unlocked"

- When the interlocking square head is in locked position (Fig. 8, Fig. 9) the interlocking system is in "Locked" position.
  In this position the ISM can not be closed (electromechanical interlocks) and the draw-out unit can be moved.
- When the interlocking square head is in unlocked position (Fig. 10) the interlocking system is in "Unlocked" position. In this position the ISM can be operated (opened and closed) and the draw-out unit can not be moved.

There are three positions of the interlocking system since the draw-out unit is inserted into the the switchgear panel:

Position A (Fig. 8)

- Draw-out unit is fixed but can be unlatch to remove it from the panel.
- Draw-out unit is in test/disconnected position.
- ISM is open.
- Interlocking square head is in locked position.
- Rotation of the racking screw is unblocked.

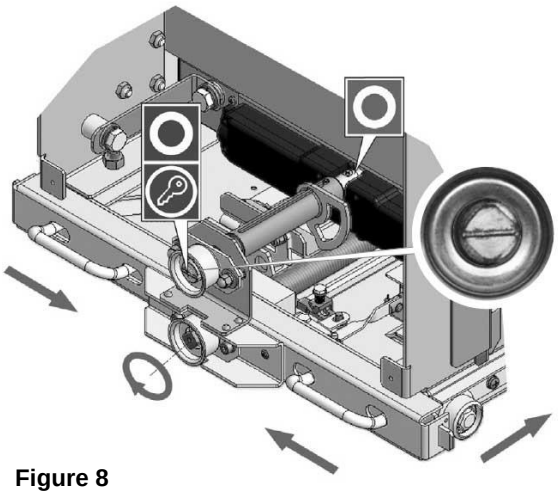


Figure 8

It is possible to move the draw-out unit.
It is possible to unlock the ISM.
It is not possible to close ISM until interlocking square head is in locked position.
It is possible to close/open ISM if interlocking square head will be moved in unlocked position.

Position B (Fig. 9)

- Draw-out unit is locked in panel and cannot be removed from there.
- Draw-out unit is in intermediate position.
- ISM is open.
- Interlocking square head is in locked position.
- Rotation of the racking screw is unblocked.

It is possible to move the draw-out unit.
It is impossible to unlock the ISM.

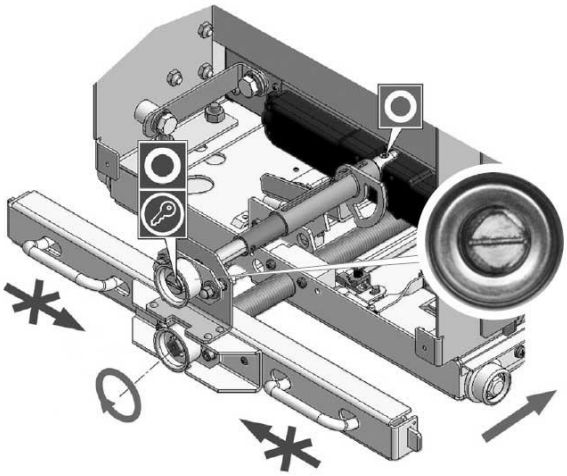


Figure 9

Position C (Fig. 10)

- Draw-out unit is locked in panel and cannot be removed from there.
- Draw-out unit is in the service position.
- ISM is closed.
- Interlocking square head is in unlocked position.
- Rotation of the racking screw is blocked.

It is impossible to rack out the draw-out unit until interlocking square head is in unlocked position
It is possible to open and lock the ISM.

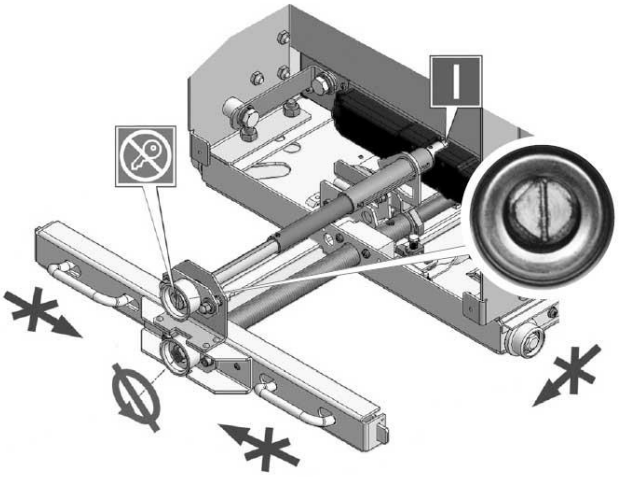


Figure 10

3.1.4 Main contact system

Before the first ISMD installation in service position it is a must to check eventual real dimensions of installed fixed contacts. In service position the connection of ISMD removable contacts with fixed contacts of switchgear should be in accordance with requirements represented in Figure 18 otherwise it can lead to overheating and other severe problems.

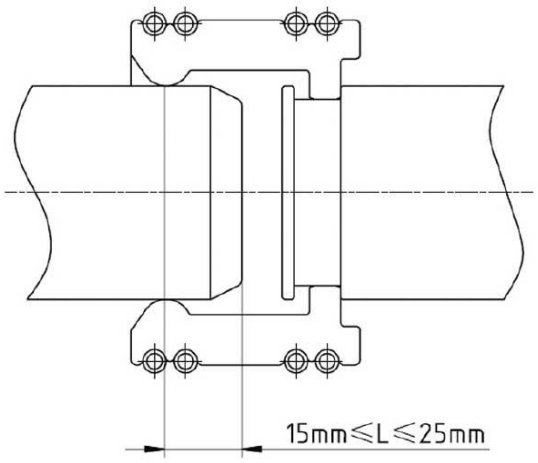


Figure 11

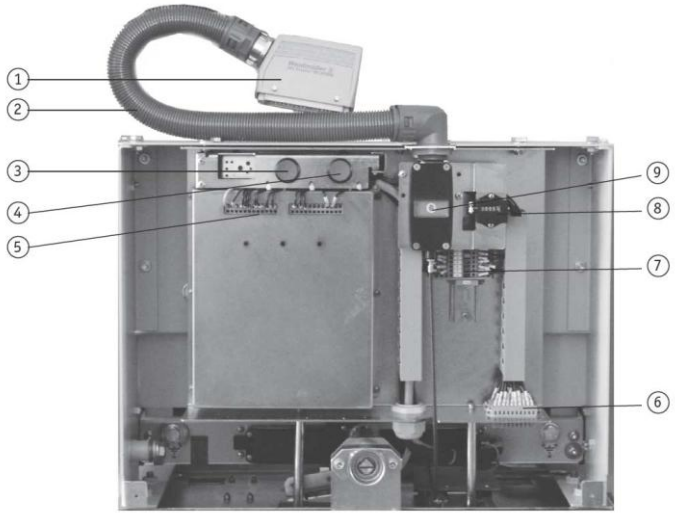
3.2 Secondary part

3.2.1 Secondary connections

3.2.1.1 Auxiliary circuits

The auxiliary circuits contain the following components (See Fig. 12):

- Control modules CM/TEL-100/220-12-01A or CM/TEL-24/60-12-01A. It is intended to control the ISM and to interface with relay protection system.
- Auxiliary switches of ISM S1 to S13 (for these designation and for given below - see pages 69, 70). They are intended to signal the ISM status.
- Internal interlocking switch of draw-out unit. It is intended to provide interlock of ISM operating if draw-out unit is in intermediate position.
- Actuator coils of ISM YA1, YA2, YA3. They are intended to actuate the main contacts of ISM.
- Electrical pushbuttons of ISM control SB1, SB2. They are intended to operate the ISM.
- Auxiliary switches of draw-out plate, 5NO contacts each SQ1, SQ2. They are intended to signal draw-out unit position.
- Electrical closing-lock-out relay. It is intended to provide external closing lock-out function if deenergized.
- Terminal blocks XT20. They are intended to connect auxiliary circuits of the draw-out unit and to comfort the testing and reconnection of the auxiliary circuits.
- Plug, male XP1. It is intended to provide connection of draw-out unit auxiliary circuits to auxiliary circuits of relay protection compartment and to power supply. The control wiring plug counterpart and the example of adapter plate design for its installation in the switchgear panel are shown in the Figure 14 and Figure 15. The dimensions ** are specially required for the control wiring plug counterpart attachment. The attachment is also maybe obtained without the adopter plate in case of having the set of holes in switchgear panel in accordance with ** dimensions. The dimensions of the control wiring plug counterpart are shown in the “Dimension and Weights” section.
- Internal plugs XS2, XS3, XP2, XP3. It is intended to provide connection of auxiliary switches SQ1, SQ2 installed at the draw-out plate to the other auxiliary circuits of draw-out unit.



1. Control wiring plug XP1
2. Protection conduits
3. Electrical closing pushbutton SB1
4. Electrical trip pushbutton SB2
5. CM
6. Plugs XS2, XS3
7. Terminal blocks XT20
8. Operation counter PC1
9. Main contacts position indication

Figure 12

3.2.1.2 Optional CM assembly

Installation of CM into the low voltage compartment of switchgear.

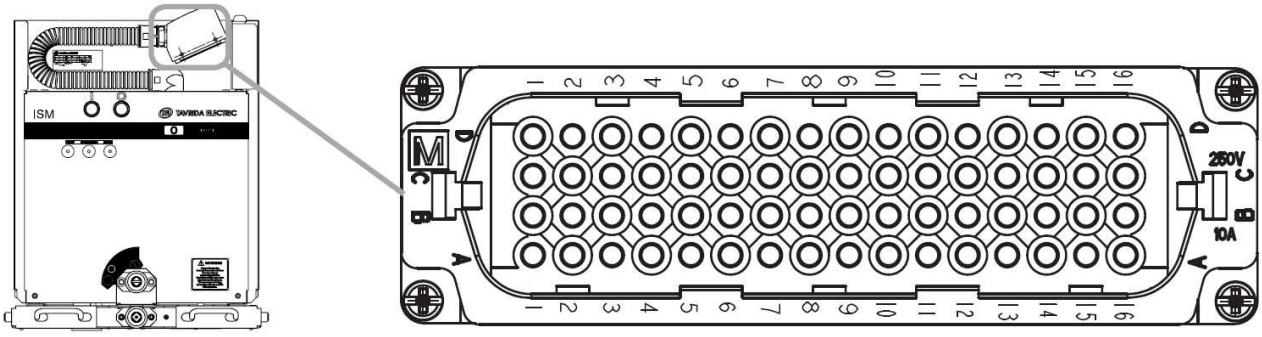


Figure 13
Terminal pin arrangement XP1

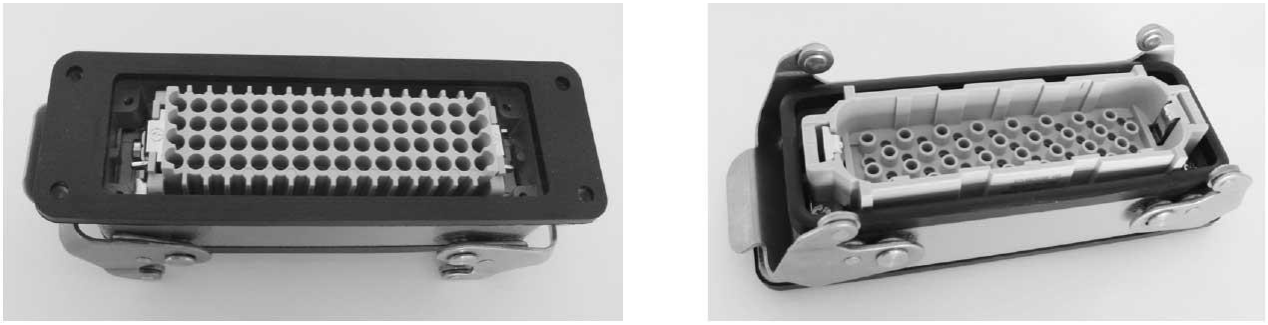


Figure 14
Control wiring plug counterpart

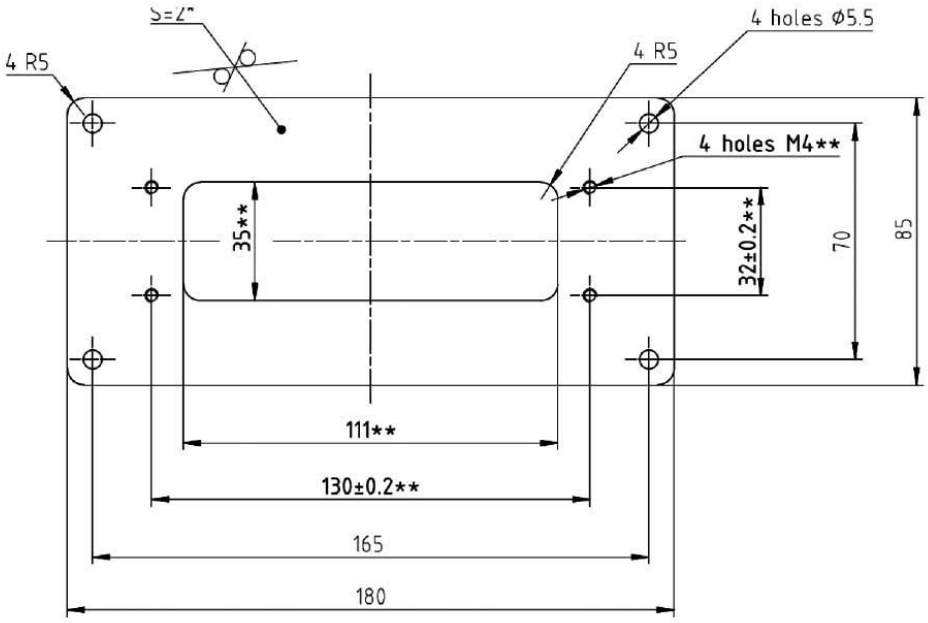


Figure 15
The example of adapter plate for control wiring plug counterpart installation

3.2.1.3 ISMD terminal arrengement

A		B	
Terminal No.	Connection	Terminal No.	Connection
1	CM: X1.3	1	Auxiliary switch (S4) XT1.8
2	CM: X1.4	2	Auxiliary switch (S5) XT1.9
3	CM: X1.9	3	Auxiliary switch (S5) XT1.10
4	CM: X1.10	4	Auxiliary switch (S6) XT1.11
5	CM: X1.12	5	Auxiliary switch (S6) XT1.12
6	CM: X2.1	6	Auxiliary switch (S1) XT2.17
7	CM: X2.2	7	Auxiliary switch (S1) XT2.18
8	CM: X2.4	8	Auxiliary switch (S8) XT2.19
9	CM: X2.5	9	Auxiliary switch (S8) XT2.20
10	FREE	10	Auxiliary switch (S9) XT2.21
11	FREE	11	Auxiliary switch (S9) XT2.22
12	Auxiliary switch (S2) XT1.3	12	Auxiliary switch (S10) XT2.23
13	Auxiliary switch (S2) XT1.4	13	Auxiliary switch (S10) XT2.24
14	Auxiliary switch (S3) XT1.5	14	Auxiliary switch (S11) XT2.25
15	Auxiliary switch (S3) XT1.6	15	Auxiliary switch (S11) XT2.26
16	Auxiliary switch (S4) XT1.7	16	FREE

C		D	
Terminal No.	Connection	Terminal No.	Connection
1	FREE	1	Test position (SQ2.3) XS3.6
2	Service position (SQ1.1) XS2.1	2	Test position (SQ2.4) XS3.7
3	Service position (SQ1.1) XS2.2	3	Test position (SQ2.4) XS3.8
4	Service position (SQ1.2) XS2.3	4	Test position (SQ2.5) XS3.9
5	Service position (SQ1.2) XS2.4	5	Test position (SQ2.5) XS3.10
6	Service position (SQ1.3) XS2.5	6	FREE
7	Service position (SQ1.3) XS2.6	7	FREE
8	Service position (SQ1.4) XS2.7	8	Auxiliary switch (S12) XT2.27
9	Service position (SQ1.4) XS2.8	9	Auxiliary switch (S12) XT2.28
10	Service position (SQ1.5) XS2.9	10	Auxiliary switch (S7) XT1.1
11	Service position (SQ1.5) XS2.10	11	Auxiliary switch (S7) XT1.2
12	Test position (SQ2.1) XS3.1	12	FREE
13	Test position (SQ2.1) XS3.2	13	FREE
14	Test position (SQ2.2) XS3.3	14	FREE
15	Test position (SQ2.2) XS3.4	15	FREE
16	Test position (SQ2.3) XS3.5	16	FREE

3.2.1.4 Disconnector terminal arrangment

A		B	
Terminal No.	Connection	Terminal No.	Connection
1	FREE	1	FREE
2	FREE	2	FREE
3	FREE	3	FREE
4	Auxiliary Switch (S14) XS5	4	FREE
5	FREE	5	FREE
6	FREE	6	FREE
7	FREE	7	FREE
8	FREE	8	FREE
9	FREE	9	FREE
10	Auxiliary Switch (S14) XS4	10	FREE
11	FREE	11	FREE
12	FREE	12	FREE
13	FREE	13	FREE
14	FREE	14	FREE
15	FREE	15	FREE
16	FREE	16	FREE

3.2.1.5 Disconnector terminal arrangment

C		D	
Terminal No.	Connection	Terminal No.	Connection
1	FREE	1	Test position (SQ2.3) XS3.6
2	Service position (SQ1.1) XS2.1	2	Test position (SQ2.4) XS3.7
3	Service position (SQ1.1) XS2.2	3	Test position (SQ2.4) XS3.8
4	Service position (SQ1.2) XS2.3	4	Test position (SQ2.5) XS3.9
5	Service position (SQ1.2) XS2.4	5	Test position (SQ2.5) XS3.10
6	Service position (SQ1.3) XS2.5	6	FREE
7	Service position (SQ1.3) XS2.6	7	FREE
8	Service position (SQ1.4) XS2.7	8	FREE
9	Service position (SQ1.4) XS2.8	9	FREE
10	Service position (SQ1.5) XS2.9	10	FREE
11	Service position	11	FREE

	(SQ1.5) XS2.10		
12	Test position (SQ2.1) XS3.1	12	FREE
13	Test position (SQ2.1) XS3.2	13	FREE
14	Test position (SQ2.2) XS3.3	14	FREE
15	Test position (SQ2.2) XS3.4	15	FREE
16	Test position (SQ2.3) XS3.5	16	FREE

3.2.2 Auxiliary power supply for CM and other control equipment

To ensure the functionality of the CM, it is recommended to connect the CM to the same auxiliary power supply like the protection relays and control devices.

Auxiliary power supply and selection of MCB for CM/TEL…-12-01A (Figure 16)

Technical data of the MCB:
24V DC: 4A, 1-pole, characteristic B or C
60V DC: 2A, 1-pole, characteristic B or C
100/220V AC: 1A, 1-pole, characteristic B or C
100/220V DC: 1A, 1-or 2-pole, characteristic B or C

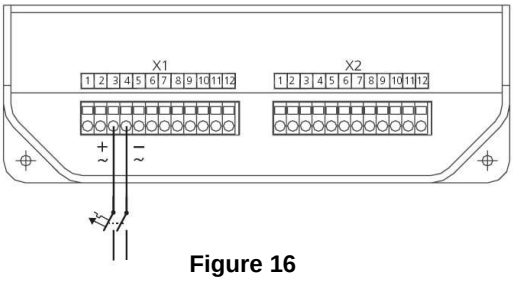


Figure 16
Auxiliary power supply for CM/TEL…-12-01A

If the CM is connected with DC voltage please pay attention to the correct polarity.

4 COMMISSIONING, OPERATION, MAINTENANCE

4.1 General

Commissioning, operation and maintenance is only permitted for qualified and trained personnel.

Insofar as installation, commissioning or retrofit is carried out on energized equipment, the relevant safety regulations must be adhered to (e.g. the 5 safety rules to DIN VDE 0105/078.3 Part 1 Point 9).

4.2 Commissioning primary part

Tests shall include at least:

- Check for damage
- Remove dirt
- Test special functions such as moving function, mechanical interlocks and plug connections
- Check that free air circulation around of the tested ISMD is possible

Testing the rated insulation level to IEC 62271-1 and VDE 06701 Part 1000:
For 12 kV ISM the rated power frequency test voltage is 28 kV (42 kV according to the Chinese Standard GB 1984-2003)

4.3 Commissioning secondary part

4.3.1 Preparation before testing the functionality include at least

- Testing the availability of auxiliary power supply. It is recommended to use the same auxiliary power supply as for protection and control devices.
- Checking whether the correct type of voltage, the correct voltage level and for direct current the correct polarity have been selected.
- Checking that the correct MCB has been installed.
- Checking that all secondary connections have been pulled up tight.
- Checking whether the withdrawable ISM is connected according to the circuit diagrams.

4.3.2 Operating test

While testing the functionality, at first the ISM must be separated from high voltage.

- Turn on the CM auxiliary power supply and check the following operating indications:
  - The POWER LED must light up immediately.
  - The READY LED must blink during charging of capacitors and light up continuously within 15 s.
  - The READY relay contact (X2:1,2 of CM)1) must close within 15 s.

- The MALFUNCTION LED must not light up.

- Check of all basic and extended functions (if any) according to the chapters “Switching and Control Functions” and “Signalling”.

- During operation both CM-actuator voltage (on CM X2:9,10 and ISM XT2:13,14) and internal auxiliary voltage for ISM auxiliary switch S13 (on CM X2:7,8 and ISM XT2:15,16) amounts to approximately 230 V DC.
- After switching off the CM, there is still a voltage at the terminals of the capacitors. Only after the MALFUNCTION-LED is extinguished the voltage has dropped to a safe value.

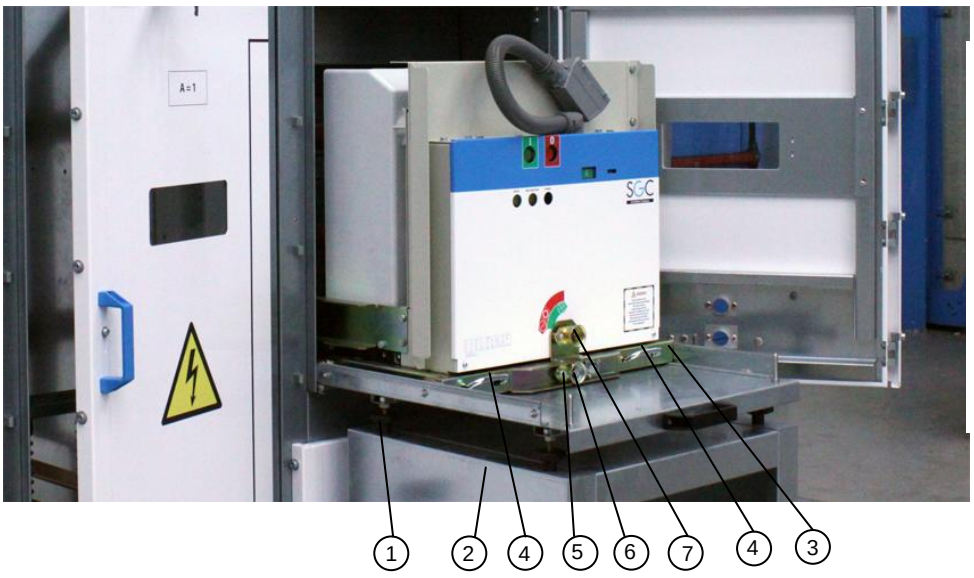
After above listed functionality tests were performed succesfully the ISM can be put into operation.

1) Here and below designations are given in accordance with clauses “Terminal arrangement” and “Circuit diagrams”.

4.4 Operation

4.4.1 Transportation for approaching and engagement with switchgear panel (Fig. 17)

After the door of the circuit breaker compartment has been opened and the service truck has been engaged with the switchgear panel (Fig. 17) the draw-out unit shall be released by moving the sliding handles (Fig. 17) inwards.After that the draw-out unit can be inserted into the test/disconnected position. The draw-out unit shall be fixed in this position by moving the sliding handles (Fig. 17) sidewards.



1. Height adjuster
2. Service truck
3. Fixative pins
4. Sliding handles
5. Socket head
6. Square head
7. Interlocking system

Figure 17

4.4.2 Insertion from the test/disconnected position to the service position (Fig. 18)

Before the control wiring insertion plug shall be connected to the switchgear panel socket (Fig. 19); for draw-out units with interlocking electromagnet (installed on request) it shall be energized; the circuit breaker compartment door shall be closed and the ISM shall be opened. Racking mechanism is operated by fitting the operating handle on the square head (Fig. 18) and turning the handle clockwise according to the sticker until the stop is reached and the draw-out unit is in the service position.

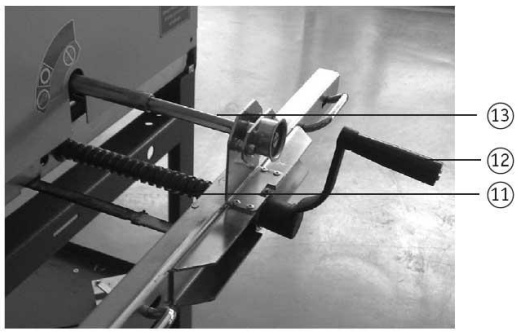


Figure 18

To move draw-out unit authorized handle from delivery set should be used only.

After that press against the operating handle and remove it.

Note: When removing the handle, it is essential that the springloaded socket head (Fig. 18) slides into the untensioned front position. Spiral spindle is thus locked in place, preventing inadvertent turning of the spiral spindle turning of the spiral spindle opens auxiliary switches([2]) and thus signals position of draw-out plate.

Note: The draw-out unit shall not be left at any position in the travel range between the service position and the test/disconnected position!

([2]) They are shown as SQ1,SQ2 in the circuit diagrams

4.4.3 Withdrawal from the service position into the test/disconnected position (Fig.19)

Before withdrawal the ISM shall be opened electrically or manually or the electromechanical interlocks of DIS shall be locked. Withdrawal shall be done accordingly to the reversed procedure described above for insertion into the service position.

4.4.4 Withdrawal from the test/disconnected position onto the service truck (Fig. 19)

Before withdrawal the door of the circuitbreaker compartment shall be opened, control wiring plug shall be released and engaged in its storage position on the draw-out unit.

After the service truck is engaged with the switchgear panel, the draw-out unit shall be released by moving sliding handles inwards against the springs, withdrawn onto the service truck and secured on it using catches.

4.5 ISM operations

4.5.1 ISM manual «Trip» and locking operation (Fig. 19)

ISM manual «Trip» and locking operation is activated by turning the operating handle (the same with the racking mechanism handle fitted on square head of the interlocks through the hole) when the circuit breaker compartment door is closed (Fig. 19).

After that the ISM is locked electrically and mechanically and can not be closed.

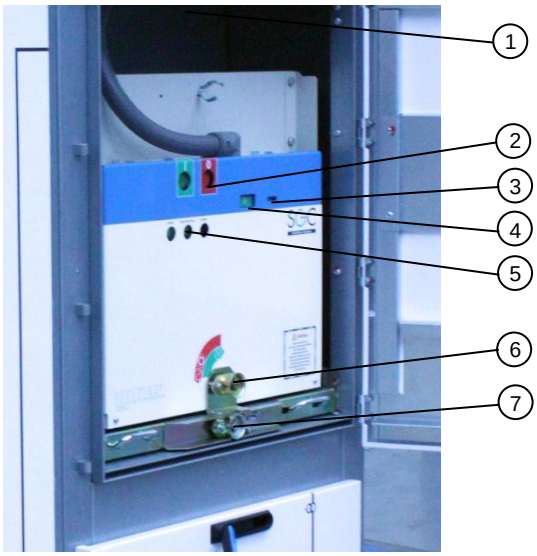


Figure 19

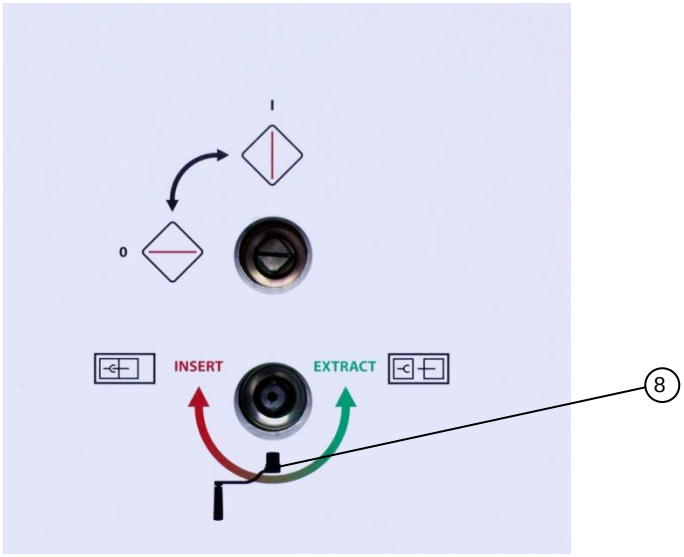


Figure 20

1. Control wiring plug
2. Electrical trip/close buttons
3. Operating counter
4. Main contacts position indication
5. CM signalling and indication
6. Mechanical trip and interlocking device integrated in the interlocking system
7. Racking mechanism of draw-out plate
8. Operating handle

4.5.2 ISM unlocking operation (Fig. 19)

The ISM manual unlocking operation is activated by turning operating handle fitted on square head of the interlocks throug the hole when the circuit breaker compartment door is closed (Fig. 19).

After that the ISM is unlocked electrically and mechanically and can be closed.

4.5.3 ISM electrical «Close» operation (Fig. 19)

Before electrical «Close» operation the ISM unlocking operation should be done. «Close» operation is activated by pushing of electrical pushbutton (green colour). «Close» operation is possible only if no interlocks are applied.

4.5.4 ISM electrical «Trip» operation (Fig. 19)

«Trip» operation is activated by pushing of electrical pushbutton (red colour).

4.5.5 ISM main contacts position indicating (Fig. 19)

ISM main contacts position indication is provided mechanically by the indicating device with symbol  for ISM «Open» state and symbol  for ISM «Closed» state.

4.6 Maintenance

4.6.1 Inspection

The ISMD should be inspected at least once every 60 months (once per five years). More-frequent inspections (up to one time per six month) are recommended when the ISMD works under unfavorable conditions such as dust, moisture.

The following check should be made with the ISMD
1. Draw out ISMD to the TEST position. Manually operate the ISM close open operations several times (at least 3 times), checking for obstructions or excessive friction including indicator position and counter function.
2. To draw the ISM out of switchgear panel and check insulating parts for evidence of overheating and for cracks that may indicate thermal aging.
3. Check the tulips condition - abscence of any main contacts overheating tracks and damages of silver coating should be ascertained.

Before inspecting the insulating parts of the ISMD check its disconnection from all voltage sources.

4.6.2 Lubrication

Bearing points and sliding surfaces of draw-out plate should be lubricated at least one time per five years. With a thin film of Kluber Barrierta L 55/3 or GE Lubricant D6A15A1 (MobilGrease 28, catalog number 193A1751P1) or Chang Cheng Pai 7023B Low-temperature lubricant (Great Wall 7023B). Clean the surfaces to be lubricated with an industry-approved solvent.

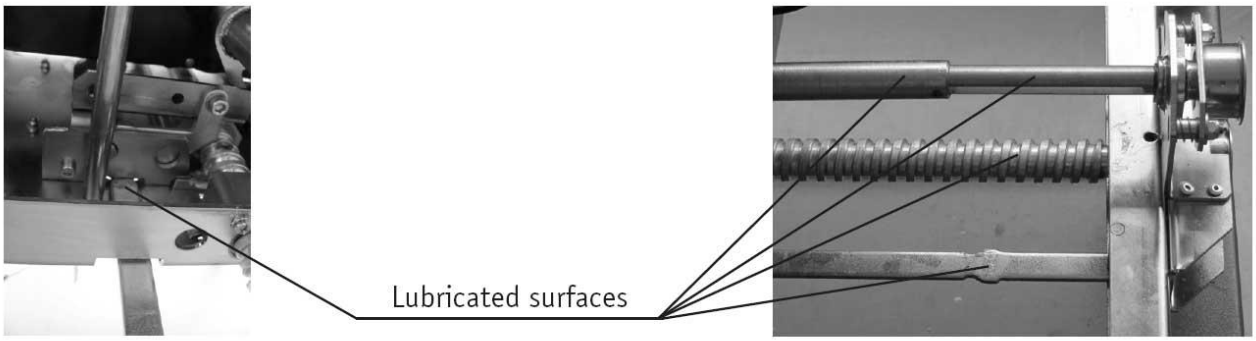


Figure 21

Remove all excess lubricant with a clean, lint free cloth to avoid accumulation of dirt or dust. The contact surfaces of the primary disconnect fingers should be cleaned.

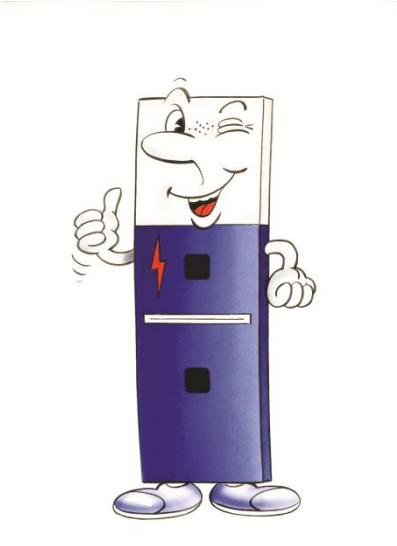
Do not lubricate the ISMD main contacts or the outside diameters of rollers.

4.7 Non-Conformity

If during installation, commissioning, operation or maintenance any non-conformity occurs, action shall be taken in accordance with the non-conformity report.

In case of non-conformity detection any self repair is strictly forbidden without permission from the seller representative!

Notes:



SwitchGear Company

MEDIUM VOLTAGE SWITCHGEAR, BUILT TO LAST

SGC nv - SwitchGear Company - Moorstraat 24 - B-9850 Nevele

Tel: +32 (0)9/321.91.12 - Fax: +32 (0)9/321.91.13 - e-mail: info@switchgearcompany.be - www.switchgearcompany.be