永彰機電
TAIWANCALSONIC

EISHO TEK

Vacuum Circuit Breaker

〔TYPE：SV1-12〕

INSTRUCTION MANUAL

〔Operation and Maintenance Version〕

TAIWAN CALSONIC

SAFETY PRECAUTIONS

- For safety reason, this equipment should be handled by personnel who has ample knowledge and technical skill required.
- Prior to usage of the equipment, please read through this instruction manual and all other documents concerned, and handle the equipment properly.
  Handling should be exercised after mastering required knowledge on the equipment, information on safety and all precautions.
  After reading of this instruction manual, please keep this in the place accessible to anyone to use the equipment.

⚠ Danger

- Because of high voltage, the following items must be observed:
  - Don't access near to high voltage charged portion.
  - Be sure the circuit breaker is off and withdrawn while handling the switchgear.
  - Front covers of devices must be attached in use.
- To avoid receiving electrical shock both main circuit and control circuit must be off (de-energised).

- During the operation of the equipment, please be sure the following items to be observed:

⚠ Caution

- Don't use under the condition exceeding the rated values. If it is not operated in order, grounding fault or short circuit fault due to insulation breakdown, fire due to over-heat, bursting due to mal-operation of switchgear may take place.
- Don't touch or insert hand or part of body into the operation mechanism.
  - When the CB indicator shows 'ON' or the CB closing spring indicator shows 'CHARGED', don't insert hand or part of body into CB.
  - Prior to maintenance, discharge the CB closing spring and confirm the CB closing spring indicator shows 'DISCHARGED'.
- Don't reform the interlock mechanism.
- For safety reason use our standard operating handle and don't use any other handle.

Owing to deformation, there may be a chance to invite injury.

If a failure or abnormal phenomenon should occur, or if you have any questions concerning the handling of the circuit breaker, contact our branch or sales offices, providing us with the information shown below.

- Name of device
- Serial No.
- Date of manufacture
- Type

Listed on the nameplate.

- Detail of the failure or abnormal phenomenon and situation before and after the occurrence.

CONTENTS

1. **RATING AND OUTLINE DRAWING**

1-1 Ratings

Table 1 Ratings

Type		VZA-12
Rated voltage (kV)		12
Rated normal current (A)		630/1250A
Rated frequency (Hz)		50/60
Insulation level	1min power frequency (kV rms.)	28
	1.2×50μs impulse (kV perk)	75
Rated short-circuit breaking current (kA)		25
Rated short-circuit making current (kA peak)		65
Rated short-time withstand current (kA-s)		25-3
Operating duty		O-0.3sec-CO-15sec-CO
Rated closing time (s)		0.05
Rated opening time (s)		0.035
Rated break time (s)		0.05
Rated TRV for terminal fault	Rate of rise (kV/μs)	0.34
	TRV peak voltage (kV)	20.6
Type of operating mechanism		Motor charged spring stored energy
Tripping system		Shunt trip
Spring charge motor	Auxiliary voltage	110Vdc
Closing coil	Auxiliary voltage	110Vdc
Tripping coil	Auxiliary voltage	110Vdc
Applicable standard		IEC62271-100（2012）

1-2. OUT LINE DRAWING

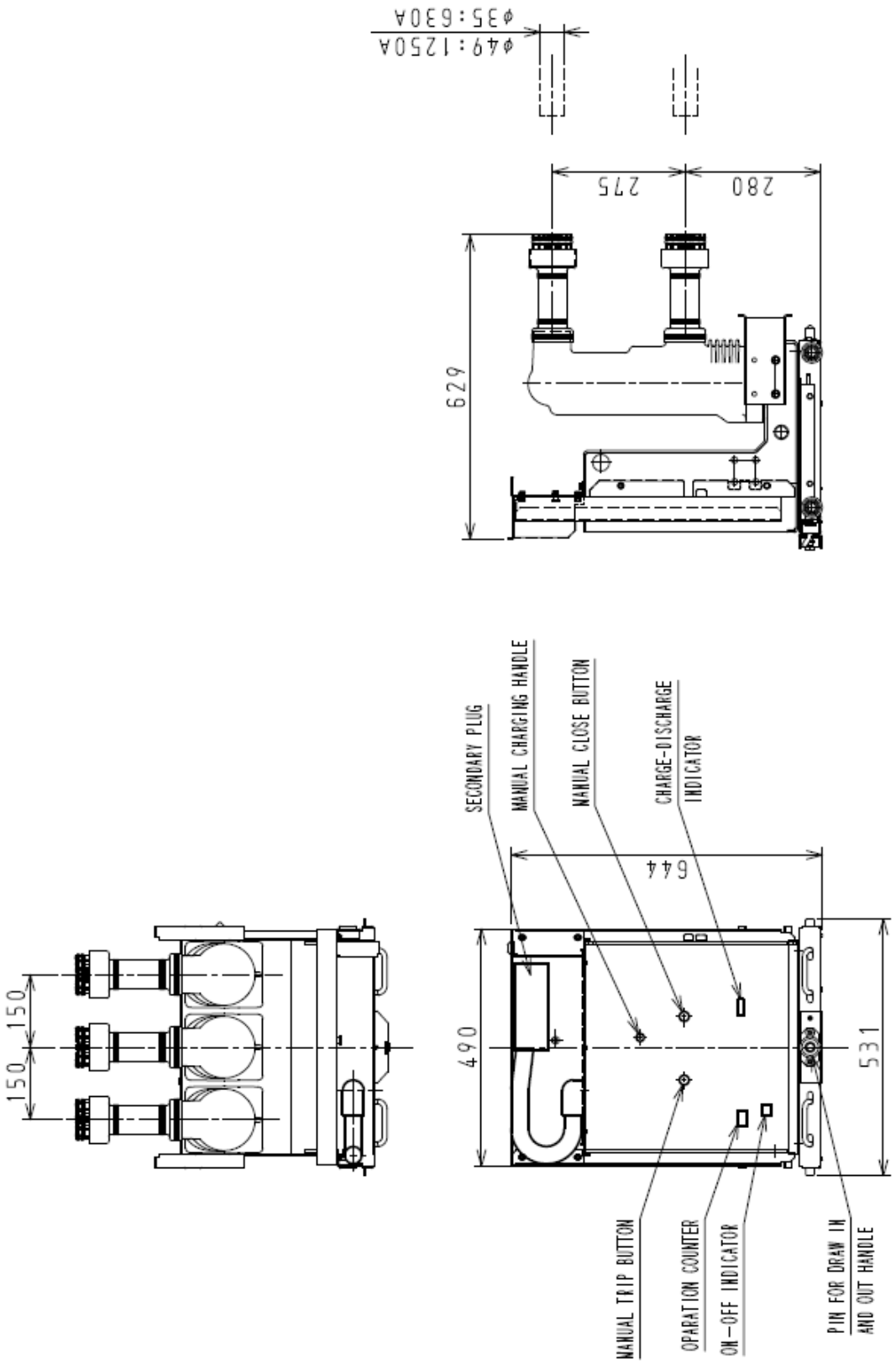


Fig.1 Outline drawing

1-3. INTERNAL CONNECTION DIAGRAM

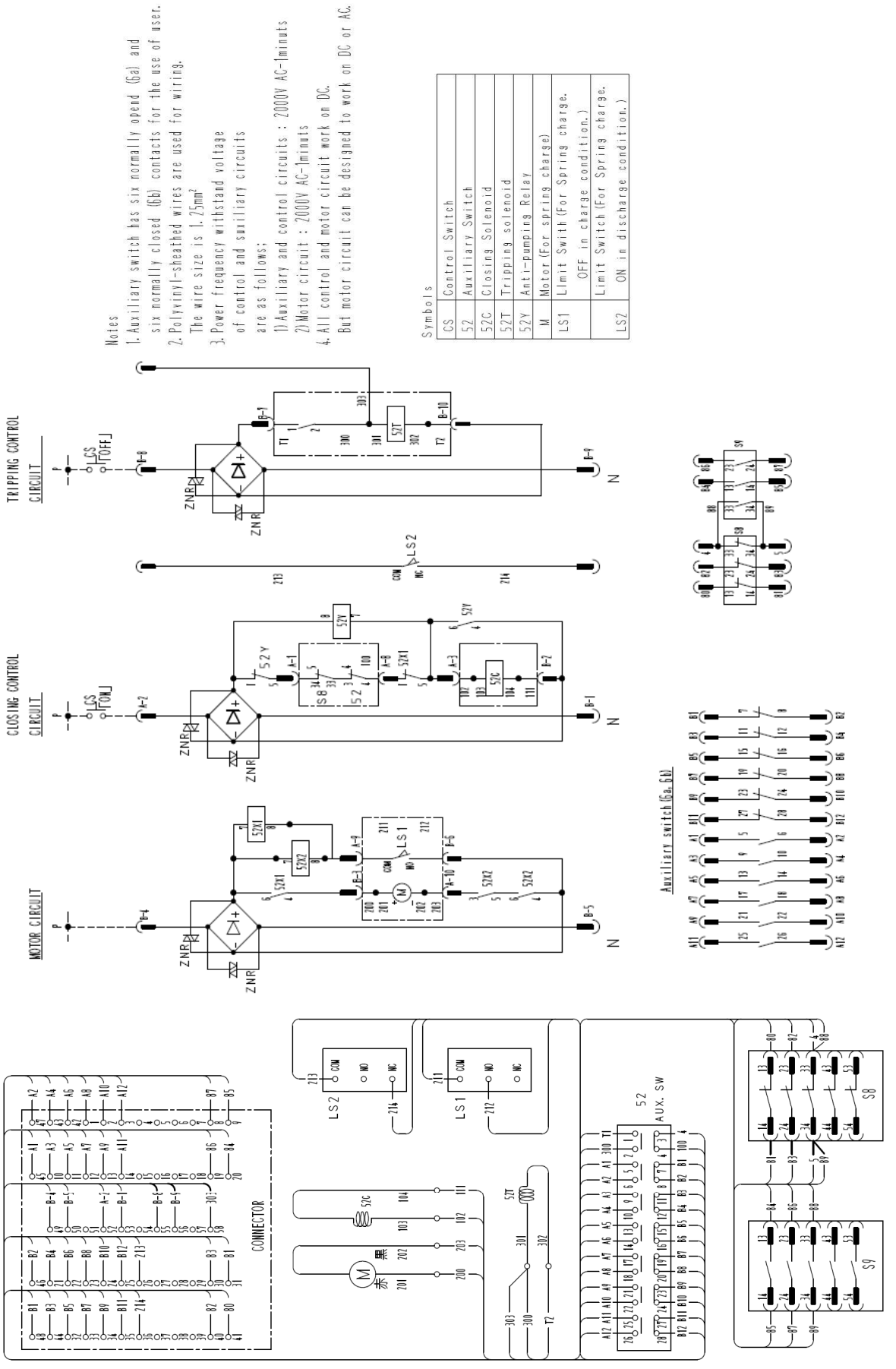


Fig.2 Internal connection diagram

2. DESCRIPTION

The Meidensha VZA-12 vacuum circuit breaker employs the vacuum interrupter which has excellent interruption efficiency.

The vacuum circuit breaker is extremely reliable in service, require only a minimum of maintenance and have a long life expectancy.

The Meidensha VZA-12 vacuum circuit breaker meets the requirements of IEC62771-100.

Closing spring can be charged motor..

The three breaker poles with vacuum interrupter, are mounted on a common truck housing.

The moving contacts in vacuum interrupters are opened and closed by springs.

In order to ensure the maximum performance and dependable operation, it is suggested that the operator reads this instruction manual carefully to be well acquainted with all the features of this vacuum circuit breaker.

Safety precaution

This circuit breaker uses powerful springs for operation. Prior to the inspection of open/closing characteristics and the parts replacement work, the vacuum circuit breaker shall be operated to be the following conditions.

・VCB status “OFF”

・Closing spring “DISCHARGED”

・Control and motor circuits “OPEND”

3. MANUAL OPERATION(Manual stored energy type and Motor stored energy type)

Motor-operated vacuum circuit breakers can be actuated by hand if the control supply should fail.

3-1. Charging (See Fig.3)

Insert the charging handle to the manual charging shaft and clockwise until a clicking sound is heard. At this time the charge-discharge indicator shows “CHARGED”.

The operator is protected for any risk when sudden recovery of control source during charging by a preventive device charging handle.

3-2. Closing (See Fig.3)

Press the manual close button to close the vacuum circuit breaker.

The ON-OFF indicator will show “ON” and the charge-discharge indicator will show “DISCHARGED”.

The closing spring is automatically recharged by the motor mechanism immediately after the breaker is closed.

On-hand operated breakers, the closing can be recharged by hand.

3-3. Opening (See Fig.3)

The tripping spring is charged during closing operation.

Press the manual trip button to open the vacuum circuit breaker.

The ON-OFF indicator will show “OFF”.

3-4. Putting into “SERVICE” and “ISOLATED” operation (See Fig.3,4)

When setting the VCB in switchgear, use the following procedure.

(1) Confirm the VCB is “OFF” position.
(2) Slide the VCB handle inward.
(3) Insert the VCB into switchgear.
(4) Confirm the VCB is located in proper position.
(5) Slide the VCB handle outward.
(6) Connect the cable connector.

When setting the VCB from the ISOLATED to the SERVICE position, use the following procedures.

(1) Confirm the VCB is “OFF” position.
(2) Insert the draw out handle to the shaft for draw in and out, and rotate clockwise until a clicking sound is heard. This position is SERVICE position.
(3) When the vacuum circuit breaker is set from the SERVICE to the ISOLATED position, insert the draw out handle into the VCB shaft and rotate un-clockwise until a clicking sound is heard. This position is ISOLATED position.

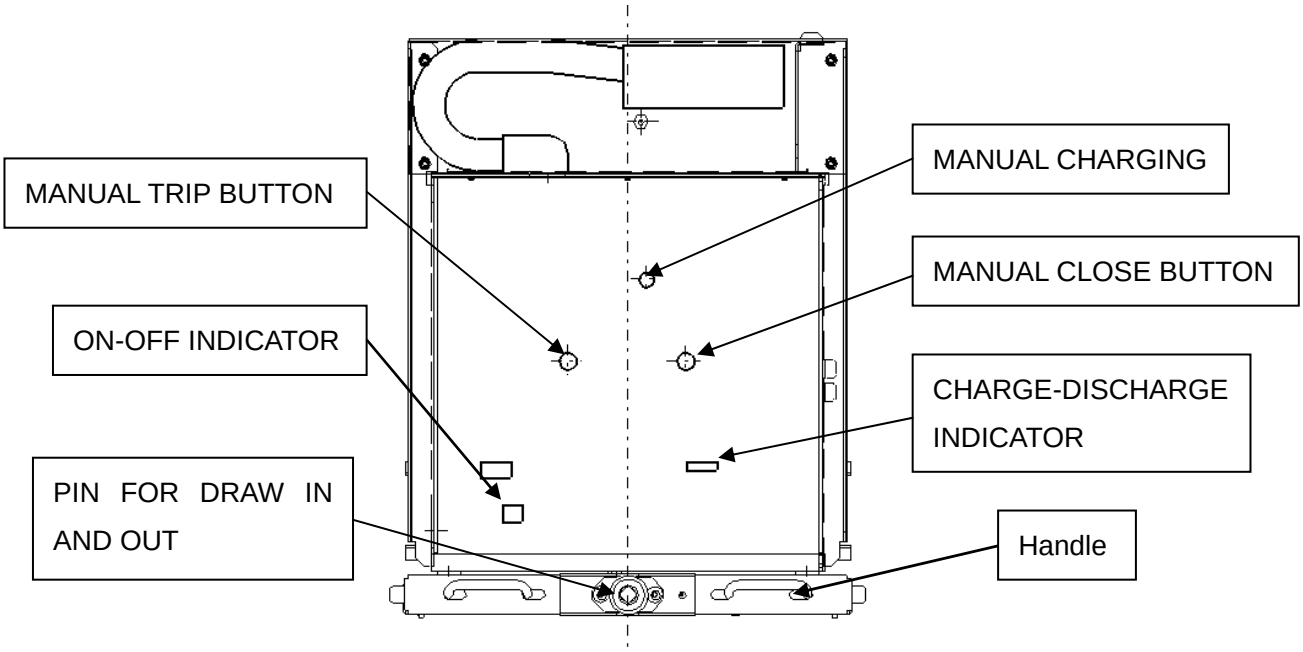


Fig.3 MANUAL OPERATING POSITION

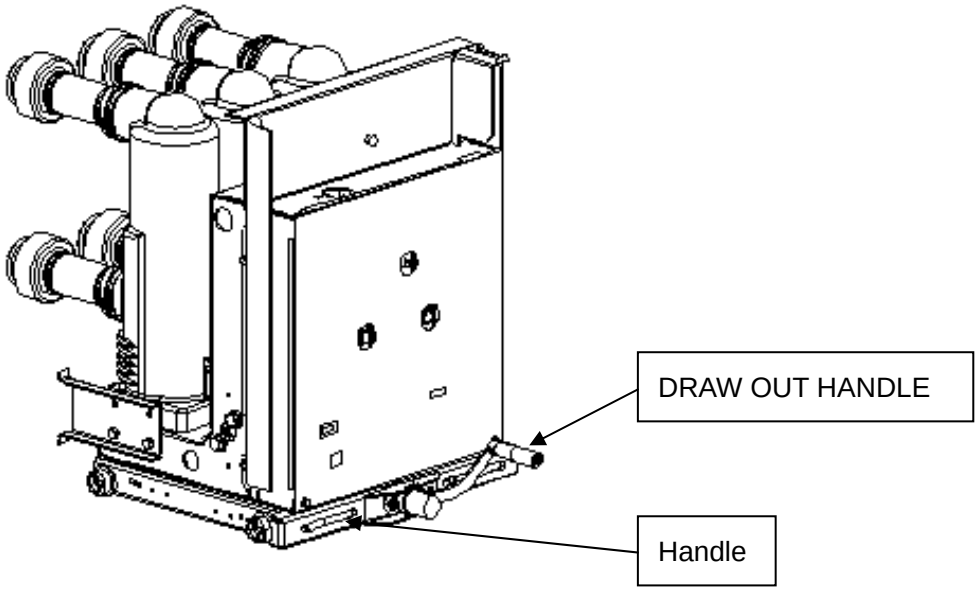


Fig.4 OPERATING CONDITION

4. UNLOADING AND PREPARATION FOR OPERATION

4-1. Unloading

Use crane or fork lift, operate it slowly not to give any shock to the vacuum circuit breaker.

4-2. Unpacking

It is recommended unpack the circuit breaker earlier when it is arrived.

Be careful, not to damage the circuit breaker especially insulating material, vacuum interrupters, main circuit connectors and front panel.

4-3. Transportation

Lift the circuit breaker as illustrated in Fig.5 if necessary.

Don’t hold upper conductor and lower conductor to move the circuit breaker.

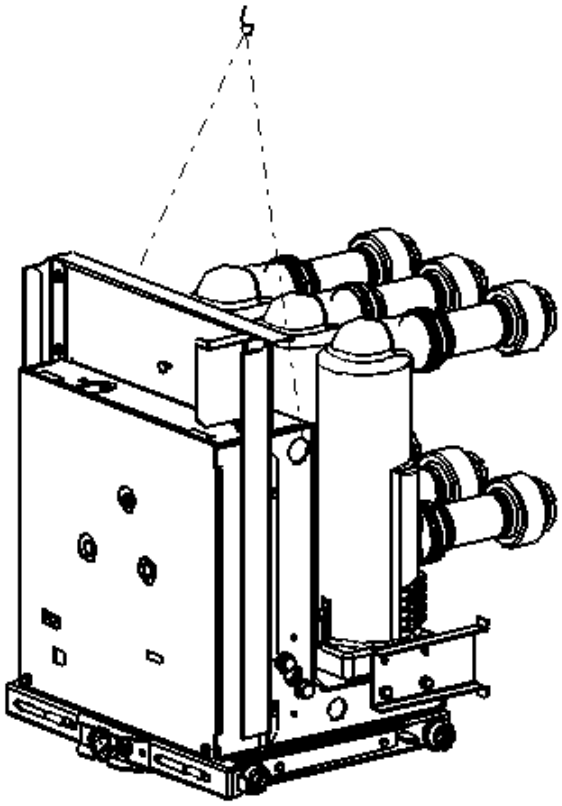


Fig.5 Lift the circuit breaker

4-4. Checking after unpacking

Check the following and report to Meidensha or representing organization when any defect is found.

(1). Quantity, Type, Ratings and etc.
(2). Damages such as bends, cut and serious scratches.
(3). Loss or loose fitting of bolts and nuts.
(4). Quantity and Type of accessories and spare parts it any.

4-5. Storage

It is recommended to put the circuit breaker into operation as soon as possible after unpacking.
However, if storage is un-avoidable, the followings shall be observed.

(1). Store unpacked.
(2). Store indoor on flat floor, in clean and dry atmosphere without corrosive gas, water and dust (especially cement dust).
(3). Cover with plastic sheet to protect dust, small animals, insects especially spiders invasion.
(4). Open circuit Breaker and release closing spring.

4-6. Inspection during storage

If longer storage is un-avoidable, check the followings yearly.
(1). Rust, if any remove it.
(2). Dust, dirt and spider web on surface of insulating material, if any clean with dry clean cloth.
(3). Loss or loose fitting of bolts and nuts, and damages.

4-7. Installation

(1). Confirm the circuit breaker is open and closing spring is discharged with respective mechanical indicator.

(2). Check the circuit breaker following to the previous Item 4-6.

4-8. Inspection and procedure before operation

(1). Measure insulation resistance by 1000V and 500V megger.
The following shall be observed.
Phase to phase of main circuit ; 500MΩ≦
Main circuit to earth ; 500MΩ≦
Control circuit to earth ; 2 MΩ≦

(2). Check smooth operation of circuit breaker in-out to and from the cubicle, and interlocking mechanism.

(3). Check circuit breaker operation manually first.

Place the circuit breaker at isolated position, and operate the MCCB for control and motor circuit to “OFF” position. Charge closing spring with manual charging handle and close circuit breaker with manual closing button after charge the spring fully.

(4). Be cautions not to leave any tools and material at the circuit breaker.

5. MAINTENANCE AND INSPECTION

Basic interval of inspections is show in Table as practical interval, is to be decided by the usage condition and frequency of operation etc.
It is recommended to carry out periodical inspection after one year operation then settle the interval by the result.
Circuit Breaker shall be replaced when the number of operation is reached to the following figure.

Number of mechanical operation		10,000 times
Number of electrical operation	Rated load current interruption	10,000 times
	Rated breaking current interruption	30 times

5-1. Caution at inspection

The following items shall be observed for inspection.

(1). Keep off dangerous zone of the circuit breaker when inspect alive.

(2). Don’t drop tools or other materials while working.

(3). After the inspection.

a). Don’t leave any tools and materials.

b). Don’t forget tighten the bolts and nuts loosened work.

c). Clean insulating material and vacuum interrupters with dry clean cloth.

(4). Tightening torque of bolts and nuts are shown in Table 2.

Table 2.

Bolt diameter	Standard Torque Nm (kgfcm)
3	78 Ncm (8 kgfcm)
4	186 Ncm (19 kgfcm)
5	392 Ncm (40 kgfcm)
6	637 Ncm (65 kgfcm)
8	1500 Ncm (154 kgfcm)
10	3020 Ncm (308 kgfcm)
12	5190 Ncm (530 kgfcm)

5-2. Patrol inspection

It is recommended to inspect the alive circuit breaker visually keeping off dangerous zone on each patrol.

If any abnormality is found, stop operation immediately and investigate the circuit breaker.

No.	Item	Contents	Remarks
1	General	Condensation, ingress of dust, rain. Abnormal sound, smell, color.	
2	ON-OFF indicator	Normal or not	
3	Charge-Discharge indication	Normal or not	
4	Operation counter	Check No. of operation.	Replace circuit breaker, if the No. is 10000 or more.

5-3. Periodical inspection

It is recommended to carry out periodical inspection on the circuit breaker each 3 years basically.

However, the practical interval is to be decided by location, frequency of operation and etc.

No.	Classification	Items	Contents	Basic period
1	Circuit breaker general	General	Record No. of operation. Clean dust, dirt, moisture with dry clean cloth. Check breakdown or damage.	Once every three years
2	Pole unit	Insulating Material	Clean dust, dirt, moisture with dry clean cloth. The detail is show in Figs. 9.	Once every three years
		Main circuit conductor	Check loose fitting of bolts and nuts.	Once every three years
3	Operating mechanism	General	Clean all parts, check loose fitting of bolts and nuts. Check loss or damage of stopper and etc.	Once every three years
		Oiling	Oil with Topas JL15 Fluid (Synthetic hydrocarbon) at specified position (NOK KLUEBER make). The detail is show in Figs. 6, 7.	Once every three years
4	Control device	General	Check rust or loosing of connection at terminal.	Once every three years

No.	Classification	Items	Contents	Basic period
5	Operation test	ON-OFF operation	Operate manually and electrically few times each, and check operation of all parts. Check ON-OFF and Charge-Discharge indicator.	Once every three years
6	Insulation resistance	Main circuit	Measure insulation resistance with 1000V meggar. If below 500MΩ for phase to and phase to earth, investigate the cause.	Once every three years
		Control circuit	Measure insulation resistance of control circuit to earth 500V meggar. If bellow 2MΩ, investigate the cause.	Once every three years

Application Part	Name	Main compounds	Manufacture
Uncovered friction part (Gear teeth, etc.)	TOPAS L52 (Grease)	Synthetic hydrocarbon oil with lithium soap	NOK Co.
Covered friction part (Bearings, etc.).	TOPAS JL15 FLUID (Oil)		

NOTE: Any other lubricants must not be used. In the serious case, using others may result in a malfunction of the mechanisms.

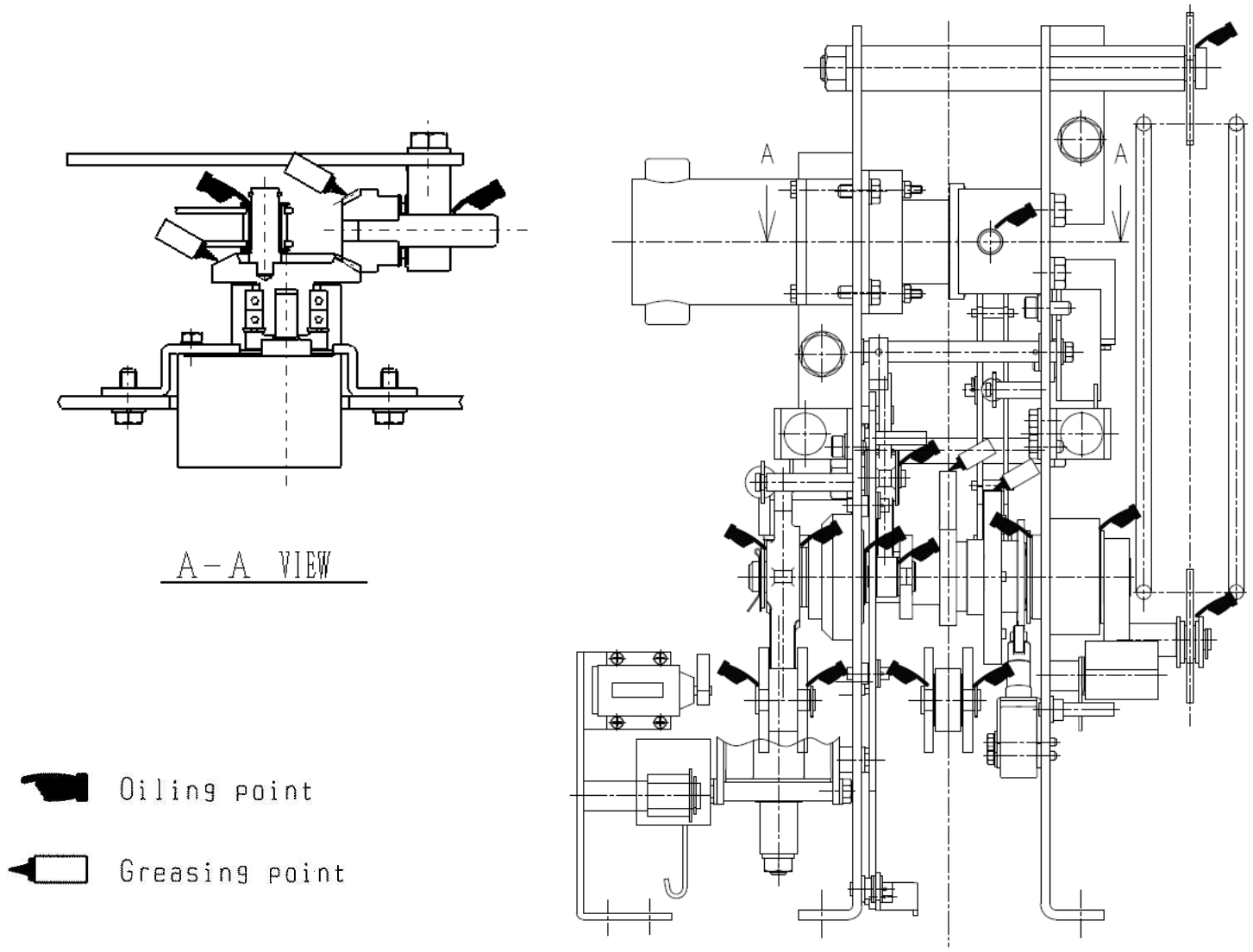


Fig.6 Lubrication points Operator mechanism

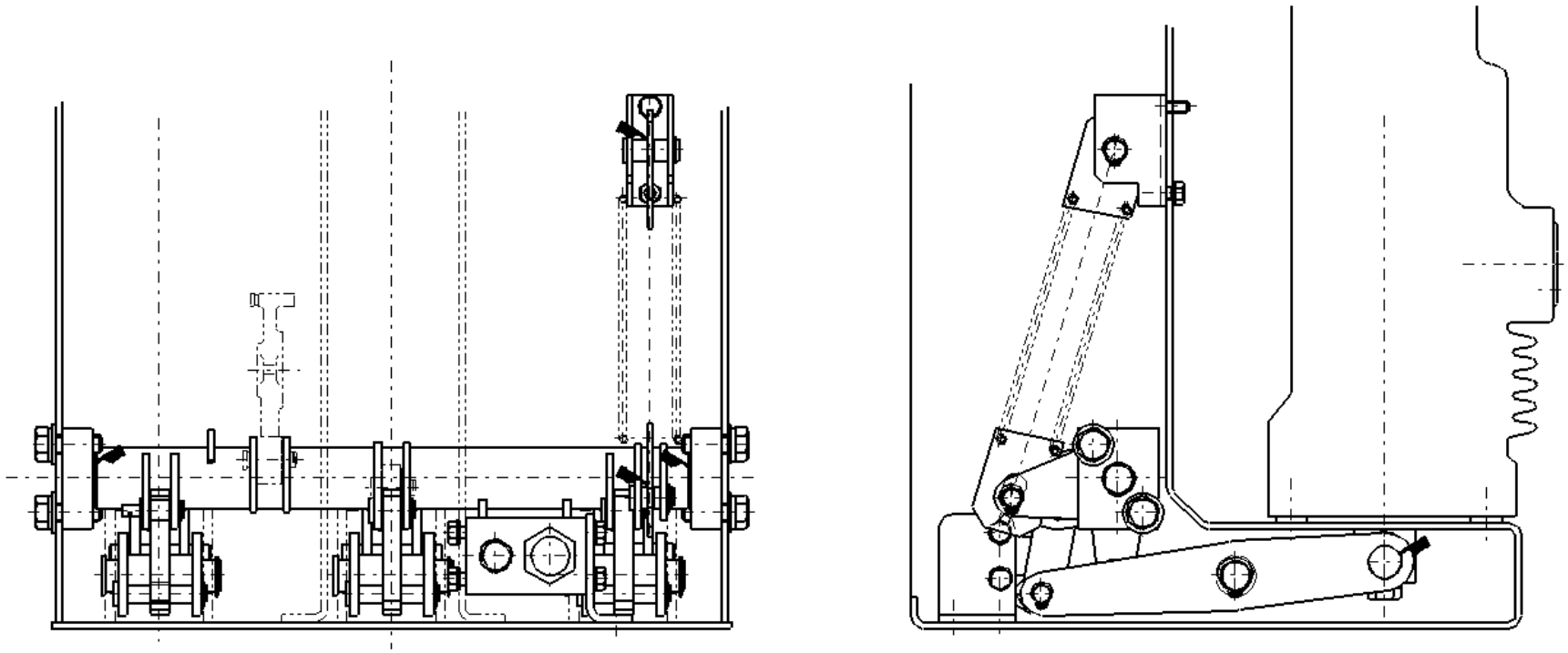


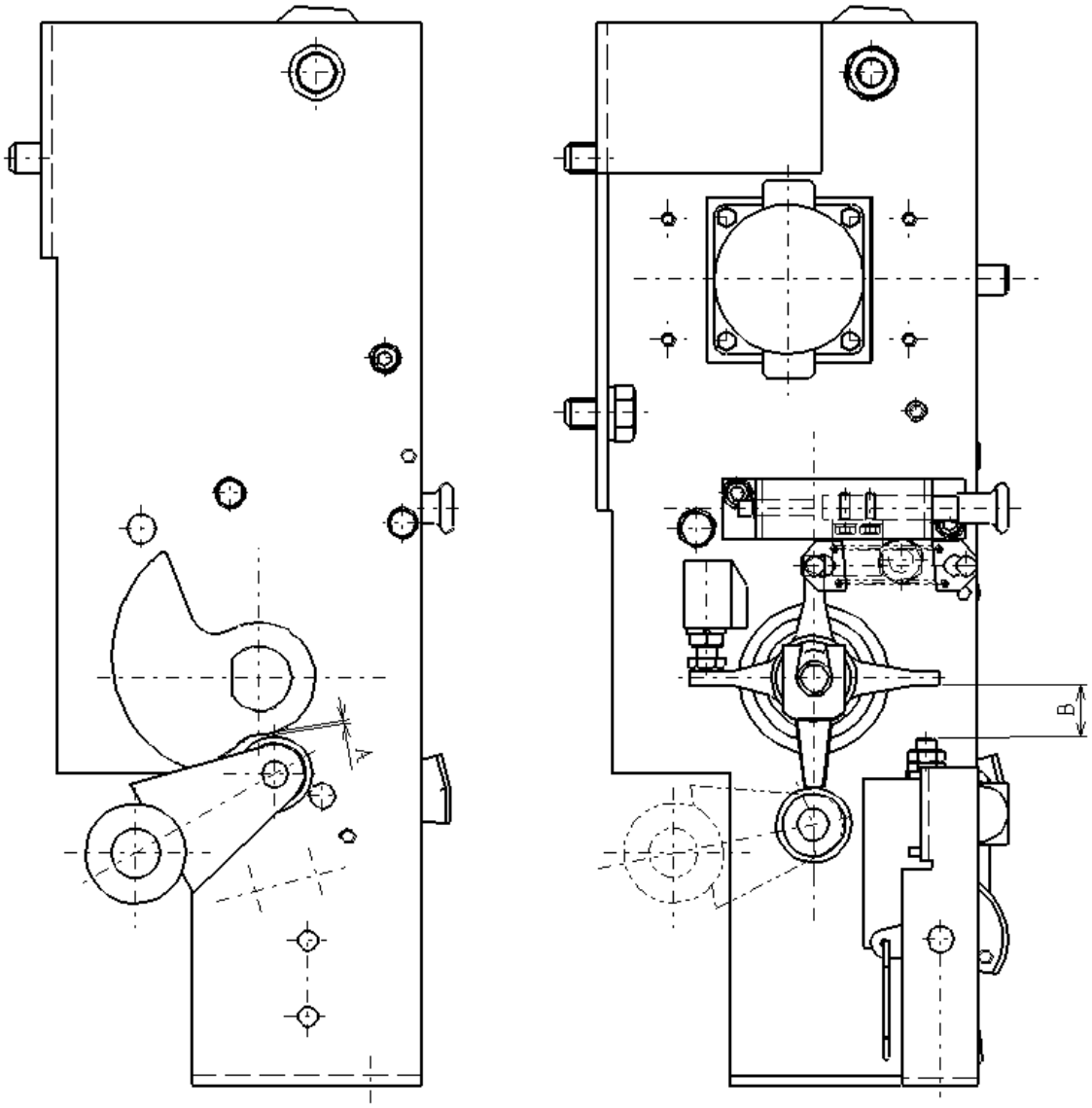
Fig.7 Lubrication points Operator mechanism

5-4. Detail inspection

Inspect the following item in addition to the item in 5-3 periodical inspection.

No.	Classification	Item	Contents	Basic period
1	Pole unit	Vacuum degree	Use vacuum checker or apply AC22kV for 1min across the contact. No flashover : good.	Once every six years
		Main circuit contact	Make sure of the state of grease, wipe off old grease if needed, and apply new grease to the contact section. Grease uses “MOLYKOTE BR2 plus. The detail is show in Figs. 10.	Once every six years
2	Operating mechanism	Dimensions	Check gap between tripping coil and trip hook to the Fig. 8.	Once every six years
		Springs	Check rust, flaws or deformation	Once every six years
		Coils	Check continuity and loose terminal.	Once every six years
3	Operation test	Operating characteristics	Confirm no abnormality with manual operation and test with electrical operation. See the criteria below and if exceed the limit, investigate the cause.	Once every six years

Item	Criteria	
Spring charge	Min. operation voltage	Less than 85%
	Charging time	Less than 15sec
Closing operation	Min. operation voltage	Less than 75%
	Closing time	Less than 60ms
Opening operation	Min. operation voltage	Less than 60%
	Opening time	Less than 50ms



A	0.5～1.5mm
B	19～21mm

Fig.8　Clearance

・the dry, clean rag is used for cleaning.
・Wipe the insulation frame and insulation cover of dust.
・It is checking the existence of cracks, when insulator cleans.

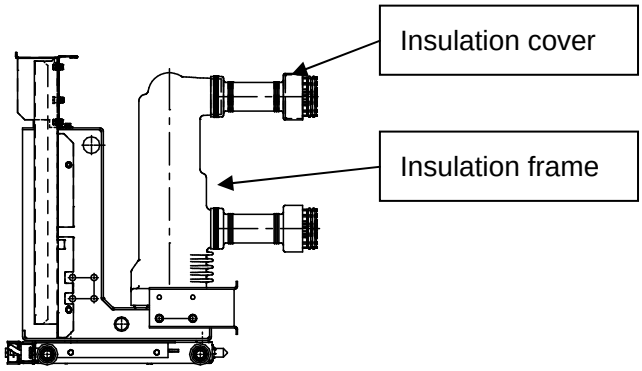
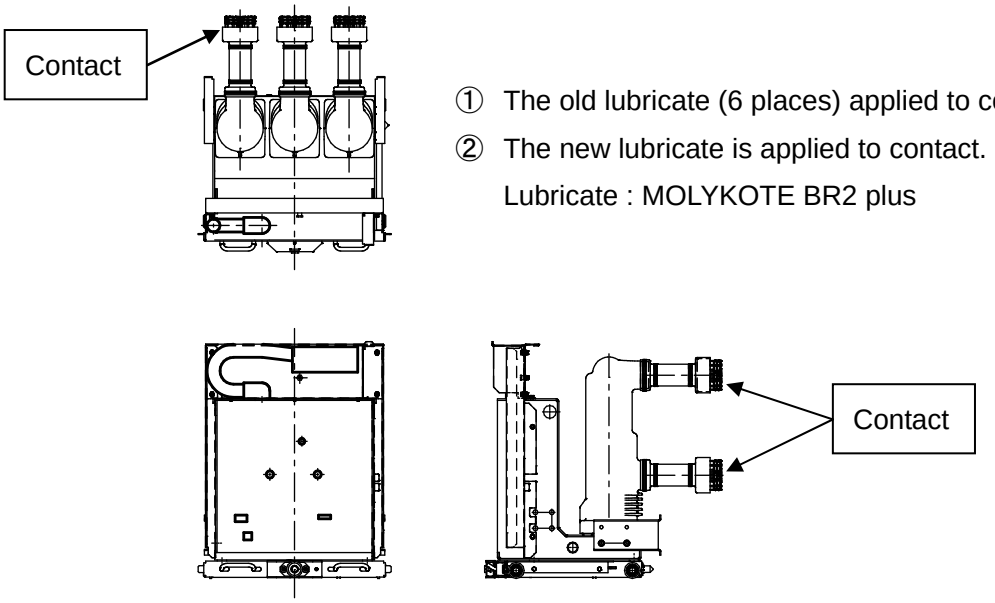


Fig.9　Cleaning part



① The old lubricate (6 places) applied to contact is wipe off.
② The new lubricate is applied to contact.
Lubricate : MOLYKOTE BR2 plus

Fig.10　Lubrication point

5-5. Special inspection

This test shall be carried out before detail test (5-4) when no. of current interruption of vacuum interrupter is reached to the following figure.

No. of interruption	Items
Fault current about 20 times. Load current about 5,000 times.	Detail inspection (5-4)

5-6. Trouble shootings

In case of replacement, disassembling and reconditioning, please contact the manufacturer.

Trouble 1	Trouble 2	Trouble 3	Cause	Action
Closing failure	Closing spring is not charged	Motor not moving	1. Power source abnormal ① Faulty connector contact ② Switchgear side power source abnormal	① Replacement of connector ② Investigation of cause
			2. 52X1, 52X2 Not moving ① Coil opening circuit ② Limit switch contact fault	③ Replacement of PCB ④ Replacement of limit switch
			3. 52X1, 52X2 Contact faulty ① Contact drop out or stained	Replacement of PCB
			4. Motor faulty	Replacement of motor
			5.Rectifier faulty	Replacement of PCB
		Motor Moving	1. Decelerator faulty ① Shaft broken	① Replacement decelerator and motor ② Replacement of decelerator
			2. Pushing claw faulty ① Reset speed Decreased	Investigation of cause
	Closing spring charged	Closing magnet (52C) not moving	1. Power source faulty ① Connector contact faulty ② Switchgear side power source faulty	① Replacement of connector ② Investigation of power supply

Trouble 1	Trouble 2	Trouble 3	Cause	Action
			2. Closing control circuit contact faulty ① 52Y b-contact faulty ② 52X1 b-contact contact faulty ③ 52 b-contact faulty	Replacement
			3. 52C Open circuit	Replacement of 52C
			4.Rectifier faulty	Replacement of PCB
Closing failure	Closing spring charged	Closing magnet (52C) moving	2. Closing hook load is Increased. ① Due to aged grease, closing latch load is increased.	① Lubrication or disassembling reconditioning
Tripping failure	Tripping magnet (52T) not moving		1. Power source faulty ① Connector contact faulty ② Switchgear side power source faulty	① Replacement of connector ② Investigation of power supply
			2. Auxiliary contact faulty	Replacement of auxiliary switch
			3. 52T open circuit	Replacement of 52T
			4. Magnet faulty ① Moving iron core jammed.	Disassembling or replacement
			5. Rectifier faulty	Replacement of PCB
	Tripping magnet (52T) moving		1. Load increment of tripping hook or roller ① Degrading of grease ② Foreign material ingress into bearing	Disassembling reconditioning
			2. Abnormal engagement between tripping hook and roller ① Grease adherence ② Foreign material ingress ③ Rusting ④ Deformation	① Disassembling or reconditioning ② Disassembling or reconditioning ③ Replacement ④ Replacement

DO NOT HANG
VCB & CRADLE TOGETHER