



MITSUBISHI Low Voltage Air Circuit Breakers World Super AE

V Series

三菱低压空气断路器 World Super AE

V Series

MODEL

型号

AED-CV

INSTRUCTION MANUAL

使用说明书

Relevant models

对象机型

AED630-CV

AED1000-CV

AED1250-CV

AED1600-CV



This is our management code.
是三菱电机管理代码。

20A

Warranty

Warranty period and warranty coverage

If any faults or defects (hereinafter “Failure”) found to be the responsibility of Mitsubishi Electric occurs during use of the product within the warranty period, the product shall be repaired at no cost via the sales representative or Mitsubishi Electric Sales office. However, if repairs are required on-site at domestic or overseas locations, expenses to send an engineer will be charged.

1. Warranty period

The free guarantee period of the product is one year from the day of purchase.

2. Warranty coverage

1. The primary failure diagnosis should be performed by users. However, if required by users, Mitsubishi Electric or Mitsubishi Electric Service Company may be able to perform the diagnosis. In that case, for damages caused by any cause found to be the responsibility of Mitsubishi Electric, the diagnosis will be performed at no cost. For details, contact a distributor.
2. The coverage shall be limited to ordinary use within the usage state, usage methods, usage environment, and other conditions which follow the instructions and precautions given in the instruction manual, user’s manual, and caution labels on the product.
3. Even within the warranty period, repair cost shall be charged for the following cases.
 - Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by selection of hardware or software design on the user side.
 - Failure caused by modifications, etc. to the product by the user without any approvals from Mitsubishi Electric.
 - In case Mitsubishi Electric product is assembled into a user’s device, failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user’s device is subject to or as necessary by industry standards, had been provided.
 - Failure that could have been avoided if the maintenance described in the user’s manual has been performed.
 - Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by natural disasters such as earthquakes, lightning, wind and water damages.
 - Failure caused by reasons unpredictable based on scientific technology standards at the time of shipment from Mitsubishi Electric.
 - Any other failure found not to be the responsibility of Mitsubishi Electric or that admitted not to be so by the user.

In addition, the warranty applies only to the product delivered. It does not apply to the damage that is caused by the failure of the product.

3. The period to supply the spare parts after discontinuation of production

Mitsubishi Electric shall supply spare parts for five (5) years after discontinuation of production. After five years, Mitsubishi Electric shall supply spare parts until the spare parts run out of stock.

Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the warranty period, Mitsubishi Electric shall not be liable for compensation to:

1. Damages caused by any cause found not to be the responsibility of Mitsubishi Electric.
2. Loss in opportunity, lost profits incurred to the user by failures of Mitsubishi Electric product.
3. Damages whether foreseeable or not, secondary damages, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products, caused by exceptional situations.
4. Compensation for cost occurring secondarily from replacement work by the user, maintenance of on-site equipment and start-up test run and other operations.

Product applications








1. When using the products listed in this catalogue, the following conditions must be confirmed and obeyed. The product must be used so that a failure that occurs to the product does not lead to a serious accident. When a damage or failure occurs, the external backup function or fail-safe function must be executed systematically.
2. The products listed in this catalogue are designed and manufactured as general-purpose products for application to the general industry field. Therefore, the warranty does not apply to the following special uses.
 - The use that has a significant influence on the public facilities such as nuclear power plants and other power plants of power companies.
 - The use for railway companies, government offices, etc. that require to build the special quality assurance system.
 - The use for aerospace equipment, medical equipment, railway equipment, combustion and fuel equipment, passenger vehicles, manned transportation equipment, recreational equipment, safety equipment, and air conditioner for servers and the cooling facilities that are expected to have a significant influence on life, body, and property.

If the products listed in this catalogue are used for the above mentioned special uses, Mitsubishi Electric does not take any responsibility for the quality, performance, and safety of the product, which includes, but is not limited to, default liability, defect liability, quality assurance liability, tort liability, and product liability. However, in case the special quality (beyond general specifications) is not required and the use is a limited purpose and the backup/fail-safe functions are equipped with the facility, Mitsubishi Electric may determine that the products listed in this catalogue can be guaranteed. For details, consult a distributor or Mitsubishi Electric.

Safety precautions

- Before using this product, read this section and this instruction manual carefully and use it correctly.
- Important safety instructions are given below. Strictly observe the instructions.
- Be sure to instruct the end user with these safety precautions.

Meaning of indications

 DANGER	Incorrect handling of the product will result in a hazardous situation, such as death or serious injury.
 CAUTION	Incorrect handling of the product may result in a hazardous situation according to circumstances.
	This means prohibition. Never ignore this instruction.
	Warning for possible outbreak of a fire under certain conditions.
	Warning for possible electrification under certain conditions.
	Be sure to follow these instructions without fail.
	Be careful not to shut your fingers.

DANGER

- Do not use the product under the conditions with over-rated current. Otherwise, ground-fault or short circuit fault could occur due to dielectric breakdown, or explosion could occur due to a short circuit protection failure.
- Do not touch terminal area. There is a risk of electrical shock.

CAUTION

- The electrical work shall be performed by qualified personnel (electrical expert).
- Inspection and maintenance should be performed by qualified personnel (electrical expert). Before performing wiring works, turn off the upstream circuit breaker. Failure to do so may expose you to electrical shock.
- Tighten the terminal screw with the torque specified in the instruction manual. Failure to do so may cause a fire.
- Do not install or store in an abnormal environment with high temperature, high humidity, dust, corrosive gas, vibrations, or shocks, etc. To do so may cause a fire, malfunction of the circuit breaker or make it inoperative.
- Protect the circuit breaker so that foreign particles, such as dust, concrete powder and iron powder, and rain water will not enter the circuit breaker. Failure to do so may cause malfunction or fire.
- When the circuit breaker trips automatically, remove the cause before turning on the handle. Failure to do so may cause an electric shock or a fire.
- Retighten the terminals periodically. Failure to do so may cause a fire.
- Use the product in 50/60 Hz. Failure to do so may cause malfunction, inoperativeness or fire.
- Dispose of the product as industrial waste.

Changes in product specifications

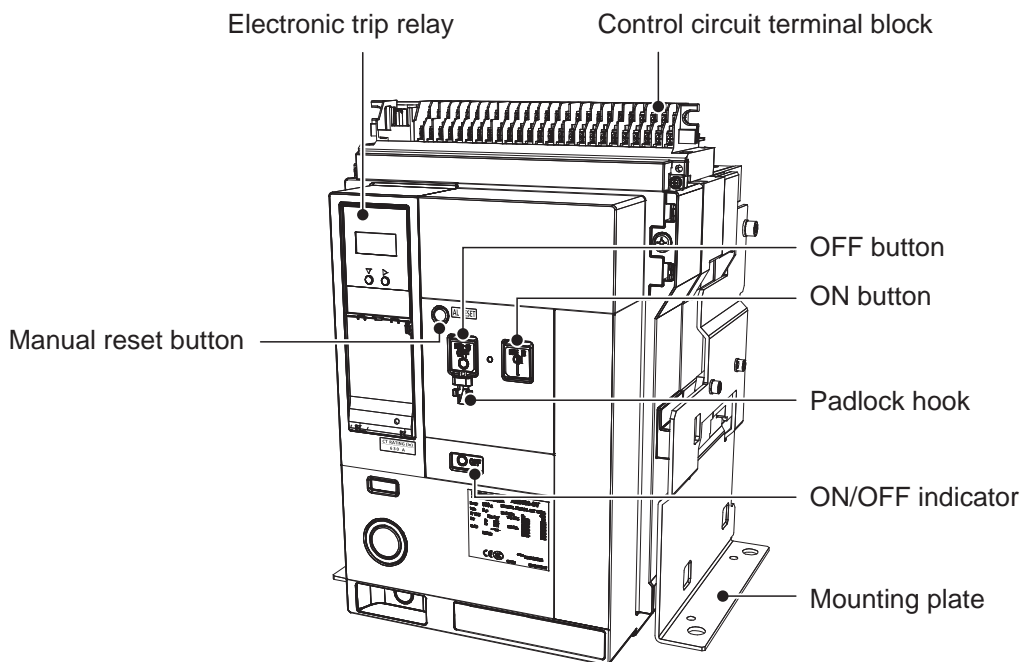
The specifications of the product listed in this catalogue, manuals or technical documents are subject to change without prior notice.

Contents

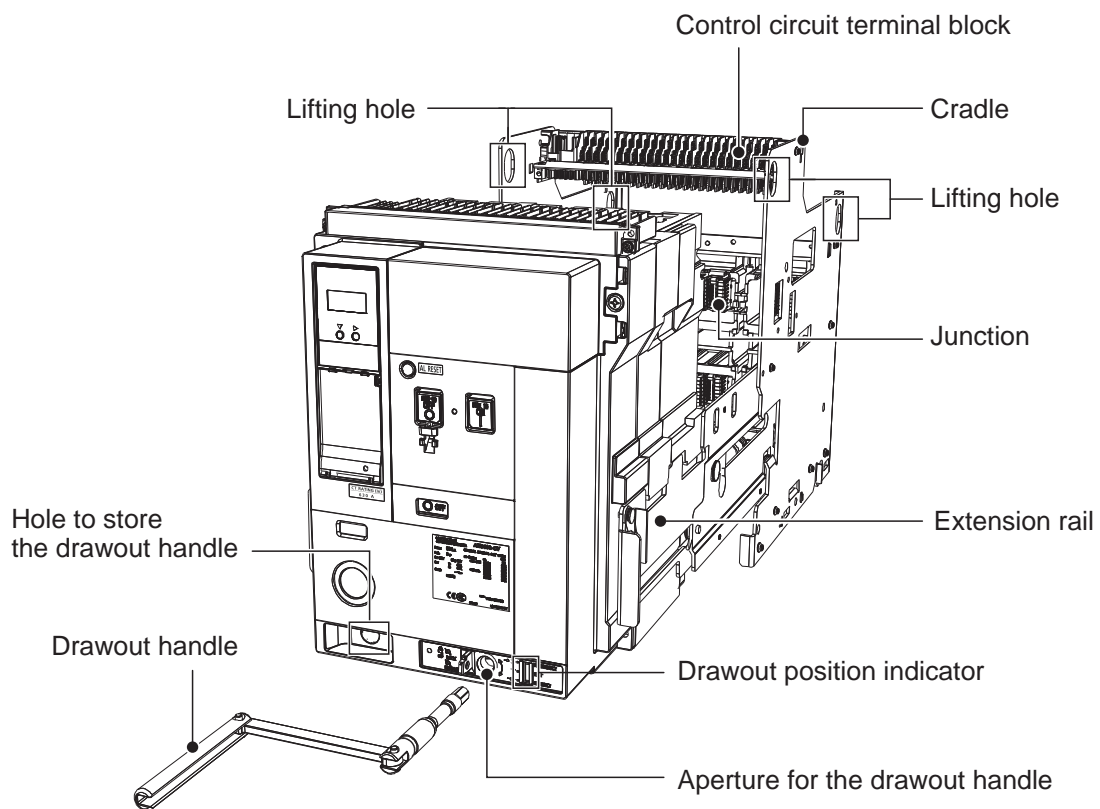
1. Appearance	6
2. Outline dimensions	7
3. Package	7
4. Storage	8
5. Required tool	8
6. Unpacking	9
6.1 Fixed type	10
6.2 Drawout type	10
6.3 CONNECT → DISCONNECT position	11
6.4 DISCONNECT → CONNECT position	14
7. Handling	17
8. Installation	18
8.1 Universal terminal	20
8.2 Precautions for connecting	21
8.3 Check of the N-pole (4-Pole)	22
8.4 Control circuit	22
9. Attachment of the Interphase barrier	23
10. Opening/Closing operation	23
10.1 Conditions allowable for the closing operation	23
10.2 Direct switching operation	24
10.3 Remote opening/closing operation	25
11. OCR alarm (AL) [MRE: Manual reset type]	26
12. Cylinder lock (CYL)	27
12.1 Locking procedures	27
12.2 Releasing procedures	27
13. Safety shutter (SST)	28
14. Safety shutter lock (SST-Lock)	29
15. Cell switch (CL)	30
15.1 How to check the specifications	30
15.2 How to connect terminals	30
16. Electronic trip relay (ETR) section	31
16.1 Load current LED	32
16.2 Pre-alarm function	32
16.3 Control power supply	32
17. Characteristics setting of ETR	34
17.1 Setting of over-current tripping characteristics	34
17.2 Setting of ground fault protection characteristics	35
17.3 Setting procedure	36
17.4 Precautions when checking characteristics using the field test device	37
18. Procedures for operating Display (LCD)	38
18.1 List of display items	38
18.2 LCD display	38
18.3 Basic operation	38
18.4 Screen display and LCD setting	39
18.5 Display of measured values	40
18.6 Trip information	42
19. Troubleshooting of ETR	43
20. Wiring diagram	44
21. Technical note	45
21.1 Arc space	45
21.2 Reverse connection available	45
21.3 Service Conditions	45
22. Inspection and Maintenance	46
22.1 Guidances for Inspection and Maintenance	46
22.2 Preparation before Inspection	47
22.3 Inspection Details	48
22.4 Fault Diagnosis	51
23. Service network	53

1. Appearance

■ Fixed type

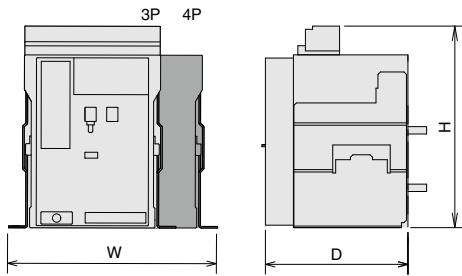


■ Drawout type

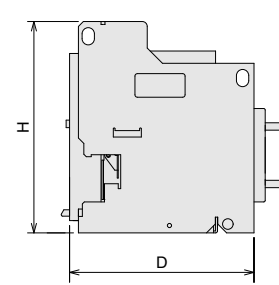


2. Outline dimensions

■ Fixed type



■ Drawout type

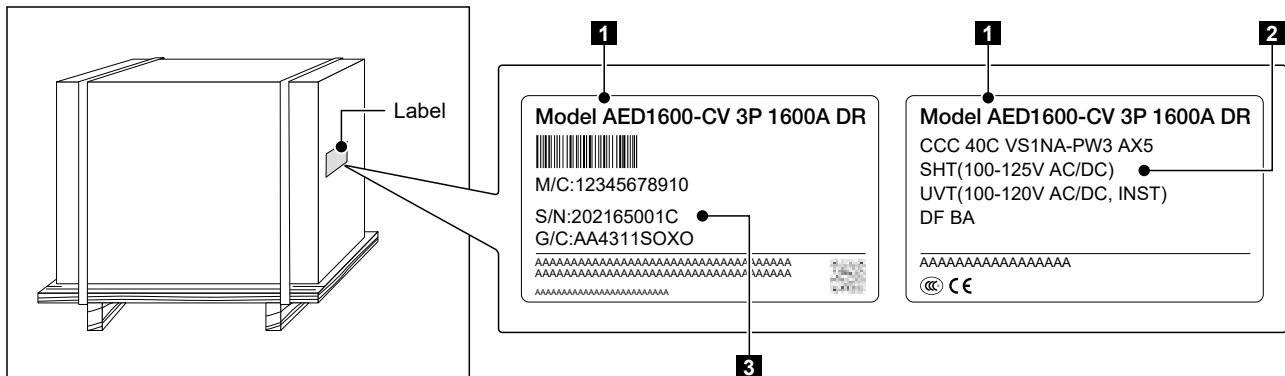


(mm)

Type		AED630-CV to AED1600-CV	
Dimensions (H × W × D)	Fixed type	3-pole	410 × 340 × 294
		4-pole	410 × 425 × 294
	Drawout type	3-pole	430 × 300 × 375
		4-pole	430 × 385 × 375

3. Package

Check the label to make sure it is the ordered product.

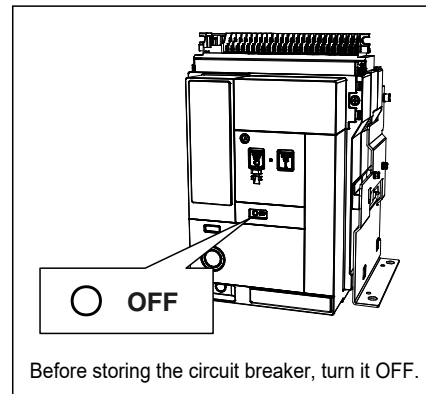
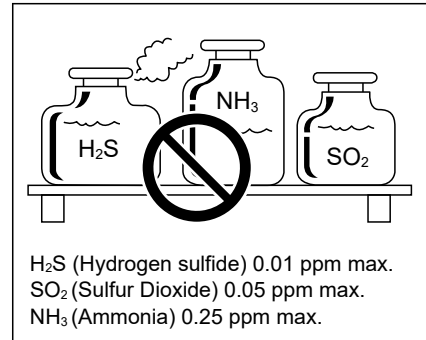
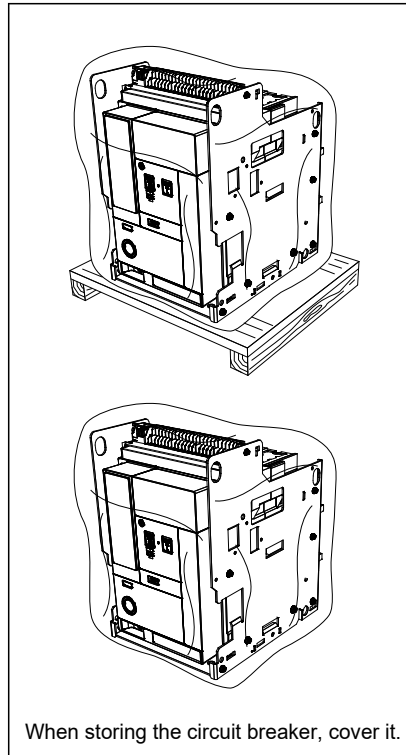
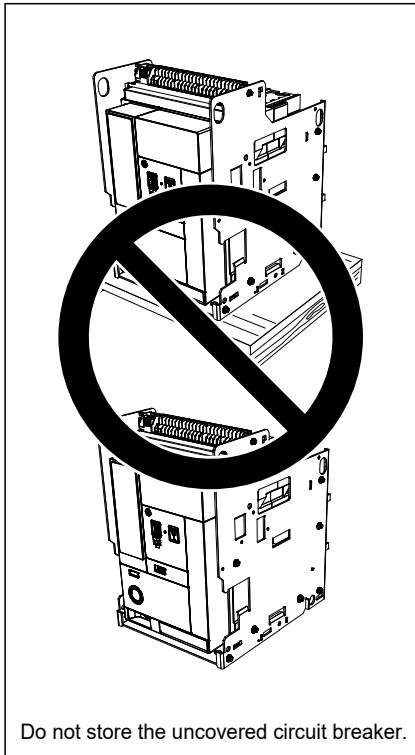
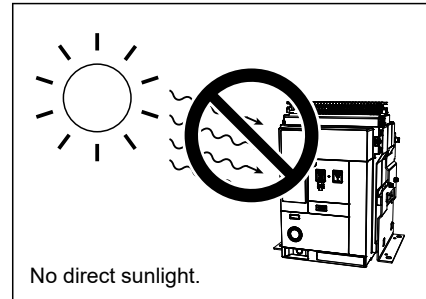
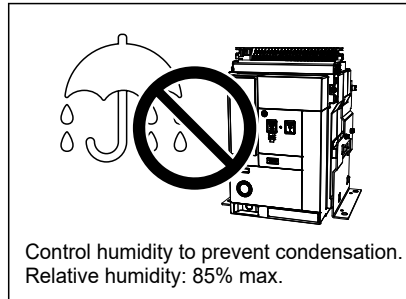
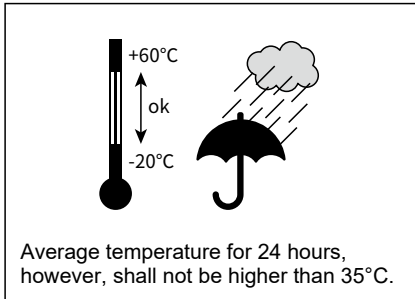


No.	Description
1	Short description of the circuit breaker
2	Description of accessories
3	Circuit breaker serial number

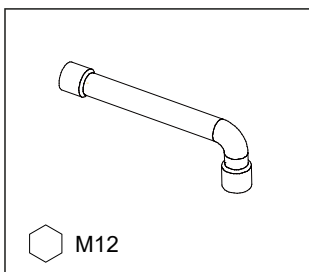
For a fixed type, lifting hooks (HP) for transportation are bundled.
For a drawout type, lifting hooks (HP) are sold separately.

4. Storage

Before using the circuit breaker stored six (6) years or longer, oil the oiling points described in Inspection and Maintenance. For details, please contact our service network.

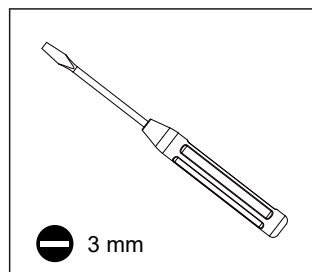


5. Required tool



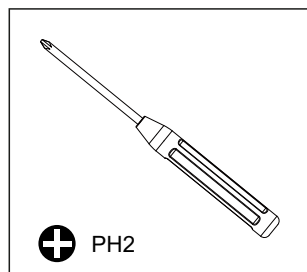
Hexagon spanner

- To open and install the circuit breaker.
- To connect the main circuit.



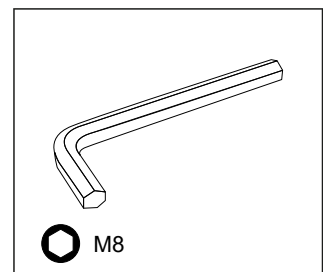
Flat tipped screwdriver

- To set the electronic trip relay.



Phillips screwdriver

- For the control circuit terminal block.

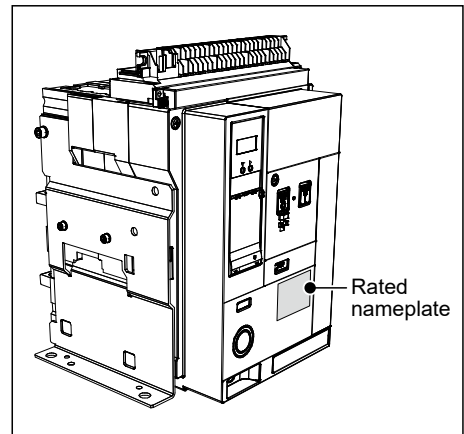
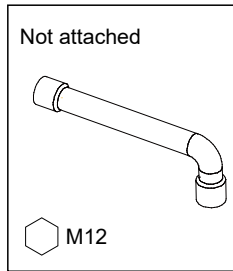


Hexagon wrench

- To remove and install the universal terminal.

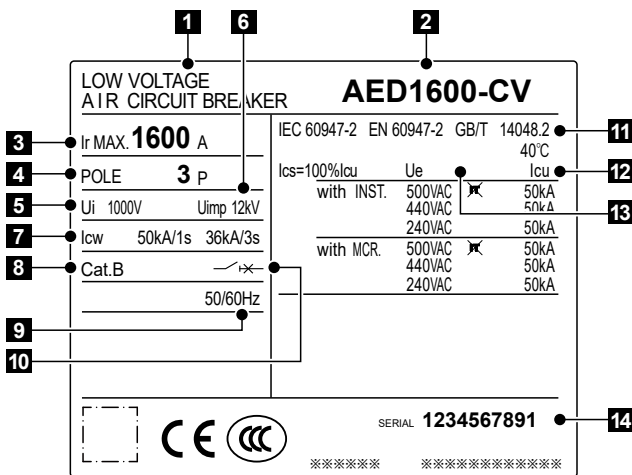
6. Unpacking

1. Make sure that the packing case is free from any abnormality such as breaking and/or wetting.
2. Check the rated nameplate to make sure it is the ordered product. The following content is described on the rated nameplate.



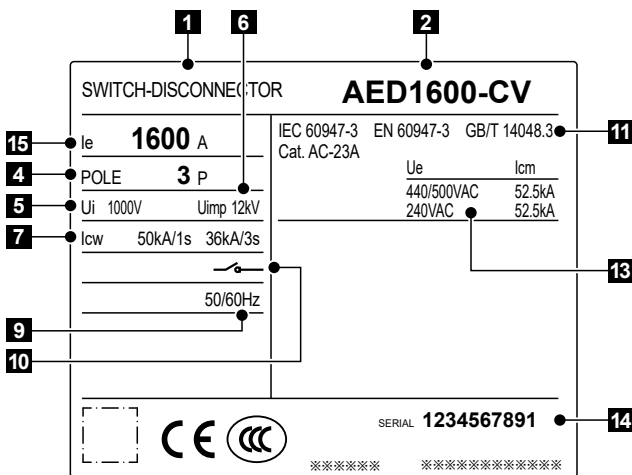
(Note)
The fixed type is provided with lifting hooks (HP).

- Low voltage air circuit breaker



No.	Description
1	Type of circuit breaker
2	Name and size of the circuit breaker
3	Rated current
4	3-pole or 4-pole
5	Rated insulation voltage
6	Rated impulse withstand voltage
7	Rated short-time withstand current
8	Utilization category
9	Rated operating frequency
10	Device type: Circuit breaker or Switch-disconnector
11	Standards
12	Rated ultimate short-circuit breaking capacity
13	Rated operational voltage
14	Serial number
15	Rated operational current

- Switch-disconnector

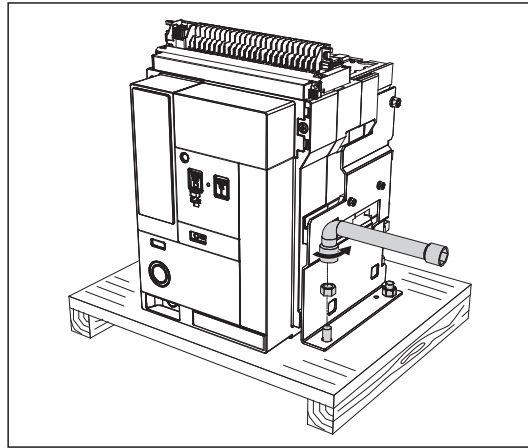


6.1 Fixed type

Remove the four fixing bolts as shown.



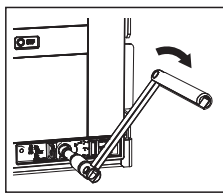
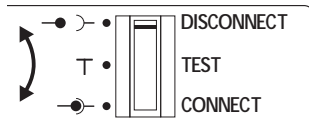
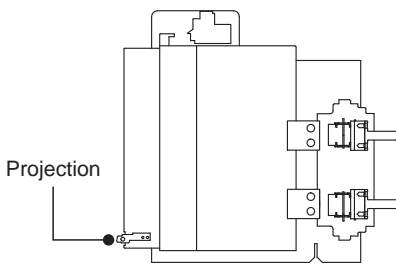
(Note)
Lifting hooks are bundled. Regarding how to use the hooks, refer to section 7.



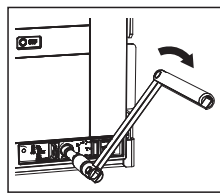
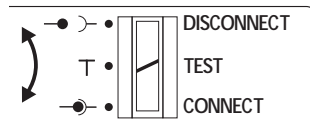
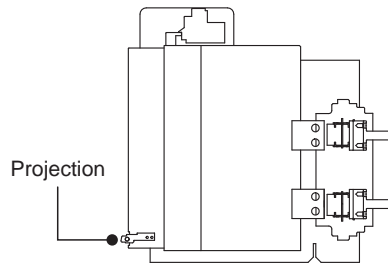
6.2 Drawout type

6.2.1 Drawout device position

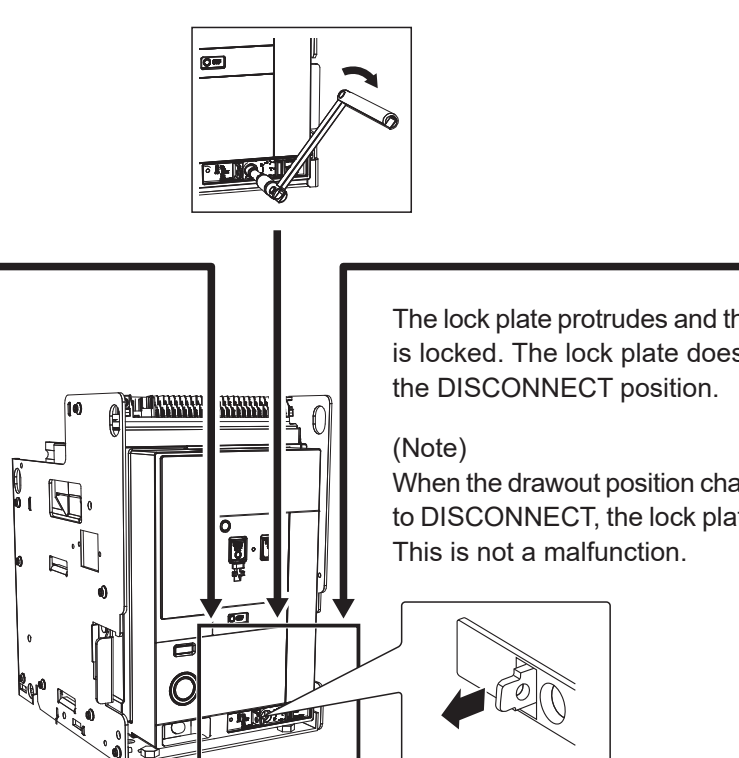
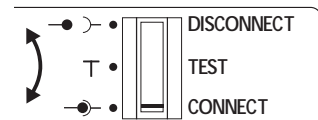
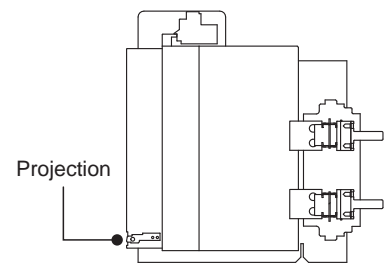
■ DISCONNECT position



■ TEST position

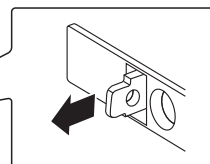


■ CONNECT position



The lock plate protrudes and the circuit breaker is locked. The lock plate does not protrude at the DISCONNECT position.

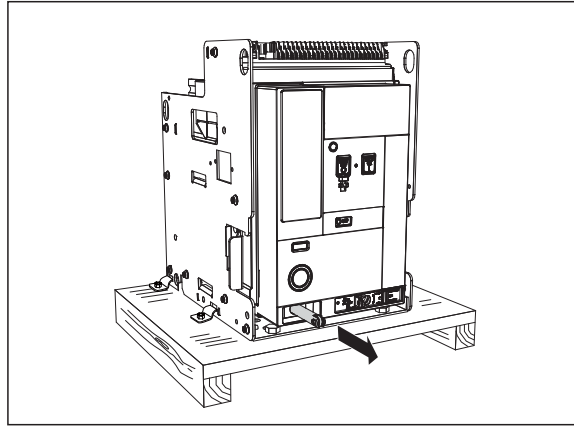
(Note)
When the drawout position changes from TEST to DISCONNECT, the lock plate may protrude. This is not a malfunction.



6.2.2 Operating method of the drawout type

Take out the drawout handle from the circuit breaker.

Turn the drawout handle to change the drawout position from CONNECT to DISCONNECT. Regarding how to operate the drawout handle, refer to section 6.3.



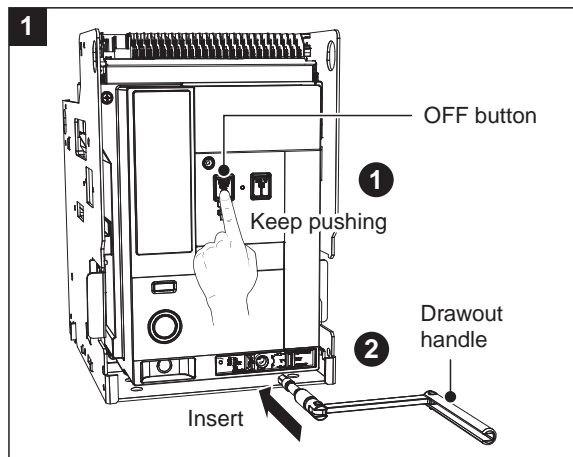
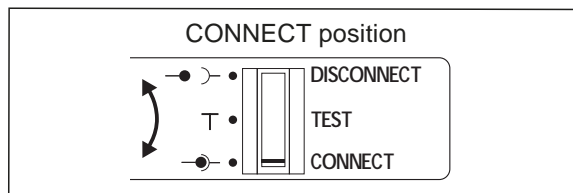
6.3 CONNECT → DISCONNECT position

1. Keeping the OFF button pushed, insert the drawout handle.



(Prohibition)

Do not insert the drawout handle forcibly when the OFF button is not pushed. Doing so can cause damage to the circuit breaker.

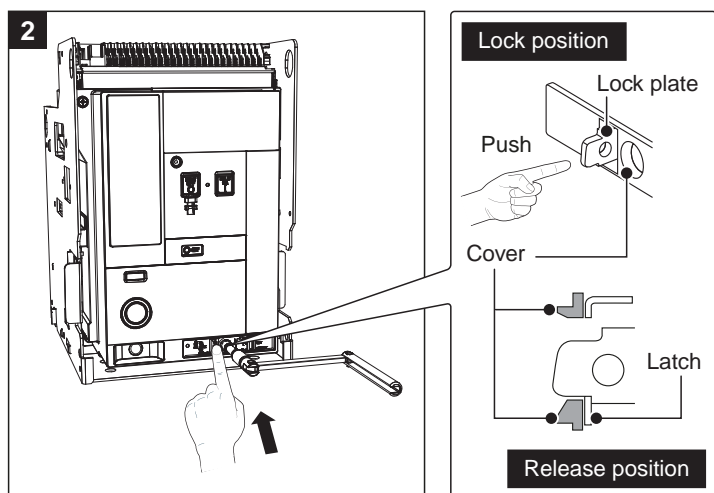


2. Push the lock plate fully until it is latched to release the lock.



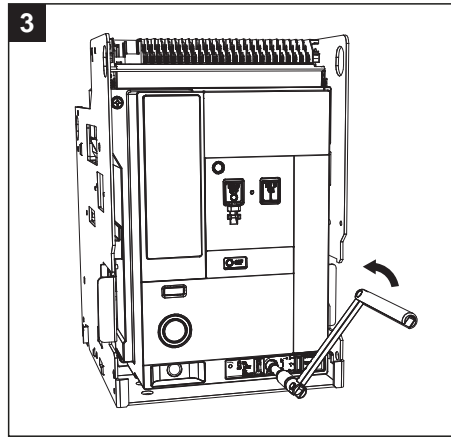
(Note)

- a. If the lock plate is not fully released, turn the drawout handle to right and left a little.
- b. Be sure to push the lock plate fully to the release position. Otherwise the drawout position indicator may not function correctly.
- c. Do not perform the drawout operation while the lock plate is protruding.



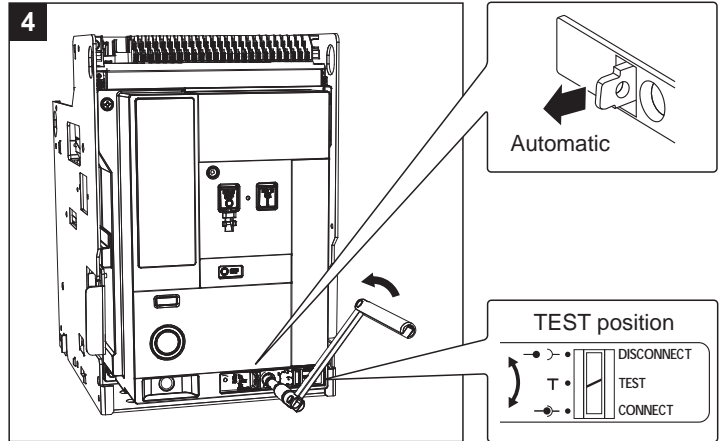
3. After pushing the lock plate, insert the drawout handle and rotate the handle in the direction of the arrow as shown.

! (Note)
Do not rotate the drawout handle in the opposite direction. The drawout position indicator may not function correctly. In this case, pull the unit out to the circuit disconnecting position and insert it to the circuit connecting position. Then drawout it again.



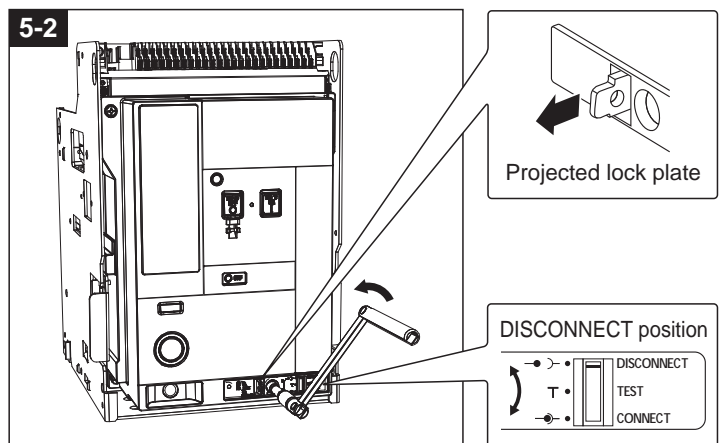
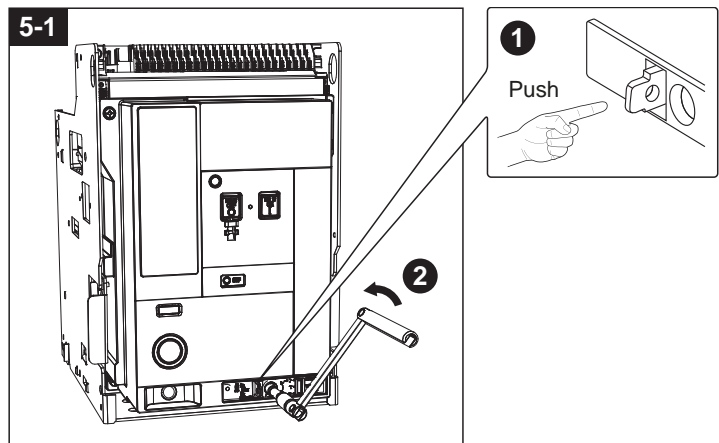
4. When the circuit breaker is drawn out to the test position, the drawout position indicator shows TEST position, and the lock plate automatically protrudes to lock the drawout handle.

! (Note)
When the drawout position is changed from CONNECT to DISCONNECT, the circuit breaker body is removed from the cradle and a sound occurs. After that, the load for the drawout operation will be lighter, which is not a malfunction.




5. Then, push the lock plate, turn the drawout handle counterclockwise to change the displayed extraction position to the DISCONNECT position until the drawout position indicator shows disconnect position. The handle operation is completed. The circuit breaker can be drawn out by hand.

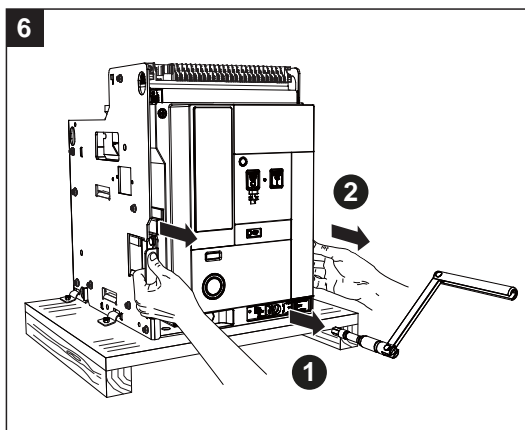
! (Note)
The drawout handle idles at the DISCONNECT position and the lock plate does not protrude. When the lock plate protrudes, push the lock plate in and continue the drawout operation.



6.1 After drawing out the circuit breaker to the DISCONNECT position, remove the drawout handle.

6.2 Draw out the left and right side of the circuit breaker simultaneously from the cradle.

⚠ CAUTION	
	Be careful not to injure your hands and fingers by the items in the panel when drawing out the circuit breaker.

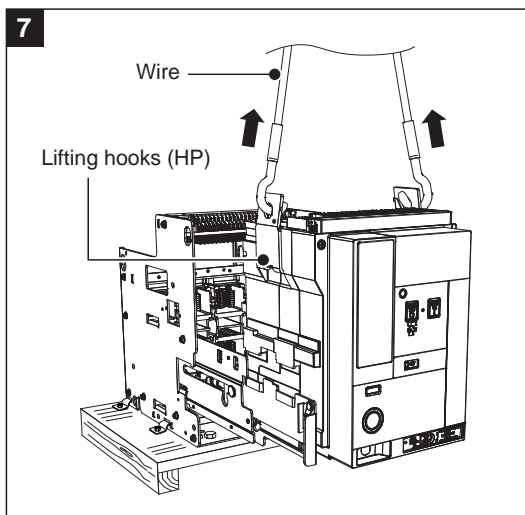


7. After drawing out the circuit breaker, lift up the circuit breaker by using a lifting truck and lifting hooks (HP) to remove it from the cradle.

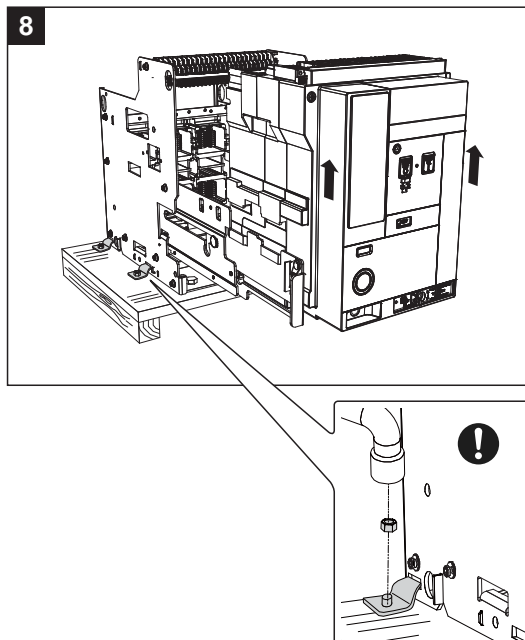
(Note)

For the drawout type, lifting hooks (HP) are sold separately.

⚠ CAUTION	
Before removing the circuit breaker, check that the cradle is fixed.	

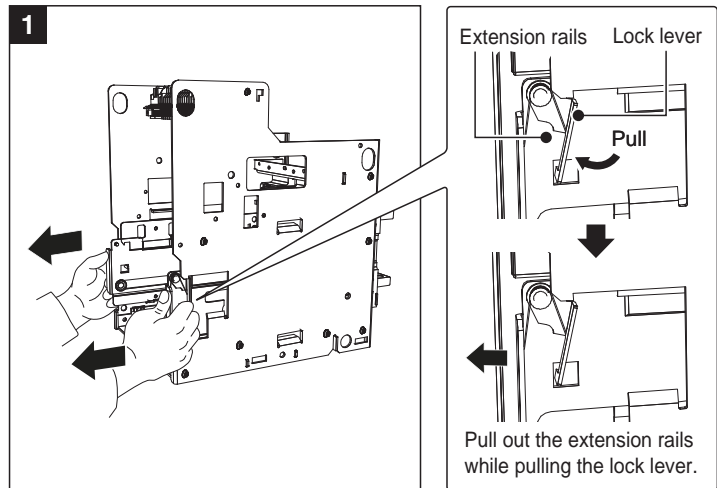
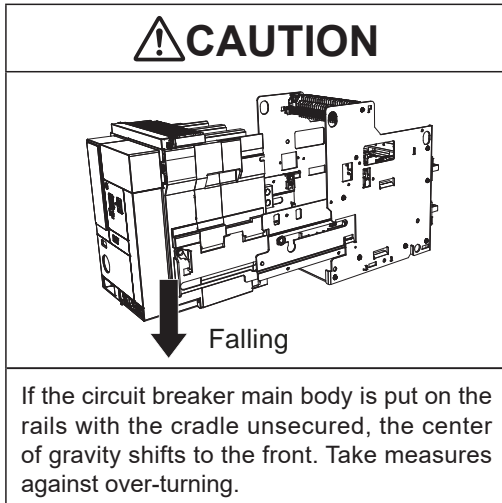


8. After removing the circuit breaker, remove the nuts in the cradle.



6.4 DISCONNECT → CONNECT position

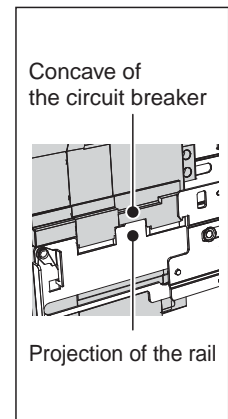
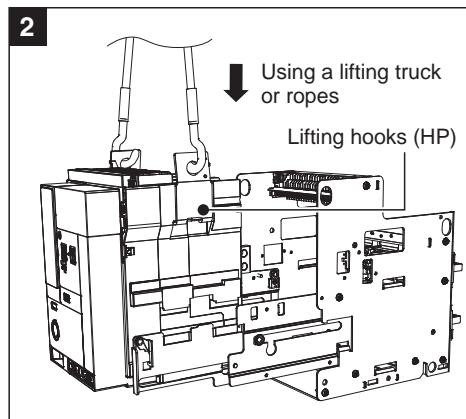
1. Release the lock levers, and pull the extension rails forward.



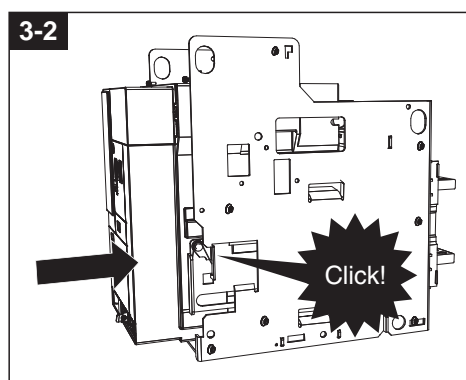
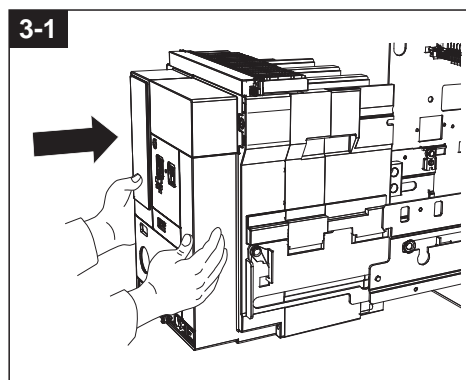
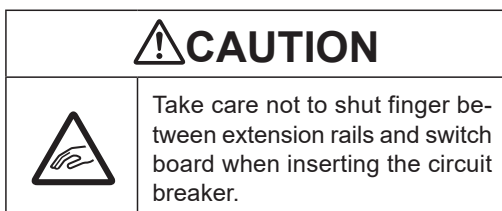
2. Place the circuit breaker on the extension rails by using a lifting truck or ropes. Mount the concave of the circuit breaker on the rail protruding portion.

(Note)


For the drawout type, lifting hooks (HP) are sold separately.

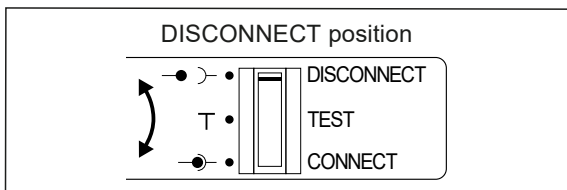
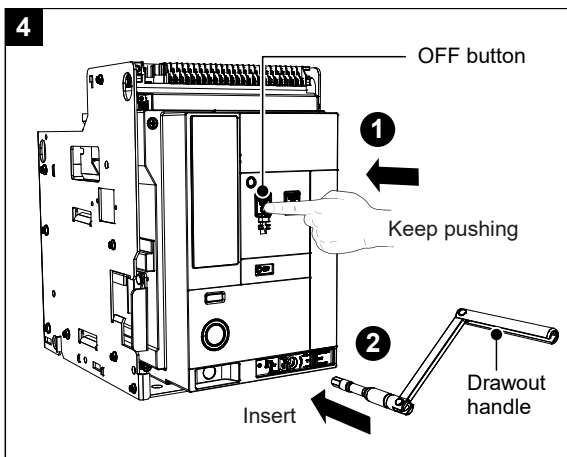


3. Slowly push the circuit breaker until it stops. To insert the circuit breaker, push each side equally. Otherwise (in the case of inserting slantwise), the breaker can not move smoothly. When the circuit breaker is installed at a high position, please do the Drawout/Insert operation by two people.




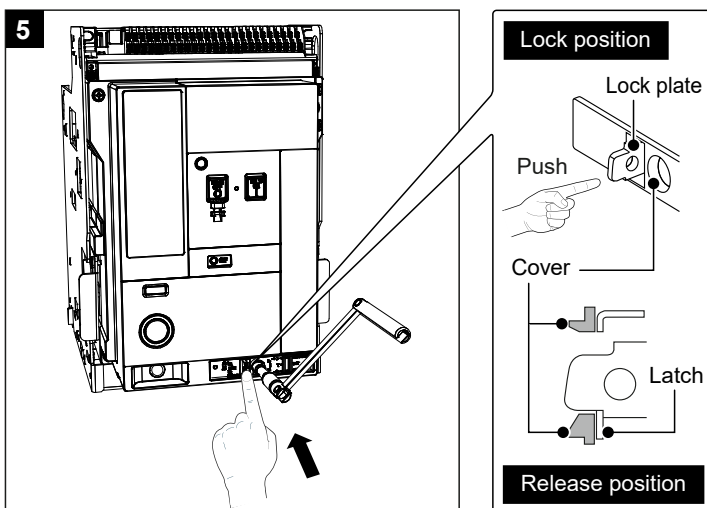
4. Keeping the OFF button pushed, insert the drawout handle.
 Make sure that the drawout position indicator shows DISCONNECT.

 (Prohibition)
 Do not insert the drawout handle forcibly unless the OFF button is pushed.
 There is a possibility of damaging.




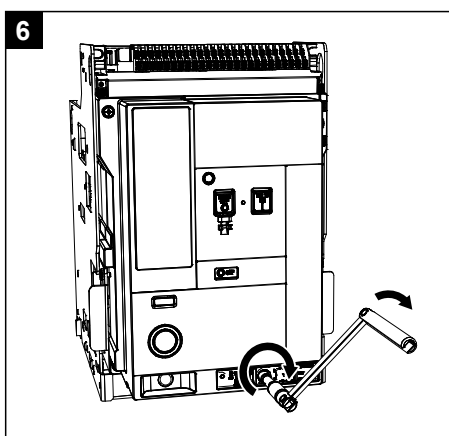
5. When the lock plate protrudes, push it in fully until it is latched to release the lock.

 (Note)
 a. If the lock plate is not fully released, turn the drawout handle to right and left a little.
 b. Be sure to push the lock plate in fully to release position. Otherwise the drawout position indicator may not function correctly.

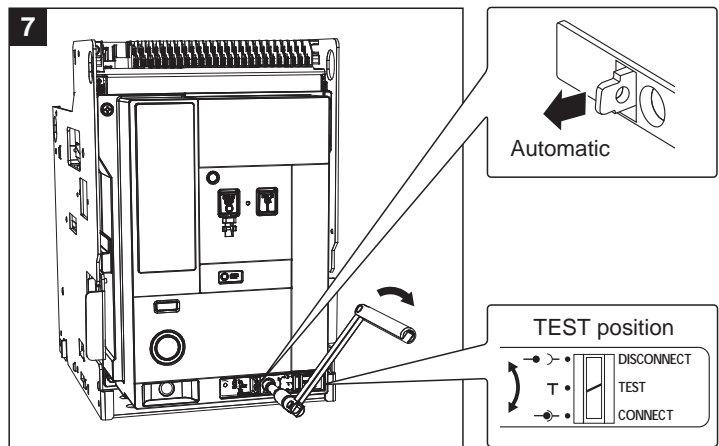


6. After releasing the lock plate, turn the drawout handle clockwise.

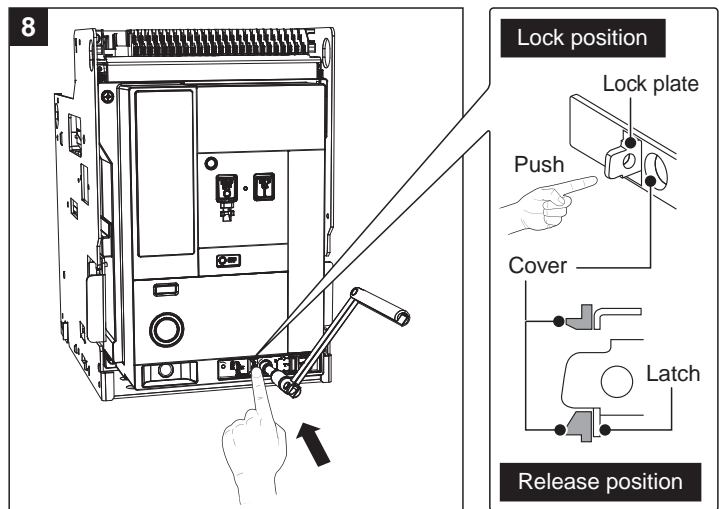
 (Note)
 Do not rotate the drawout handle in the opposite direction. The drawout position indicator may not function correctly. In this case, pull it out to the circuit disconnecting position and then insert it again.



7. When the circuit breaker is inserted to the test position, the drawout position indicator shows TEST position and the lock plate automatically protrudes to lock the drawout handle.



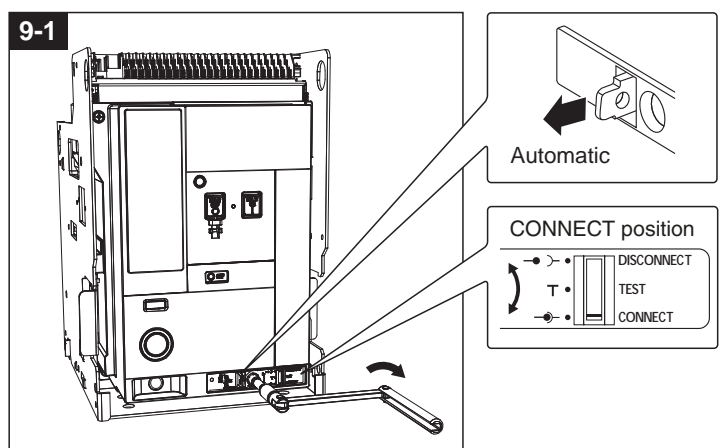
8. Then, push the lock plate and turn the handle clockwise.



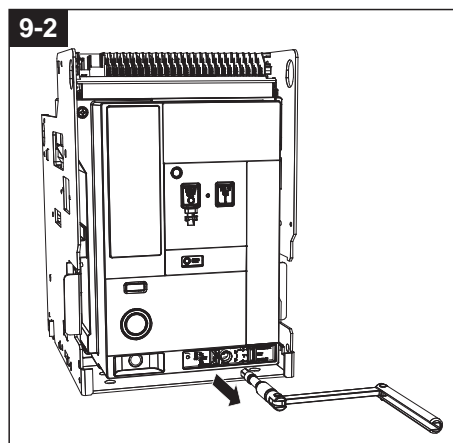
9. When the circuit breaker is inserted to the CONNECT position, the lock plate automatically protrudes to indicate that the circuit breaker has been inserted completely. The drawout position indicator shows CONNECT position.

⚠ CAUTION

Insert the circuit breaker until the lock plate protrudes. If it does not protrude, the circuit breaker may not be connected completely.

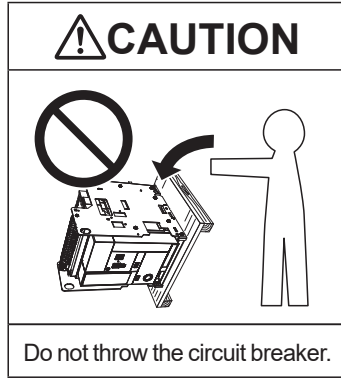
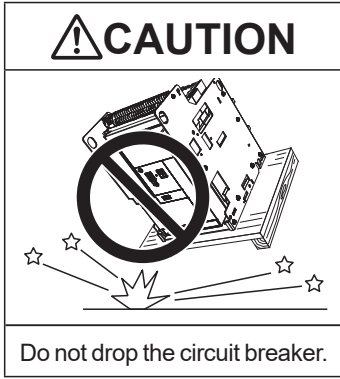


- !** (Note)
- a. After insertion is completed, do not turn the drawout handle further.
 - b. The drawout position indicator shows the position (CONNECT or TEST) of the circuit breaker at the time when the lock plate protrudes. When the lock plate is in the released state, the indicator shows the reference position.
 - c. It is impossible to close the circuit breaker while the drawout handle is inserted.



7. Handling

Never drop the circuit breaker when handling. Never roll the circuit breaker when handling.



Weight (kg)

Type	AED630-CV to AED1600-CV	
Fixed type	3-pole	37
	4-pole	43
Drawout type	3-pole	57
	4-pole	66

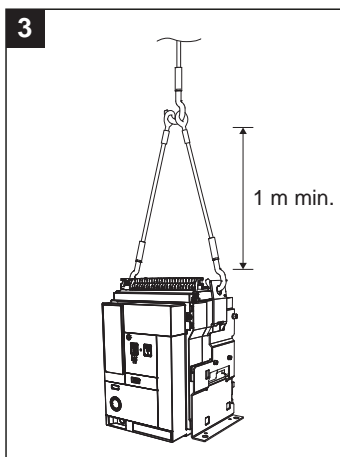
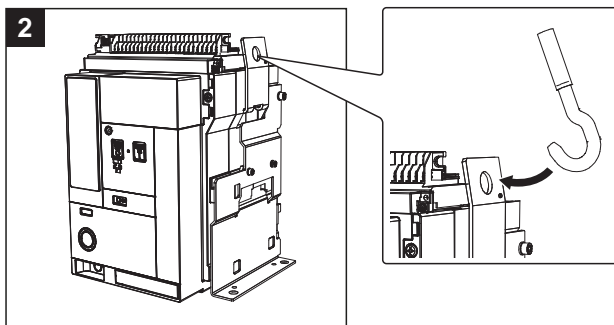
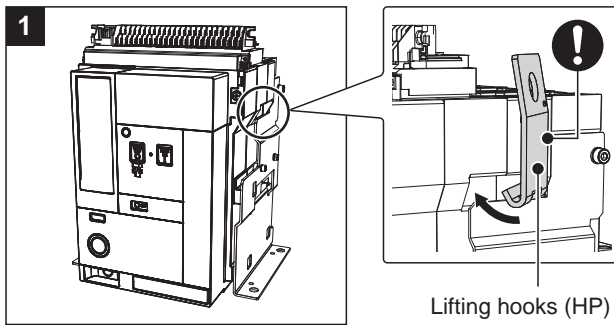
(Note)

- The values in the table are typical values, not guaranteed values.
- The values include the weight of packaging materials. The values do not include the weight of optional accessories.

Fixed type

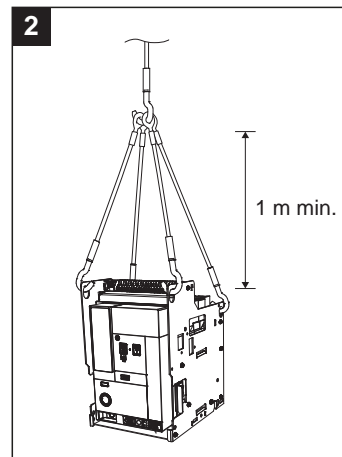
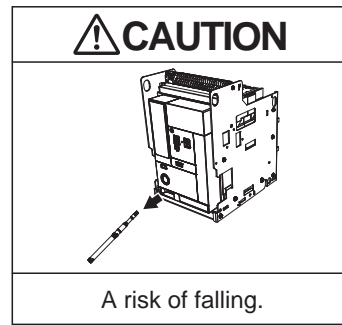
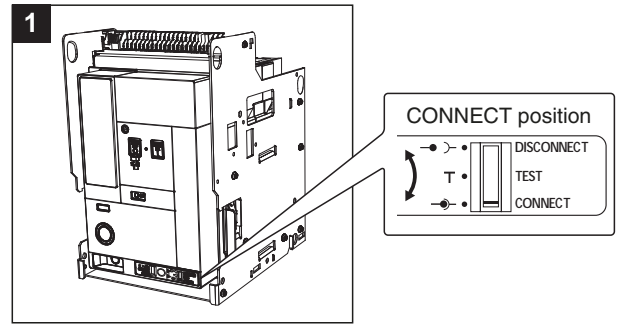
When moving the fixed type, use the bundled lifting hooks (HP).

! (Note) Attach the lifting hooks (HP) to the hollow of the circuit breaker surely as shown below.



Drawout type

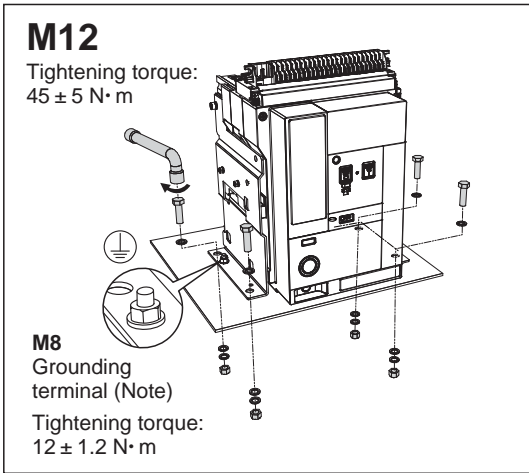
When moving the drawout type, use the wires hang on the lifting hole. Before lifting the circuit breaker, take out the drawout handle and check that the drawout position is CONNECT position.



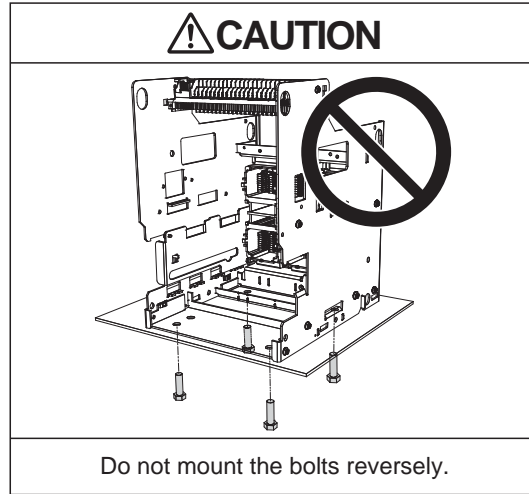
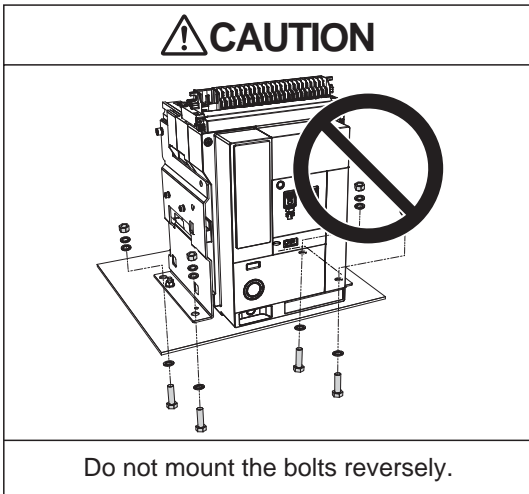
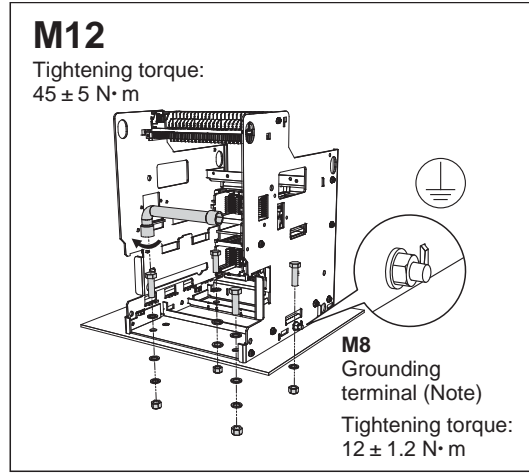
8. Installation

Install the circuit breakers as the following procedures.

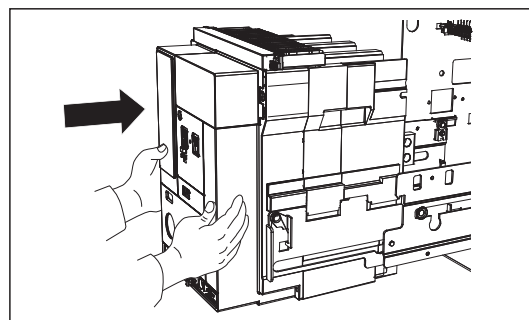
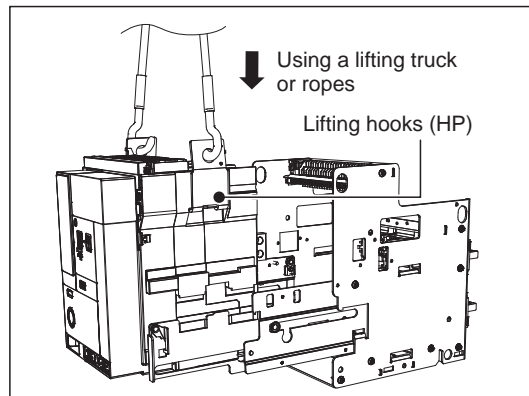
■ Fixed type



■ Drawout type



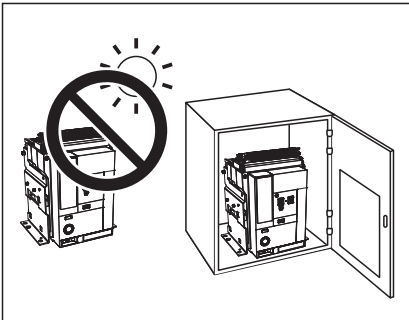
(Note)
Grounding terminal: Unless otherwise specified,
ground a protect grounding terminal for safety.



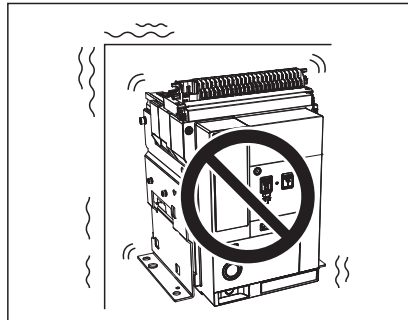
For the detail operating procedure of the cradle,
refer to page 14 to page 16.

⚠ CAUTION

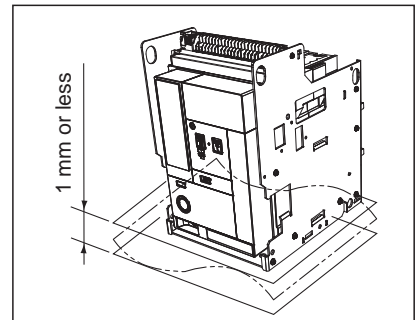
When installing the circuit breaker, observe the following precautions.



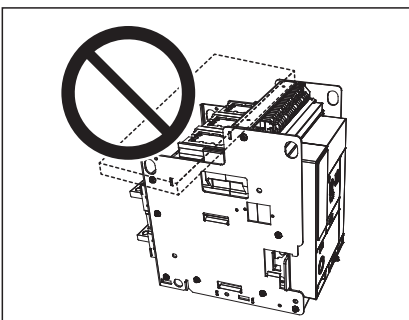
Use the circuit breaker in a panel.
Keep off dust and dirt.



Do not give the circuit breaker
shock or vibration.



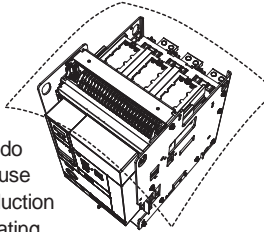
Tolerance of the mounting surface
flatness of the circuit breaker ≤ 1 mm



Do not block the exhaust ports.

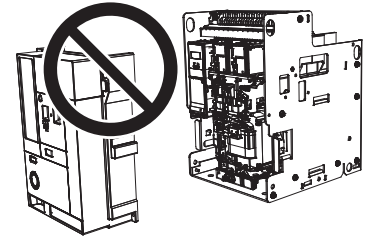
Cover the circuit breaker with a sheet or
others during installation.

Failure to do
so can cause
poor conduction
or overheating.



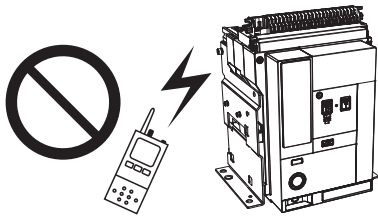
Do not insert foreign matters from
the exhaust ports.

Doing so can cause the circuit breaker
to malfunction or not to work.

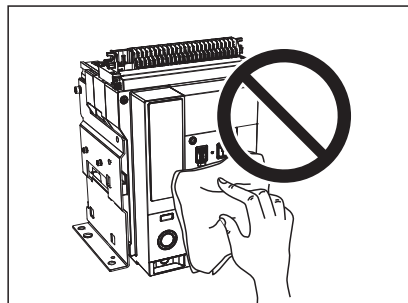


Do not disassemble the circuit breaker.

Use transceivers 1 m or more away from
the circuit breaker.

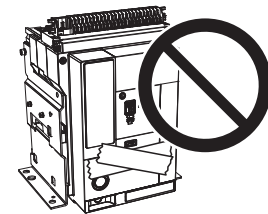


Do not install the circuit breaker in a
strong magnetic field.



Do not wipe the circuit breaker using
thinner, detergent, or a chemical dust cloth.

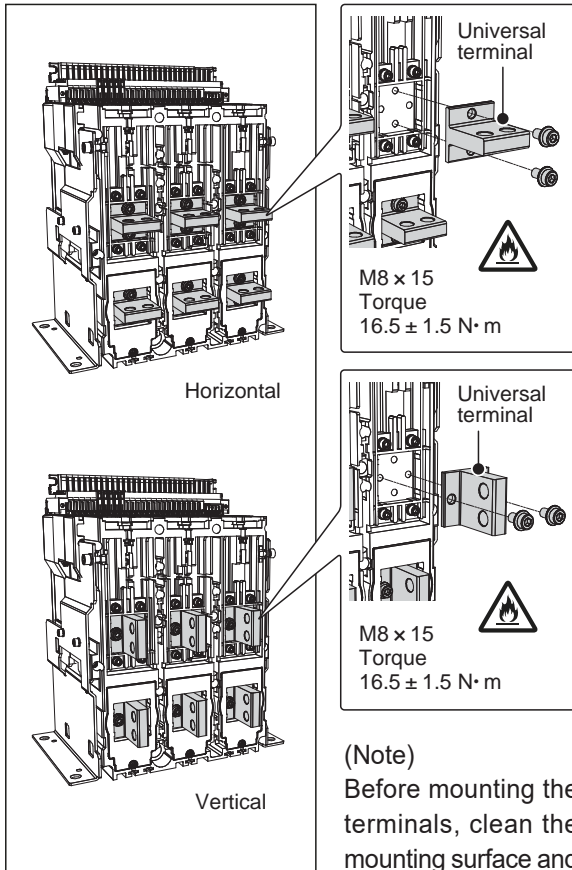
Doing so can take off the nameplates.



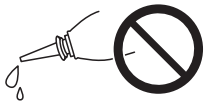
Do not tape on the nameplates.

8.1 Universal terminal

■ Fixed type

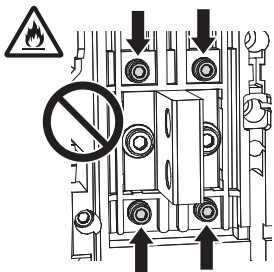


CAUTION



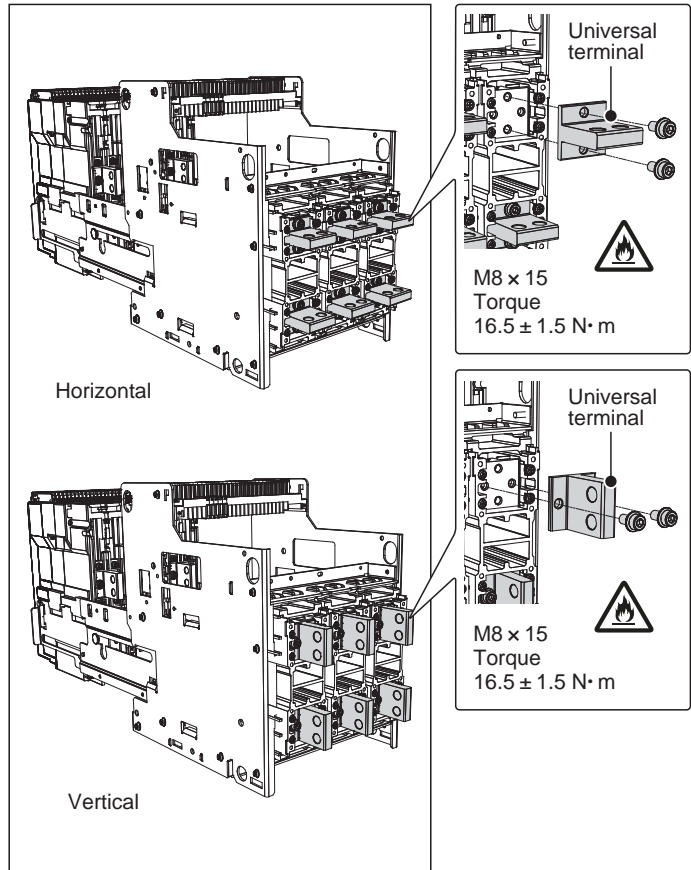
Do not oil.

CAUTION

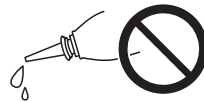


Do not loosen the screws for the circuit breaker.

■ Drawout type

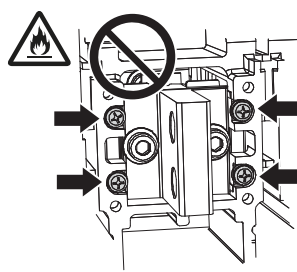


CAUTION



Do not oil.

CAUTION



Do not loosen the screws for the circuit breaker.

(Note)

For how to mount the front terminals (FT) described in the catalog, refer to the bundled user's manual.

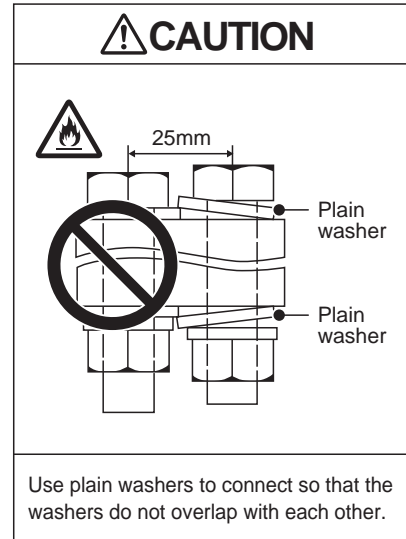
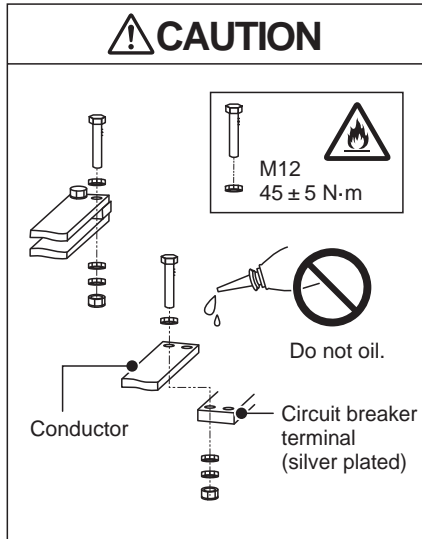
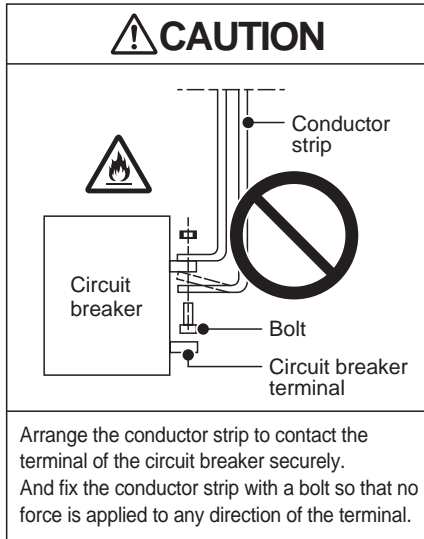
8.2 Precautions for connecting

Use M12 bolts, plain washers, and spring washers to connect the conductor. Clean the surface of conductor to be connected to the (silver plating) terminal of circuit breaker and securely tighten the bolts with a correct torque (M12: 45 ± 5 N·m).

The circuit breaker terminal which is applicable to connect the conductor is different depending on the shape of the terminal.

Tightening torque

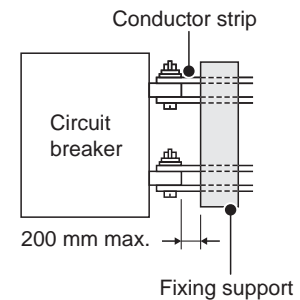
Screw size	Tightening torque (N·m)
M12	45 ± 5



Since the fault current flowing through the conductors causes large electromagnetic forces, the conductors should be secured firmly, using the values in the below table as a reference. The distance between the fixing support and the circuit breaker conductor strip should be less than 200 mm.

Electromagnetic force in N per 1 m conductor (3-phase short circuit) (N)

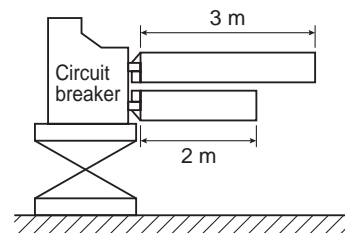
Type	AED630-CV to AED1600-CV
Conductor distance (mm)	85
Prospective fault current kA (pf)	
30 (0.2)	7,700
42 (0.2)	15,100
50 (0.2)	21,400



Ensure that they have a sufficient current capacity. Refer to the following table.

Conductor size (Ambient temperature: 40 °C at open air)
(Compliance with IEC 60947-1)

Rated current connecting max. (A)	Conductors (Copper bus bar)		
	Arrangement	Quantity (Note)	Conductor size (mm)
630	With long surface vertical	2	40 x 5
1000		2	60 x 5
1250		2	80 x 5
1600		2	100 x 5



(Note) The values indicate the quantity per pole and terminal.



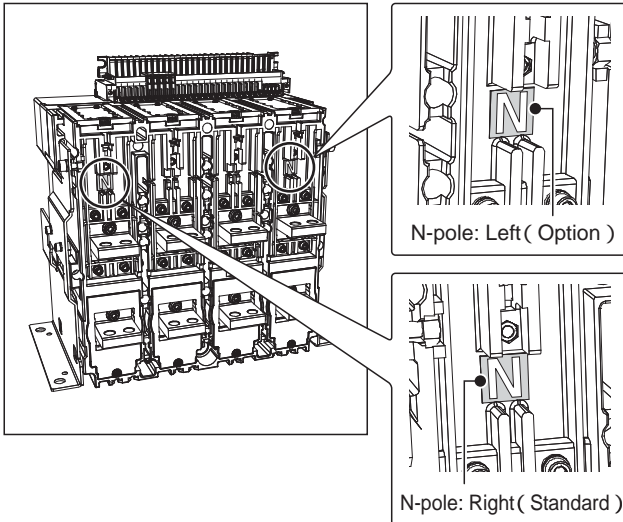
(Note)

The above table shows a conductor size based on IEC 60947-1 Table 11 in ambient temperature 40°C and open air. The above figure shows an examination circuit.

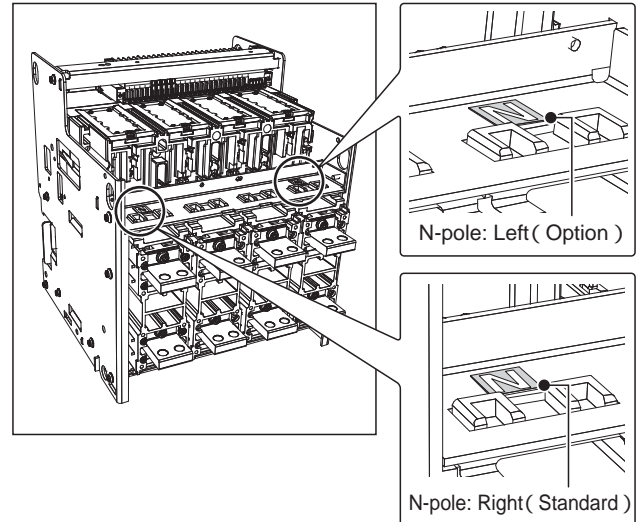
8.3 Check of the N-pole (4-Pole)

The position of N-pole is selectable. Check the label on the rear side of the circuit breaker before connecting.

■ Fixed type



■ Drawout type



8.4 Control circuit

■ Crimp-type terminal size

Use the connection terminals for M3.5. For the size, refer to the right figure.

The recommended terminal is shown below.

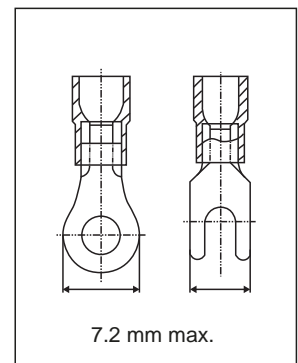
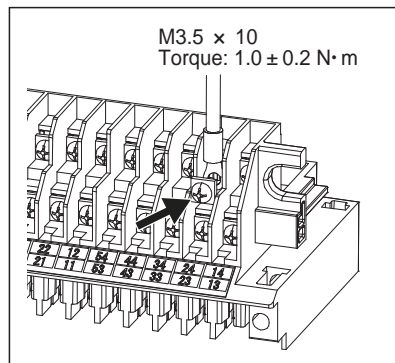
Ex. 1.25 mm² to 2.0 mm² wires

N2-M3 (RAP2-3.5)

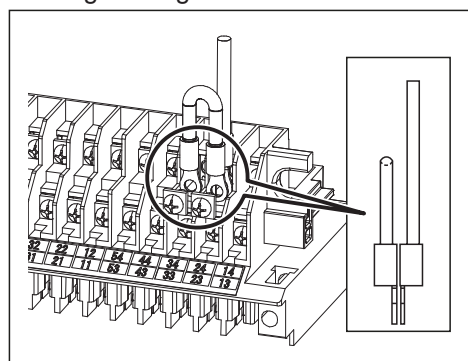
FN2-M3 (RBP2-3.5)

N2-YS3A

Manufacturer: J.S.T. Mfg. Co.,Ltd.



Passage wiring



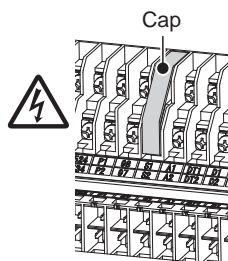
(Note)

If the screw is tightened with excessive torque, the crimp-type terminal and the screw may be damaged. Tighten the screw with the specified torque.

Use a screwdriver that is suitable for the size of cruciform groove.

Size of toolhead : PH2

⚠ CAUTION

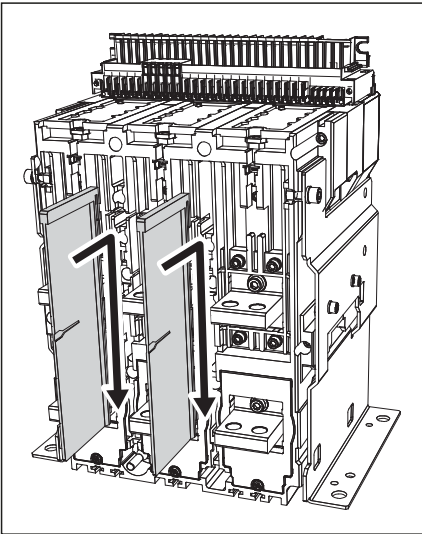


Since voltage is applied to the terminals **S1** and **S2**, do not touch them. When an UVT is installed, voltage is applied to **DT1** and **DT2** of the terminal block. Do not touch the terminals. When not using **S1**, **S2**, **DT1**, and **DT2**, do not remove the caps on them for safety.

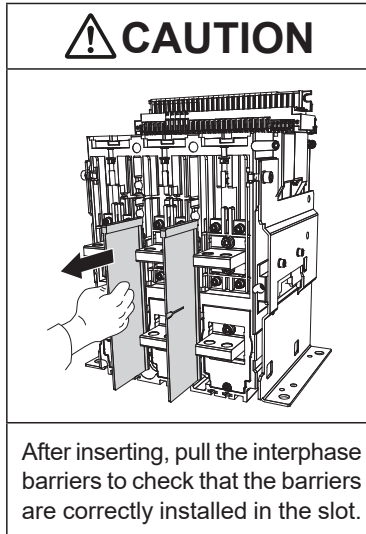
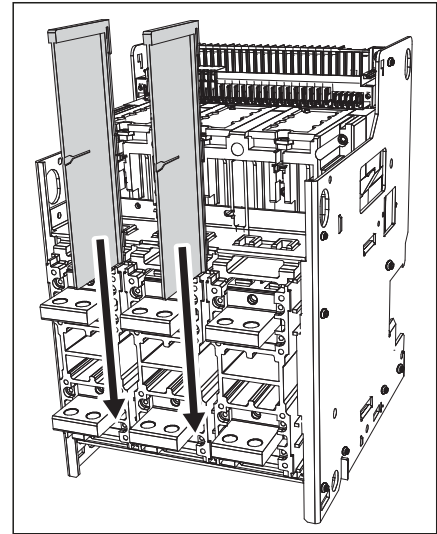
9. Attachment of the Interphase barrier

Insert the Interphase barriers in the slot on the circuit breaker.

■ Fixed type



■ Drawout type

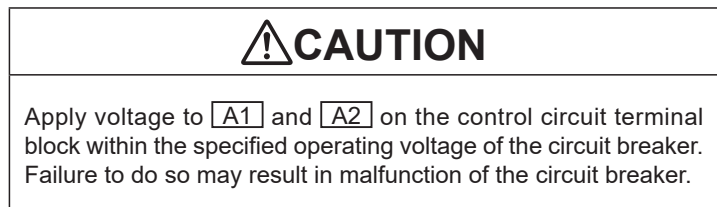
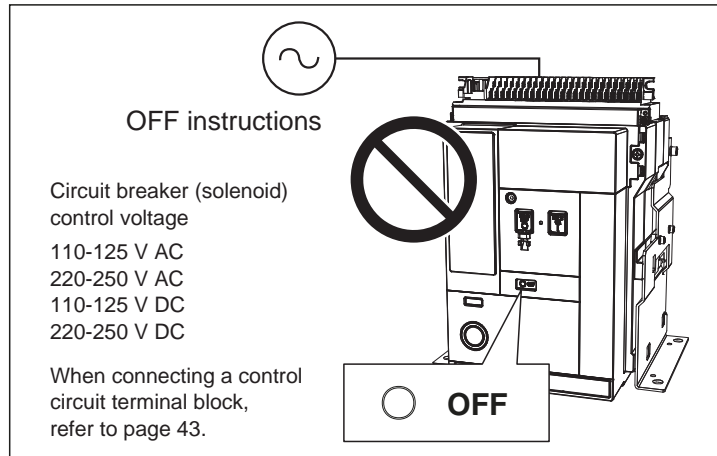


10. Opening/Closing operation

10.1 Conditions allowable for the closing operation

When the following conditions are satisfied, the ON operation can be operated.

1. The circuit breaker is OFF.
2. The voltage for the ON operation is applied to **A1** and **A2** of the control circuit terminal block. Set the voltage capacity and power supply capacity applied to **A1** and **A2** by following the table of Circuit breaker (solenoid) control rating.
3. The state without the OFF instruction (following conditions)
 - The voltage is not applied to the Shunt trip device (SHT).
 - The circuit breaker is not locked mechanically by the Cylinder lock (CYL) or Castell lock (CAL).
 - The voltage is applied to the Under voltage trip device (UVT).
 - The circuit breaker is not tripped.
 - When the padlock is used, the padlock of the OFF button is released.



Circuit breaker (solenoid) control rating

Rated voltage (V)		Applicable voltage range (V)	Applied voltage (V)	Current (Peak value) (A)	Operating time (s)	Criterion for power requirement
AC (50/60 Hz)	110-125	93.5-137.5	110	6.5	≤ 0.3	1000 VA
			125	7.7		
	220-250	187-275	220	3.3		
			250	3.9		
DC	110-125	93.5-137.5	110	7.1		1000 W
			125	8.4		
	220-250	187-275	220	3.5		
			250	4.2		

(Note) In consideration of the voltage drop, set the power supply capacity for the solenoid not to be less than the operating voltage.

10.2 Direct switching operation

10.2.1 Closing

When the voltage for the ON operation is applied to **A1** and **A2** of the control circuit terminal block and the ON button on the circuit breaker is pushed, the circuit breaker is closed and “ON” is displayed on the ON/OFF indicator. The operating load is 50 N or less. The circuit breaker has the one-pulse circuit that operates only once with one closing instruction.

For the circuit breaker with the Under voltage trip device (UVT), when the power supply is applied to **D1** and **D2** terminals, the circuit breaker is closed. (The circuit breaker can be closed 1.5 seconds after the power supply is applied to the Under voltage trip device (UVT).)



(Note)

If the voltage for the ON operation is not applied to **A1** and **A2** of the control circuit terminal block, the circuit breaker is not closed even if the ON button is pushed. If the OFF lock devices (padlock, cylinder lock, or castell lock) are used, perform the closing operation after releasing the lock. For the drawout type, open/close the circuit breaker when the drawout position is CONNECT or TEST and the lock plate protrudes. For the circuit breaker with the Under voltage trip device (UVT), apply the rated voltage to the circuit breaker.

- Failure to do so can result in the circuit breaker closed (turned ON) accidentally due to malfunction of the control circuit (or switches) connected to **S1** and **S2**.
- The control circuit to close the circuit breaker is comprised of the semiconductor elements. If the surge or noise more than the specified value is applied to the circuit breaker, the circuit can be damaged.
- The safety circuit is built in to prevent accidental operation when the circuit breaker is damaged. To reduce the risk, do not apply the power supply to **A1** and **A2** when the circuit breaker is not closed for a long term.

10.2.2 Opening

When the OFF button is pushed, the circuit breaker is opened and “OFF” is displayed on the ON/OFF indicator. The operation load is 50 N or less.

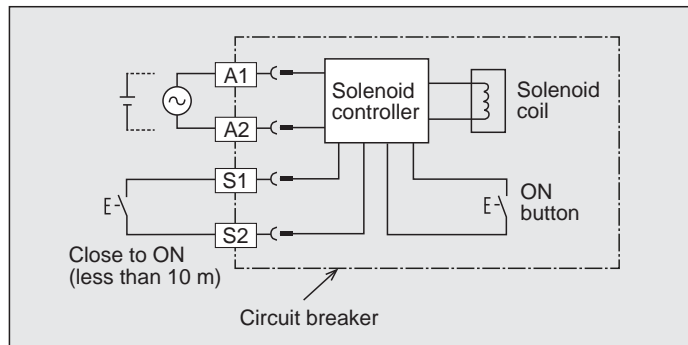
10.3 Remote opening/closing operation

10.3.1 Closing

When the voltage for the ON operation is applied to **A1** and **A2** of the control circuit terminal block and the ON switches **S1** and **S2** on the outside of the circuit breaker are turned ON, the circuit breaker is closed. Remove the caps on **S1** and **S2** of the control terminal block before connecting the terminals.

The circuit breaker has the one-pulse circuit that operates only once with one closing instruction. For the circuit breaker with the undervoltage trip device (UVT), when the power supply is applied to **D1** and **D2** terminals, the circuit breaker is closed. (The circuit breaker can be closed 1.5 seconds after the power supply is applied to the Under voltage trip device (UVT).)

Standard controller diagram



(Note)

When closing the circuit breaker, do not apply the voltage to **A1** and **A2** terminals while **S1** and **S2** switches are turned ON. Do not open and close the circuit breaker at intervals of one minute or shorter.

- Doing so can result in the circuit breaker closed unexpectedly due to malfunction of the control circuit (or switches) connected to **S1** and **S2**.
- The control circuit to close the circuit breaker is comprised of the semiconductor elements. If the surge or noise more than the specified value is applied to the circuit breaker, the circuit can be damaged. The safety circuit is built in to prevent accidental operation when the circuit breaker is damaged. To reduce the risk, do not apply the voltage to **A1** and **A2** when the circuit breaker is not closed for a long term.

10.3.2 Opening

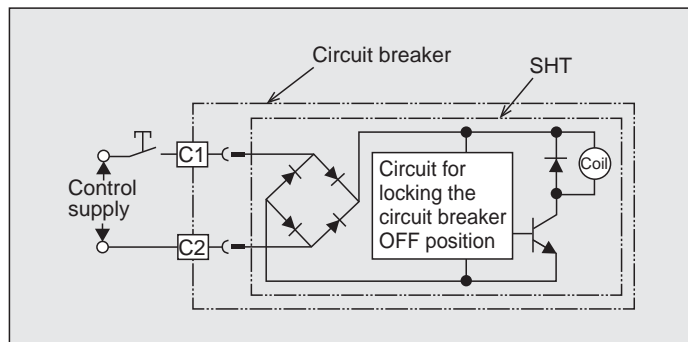
The use of a shunt trip device (SHT) or an under-voltage trip device (UVT) enables to electrically trip the breaker.

When an SHT is used, apply the rated voltage to **C1** and **C2** on the control circuit terminal block.

When a UVT is used, open the trip terminals **DT1** and **DT2** on the control circuit terminal block. (Short-circuiting bars and caps have been fitted to the terminals before shipment. Remove them before using the terminals.)

Or cut off the applied voltage to **D1** and **D2**.

SHT circuit diagram

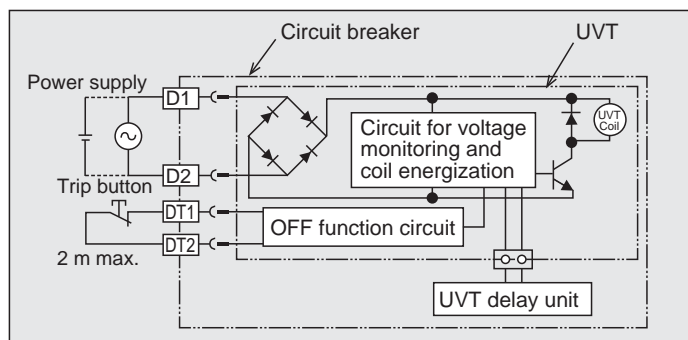


Diode rectifier is not used for control source 24-30 V DC and 48-60 V DC.

(Note)

SHTs and UVTs are optional accessories.

UVT circuit diagram





11. OCR alarm (AL) [MRE: Manual reset type]

AL is standard equipment on the circuit breaker with ETR.

When the circuit breaker trips with the LTD, STD, INST, or GF pickup current, the manual reset button protrudes and AL is output continuously.

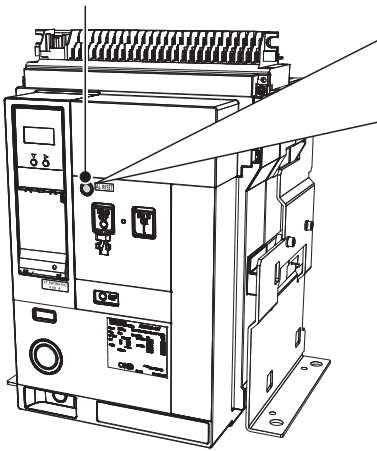
In this case, to reset the circuit breaker, press the manual reset button on the front of the circuit breaker until the button clicks.

⚠ CAUTION

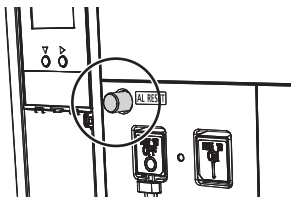
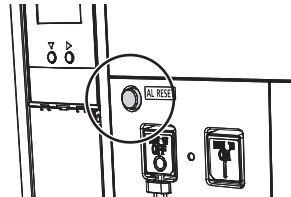



Remove trip causes before turning on the circuit breaker. Failure to do so may result in an electric shock or fire.

Manual reset button



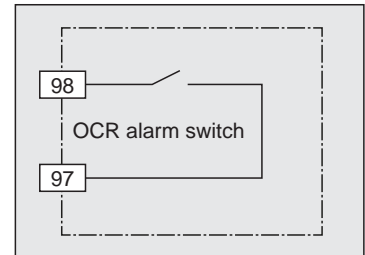
⚠ CAUTION

Tripping state (protruding)	Reset state (not protruding)
	
<p>Even if the circuit breaker is turned on while the manual reset button protrudes, the ON operation is not performed.</p>	<p>Press the protruding manual reset button until it clicks to reset the circuit breaker. AL can be released and the circuit breaker can be turned on.</p>

The following table lists the electrical capacity of AL. The following figure shows the internal wiring diagram.

Switch rating

Voltage (V)		Current (A)	
		Resistive load	Inductive load
AC (50/60 Hz)	240	3	2
	125	5	3
DC	240	0.2	0.2
	125	0.4	0.4
	30	4	3



(Note 1) Using the power supply part with the contact output, which requires a control power supply, enables the contact output for each cause of overcurrent trip. This is the same function as AL.

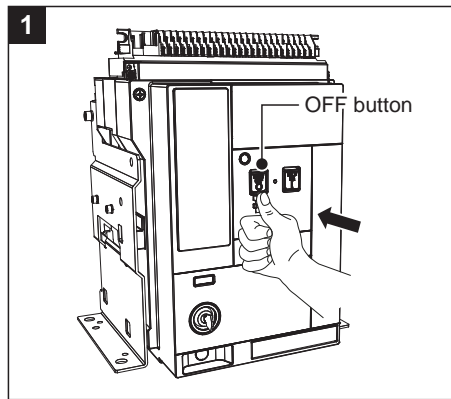
(For more details of the function, refer to the section 16.3 (page 32).)

(Note 2) AL is not output when OFF operation (SHT operation, UVT operation, or OFF button pressing) is performed.

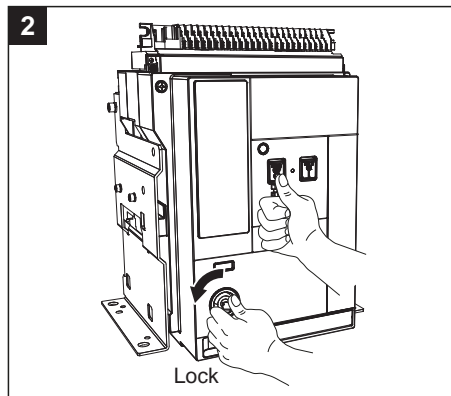
12. Cylinder lock (CYL) Option

12.1 Locking procedures

1. Press the OFF button to turn off the circuit breaker.

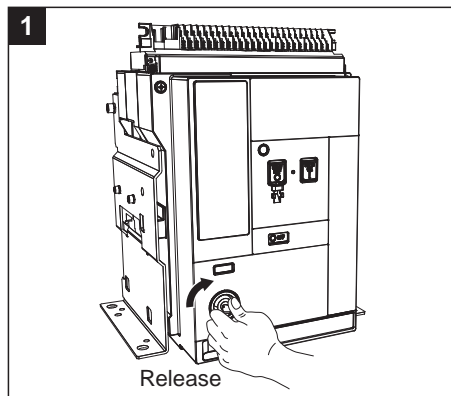


2. Hold down the OFF button and turn the key to the locking side. Then, the key can be removed, and the circuit breaker will be locked in the off state.

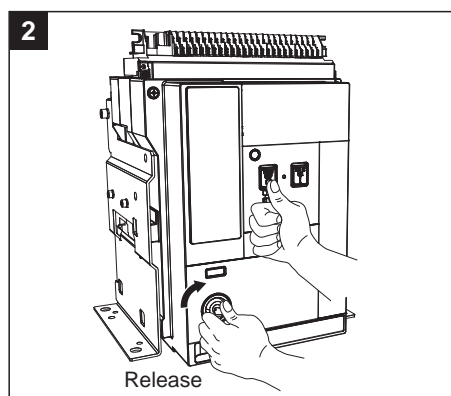


12.2 Releasing procedures

1. Insert the key, and turn the key to the releasing side.



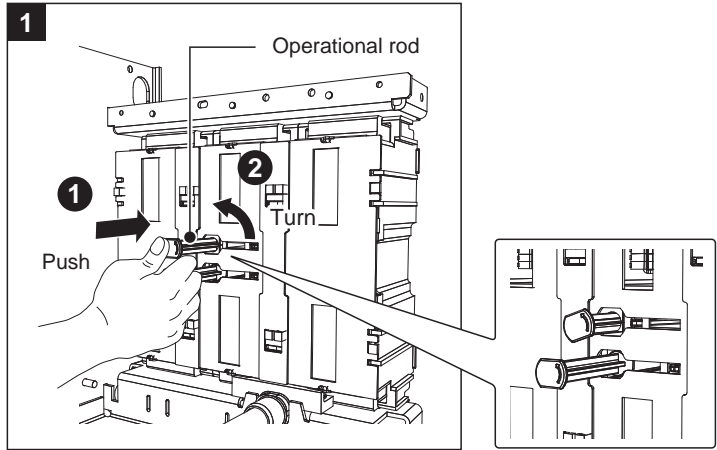
2. If the key cannot be turned smoothly, hold down the OFF button and turn the key to the releasing side.



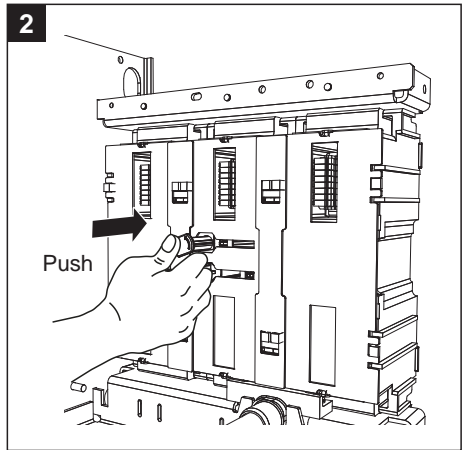
13. Safety shutter (SST) Option

SST can have the upper shutter and the lower shutter kept open independently.

1. Push the operational rod of the shutter to be held until the shutter opens, and turn the rod counterclockwise.



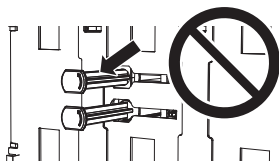
2. To close the shutter, push the operational rod to release holding.



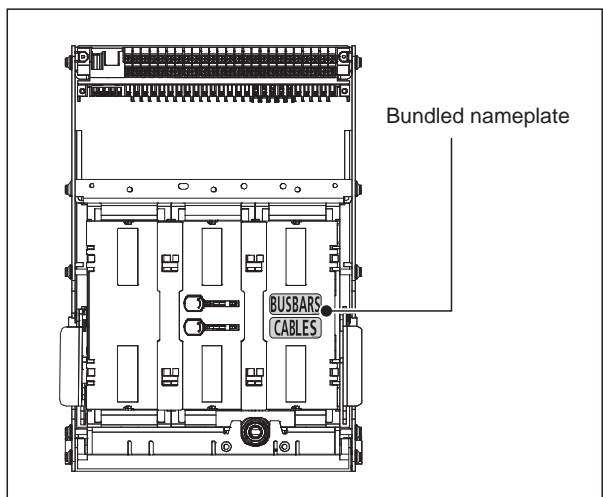
⚠ DANGER

Opening the safety shutters expose connections which may be "Live". Do not touch these connectors. As an electric shock could be received resulting in severe personal injury or death.

- ⊘** (Prohibition) Do not push the operational rods from side to side as this will result in being damaged.



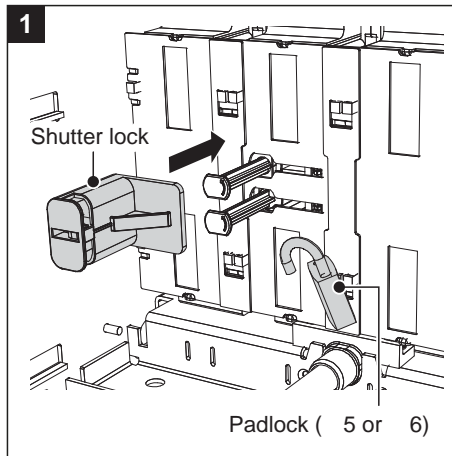
Please refer to the right figure, if you need to attach the sticker "BUSBARS" and "CABLES" included in the package of the safety shutter.



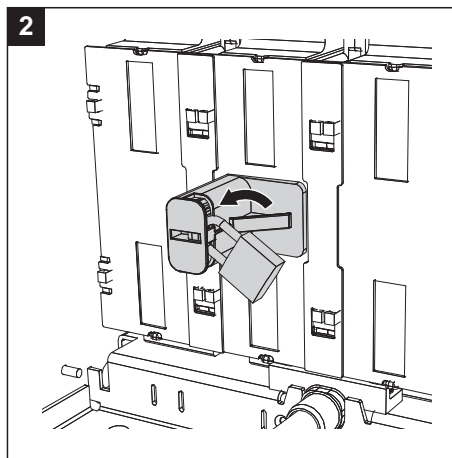
14. Safety shutter lock (SST-Lock) Option

The safety shutter can be locked at the closing position so that the live parts are not touched. Prepare a padlock by yourself.

1. Mount the shutter lock to the safety shutter.



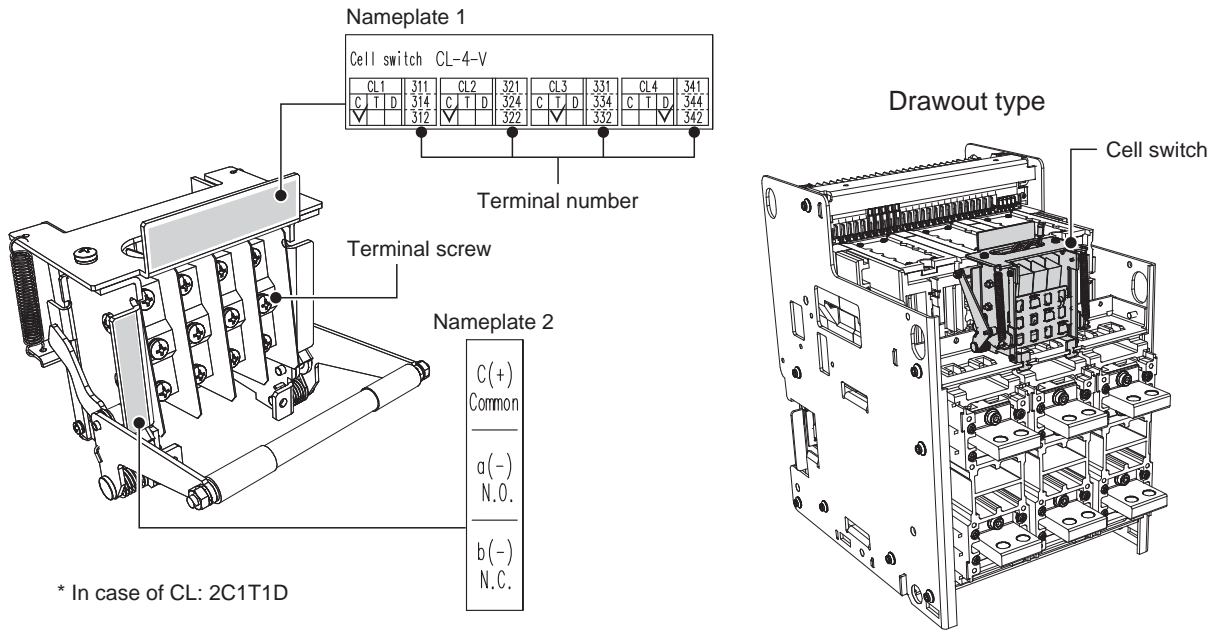
2. Mount the padlock on the shutter lock.



15. Cell switch (CL) Option

15.1 How to check the specifications

The terminal screws on the cell switch are arranged corresponding to the terminal numbers on the rated nameplate.



15.2 How to connect terminals

Connect the wire to the terminal block within the specified tightening torque. The following table lists the drawout position depending on the specifications of the cell switch.

Wire the lead wires through the lead wire hole on the top of the circuit breaker and fix them in the terminal block with screws.

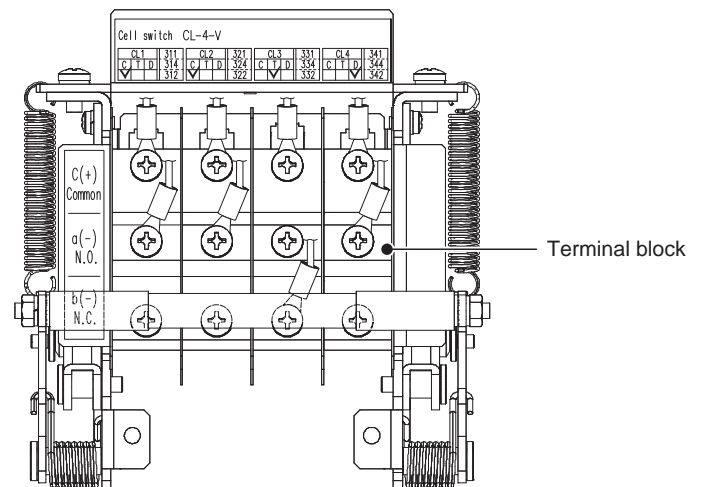
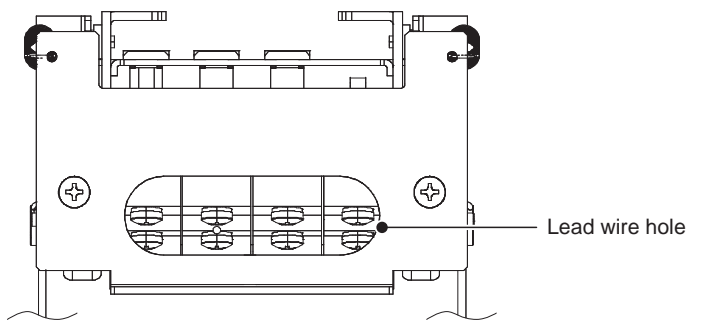
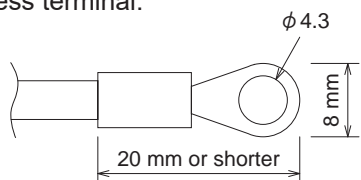
When wiring, do not damage the lead wires. Wire them so that the excessive tension is not applied to them when the circuit breaker operates.

After wiring, check that the wires do not interfere with the operation of the circuit breaker and the output properly switches depending on the drawout position.

Specifications	Position for the drawout operation
CL-C	CONNECT
CL-T	TEST
CL-D	DISCONNECT

(Note) Overtightening can cause damage to the terminals and/or screws.

The terminal screws are M4 binding head screws. The following figure shows an available solderless terminal.



Terminal screw (M4)
Tightening torque: $0.98 \pm 0.2 \text{ N} \cdot \text{m}$

16. Electronic trip relay (ETR) section

1. ERR. LED, Contact alarm output

When any abnormality or setting failure is found in ETR, the LED alerts the operators to the abnormal status. When the power supply type is P3 or P4, contact output is given between **513** and **574** on the control circuit terminal block.

- ETR function abnormality (Microprocessor, H/W)
- Internal wiring abnormality of the circuit breaker related to ETR

2. RUN LED

This LED indicates that ETR is functional. When control power is applied or approx. 10% of rated current, flows into the main circuit, the LED will light.

3. Trip indicator (LED and contact alarm output)

The LED indicates the tripping or pre-alarm status. When the power supply type is P3 or P4, contact output is given between **513** (common) and **524**, **534**, **544**, and **554** on the control circuit terminal block. When the current exceeds the pre-alarm current setting (I_p), the PAL LED will blink. When the half time of LTD passes, the PAL LED will light and output the contact.

4. Frequency selector switch for an ETR with DP **Option**

To ensure measurement accuracy, set this switch according to the circuit frequency to be used (50 Hz or 60 Hz).



(Note)

To ensure measurement accuracy for an ETR with DP, set the frequency selector switch according to the circuit frequency to be used.

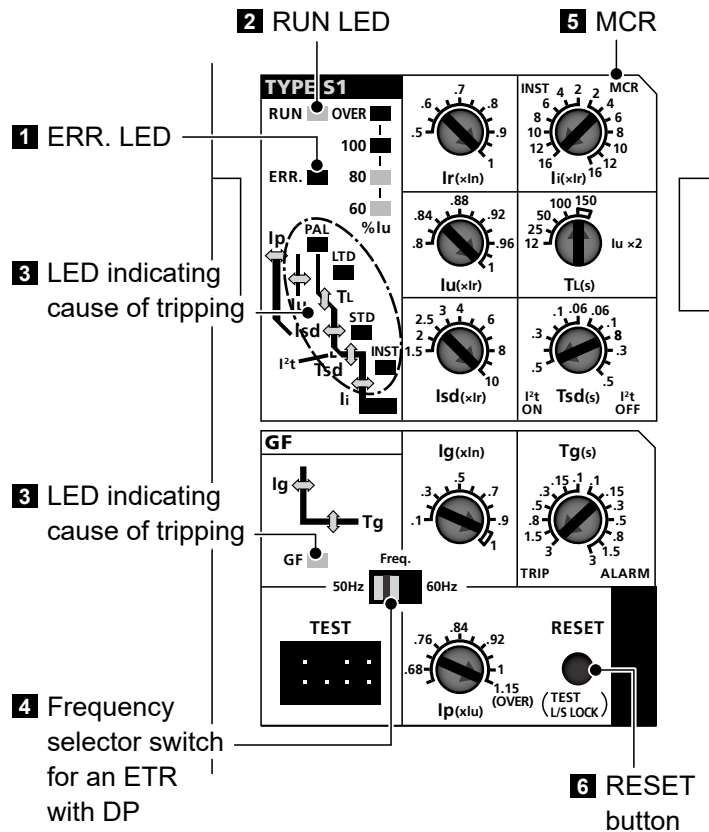
5. MCR (Making current release)

Only when the circuit breaker is turned on (from the off state), it has the INST characteristics. After it is turned on, the INST characteristics will be disabled. MCR can be functional by setting the INST setting dial of ETR to the MCR side.

6. RESET button

The trip indicator (LED and contact alarm output) can be reset by pressing the "RESET" button on the front panel of ETR or short-circuiting **RS1** and **RS2** on the control circuit terminal block.

A function is provided to temporarily lock LTD and STD when the INST characteristics is tested with the field test device. (Refer to the instruction manual for the field test device.)



16.1 Load current LED

The current value which is used as the reference of the load current indication LED varies depending on the characteristics setting.

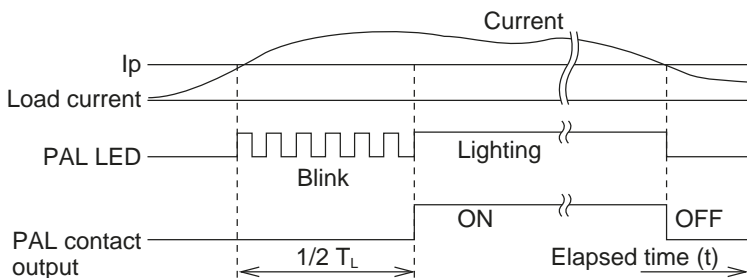
Usage	ETR type	Base current	LED indication
General protection use	S1	I_u Uninterrupted current	OVER ■ 100 ■ 80 ■ 60 ■ $\%I_u$

When the "OVER" LED is lighting, the current value is over LTD pick-up current. The circuit breaker carries out trip operation after specified time.

16.2 Pre-alarm function

When the current exceeds the pre-alarm current setting (I_p), the PAL LED will blink. When the half time of LTD time passes, the PAL LED will light and output the contact. For the operation time, refer to the characteristic curve. When an ETR with DP is used and the load current exceeds the pre-alarm current setting (I_p), the back light of the liquid crystal display (LCD) will change from white to red.

(The back light will only change to red. Pre-alarm information will not be displayed on the LCD.)



16.3 Control power supply

It is necessary for trip indicator (LED, output contact) operation and current indication. For overcurrent and short-circuit protection, even if there is no control power supply, the operation is done using the internal CT energy.

Power supply module

Type	Rated voltage	Applicable voltage range (V)	Criterion for power requirement (VA)	Alarm output
P3	100-240 AC (50/60 Hz)/ 100-125 DC	85-264 AC 85-138 DC	15	5 output contacts
P4	24-60 DC	18-72 DC	10	5 output contacts

Contact capacity (Type P3 and P4) ←

Voltage (V)		Current (A)	
		Resistive load	Inductive load
		$\cos \phi = 1.0$	$\cos \phi = 0.4$ $L/R = 0.7$
AC (50/60 Hz)	240	1	0.5
	120	1	1
DC	125	0.1	0.05
	30	1	1

(Note) Taking into consideration the capacity of voltage drop due to factors other than the circuit breaker, set the working voltage range of the power supply capacity.

Self-holding/Automatic reset setting of 5 contacts

1. LTD	2. STD/INST	3. GF	4. PAL	5. ERR.
Self-holding	Self-holding	Refer to lower table	Automatic reset	Automatic reset
	ETR dial set	GF		
	TRIP side	Self-holding		
	ALARM side	Automatic reset		

Self-holding: The output is maintained until it resets.

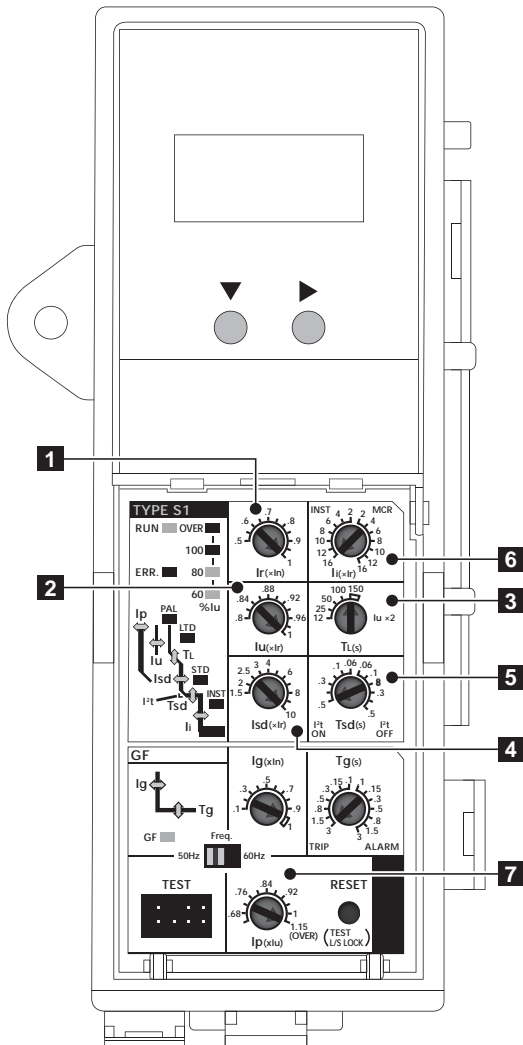
Automatic reset: The output will be reset if it backs to normal condition.

⚠ CAUTION

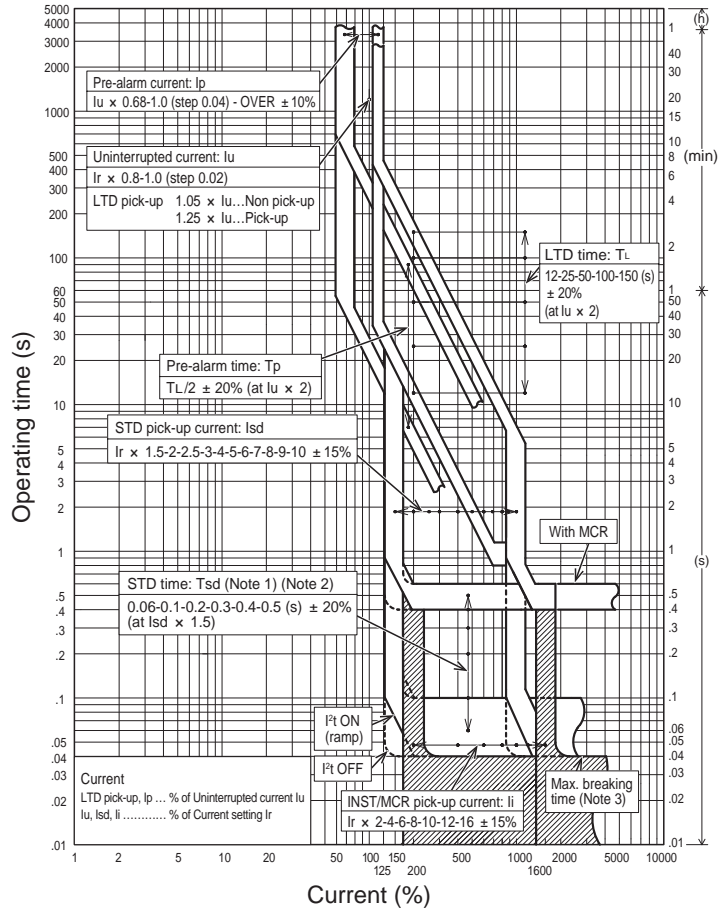
In the case of power supply type P3 or P4, a high-sensitivity relay is used for the alarm contact output. Therefore, a chattering noise (output error of approximately 1 ms) may be caused by ON/OFF operation of the circuit breaker depending on panel installation conditions. When using in a highly responsive sequence, install a filter circuit of several ms or perform sampling double reading, or the like.

17. Characteristics setting of ETR

17.1 Setting of over-current tripping characteristics



Operating characteristic curve (for general purpose: Type S1)



- (Note 1) (O operation)
 When Tsd = " 0.06 "setting, operating time is 0.04-0.1 s.
 When Tsd = " 0.1 "setting, operating time is 0.1 s ±50%.
 (CO operation)
 When Tsd = " 0.06, 0.1 "setting, operating time is 0.04-0.15 s.
- (Note 2) I²t is selectable: ON or OFF.
- (Note 3) When CO operation, max. breaking time is 0.135 s.

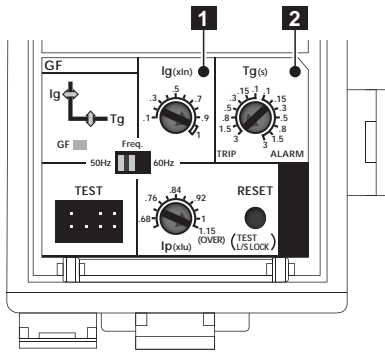
Adjustable setting range

No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
1	Current setting	Ir	0.5-1.0 (step 0.05) × In (CT rating)		1.0
2	Uninterrupted current	Iu	0.8-1.0 × Ir (step 0.02), Pick-up current: 1.15 × Iu	1.05 × Iu ... Non pick-up 1.25 × Iu ... Pick-up	1.0
3	LTD time	TL	12-25-50-100-150 s at Iu × 2	± 20%	150
4	STD pick-up current	Ird	1.5-2-2.5-3-4-5-6-7-8-9-10 × Ir	± 15%	10
5	STD time	Tsd	0.5-0.4-0.3-0.2-0.1-0.06 - 0.06-0.1-0.2-0.3-0.4-0.5 s (I ² t ON) (I ² t OFF) (at Ird × 1.5)	± 20% (Note)	0.5 (I ² t ON)
6	INST/MCR pick-up current	Ii	16-12-10-8-6-4-2 - 2-4-6-8-10-12-16 × Ir (INST) (MCR)	± 15%	16 (INST)
7	Pre-alarm current	Ip	Iu × 0.68-1.0 (step 0.04) -OVER	± 10%	OVER
	Pre-alarm time	Tp	1/2 TL at Iu × 2 (after 1/2 TL, PAL contact output turns on.)	± 20%	

The table and the figure include both optional display. Pre-alarm current " OVER "setting is Iu × 1.15.

- (Note) (O operation)
 When Tsd = " 0.06 "setting, operating time is 0.04-0.1 s. When Tsd = " 0.1 "setting, operating time is 0.1 s ±50%.
 (CO operation)
 When Tsd = " 0.06, 0.1 "setting, operating time is 0.04-0.15 s.

17.2 Setting of ground fault protection characteristics Option

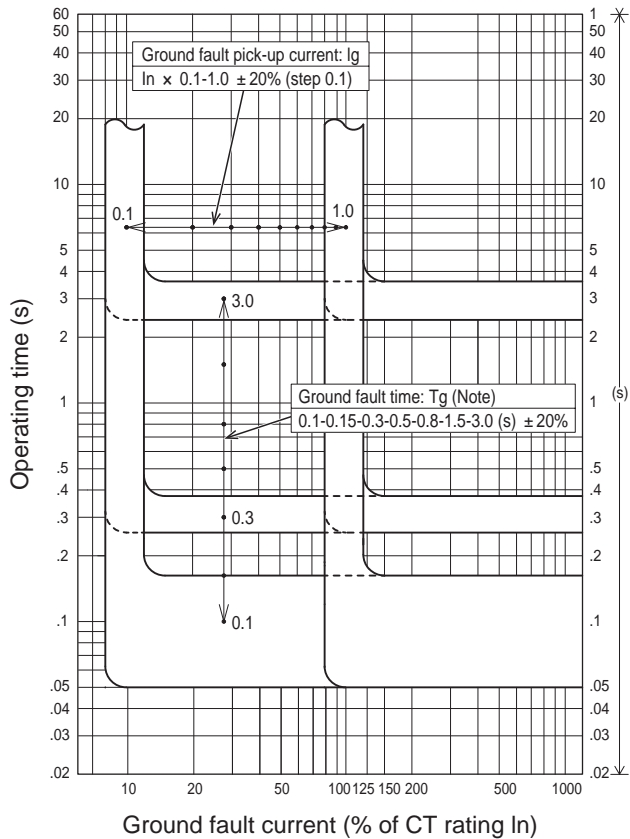


(Note)

When the 3-pole circuit breaker is used on a 3-phase 4-wire system, the N-pole CT (NCT) is required for ground fault protection.

For the specifications, refer to the catalog. For the NCT installation, refer to the instruction manual included in the product. When the ground fault pick-up current (I_g) is 0.1, the control power supply is required.

Ground fault protection characteristic curve



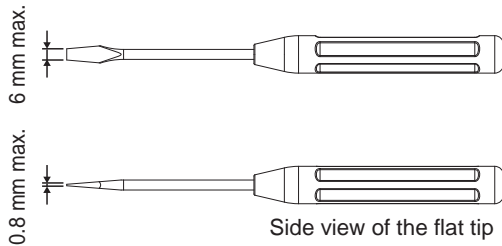
(Note) When $T_g = "0.1"$ setting, operating time is $0.1 \text{ s} \pm 50\%$.
When $T_g = "0.15"$ setting, operating time is $0.15 \text{ s} \pm 30\%$.

No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
1	GF pick-up current	I_g	0.1 to $1.0 \times I_n$ (0.1 steps)	$\pm 20\%$	1.0
2	GF time	T_g	$\frac{3-1.5-0.8-0.5-0.3-0.15-0.1}{\text{(TRIP)}} - \frac{0.1-0.15-0.3-0.5-0.8-1.5-3}{\text{(ALARM)}}$ (at $1.5 \times I_g$)	$\pm 20\%$ (Note)	3 s (TRIP)
	Alarm output		Setting for TRIP: Self-holding/Setting for ALARM: Automatic reset		Setting for TRIP (Self-holding)

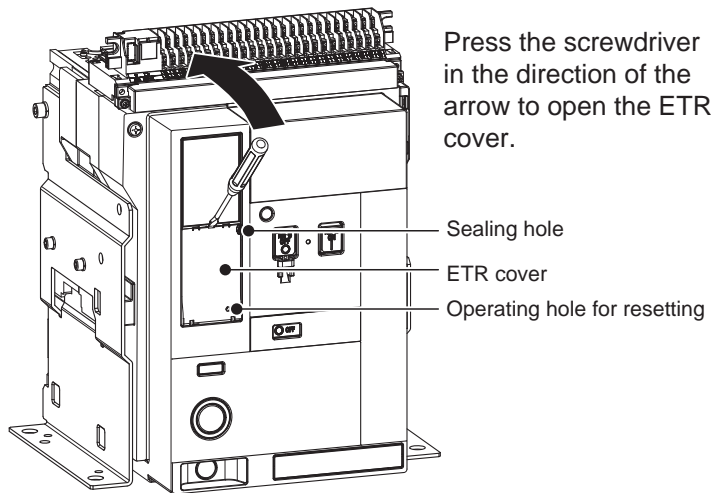
(Note) When $T_g = "0.1"$ setting, operating time is $0.1 \text{ s} \pm 50\%$.
When $T_g = "0.15"$ setting, operating time is $0.15 \text{ s} \pm 30\%$.

17.3 Setting procedure

1. Prepare a small flat tipped screwdriver.



2. Insert the flat tipped screwdriver into the opening of the ETR cover. Then, lightly turn the screwdriver to the upside as shown in the left figure, and the ETR cover will open.



3. There are two kinds of switches for characteristics setting and for trip indicator reset. They should be used as follows.

- a. Adjustable in steps

Rotary code switch is used. Do not set the switch at points between steps.

The setting value is the same when the switch is positioned at the thick line. (Set the switch with a torque of 0.02 N·m or less.)



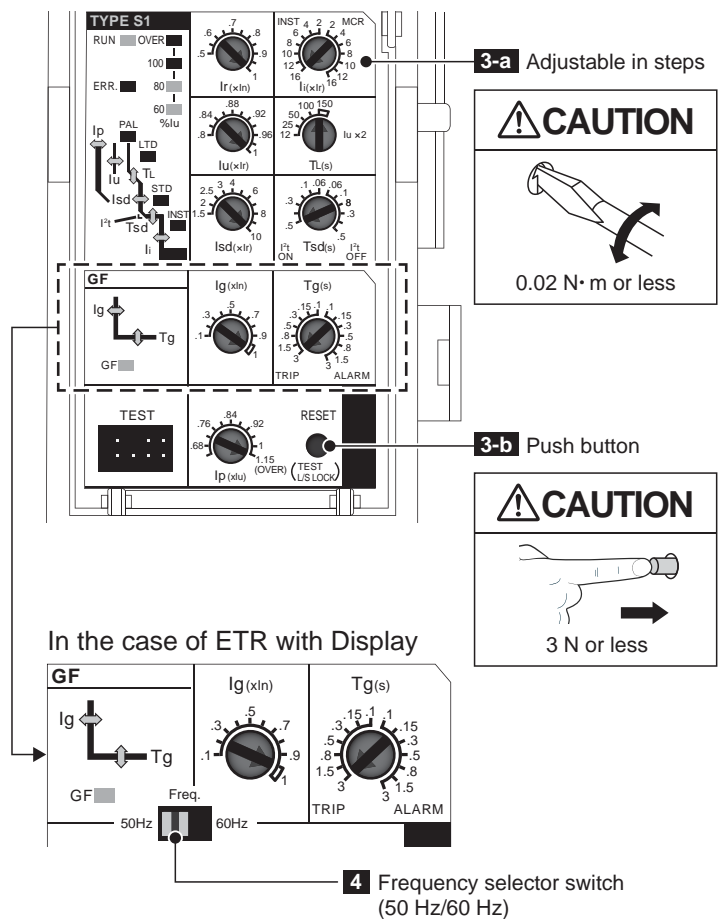
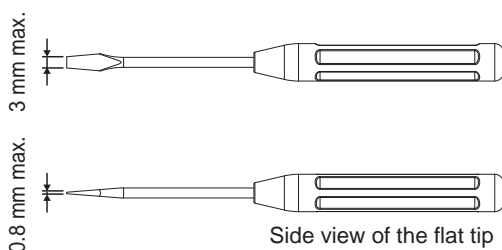
(Note)

If the switch is set at points between steps, the characteristics setting value will be decided at either end of steps.

- b. Push button

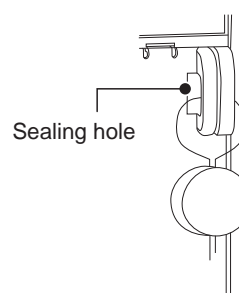
This is a return-type push button. Press it with force of 3 N or less.

4. For ETR with Display (Option), there is a slide type switch (Frequency selector switch) as the left side picture shows. Do not set the switch at points between the slide. When operating the switch, use a flat tipped screwdriver of the following size.



5. When the characteristic is set up, use a device like a field test device, etc. to make sure that the required characteristic has been set.

6. When sealing, seal the ETR cover by using the sealing hole at the top of the ETR cover.



17.4 Precautions when checking characteristics using the field test device

CAUTION

Before performing the test, make sure that no power is supplied to the main circuit of the circuit breaker. There is a risk of an electrical shock.



(Note)

For the operating procedures of field test devices Y-2005 and Y-2000 (discontinued model), refer to the instruction manual included with the field test device.

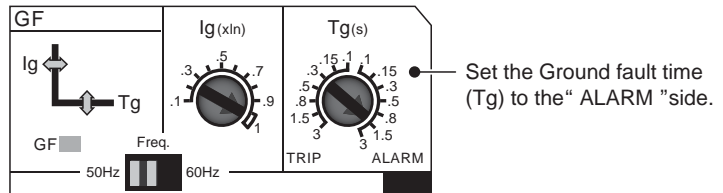
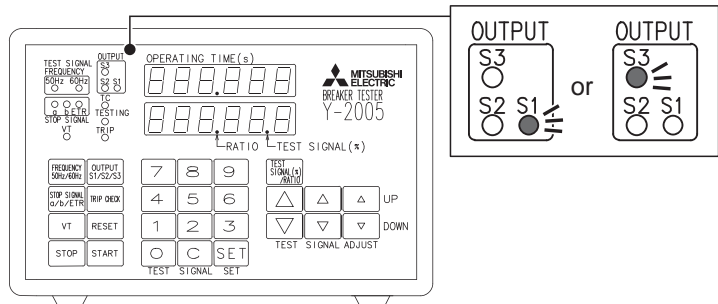
When checking the characteristics of ETR with field test devices Y-2005 and Y-2000 (discontinued model), it is necessary to set the characteristic setting switch of ETR as follows.

1. When testing the over-current tripping operation or pre-alarm operation with the signal output pin of the field test device set to S1 or S3

When performing an over-current operation test by setting the signal output pin of the test device with ground fault protection characteristics (GF) at S1 or S3, turn the ground fault time (Tg) setting switch to the "ALARM" side.

If the test is performed with the ground fault time (Tg) setting switch set to the "TRIP" side, tripping may be caused by the ground fault operation depending on the setting of the ground fault operation characteristics. In such cases, the over-current operation cannot be checked.

Field test device (Y-2005)



2. When testing the ground fault tripping operation or ground fault alarm output with the signal output pin of the field test device set to S2

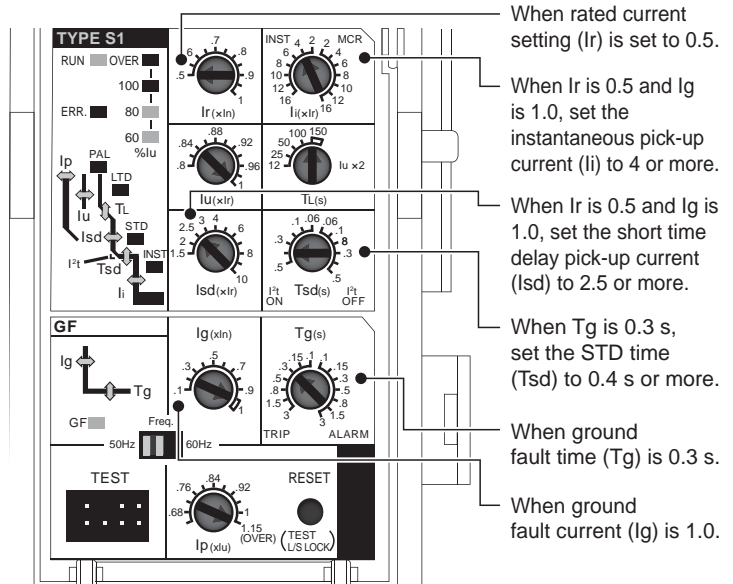
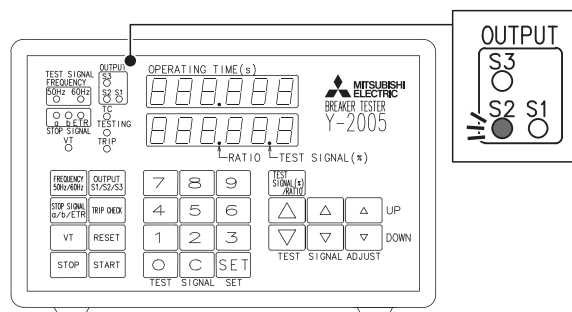
If the ground fault tripping operation or alarm output is tested with the signal output pin of the test device set to S2, make settings so that the short time delay pick-up current (I_{sd}), short time delay operating time (T_{sd}), and instantaneous pick-up current (I_i) setting values are higher than the ground fault current (I_g) and ground fault time (T_g) values. If the above settings are not made, the ground fault operation cannot be checked in some cases as a result of tripping by the over-current operation.

(Example)

Rated current setting (I_r) : 0.5 × I_n

Ground fault current (I_g) : 1.0 × I_n

Ground fault time (T_g) : 0.3 s (TRIP)



18. Procedures for operating Display (LCD) Option

A protective sheet has been affixed on the Display (LCD) to prevent scratches. Remove the sheet before starting the operation.

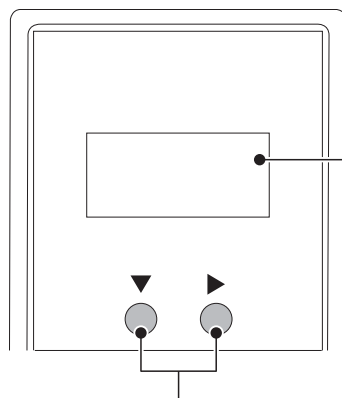
When removing the protective sheet, static electricity may be generated to light the LCD. However, it will go off in a short time by self-discharge. Also, the display may flicker due to internal processing for refreshing the display. This is not a malfunction.

18.1 List of display items

List of measurement items

Measuring items		Measuring	Display indication		Remark
Load current (A)	Current of each phase	0 to 200% I _n	***** A (I _n = 630 A to 1600 A)		Indication of 1 to N-phase concurrently (Bar graph display is also available)
	Maximum value				
Harmonics current (HI)	Fundamental harmonics of each phase	0 to 100% I _n	***** A (I _n = 630 A to 1600 A)		Indication of 1 to N-phase
	Harmonics of each phase (3rd, 5th, 7th, 9th)				
	Each phase total value		***. * %		
	Each phase total distortion rate				
	Content rate of each phase				
Fault memory	Trip cause/Fault current	0 to 2000% I _n	LTD	***** A (0-19999 A)	—
			STD		
	INST	***. * kA (20000 A and more)			
		0 to 200% I _n	GF	***** A	GF is an option
	Elapsed time since tripping	0 to 24: 00	h: m		Time is recorded up to 24 hours

18.2 LCD display



(Down), and (Right) keys

Liquid crystal display (LCD) screen

Displays the measured value of load current, harmonic current, trip information, and LCD setting.

The back light changes from white to red in the following cases:

- Trip operation
- Pre-alarm output

Used to select and determine the display menu on the LCD screen.
(Press the key with a force of 3 N or less.)

18.3 Basic operation

Press the “▼” and “▶” keys under the liquid crystal display (LCD) screen to operate the screen.

▼(Down) key: Selects the item in the screen in descending order. The selected item is displayed with blinking.

▶(Right) key: Fixes the selected item and opens the display screen for the item.

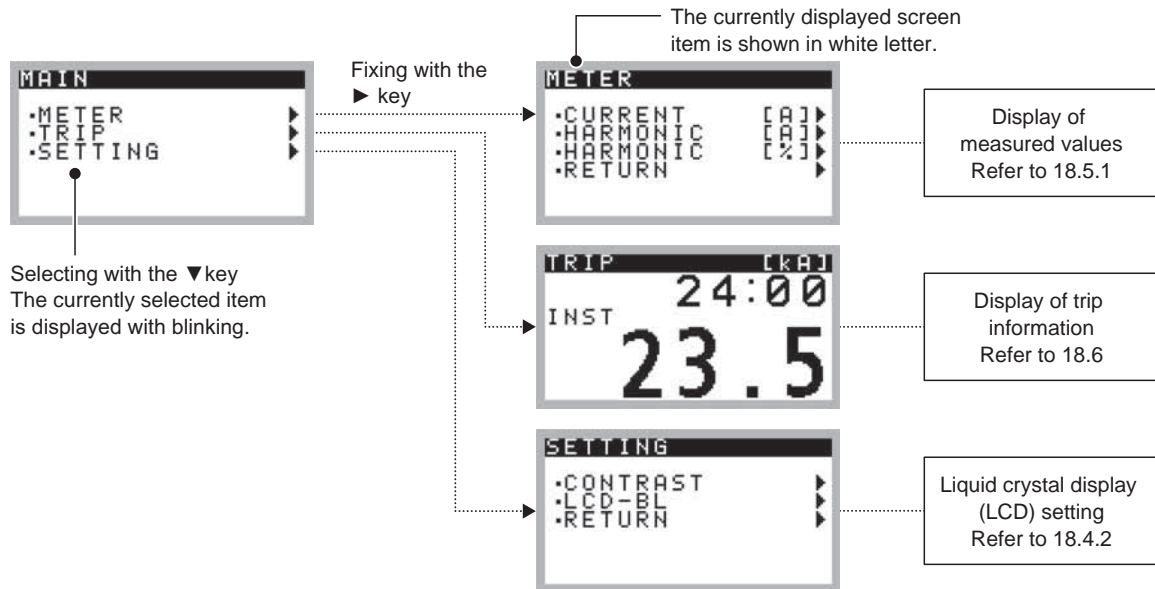
The screen for the high-order item is displayed by selecting the “RETURN” item and pressing the key.

18.4 Screen display and LCD setting

18.4.1 Menu selection and screen display

Selecting the menu on the MAIN screen opens the screen for each item.

- METER : Measured value display
- TRIP : Trip information display
- SETTING : Liquid crystal display (LCD) setting



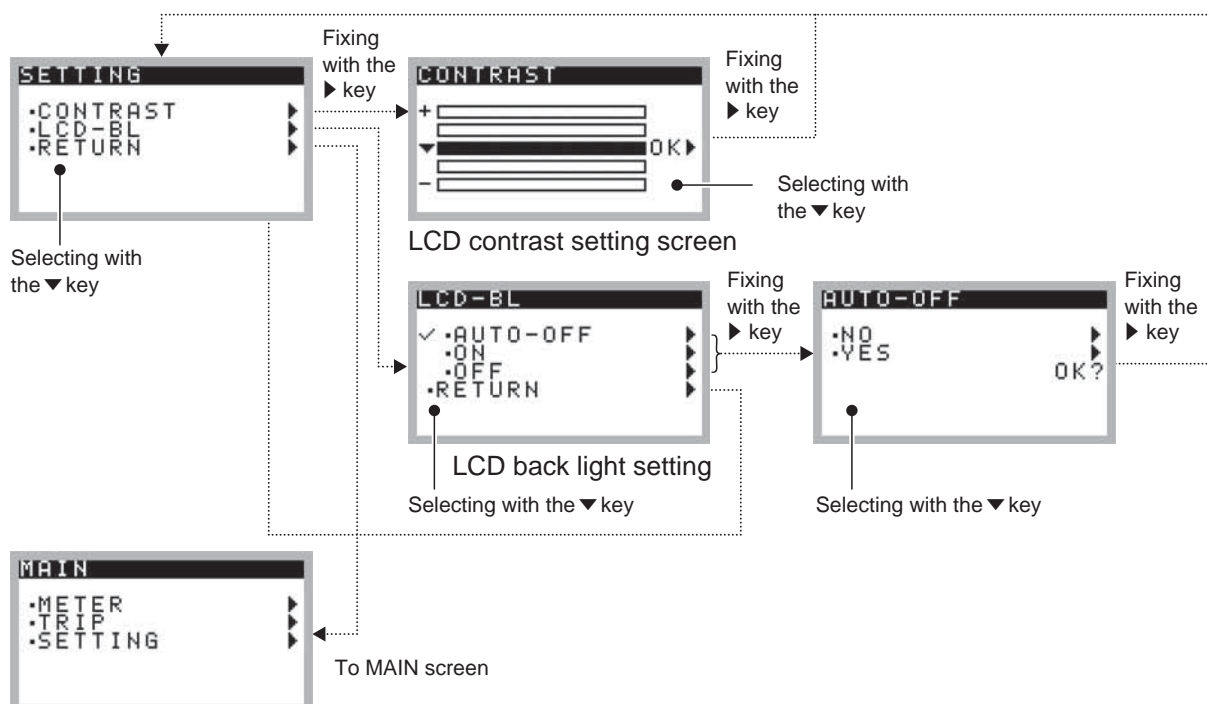
18.4.2 Liquid crystal display (LCD) setting (contrast and back light)

The following table shows the setting specifications for the SETTING menu.

Setting item	Setting contents (range)	Default setting value
SETTING	CONTRAST	-2/-1/0/+1/+2
	LCD-BL (LCD back light)	AUTO OFF (Note) /Always ON/Always OFF
		0
		Auto OFF

(Note) When the LCD back light is set to "AUTO OFF", the back light will go off automatically when there has been no key operation for five minutes. Pressing any key lights the backlight when it is off.

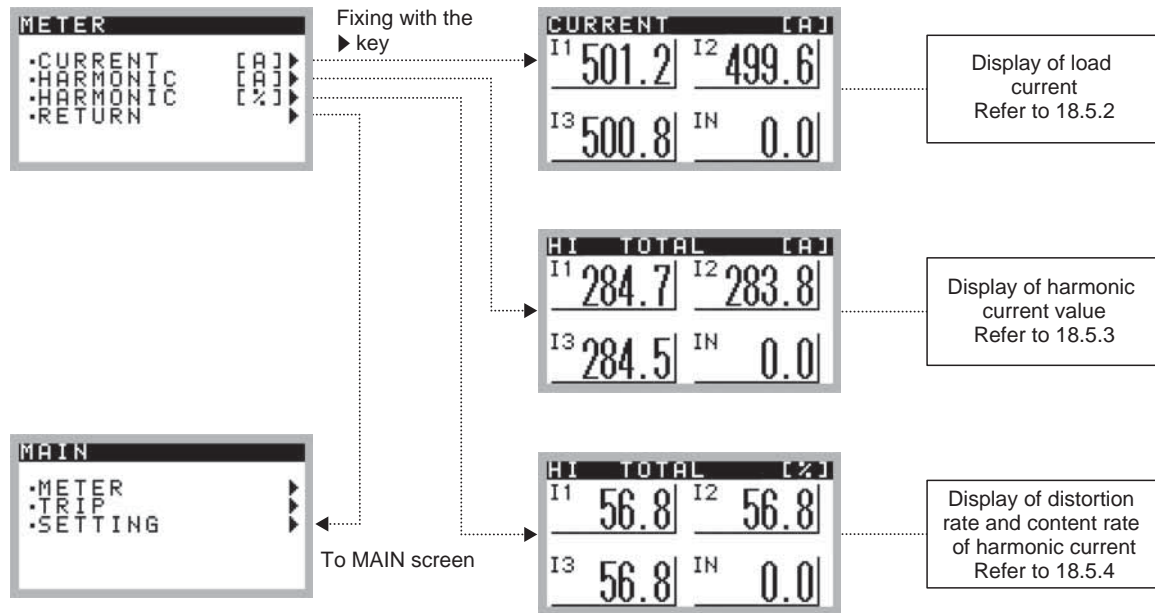
The following describes the procedure for setting the contrast and back light of the liquid crystal display (LCD).



18.5 Display of measured values

18.5.1 Measurement items

On the METER menu, measured values of load current (CURRENT) and harmonic current (HARMONIC) can be displayed.



18.5.2 Load current

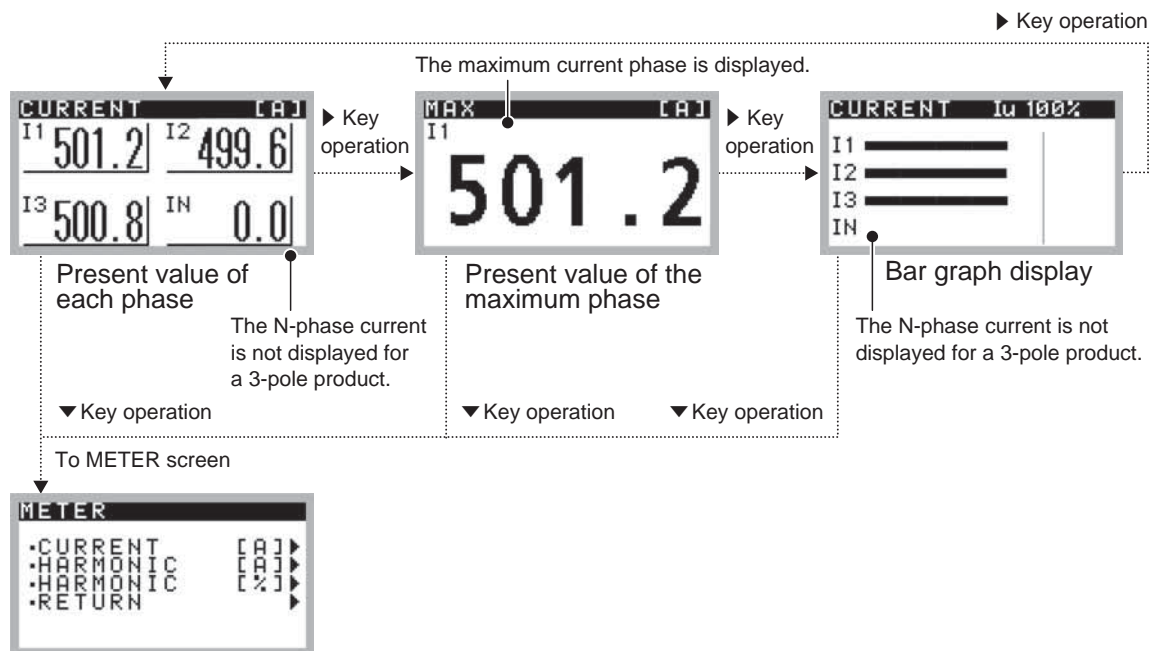
■ Display items

- Present value of each phase
- Present value of the maximum phase
- Bar graph display
(Display of the ratio to uninterrupted current (I_u))



(Note)

To measure the accurate value, set the frequency selector switch according to the circuit frequency to be used as described in page 31.



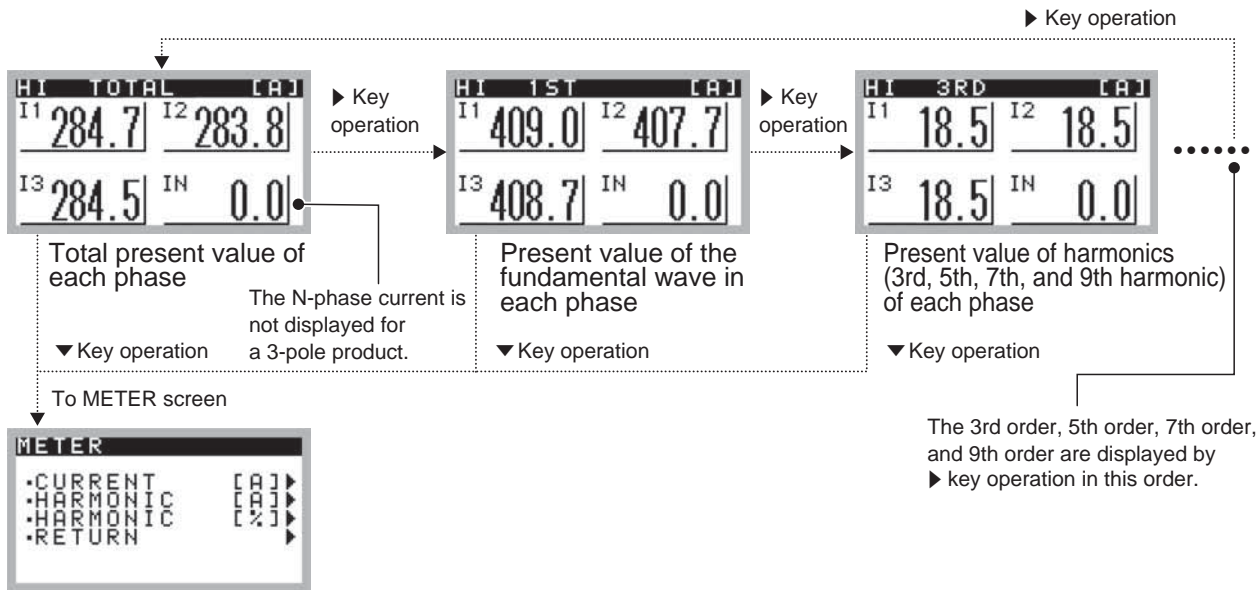
18.5.3 Harmonic current

■ Display items

- Present value of the fundamental wave in each phase
- Present value of harmonics (3rd, 5th, 7th, and 9th harmonic) of each phase
- Total present value of each phase



(Note)
To measure the accurate value, set the frequency selector switch according to the circuit frequency to be used as described in page 31.



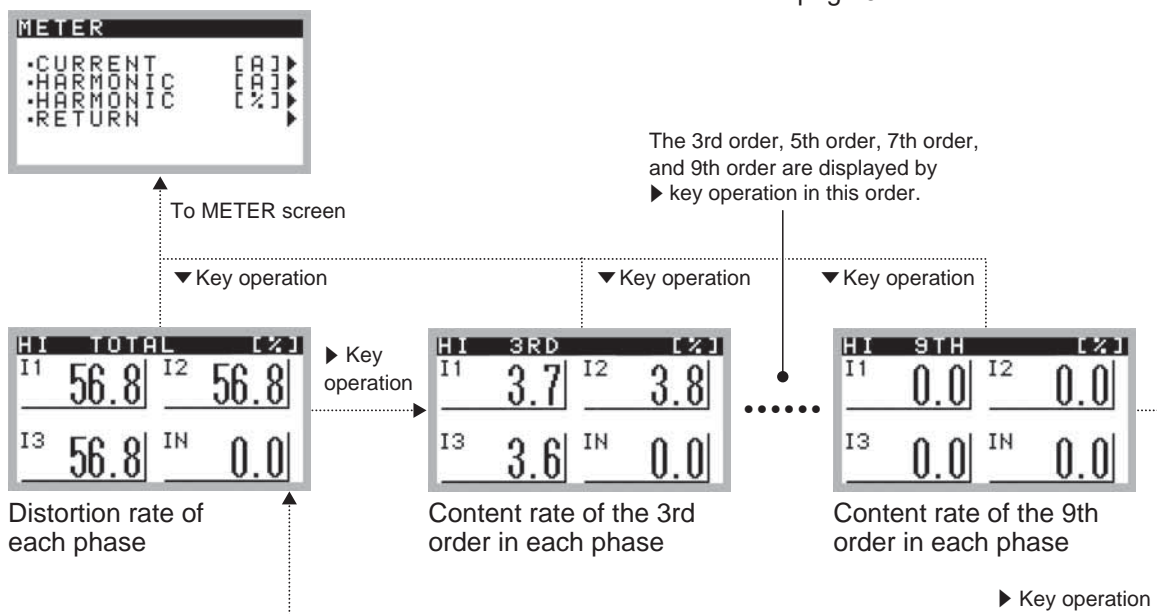
18.5.4 Harmonic current (distortion rate and content rate)

■ Display items

- Distortion rate of each phase
- Content in each order of each phase



(Note)
To measure the accurate value, set the frequency selector switch according to the circuit frequency to be used as described in page 31.



18.6 Trip information

When tripping has occurred, the trip information screen will appear automatically, and the back light will change from white to red. The trip information screen will remain displayed until tripping is reset.

The trip information means the history of the cause of the last fault.

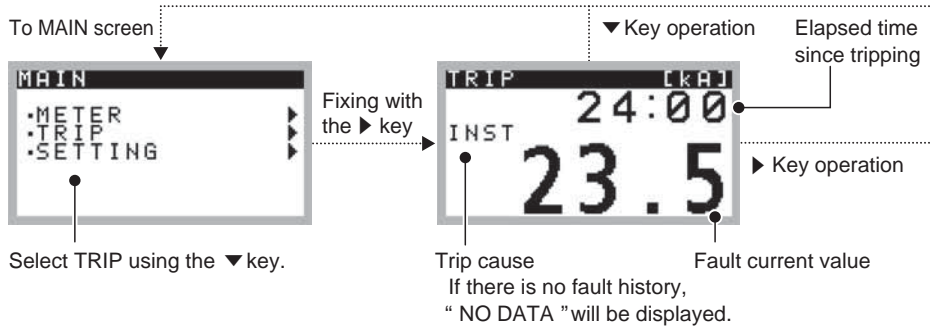
■ Display items

- Trip cause
- Fault current value
- Elapsed time since tripping (max. 24 hours)

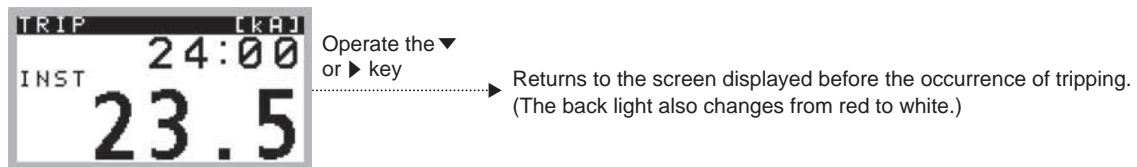


(Note)

To store memory for the Trip cause, it is necessary to apply power to the control power supply (P3 or P4) described in page 32.



Operating the "▼" or ">" key in the trip information screen returns to the screen displayed before the occurrence of tripping.



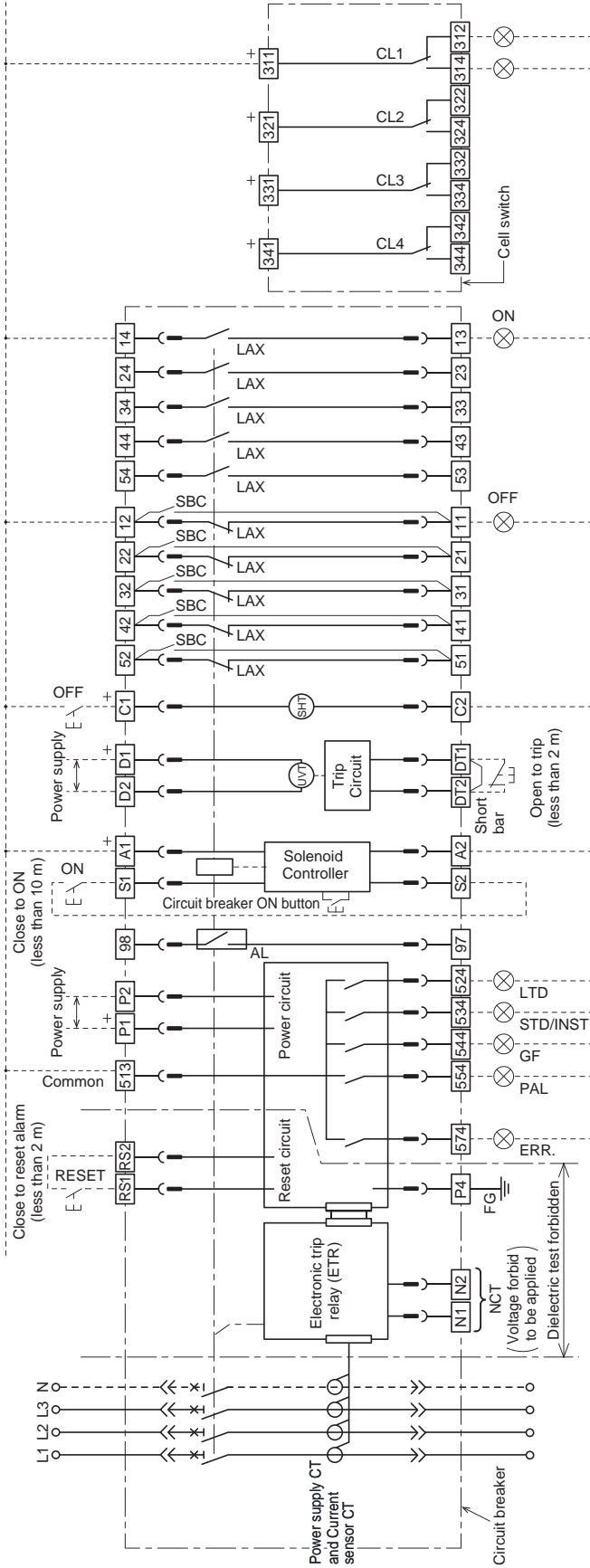
19. Troubleshooting of ETR

If you have encountered a trouble during operation, check the following items.

1. Current is displayed as 0 A when you perform a test with the field test device.
While the test signal and voltage are input by the field test device, the LCD indicates the current value as 0 A according to the specifications.
If you perform a trip test with the field test device while supplying power to ETR through the control power sources (P3 or P4), the following operations will occur.
 - While test signals are being input, the indicated values of load current and harmonic current will all be 0 A.
 - If a test signal exceeding the pre-alarm current setting (I_p) is input by the field test device, the current indication will be kept at 0 A and the back light will change from white to red.
 - If a trip operation is performed by the field test device, the back light will change from white to red and the fault current value will be displayed on the trip information screen.While voltage is supplied from the test terminal of the field test device, the current indication on LCD will be kept at 0 A.
2. The load current indication is 0 A even during energization.
If the measured current value is less than 1.5% of the rated current, the value is cut off so that the indication is 0 A.
3. The elapsed time since fault occurrence is displayed as “----”.
If control power (P3 or P4) turns off after fault occurrence when the elapsed time is short after power application to ETR, the elapsed time since fault occurrence may be indicated as “----” because charging to the power failure capacitor circuit in ETR is insufficient. To display the elapsed time since fault occurrence up to 24 hours later, it is necessary to apply control power to ETR for at least 36 hours.
4. The LED display of ETR flashes.
In a dark place, the light emitted from LED may escape to the neighboring LED display.
5. The current value measured by this product is different from the value measured by the other measuring instrument.
This product indicates effective values. Check whether the measuring instrument used for comparison measures effective values accurately. In the case of a measuring instrument which measures an average value, the measured value may be significantly different from the effective value if there is current distortion.

20. Wiring diagram

The following diagram shows the case that accessories are fully equipped.
For the N-pole, the following diagram shows the (Standard) case that the accessories are equipped on the right side.



Main circuit

Electronic trip relay (ETR)

Control power circuit/ alarm contact

OCR alarm

Electronic operation circuit

Auxiliary switch (normal close)

Auxiliary switch (normal open)

Cell switch

Terminal description

[13] [14] [53] [54]	Auxiliary switch "a" contacts "
[11] [12] [51] [52]	Auxiliary switch "b" contacts "
[D1] [D2]	Voltage input terminal of UVT
[DT1] [DT2]	Trip terminal of UVT (Remote trip)
[A1] [A2]	Power supply for Solenoid Controller
[S1] [S2]	External ON (Close by remote control)
[C1] [C2]	Shunt trip
[97] [98]	OCR alarm
[P1] [P2]	Power supply for ETR
[P4]	FG of power supply (FG: Frame Ground)
[RS1] [RS2]	Alarm reset (Trip cause, alarm contact)
[513] [524] [534] [544] [554] [574]	Trip cause, alarm contact
[N1] [N2]	For Neutral CT (NCT)

Accessory Symbols

(SHT)	Shunt tripping device
(UVT)	UVT coil
LAX	Auxiliary switch Standard
AL	OCR alarm switch
SBC	Shorting b contact
CL	Cell switch

- Internal wiring
- - - External wiring (user's wiring)
- ⌋ Control circuit connector (drawout type)



Applying power to the terminals [A1] and [A2] changes the terminals [S1] and [S2] to the live part. Applying power to the terminals [DT1] and [DT2] changes a terminals [DT1] and [DT2] to the live part. Do not touch the terminals.

- On the drawout type, the cables should have the length which allow the control circuit terminal block to be moved to the left or right by 5 mm.
- When a coil load is connected in the same control circuit as ETR, surge absorbers are required to absorb the surge voltage.
- Since some terminals are polarized, the wiring should be done correctly as the polarity shown in the wiring diagram when the control voltage is DC.
- To close the circuit breaker remotely, connect a switch between terminals [S1] and [S2].
- The switch used for remote close should be rated 30 V DC 10 mA or more (minimum applicable load 15 V DC 1 mA or less).
- For the power supply type P3 or P4, the high sensitive relay used in contact output may cause the chattering noise (wrong output of 1 ms level) during ON and OFF operation, depending on the panel placing condition. When it used in the quick responsive sequence, the filter circuit of a few milli-second (ms) should be provided or the double reading sampling should be implemented.
- Alarm reset (Terminal: [RS1] and [RS2]) and Alarm contacts (Terminal: [513] | [524] | [534] | [544] | [554] | [574]) are available only for power supply type P3, P4.
- Under voltage trip device (UVT)
The switch used for remote trip should be rated 30 V DC 10 mA or more (minimum applicable load 15 V DC 1 mA or less). Remote trip terminal has short bar at shipment, so remove it before using this function.
Disconnect the voltage input wires during dielectric testing of main circuit.

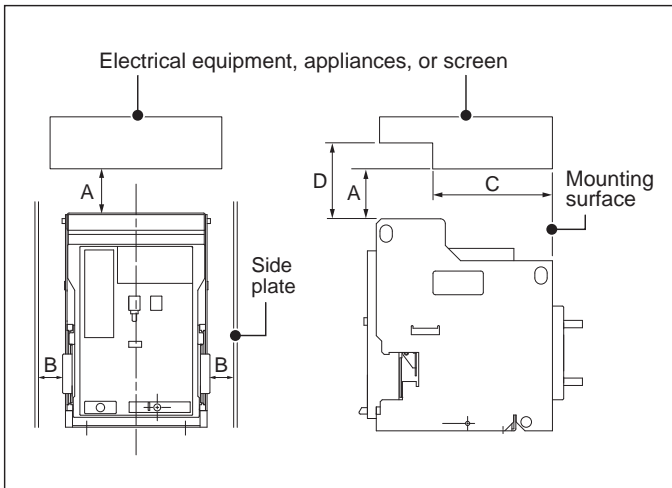


21. Technical note

21.1 Arc space

When the short circuit is interrupted, hot gas is discharged from the exhaust port of the arc-extinguishing chamber, so provide a clearance as shown in the following table.

In case of drawout type, secure appropriate space to prevent the fingers from getting trapped at the time of drawing.



Dimensions (mm)

Type	AED630-CV to AED1600-CV	
Applicable voltage	500 V AC or less	
Fixed type	A	0 (Note 1)
	B	50
	C	162
	D	50 (Note 2)
Drawout type	A	0
	B	50
	C	240
	D	50 (Note 2)

(Note 1) 300 mm or more clearance is necessary to inspect the arc-extinguishing chamber and contacts.

(Note 2) The wiring space required for the control terminal block.

21.2 Reverse connection available

Line and Load are not defined on the Main circuit terminals. Therefore reverse connection is available without any limitation.

21.3 Service Conditions

1. Normal service conditions

Use a circuit breaker in the conditions that meet all of the following conditions unless otherwise specified.

a. Ambient air temperature

A range of -5°C to $+40^{\circ}\text{C}$ is recommended. However, the average over 24 hours must not exceed $+35^{\circ}\text{C}$.

b. Altitude

2000 m (6600 feet) or less

c. Environmental conditions

The air must be clean, and the relative humidity 85% or less at $+40^{\circ}\text{C}$. Do not use and store in atmospheres with sulfide gas, ammonia gas, etc. ($\text{H}_2\text{S} \leq 0.01$ ppm, $\text{SO}_2 \leq 0.05$ ppm, $\text{NH}_3 \leq 0.25$ ppm)

d. Installation condition

When installing the AE V Series air circuit breaker, refer to "22. Inspection and Maintenance" (page 46) in the catalogue and instruction manual.

e. Replacement yardstick

Approx. 15 years. It is dependent on the environment. Please refer to "22. Inspection and Maintenance" (page 46) section of this manual.

2. Special service conditions

In case of special service condition, service life may become shorter in some cases.

a. Special environmental conditions

High temperature and/or high humidity corrosive gas.

b. Special ambient temperature

If the ambient temperature exceeds $+40^{\circ}\text{C}$, the uninterrupted current rating will be reduced.

c. Special altitude

If it is used at 2000 m or higher, the heat radiation rate is reduced, decreasing the operating voltage rating, continuous current capacity, and breaking capacity. Moreover the durability of the insulation is also decreased owing to the atmospheric pressure. Apply for further detail.

22. Inspection and Maintenance

An after-sale service person approved by Mitsubishi Electric inspects and maintains the products. Contact information is listed on the last page of this manual. Please check it and request inspection. When you inspect and maintain the products, read thoroughly section 22.3 Inspection Details.

22.1 Guidances for Inspection and Maintenance

Inspection : The circuit breakers are inspected to detect part that may be deteriorating at an early stage, resulting in maintaining the performance of the circuit breaker through timely renewal of consumable and deteriorating parts and preventing accidents that could otherwise arise as the circuit breaker approaches the end of lifetime.

Maintenance: Regular maintenance such as grease lubrication, as-needed replacement of component and so on, is necessary in order to maintain the performance of the circuit breaker.

22.1.1 Guidances for Inspection and Replacement according to the period of use and the usage environment

It is recommended that periodic inspections are performed about once a month commencing use thereafter according to the guidelines for inspection, maintenance and renewal to ensure a stable, long-term use of the circuit breaker.

Environments		Specific examples	Guidances for inspection	Guidances for maintenance	Guidances for replacement
Normal service condition	Indoor where there is no corrosive gas and little dust.	Distribution panels in individual electrical rooms that are not dustproof and air-conditioned.	Once every 2 to 3 years	Once every 2 inspection	Within approx. 7 to 15 years
Adverse environment	Locations with especially service corrosive gas and dust conditions and where humans cannot stay for a long period of time.	Geothermal power plants, sewage (treatment) plant, steel works, paper factories, pulp factories. Chemical factories, quarries, mining areas, etc.	Once every half year	Once a year	Within approx. 1 to 3 years

22.1.2 Guidances for Inspection and Replacement according to the number of operating cycles

Model	Guidances for inspection		Product performance				
	Number of operating cycles with current (Note 1)	Number of operating cycles without current	Limit of number of operating cycles (Note 2)			Limit of number of operating cycles with overload current	
			With current	Without current	Total	Current	Number of operating cycles
AED630-CV AED1000-CV AED1250-CV AED1600-CV	Every 500 cycles	Every 2,000 cycles	6,000	4,000	10,000	6 times the rated current	12 cycles

(Note 1) Operating cycles shall be regarded as being with rated current, even if the current is much less than the maximum rated current of the circuit breaker.

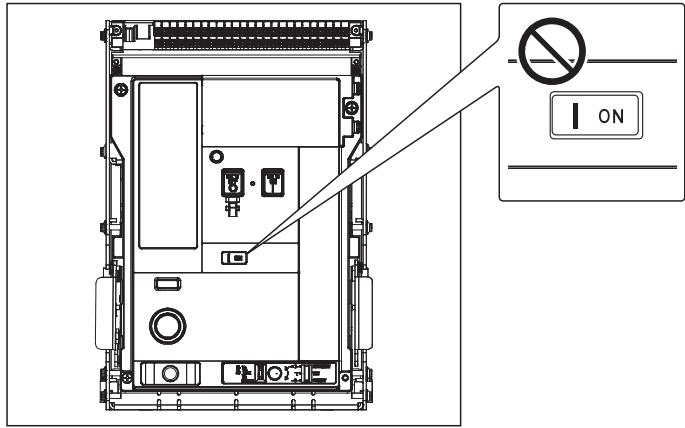
(Note 2) When an after-sale service person approved by Mitsubishi Electric inspects and maintains the products according to the period of use and usage environment

22.2 Preparation before Inspection

CAUTION

Before inspecting the circuit breaker, open (turn OFF) the upper circuit breaker and check that the power is not supplied.

If the circuit breaker is ON, open (turn OFF) the circuit breaker and perform the drawout operation.



CAUTION



- The personnel having expertise concerned shall perform any inspection and maintenance. Note that there are the risk of electrical shock.
- Any maintenance/inspections shall be performed after cutting off the master device and making sure that there is no current flowing. Note that there are the risk of electrical shock.

If inspection and maintenance should be carried out without cutting of the power supply in an unavoidable cases, wear rubber gloves and insulated boots laying rubber mat on the floor. Use insulated tools and instruments only. An access to the live parts is necessary in this inspection and maintenance work, when workers' full attention should be paid to the insulation of human body from the live parts.

Any normal opening/closing of the circuit breaker will be done safely because the live parts are covered with insulated mold case or the like.

22.3 Inspection Details

CAUTION

If you find any failure during the inspection, take corrective action immediately. If the product with any failure is used, the product may be damaged, leading to secondary accidents.

22.3.1 Initial Inspection

22.3.1-1 Inspection prior to applying current

Perform the following inspections after installing the circuit breaker and before applying the current.

Inspection item	Criteria
1. Are the electrical wires and bars fastened securely to the external line connection main terminals?	Must be tightened at the designated tightening torque (M12 screw: 45±5 N·m)
2. Are any conductive foreign objects, such as screw, nails, processing chips from the panel and also connecting lead wires for the withstand voltage tests, left around the terminals?	Must be removed completely.
3. Is the front cover, base, etc. cracked or damaged?	There must be no cracks or damage.
4. Has the circuit breaker been flooded or is there condensation of dew?	There must be no flooding or dew condensation.

(Note 1) Follow the standards in 22.3.1-2 when carrying out withstand voltage test.

(Note 2) Follow the standards in 22.3.1-2 when measuring the insulation resistance using a 500 V megohmmeter.

22.3.1-2 Test locations and standards for insulation resistance and withstand voltage tests

Test locations	Insulation resistance test (MΩ) (Note 1)		Withstand voltage test (V AC) (Note 2)	
	ON	OFF	ON	OFF
Between all the terminals of the main circuit connected together and the enclosure or mounting plate.	≥ 5	≥ 5	3500	3500
Between each pole of main circuit and the other poles connected together and to the enclosure or mounting plate.	≥ 5	—	3500	—
Between the upper terminals connected together and the lower terminals connected together.	—	≥ 5	—	3500
Between each control and auxiliary circuit not normally connected to the main circuit and the main circuit connected together.	≥ 5	≥ 5	3500	3500
Between each control and auxiliary circuit not normally connected to the main circuit. (Note 3)	≥ 5	≥ 5	2000	2000

(Note 1) Must be no less than 50 MΩ for the circuit breaker alone.

(Note 2) Voltage application time is 1 min.

(Note 3) There are some locations that withstand voltage tests must not be performed. Check the following CAUTION.

CAUTION

Do not perform the withstand voltage test for the following terminal.

Terminal mark: **N1**, **N2**, **P4**, **RS1**, **RS2**, **D1**, **D2**, **DT1**, **DT2**

Before performing the test, disconnect the wires **D1**, **D2**, **DT1**, and **DT2**. Failure to do so may result in damage to the UVT.

22.3.2 User Inspection

Perform the user inspection described in this section once about a month after starting use. After that, perform the inspection depending on the usage environment. For the periodic inspection (performed by an after-sale service person) in section 22.1, contact the sales representative or Mitsubishi Electric sales office.

22.3.2-1 External appearance of the circuit breaker

Inspection item	Inspection method	Criteria	Treatment
1. Dust or soil	Visual inspection	There must be no detrimental deposits of dust or dirt.	Blow with air upon each periodic inspection or clean and remove the dust with a drycloth. Do not use any solvents, such as a thinner.
2. Loosening of the main circuit terminals	Tighten with a torque wrench.	Must be tightened securely. (M12 screw: 45±5 N·m)	Retighten if necessary.
3. Loosening of control terminals	Tighten with a screwdriver.	Must be tightened securely. (M3.5 screw: 1.0±0.2 N·m)	Retighten if necessary.
4. Cracks, breakage, deformation, or discoloration of the front cover, base, control circuit terminal block, and other parts	Visual inspection	There must be no cracks, breakage, deformation, or discoloration.	Please contact our company if any abnormalities on the front cover, base, or the control circuit terminal block, etc. Replace the circuit breaker if the base is found to have trouble.
5. Flooding, immersion in water	Visual inspection	Must be no trace of flooding or immersion.	Replace the product if flooding or immersion has occurred.
6. Drawout operation	Visual inspection	Rails must be inserted in and pulled out smoothly.	Please contact our company if any abnormalities are found on the rail operation.

22.3.2-2 Conductive parts of the main circuit (External appearance)

Inspection item	Inspection method	Criteria	Treatment
1. Measurement of insulation resistance	Measure the insulation resistance with 500 V DC insulation resistance tester (megohmmeter).	Must be no less than 5 MΩ. (must be no less than 50 MΩ for the AED-CV alone.) Testing locations are shown in section 22.1.	Clean and dust off before re-measurement. In case the insulation fails to recuperate, replace the circuit breaker and drawout cradle.
2. Soiling of the main circuit conductor	Visual inspection	There must be no detrimental deposits of dust or soot.	Clean the main conductor.
3. Misconnection of the junction	Visual inspection	Must be no deformation and drop of the junction.	Replace the cradle if there are any abnormalities.

22.3.2-3 Arc extinguishing chamber and movable/fixed contact

Inspection item	Inspection method	Criteria	Treatment
1. Soot or stains	Visual inspection	No detrimental deposits of dust or dirt.	Remove dust and clean upon each inspection.
2. State of the arc extinguishing chamber	Visual inspection	1. There must be no breakage. 2. There must be no remarkable arc extinguishing plate melted.	Please contact Mitsubishi Electric if there are any abnormalities.
3. Movable/Fixed contacts	Visual inspection	There must be no remarkable contact wearing.	Please contact Mitsubishi Electric if there are any abnormalities.
4. Loosening of the arc extinguishing chamber fastening screw	Tighten with a screw driver for M6 screws.	Must be tightened securely. (M6 screw: 5.4±0.8 N·m)	Retighten if necessary.

22.3.2-4 Electronic trip relay

Inspection item	Inspection method	Criteria	Treatment
1. External appearance of the ETR	Visual inspection	There must be no breakage or deformation of the external parts and the setting dials.	Please contact Mitsubishi Electric if there is any breakage or deformation.
2. Dust or soil	Visual inspection	There must be no detrimental deposits of dust and dirt.	Remove the dust with a dry cloth. Do not use any solvents, such as a thinner.
3. Operating characteristics of the ETR	Use the field test device (Y-2005)	Use the field test device (Y-2005) to confirm that the characteristics are within the standard values.	Please contact Mitsubishi Electric if the measured values deviate from the standard values.

22.3.2-5 Accessory devices (General accessory devices)

Inspection item	Inspection method	Criteria	Treatment
1. Shunt trip device (SHT)	The circuit breaker is ON and the specified voltage is applied to the terminals C1 and C2 .	The circuit breaker must be changed from ON to OFF.	Please contact Mitsubishi Electric if there is any breakage or deformation.
2. Auxiliary switch (LAX)	Check continuity of LAXa and LAXb.	Must switch in accordance with the conditions of the circuit breaker.	Please contact Mitsubishi Electric if there are any abnormalities.
3. Under voltage trip device (UVT)	Check that the UVT operates correctly by supplying current to D1 and D2 of control circuit terminal block.	Must be able to close reliably upon application of a voltage that is 85% of the rated voltage and to trip and disable closing by the time when the voltage reaches 45% of the rated voltage.	Please contact Mitsubishi Electric if the measured values deviate from the standard values.
4. Safety shutter (SST)	Drawout/Insert operation	1. There must be no breakage of the parts.	Please contact Mitsubishi Electric if there are any abnormalities.
		2. Must be able to perform the drawout/insertion operation without any difficulty.	1. Remove any broken parts that impair the drawout/insertion operation. 2. Please contact Mitsubishi Electric if the drawout/insertion operation cannot be performed.
5. Cell switch (CL)	Drawout/Insert operation	Must switch reliably at the "DISCONNECT" and "CONNECT" positions.	Please contact Mitsubishi Electric if there are any abnormalities.

(Note) For the accessories other than the above, check the user's manual for each accessory.

22.3.3 Inspections after a breaking operation

Inspect the items detailed for periodic inspection (section 22.3.2) when the circuit breaker has performed a breaking operation as a result of an overload current or a short-circuit current.

Reuse is possible if the relevant criteria are satisfied. A circuit must never be reclosed (locally or remotely) before the cause of the fault has been identified and cleared.

However, it is recommended that the circuit breaker be replaced as soon as possible after it has interrupted a large fault current. The circuit breaker should be monitored for unusual temperature rises and other abnormalities until replacement occurs. Refer to the following chart regarding the level of breaking currents and the treatments to be performed:

Level of breaking current	Level of the circuit breaker damage	Treatment
1. Breaking current is 6 times or less the rated current (LTD, STD range)	1. Abnormalities of the external parts cannot be detected visually. 2. Slight wear of contacts, soiling by soot, etc.	Reusable. Refer to section 22.1.2 regarding the switching operation lifetime at the rated current.
2. Breaking current is 70% of the rated breaking capacity or less (STD, INST range)	1. There is slight overall soiling of the exhaust ports by soot. 2. There is also overall damage of the contacts and the arc extinguishing chamber but only to a slight degree.	Reusable. The circuit breaker can be used if the relevant criteria in section 22.3.2 are satisfied.
3. Breaking current near to the rated breaking capacity	1. There is significant overall soiling of the exhaust ports by soot. 2. The contacts and the arc extinguishing chamber also suffer considerable damage.	1. Immediate replacement is desirable. 2. If immediate replacement is not possible, the circuit breaker can be used carefully by gradually reducing the rated current, etc., provided that the relevant criteria in section 22.3.2 are satisfied. As an additional test, perform the withstand voltage test to the live parts of the main circuit of the circuit breaker at twice the rated insulation voltage, in other words, at 2000 V. However, replace as soon as possible.

(Note 1) ETR with the trip indication function, it can be determined whether the cause of the tripping lies in the LTD (long-time-delay), STD (short-time-delay) or INST (instantaneous) level.

For the circuit breaker with a display, the fault current is estimated.

(Note 2) If the magnitude of the fault current cannot be estimated, treat according to 3 of section 22.3.3.

22.4 Fault Diagnosis

Type and condition of abnormality	Defect/Probable cause	Treatment	
		Investigation/Primary treatment	Secondary treatment
1. The circuit breaker is not closed.	1. The closing operation cannot be performed. 1.1 The OFF-lock device (CYL, CAL, Padlock) is not released.	Release the OFF-lock device. (CYL, CAL, Padlock)	Please contact Mitsubishi Electric if closing cannot be performed even after completing the primary treatment.
	1.2 The circuit breaker is not in the correct position.	Change the drawout position to "CONNECT", "DISCONNECT", or "TEST".	
	1.3 The drawout handle is inserted.	Pull out the drawout handle.	
	1.4 Voltage is not applied to the UVT.	Apply voltage to the UVT.	Refer to the section "10.3.2 Opening" if there is an abnormality of the UVT.
	1.5 Voltage is not applied to [S1] and [S2] of the control circuit terminal.	Examine the circuit.	
	2. The closing operation is performed. Tripping (OFF) is performed simultaneously with the closing operation.	Please contact Mitsubishi Electric.	—
	3. ON button is damaged or cannot be pushed.	Please contact Mitsubishi Electric.	—
	4. Manual reset button protrudes.	Push the Manual reset button to reset.	—
	5. The circuit breaker body greatly tilts.	Check the installation conditions on page 19 and install the circuit breaker correctly.	—
	2. The circuit breaker is not opened.	1. The contact does not open even after pushing the OFF button.	Please contact Mitsubishi Electric. (Note)
2. The SHT does not operate.		1. If the voltage is not applied, examine the control circuit.	—
		2. In the case of voltage applied, the circuit breaker has some failure. Please contact Mitsubishi Electric.	—
3. OFF button is damaged or cannot be pushed.	Please contact Mitsubishi Electric.	—	
3. Unusual temperature rise	1. Loosening of the main circuit terminal screws.	Retighten. (M12 45±5 N·m)	Please contact Mitsubishi Electric if discoloration of the conductor or the terminal molding is noted.
	2. Main circuit junction is damaged.	Please contact Mitsubishi Electric.	—
	3. The contact resistance of the contact has increased. (DC resistance value is to be the catalog value × 1.5 or less)	Clean the contact surface (by using wire brush).	Please contact Mitsubishi Electric if the temperature does not fall even after cleaning the contact surface.
	4. Load current is too large.	Check the load equipments.	—
4. Electronic Trip Relay (ETR) Abnormality 4.1 Unexpected trip	1. Trip at rated current or less	Check the load current and characteristics setting of the ETR. Check the characteristics by the field test device Y-2005.	Please contact Mitsubishi Electric if there are any abnormalities.
	2. Trip when the load starts	Check the inrush current and STD/INST setting of the ETR.	Please contact Mitsubishi Electric if there are any abnormalities.
	3. Trip due to noise or surge	Shift the setting of the ETR to upper level (temporary use). Check connection of the frame ground terminal [P4].	Reduce noise or surge at the source. Add a surge absorber, etc.
4.2 Abnormal characteristics	1. The circuit breaker does not trip even when an over current flows.	Check the load current and characteristics setting of the ETR. Check the characteristics by the field test device Y-2005.	Please contact Mitsubishi Electric if there are any abnormalities.
	2. The characteristics by the field test device Y-2005 is abnormality.	Check the field test device setting.	Please contact Mitsubishi Electric.

Type and condition of abnormality	Defect/Probable cause	Treatment	
		Investigation/Primary treatment	Secondary treatment
4.3 Abnormalities of Indication function or contact output	1. The trip indicator LED or alarm contact output does not work.	Check that the control power is supplied at terminals [P1] and [P2], and the RUN LED lights up.	Please contact Mitsubishi Electric.
	2. The LCD does not display.		
	3. The ERR. LED lights up.	Function of ETR microprocessors or internal wiring is abnormal. Please contact Mitsubishi Electric.	—
	4. The RUN LED does not light up.	Check that the control power is supplied at terminals [P1] and [P2], or the load current flows 20% or more in main circuit.	Please contact Mitsubishi Electric.
	5. The Load current LED does not light up.	Check the load current flows 60% or more in main circuit.	Please contact Mitsubishi Electric.
	6. The display key operation does not work.	Refer to Procedure for operating LCD (section 18).	Please contact Mitsubishi Electric.
5. The drawout operation is not performed.	1. The drawout handle cannot be inserted.	Push the OFF button before insert the drawout handle.	Please contact Mitsubishi Electric if the drawout handle cannot be inserted even when the OFF button is pushed.
	2. The lock plate cannot be pushed in.	Turn the drawout handle slightly to the right and left and push in the lock plate at a position where the lock plate can be pushed in easily.	Please contact Mitsubishi Electric if the lock plate cannot be pushed in.
	3. The lock plate does not come out at the "TEST" or "CONNECT" position.	Please contact Mitsubishi Electric.	—
	4. The stopper pin has broken and although the lock plate protrudes out at the "TEST" and "CONNECT" position, the insertion operation does not lock.	Please contact Mitsubishi Electric.	—
	5. The indication on the drawout indicator does not change.	Please contact Mitsubishi Electric.	—
	6. The drawout handle does not turn.	Push in the lock plate.	Please contact Mitsubishi Electric.
	7. The junction is broken and is impairing the drawout/insertion operation.	Please contact Mitsubishi Electric.	—
	8. The control circuit terminal is broken and is impairing the drawout/insertion operation.	Please contact Mitsubishi Electric.	—
6. The safety shutter (SST) does not operate.	1. The barrier of the safety shutter (SST) is broken.	Please contact Mitsubishi Electric.	—
	2. The rod of the safety shutter (SST) unit is broken.	Please contact Mitsubishi Electric.	—
7. The control circuit terminal block does not make contact at the "TEST" and "CONNECT" positions.	Is the control circuit terminal block damaged or deformed?	Please contact Mitsubishi Electric.	—
8. The auxiliary switch does not operate.	Breakage of the operating parts of the auxiliary switch	Please contact Mitsubishi Electric.	—
9. The UVT dose not draw in.	1. Applied voltage is too low. (Or applied voltage is too high.)	Check the applied voltage, and adjust applied voltage in accordance with the rated voltage of the UVT.	Please contact Mitsubishi Electric.
	2. The applied voltage capacity is insufficient.	Check the capacity of the voltage supply.	Please contact Mitsubishi Electric.
	3. The trip terminals, [DT1] and [DT2], are opened.	Check whether the trip terminals ([DT1] and [DT2]) are shorted. In case of using the push button for trip, use a b-contact type (normally closed button).	Please contact Mitsubishi Electric.

(Note) When you draw out the circuit breaker forcefully, do it after releasing higher breaker. Drawing out the circuit breaker when it is energized may cause a serious accident.

23. Service network

Country/Region	Corporation Name	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
Algeria	Mec Casa	Rue i N 125 Hay-Es-Salem, 02000, W-Chief, Algeria	+213-27798069
Bangladesh	PROGRESSIVE TRADING CORPORATION	HAQUE TOWER, 2ND FLOOR, 610/11, JUBILEE ROAD, CHITTAGONG, BANGLADESH	+880-31-624307
	ELECTRO MECH AUTOMATION & ENGINEERING LTD.	SHATABDI CENTER, 12TH FLOOR, SUITES : 12-B, 292, INNER CIRCULAR ROAD, FAKIRA POOL, MOTIJHEEL, DHAKA-1000, BANGLADESH	+88-02-7192826
Belarus	Tehnikon	Oktyabrskaya 19, Off. 705, BY-220030 Minsk, Belarus	+375 (0) 17 / 210 46 26
Belgium	EL-CON, Powergrid Solutions B.V.	Wattstraat 8, 2691GZ 's-Gravenzande, Netherlands	+31 (0) 174 286 900
Brasil	Mitsubishi Electric do Brasil Comércio e Serviços Ltda.	Avenida Adelino Cardana, 293 21 andar Bethaville, Barueri SP, Brasil	+55-11-4689-3000
Cambodia	DHINIMEX CO., LTD.	#245, St. Tep Phan, Phnom Penh, Cambodia	+855-23-997-725
Central America	Automation International LLC	7050 W. Palmetto Park Road Suite #15 PMB #555, Boca Raton, FL 33433	+1-561-237-5228
Chile	Rhona S.A. (Main office)	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile	+56-32-2320-600
China	Mitsubishi Electric Automation (China) Ltd.	Mitsubishi Electric Automation Building, No.1386 Hongqiao Road, Shanghai, 200336	+86-21-2322-3030
	Mitsubishi Electric Automation (China) Ltd. Beijing Branch	5/F, ONE INDIGO, 20 Juxianqiao Road Chaoyang District, Beijing, China 100016	+86-10-6518-8830
	Mitsubishi Electric Automation (China) Ltd. ShenZhen Branch	Level 8, Galaxy World Tower B, 1 Yabao Road, Longgang District, Shenzhen, China 518129	+86-755-2399-8272
	Mitsubishi Electric Automation (China) Ltd. GuangZhou Branch	Rm.1006, A1 Times E-Park, No.276-282, Hanxi Road East, Zhongcun Street, Panyu Distric, Guangzhou, China 510030	+86-20-8923-6730
	Mitsubishi Electric Automation (China) Ltd. ChengDu Branch	1501-1503,15F, Guang-hua Centre Building-C, No.98 North Guang Hua 3th Rd Chengdu, China 610000	+86-28-8446-8030
	Mitsubishi Electric Automation (Hong Kong) Ltd.	20/F., Cityplaza One, 111 King's Road, Taikoo shing, Hong Kong	+852-2510-0555
Colombia	Setsuyo Enterprise Co., Ltd.	5th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, China	+886-(0) 2-2298-8889
	Proelectrico Representaciones S.A.	Carrera 42 N° 75-367 Bodega 109, Itagüí, Medellín, Antioquia, Colombia	+57-4-4441284
	Mavicontrol Ltda	Calle 78 No. 70A-03 BRR BONANZA, Bogotá-Colombia	+57-1-4303803
Czech Republic	AUTOCONT CONTROL SYSTEMS S.R.O	Technologická 374/6, CZ-708 00 Ostrava-Pustkovec	+420 595 691 150
Denmark	BEIJER ELECTRONICS A/S	LYKKEGARDSVEJ 17, DK-4000 ROSKILDE, Denmark	+45 43 20 86 00
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab, Cairo - Egypt	+20-2-27961337
France	Mitsubishi Electric Europe B.V. French Branch	FR-92741 Nanterre Cedex	+33 (0) 1 55 68 57 01
Germany	Mitsubishi Electric Europe B.V.	Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	+49 (0) 2102 4860
Greece	KALAMARAKIS-SAPOUNAS S.A.	IONIAS & NEROMILOU STR., CHAMOMILOUS ACHARNES, ATHENS, 13678 Greece	+30-2102 406000
	UTECO	5, MAVROGENOUS STR., 18542 PIRAEUS, Greece	+30-211-1206-900
Hungary	Meltrade Ltd.	Fertő utca 14, HU-1107 Budapest, Hungary	+36 (0) 1-431-9726
India	Mitsubishi Electric India Private Limited	2nd Floor, Tower A&B, Cyber Greens, DLF Cyber City, DLF Phase-III, Gurgaon-122 022 Haryana, India	+91-124-4630300
	Mitsubishi Electric India Private Limited Pune Sales Office	ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune-411018, Maharashtra, India	+91-(20) 68192100
Indonesia	P. T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+62-(0) 21-8610651-9
Ireland	Mitsubishi Electric Europe B.V.	Westgate Business Park, Ballymount, IRL-Dublin 24, Ireland	+353 (0) 1-4198800
Israel	Gino Industries Ltd.	26, Ophir Street IL-32235 Haifa, Israel	+972 (0) 4-867-0656
Italy	Mitsubishi Electric Europe B.V.	Viale Colleoni 7, I-20041 Agrate Brianza (MI), Italy	+39 039-60531
Kazakhstan	Kazpromavtomatika	Ul. Zhambyla 28, KAZ-100017 Karaganda	+7-7212-501000
Korea	Mitsubishi Electric Automation Korea Co., Ltd.	9F Gangseo Hangang xi-tower, 401 Yangcheon-ro, Gangseo-gu, Seoul 07528 Korea	+82-2-3660-9572
Laos	AROUNKIT CORPORATION IMPORT-EXPORT SOLE CO.,LTD.	SAPHANMO VILLAGE. SAYSETHA DISTRICT, VIENTIANE CAPITAL, LAOS	+856-20-415899
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center-Block A Autostrade Dora, P.O. Box 11-2597 Beirut-Lebanon	+961-1-240445
Lithuania	Rifas UAB	Tinklu 29A, LT-5300 Panevezys, Lithuania	+370 (0) 45-582-728
Malaysia	Mitric Sdn Bhd	No. 5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam, Selangor, Malaysia	+603-5569-3748
Malta	ALFATRADE LTD.	99 PAOLA HILL, PAOLA PLA 1702, Malta	+356 (0) 21-697-816
Maroco	SCHIELE MAROC	KM 7,2 NOUVELLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Maroco	+212 661 45 15 96
Myanmar	Peace Myanmar Electric Co., Ltd.	NO137/139 Botahtaung Pagoda Road, Botahtaung Town Ship 11611, Yangon, Myanmar	+95 (0) 1-202589
Nepal	Watt & Volt House	KHA 2-65, Volt House Dillibazar Post Box: 2108, Kathmandu, Nepal	+977-1-4411330
Netherlands	Imtech Marine & Offshore B.V.	Sluisjesdijk 155, NL-3087 AG Rotterdam m, Netherlands	+31 (0) 10-487-19 11
North America	Mitsubishi Electric Automation, Inc.	500 Corporate Woods Parkway, Vernon Hills, IL 60061 USA	+847-478-2100
Norway	Scanelec AS	Leivikasen 43B, NO-5179 Godvik, Norway	+47 (0) 55-506000
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch	Bldv. Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Col. Ampliación Granada, Miguel Hidalgo, Ciudad de México, CP 11520, México	+52-55-3067-7511
Middle East Arab Countries & Cyprus	Comptoir d'Electricite Generale-International-S.A.L.	Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon	+961-1-240430
Pakistan	Prince Electric Co.	2-P GULBERG II, LAHORE, 54600, PAKISTAN	+92-42-675232, 5753373
Peru	Rhona S.A. (Branch office)	Avenida Argentina 2201, Cercado de Lima	+51-1-464-4459
Philippines	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+63-(0) 2-634-8691
Poland	Mitsubishi Electric Europe B.V. Polish Branch	Krakowska 50, 32-083 Balice, Poland	+48 12 347 65 00
Republic of Moldova	Intehsis SRL	bld. Traian 23/1, MD-2060 Kishinev, Moldova	+373 (0) 22-66-4242
Romania	Sirius Trading & Services SRL	RO-060841 Bucuresti, Sector 6 Aleea Lacul Morii Nr. 3	+40-(0) 21-430-40-06
Russia	Mitsubishi Electric (Russia) LLC	2 bld.1, Letnikovskaya street, Moscow, 115114, Russia	+7 495 721-2070
Saudi Arabia	Center of Electrical Goods	Al-Shuwayer St. Side way of Salahuddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454-Saudi Arabia	+966-1-4770149
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943	+65-6473-2308
Slovakia	PROCONT, Presov	Kupelna 1/, SK-08001 Presov, Slovakia	+421 (0) 51-7580 611
	SIMAP	Jana Derku 1671, SK-91101 Trenčin, Slovakia	+421 (0) 32 743 04 72
Slovenia	Inea RBT d.o.o.	Stegne 11, SI-1000 Ljubljana, Slovenia	+386 (0) 1-513-8116
South Africa	CBI-electric: low voltage	Private Bag 2016, ZA-1600 Isando Gauteng, South Africa	+27-(0) 11-9282000
Spain	Mitsubishi Electric Europe B.V. Spanish Branch	Carretera de Rubí 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain	+34 (0) 93-565-3131
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia)	Hedvig Möllers gata 6, 223 55 Lund, Sweden	+46 (0) 8-625-10-00
	Euro Energy Components AB	Järnvägsgatan 36, S-434 24 Kungälv, Sweden	+46 (0) 300-690040
Switzerland	TriElec AG	Muehlentalstrasse 136, CH-8201 Schaffhausen	+41 (0) 52 632 10 20
Thailand	United Trading & Import Co., Ltd.	77/12 Bamrunmuang Road, Klong Mahanak Pomprab Bangkok Thailand	+66-223-4220-3
Tunisia	MOTRA Electric	3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia	+216-71 474 599
Turkey	Mitsubishi Electric Turkey A.Ş.	Şerifali Mahallesi Kale Sokak No: 41, 34775 Ümraniye, Istanbul, Turkey	+90-216-969-2666
United Kingdom	Mitsubishi Electric Europe B.V.	Travellers Lane, UK-Hatfield, Herts. AL10 8XB, United Kingdom	+44 (0) 1707-276100
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274 Montevideo Uruguay	+598-2-902-0808
Vietnam	Mitsubishi Electric Vietnam Co., Ltd. Head Office	Unit01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1, Ho Chi Minh City, Vietnam	+84-28-3910-5945
	Mitsubishi Electric Vietnam Co., Ltd. Hanoi Branch	24th Floor, Handico Tower, Pham Hung Road, khu do thi moi Me Tri Ha, Nam Tu Liem District, Hanoi City, Vietnam	+84-24-3937-8075



**mitsubishi
electric**

三菱低压空气断路器

World Super AE

V Series

型号

AED-CV

使用说明书

保修

保修期和保修范围

在保修期内,产品在使用过程中出现的任何属于三菱电机责任范围内的故障或缺陷(以下简称“故障”),均由销售代表或三菱电机服务公司免费维修。但是,如果需要进行现场维修,根据实际情况则将收取派遣工程师的费用。

1. 保修期

产品的保修期限为自购买或交付到指定地点之日起1年。请注意,从三菱电机制造并装运后,最长的分销期为6个月,制造后最长的保修期限为18个月。维修零件的保修期限不得超过维修前原始产品的保修期。

2. 保修范围

1. 主要故障诊断应由用户执行。但是,如果用户需要,三菱电机可以进行诊断。在这种情况下,对于任何由三菱电机负责的原因造成的损坏,将免费进行诊断。有关详细信息,请联系销售公司。
2. 保修范围应仅限于在符合说明书、用户手册和产品警告标签上给出的说明和注意事项的使用状态、使用方法、使用环境和其他条件下正常使用。
3. 即使在保修期内,下列情况也应收取维修费用。
 - 由于不当的储存或处理,用户的粗心或疏忽而导致的故障。由用户选择的硬件或软件设计导致的故障。
 - 未经三菱电机的任何许可,用户对产品进行修改等导致的故障。
 - 将三菱电机产品组装到用户设备中时,如果提供的功能或结构在用户设备的法律安全措施中被认为是必需的,或已根据行业标准进行了评估,则可以避免发生的故障。
 - 如果执行了用户手册中所述的维护,则可避免的故障。
 - 由外部不可抗力(如火或异常电压)导致的故障,以及由自然灾害(如地震、闪电、风和水的破坏)导致的故障。
 - 由于以从三菱电机出厂时的科学技术标准无法预测的原因导致的故障。
 - 其他非三菱电机责任范围内的故障,或用户承认非三菱电机责任范围内的故障。

此外,保修仅适用于交付的产品。不适用于由产品故障引起的损坏。

3. 停产后的备件供应期

三菱电机将在停产后的5年内提供备件。5年后,三菱电机只提供此备件到库存数量用完为止。

将机会损失和二次损失排除在保修责任之外

无论保修期长短,三菱电机均不承担以下赔偿责任:

1. 由任何不属于三菱电机的责任范围的原因造成的损害。
2. 由三菱电机产品的故障给用户带来的机会损失和利润损失。
3. 可预见或不可预见的损害、二次损害、事故赔偿、以及由特殊情况造成的对三菱电机产品以外的其他产品的损害赔偿。
4. 对由用户进行的更换工作、现场设备维护、启动试运行和其他操作产生的间接费用的补偿。

产品应用








1. 使用本目录中列出的产品时，必须确认并遵守以下条件。需保证使用本产品时，产品中发生的故障不会导致严重事故。发生损坏或故障时，必须系统地执行外部备份功能或故障安全功能。
2. 本目录中列出的产品是作为通用产品设计和制造的，可应用于一般工业领域。因此，保修不适用于以下特殊用途。
 - 对公共设施有重大影响的核电站及其他发电厂项目。
 - 用于需要建立特殊质量保证体系的铁路系统、政府机关等。
 - 对生命、身体和财产产生重大影响的航空航天设备、医疗设备、铁路设备、燃烧和燃料设备、乘用车、载人运输设备、娱乐设备、安全设备、服务器和冷却设施的空调等用途。

如果本目录中列出的产品用于上述特殊用途，则三菱电机对产品的质量、性能和安全性不承担任何责任，包括但不限于违约责任、缺陷责任、质量保证责任、侵权责任和产品责任。但是，如果不需要特殊质量（超出一般规格），使用目的有限，且该设备配备了备份/故障安全功能，则三菱电机可以确定本目录中列出的产品可以得到保证。有关详细信息，请咨询三菱电机。

安全注意事项

- 在使用本产品之前，请仔细阅读本节和本用户手册并正确使用。
- 重要安全说明如下。请严格遵守说明。
- 确保向最终用户提供这些安全注意事项的指导。

标志的含义

 危险	不正确的产品使用会导致死亡或严重伤害等危险情况。
 注意	根据情况，不正确的产品使用可能会导致危险情况。
	该标志表示禁止。切勿忽略此指示。
	警告在某些情况下可能会发生火灾。
	在一定条件下可能发生触电的警告。
	确保万无一失地遵守这些说明。
	注意不要夹到手指。

危险

- 请勿在电流超过额定值的条件下使用产品。否则，由于电介质击穿，可能会导致接地故障或短路故障，或可能由于短路保护故障而发生爆炸。
- 请勿触摸端子区域。有触电的危险。

注意

- 电气工作应由合格的人员(电气专家)进行。
- 检查和维护应由合格的人员(电气专家)进行。在进行接线工作之前,请关闭上游断路器。否则可能会导致触电。
- 使用说明手册中指定的扭矩拧紧端子螺钉。否则可能会引起火灾。
- 请勿在高温、高湿、有灰尘、有腐蚀性气体、有振动或冲击等异常环境中安装或存放。否则可能会引起火灾、断路器故障或使其无法工作。
- 保护断路器,以防止灰尘、混凝土粉、铁粉和雨水等异物进入断路器。否则可能会导致故障或火灾。
- 当断路器自动跳闸时,请在转动手柄之前消除原因。否则可能会导致触电或火灾。
- 定期重新拧紧端子。否则可能会引起火灾。
- 在50/60Hz 下使用产品。否则可能会导致故障、不工作或火灾。
- 将产品作为工业废物处理。

产品规格变更

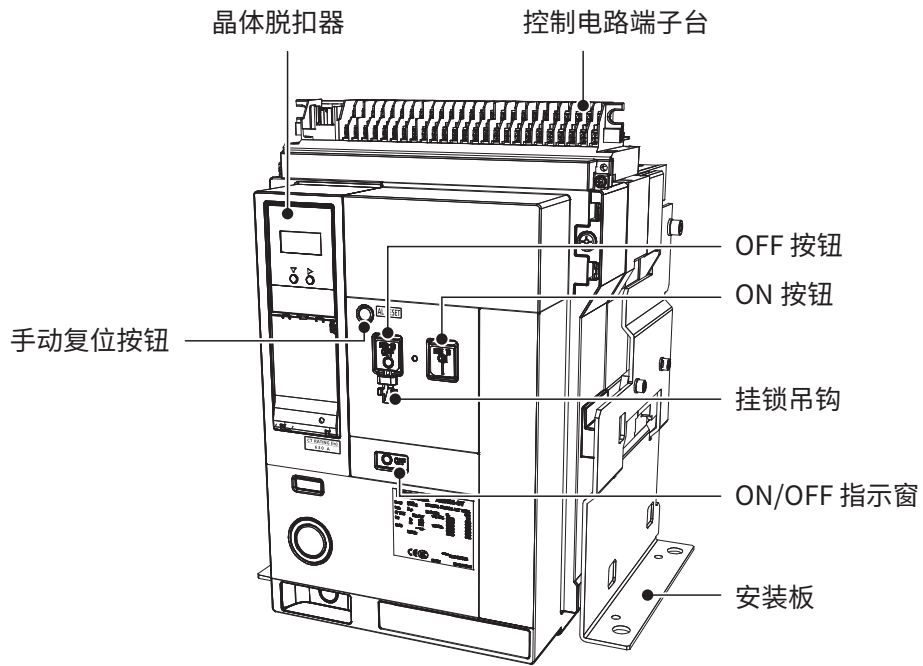
本目录、手册或技术文档中列出的产品规格如有更改,恕不另行通知。

目录

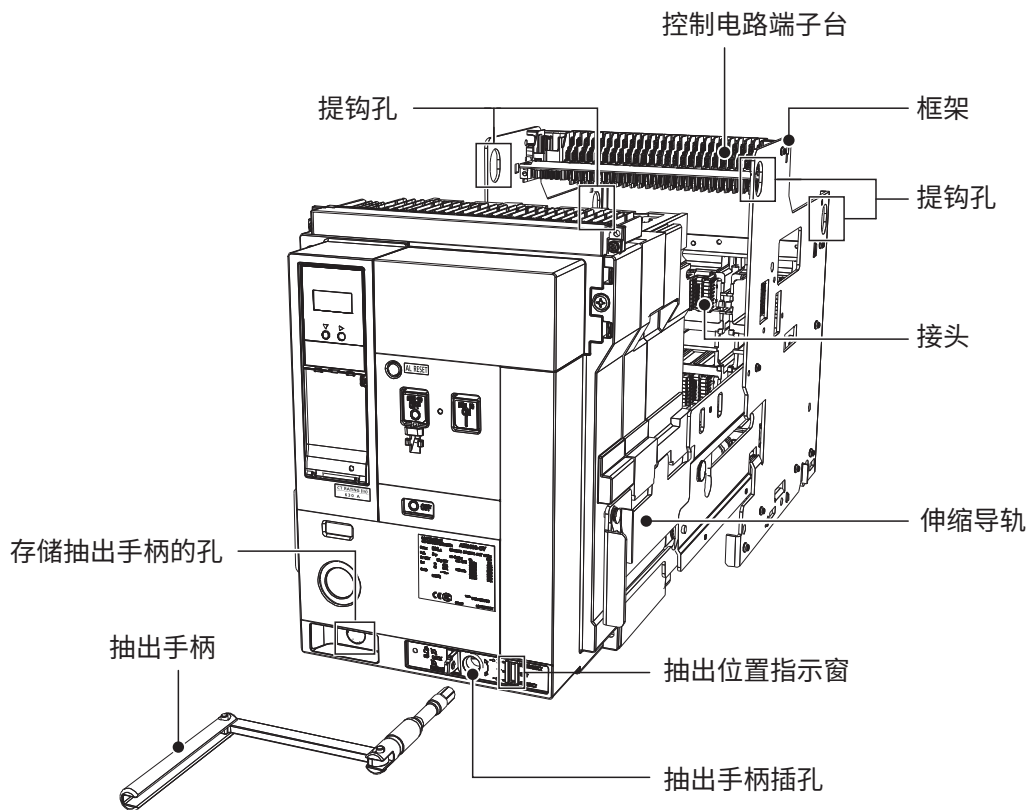
1. 外部结构	6
2. 外形尺寸	7
3. 包装·标签信息	7
4. 储存·安放须知	8
5. 必要使用工具	8
6. 拆包	9
6.1 固定型	10
6.2 抽出型	10
6.3 CONNECT (连接)→DISCONNECT (分离) 位置	11
6.4 DISCONNECT (分离)→CONNECT (连接) 位置	14
7. 搬运	17
8. 安装	18
8.1 转换端子	20
8.2 连接注意事项	21
8.3 N极的位置确认(4-Pole产品)	22
8.4 控制电路	22
9. 相间隔板的安装	23
10. 分闸/合闸操作	23
10.1 可进行闭合操作的条件	23
10.2 直接分闸/合闸操作	24
10.3 远程分闸/合闸操作	25
11. OCR报警(AL) [MRE:手动复位型]	26
12. 圆柱锁(CYL)	27
12.1 锁定步骤	27
12.2 解锁步骤	27
13. 安全挡板(SST)	28
14. 安全挡板锁(SST-Lock)	29
15. 位置开关(CL)	30
15.1 规格的确认方法	30
15.2 连接到端子的方法	30
16. 智能脱扣器(ETR)各部位功能	31
16.1 负载电流指示LED	32
16.2 预报警功能	32
16.3 控制电源	32
17. 智能脱扣器(ETR)的特性设置	34
17.1 智能脱扣器特性的设置	34
17.2 设置接地故障保护特性	35
17.3 设置步骤	36
17.4 通过现场测试仪器进行特性检查时的注意事项	37
18. 液晶显示部的使用方法	38
18.1 显示项目一览	38
18.2 液晶显示部	38
18.3 基本操作	38
18.4 画面显示与液晶的设置	39
18.5 测量值的显示	40
18.6 脱扣信息	42
19. 发生疑似故障时	43
20. 接线图	44
21. 技术资料	45
21.1 电弧距离	45
21.2 可进行逆接	45
21.3 工作条件	45
22. 检查与维护	46
22.1 检查与维护工作的指导原则	46
22.2 维护前的准备	47
22.3 检查详情	48
22.4 故障诊断	51
23. 销售网络	53

1. 外部结构

■ 固定型

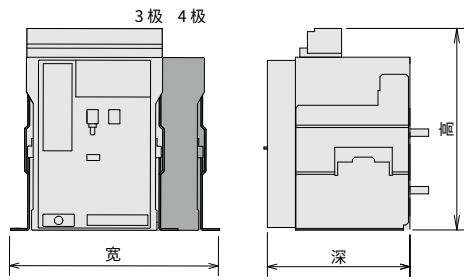


■ 抽出型

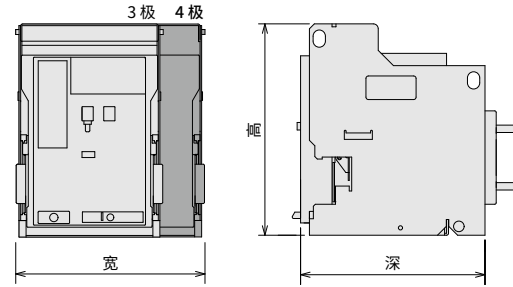


2. 外形尺寸

■ 固定型



■ 抽出型

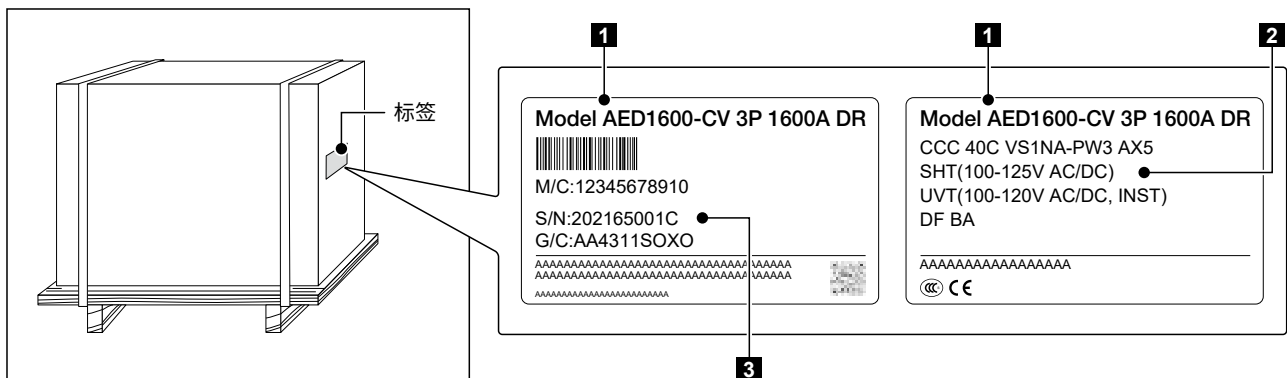


(mm)

型号		AED630-CV~AED1600-CV	
尺寸(高 × 宽 × 深)	固定型	3极	410 × 340 × 294
		4极	410 × 425 × 294
	抽出型	3极	430 × 300 × 375
		4极	430 × 385 × 375

3. 包装·标签信息

请对照标签以确认是否与您的订单要求相符。

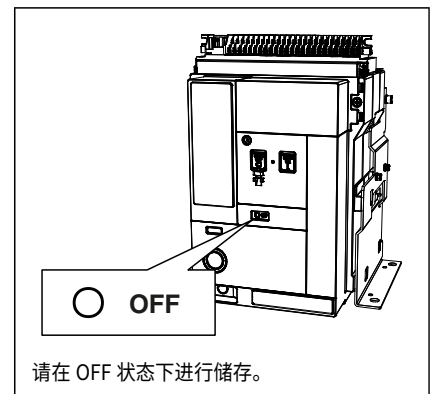
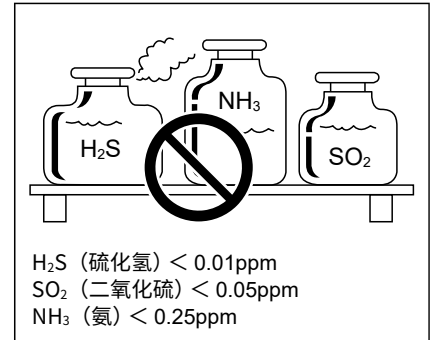
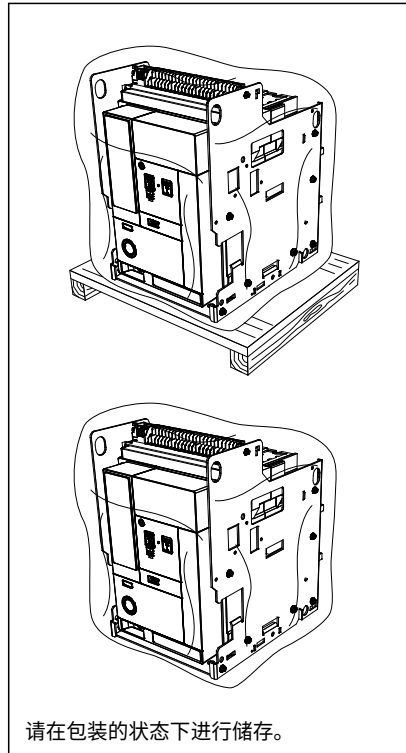
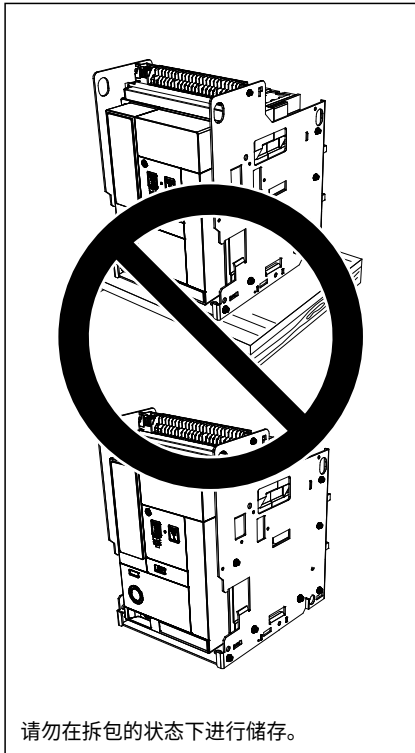
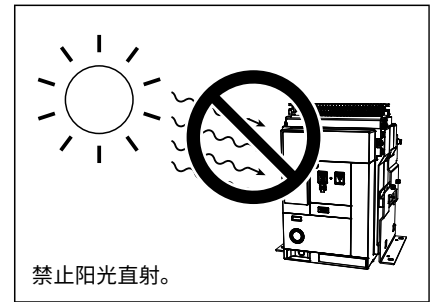
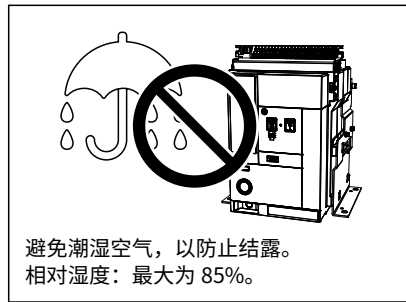


编号	说明
1	断路器的信息
2	附加信息
3	断路器序列号

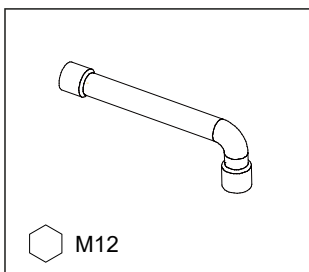
固定型包装中附带搬运用的提升吊钩 (HP)。
抽出型另售。

4. 储存·安放须知

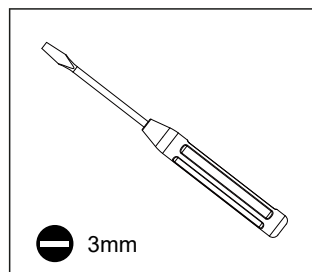
经过储存后的使用, 如果储存期间已超过6年, 请根据检查/维护手册的“润滑油润滑要领书”对本体润滑后再进行使用。请从销售公司获取润滑油润滑要领书。



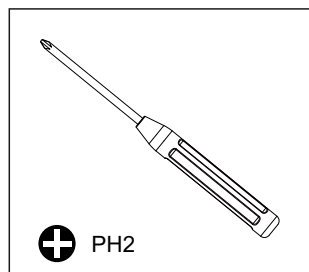
5. 必要使用工具



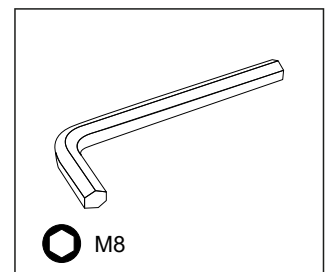
外六角扳手



一字螺丝刀



十字螺丝刀



内六角扳手

- 断路器的拆包及安装
- 与主电路的连接

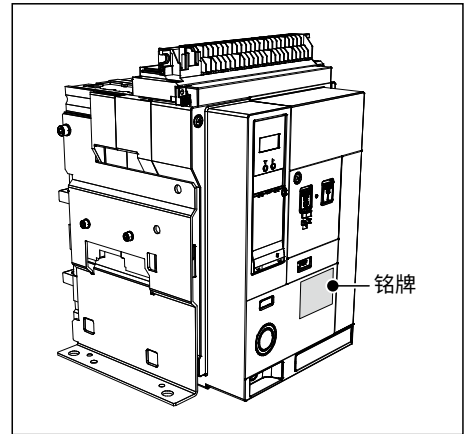
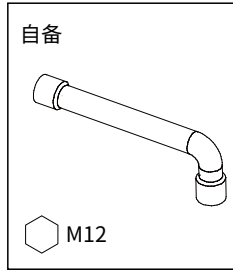
- ETR的设置

- 控制电路端子台

- 转换端子的组装

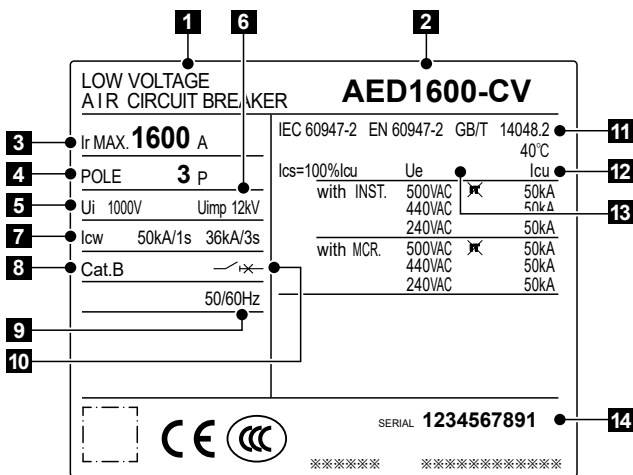
6. 拆包

1. 请确认包装箱无异常情况，例如损坏、水湿等。
2. 请通过断路器本体的铭牌确认与您的订单要求相符。



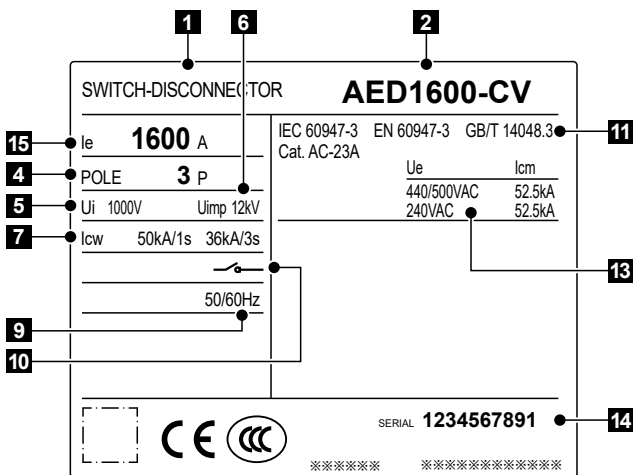
(注)
固定型包装中附带提升吊钩 (HP)。

• 断路器



编号	说明
1	断路器种类
2	本体型号
3	额定电流
4	3极/4极产品
5	绝缘电压
6	额定冲击耐受电压
7	短时间耐受电流
8	使用类别
9	频率
10	断路器或隔离开关符号
11	标准
12	额定极限短路分段能力
13	额定控制电路电压
14	序列号
15	额定使用电流

• 隔离开关

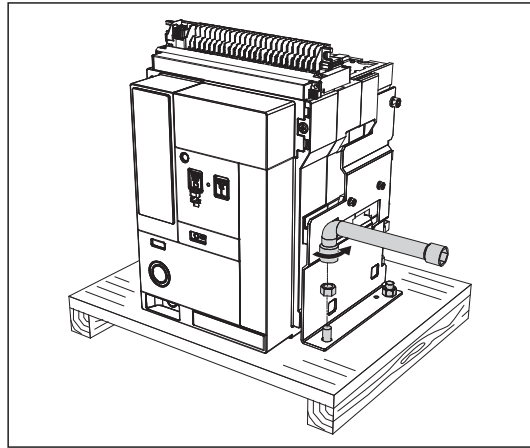


6.1 固定型

请取下固定本体的4个位置的螺栓。



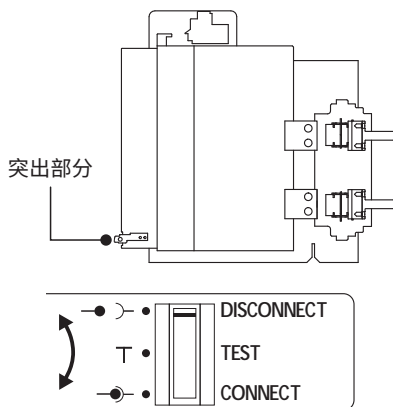
(注)
请使用提升吊钩 (HP) 进行本体的搬运。
使用方法记载在第7节。



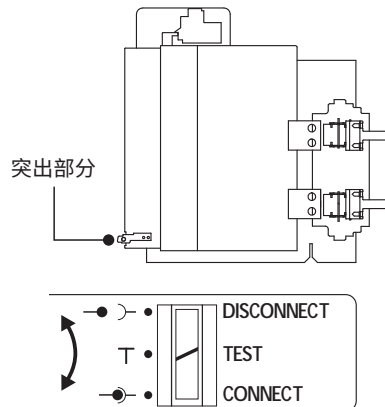
6.2 抽出型

6.2.1 抽出位置

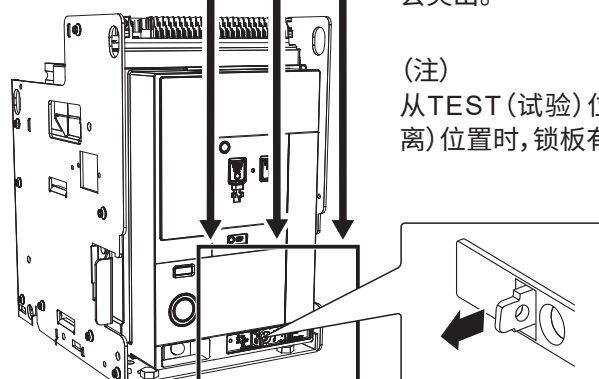
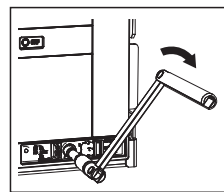
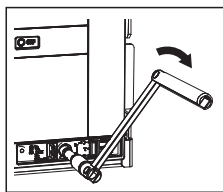
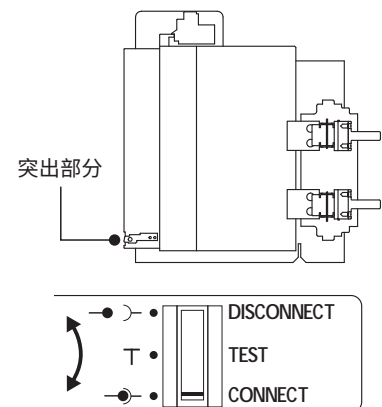
■ DISCONNECT (分离) 位置



■ TEST (试验) 位置



■ CONNECT (连接) 位置

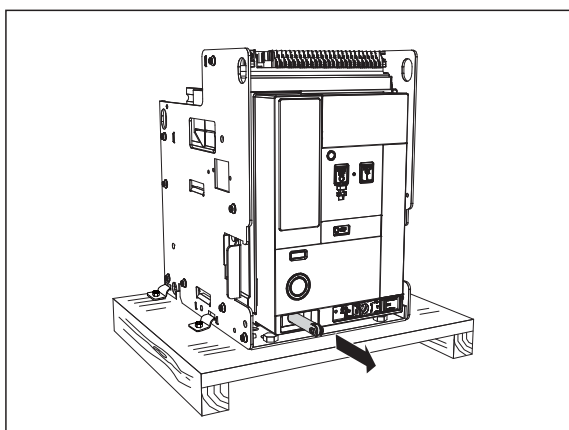


锁板突出并锁定。DISCONNECT (分离) 时不会突出。

(注)
从TEST (试验) 位置变为DISCONNECT (分离) 位置时, 锁板有可能突出, 但不是故障。

6.2.2 抽出型的操作方法

从断路器取出抽出手柄。
进行操作, 将CONNECT (连接) 变为
DISCONNECT (分离) 位置。
操作方法记载在6.3。



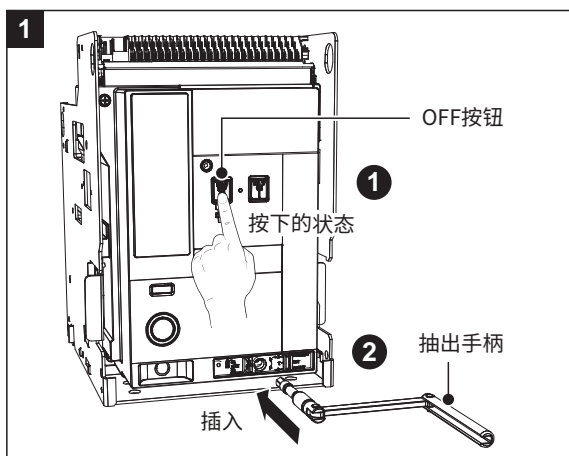
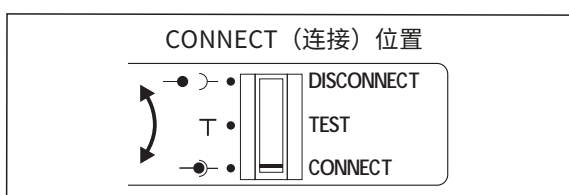
6.3 CONNECT (连接) →DISCONNECT (分离) 位置

1. 在按下 OFF 按钮的状态下插入抽出手柄。



(禁止)

没有按下OFF按钮时请勿强行插入抽出手柄。否则, 有可能损坏产品。

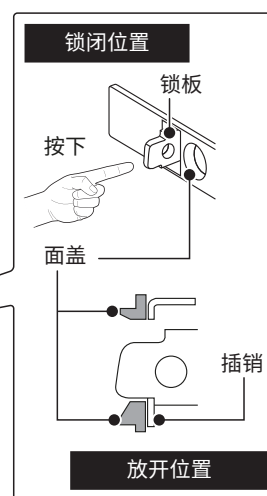
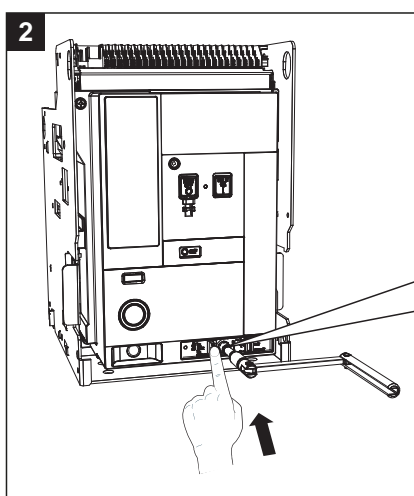


2. 请充分推动锁板, 直到锁板锁住为止, 此时, 方可放开锁板。



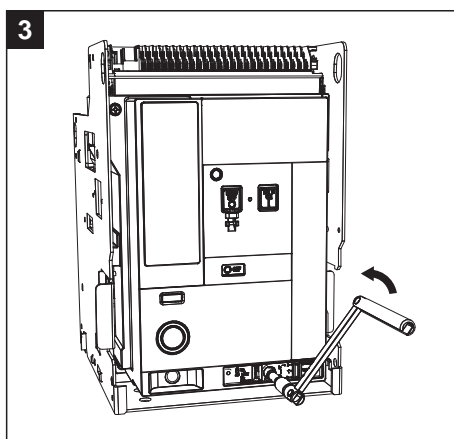
(注)

- 如果不能完全推动锁板, 则需要向左、向右转动抽出手柄。
- 确保充分将锁板推入到放开位置, 否则, 抽出位置指示器可能无法正常工作。
- 请勿在锁板突出的状态下进行抽出操作。



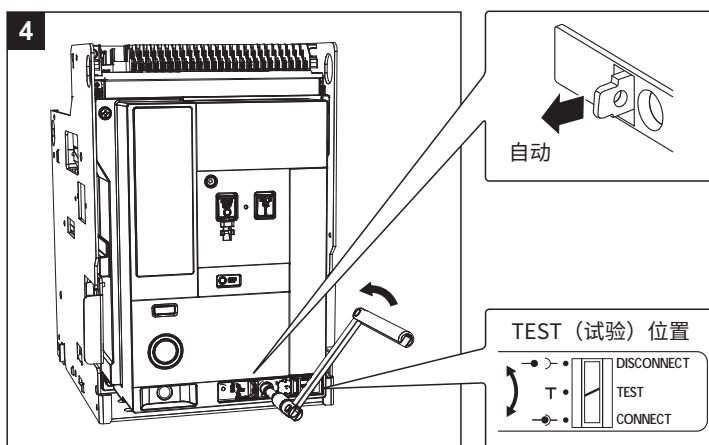
3. 在推动锁板的状态下, 请插入抽出手柄后按如图所示的方向进行转动。

! (注)
请勿在操作途中进行反向转动, 有可能不能正确显示抽出位置。如果进行了反向转动的情况下, 请从头开始重新进行操作。



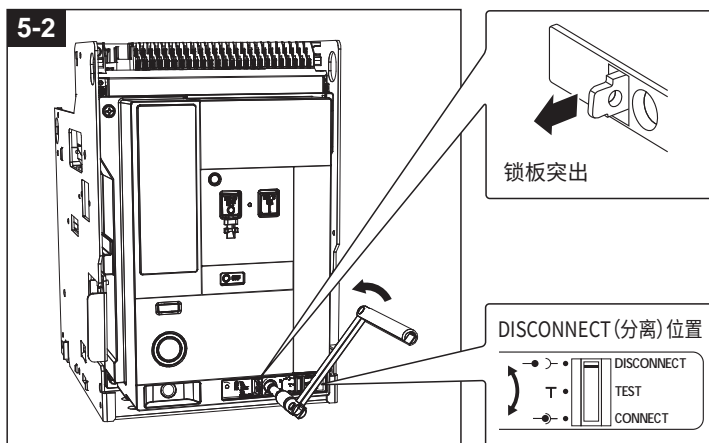
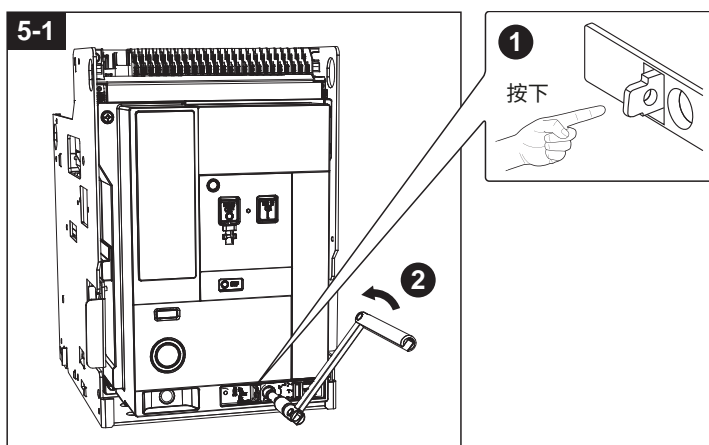
4. 当断路器到达TEST (试验) 位置时, 锁板将自动突出且抽出操作被锁定。

! (注)
进行从CONNECT (连接) 变为TEST (试验) 位置的操作时, 本体与抽出框架的连接部分会发出断开的声音。之后的抽出操作会变轻, 但不是异常。




5. 请在推动锁板后, 将抽出手柄按如图所示的方向进行转动。请转动抽出手柄, 直到抽出位置指示器显示DISCONNECT (分离) 位置且断路器不再移动为止。到此为止, 抽出操作完成。

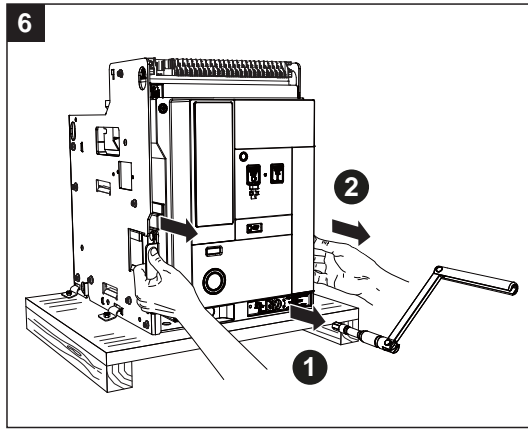
! (注)
当断路器抽出至DISCONNECT (分离) 位置后, 抽出手柄会空转, 锁板不突出。锁板突出的情况下, 请在推动锁板后继续进行抽出操作。



6.1 请将本体抽出到DISCONNECT (分离) 的位置后, 取下抽出手柄。

6.2 如右图所示, 从抽出框架左右均等地抽出断路器本体。

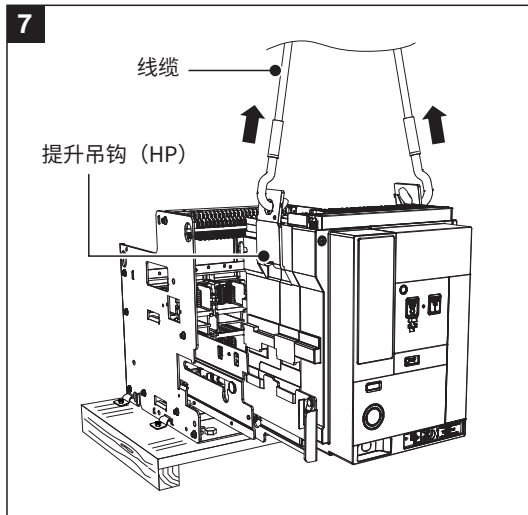
⚠ 注意	
	在插入断路器时, 小心不要将手指夹在伸缩导轨与配电板之间。



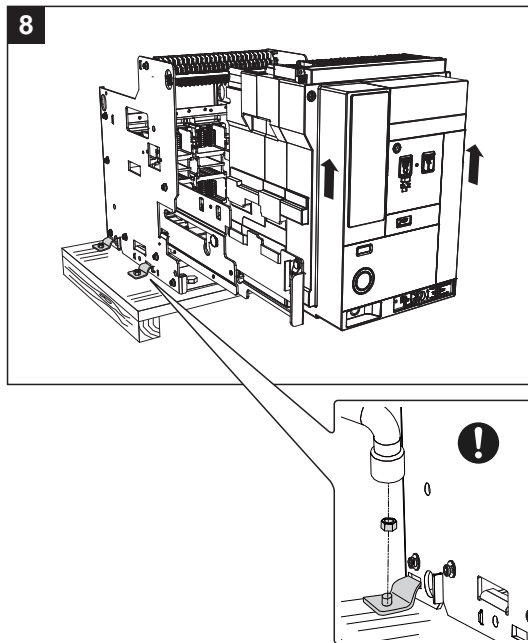
7. 抽出本体后, 请使用起重器或提升吊钩 (HP) 从抽出框架中将本体向上提起从而取出。

(注)
抽出型时, HP是选件。

⚠ 注意	
在移动断路器之前, 请确认抽出框架是否被牢固固定。	

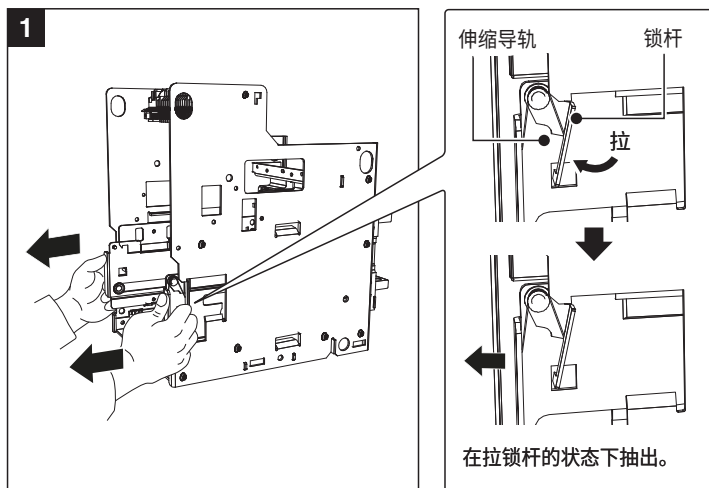
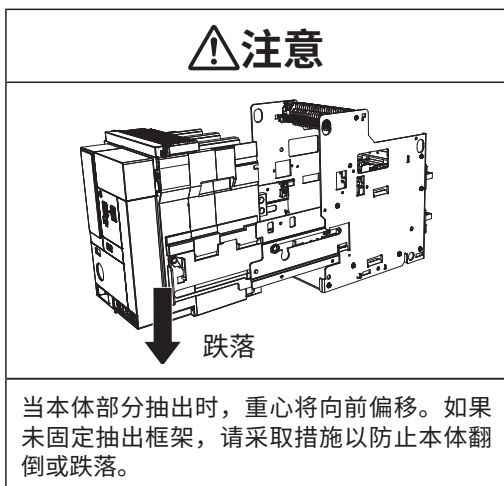


8. 取出本体后, 请取下固定抽出框架的螺母。



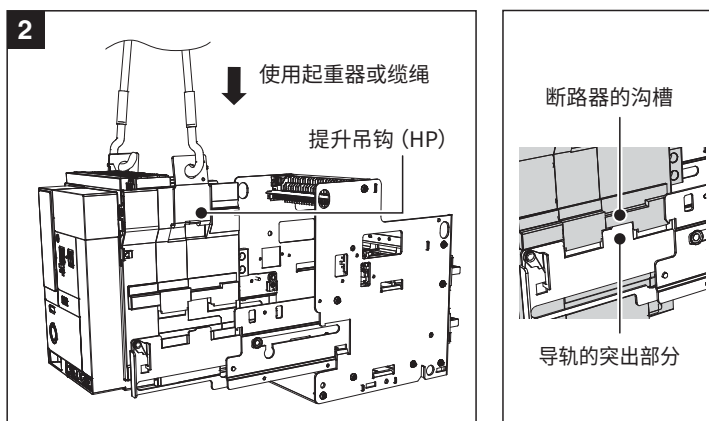
6.4 DISCONNECT (分离) →CONNECT (连接) 位置

1. 请将锁杆拉到面前, 并向前抽出伸缩导轨。

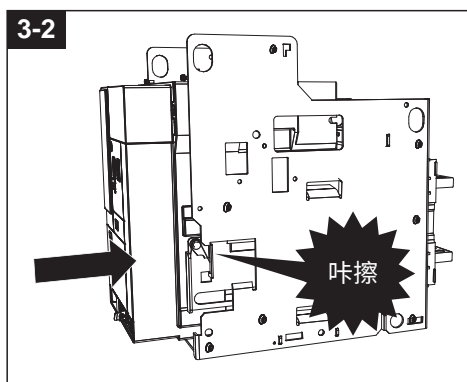
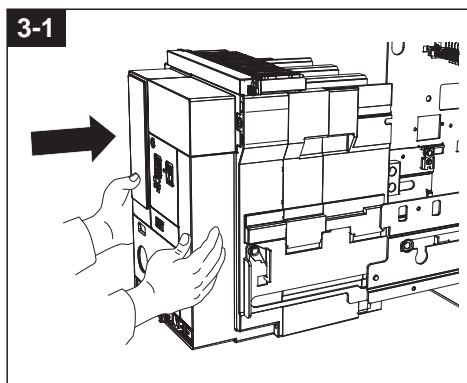
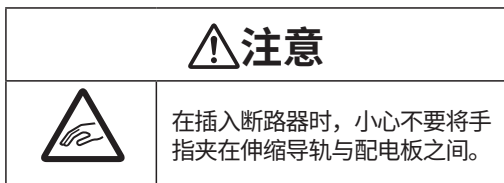


2. 请使用起重器或缆绳将断路器放到伸缩导轨上。

(注)
抽出型时, HP是选项。



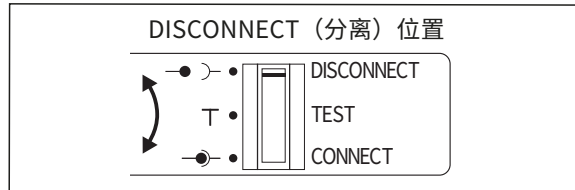
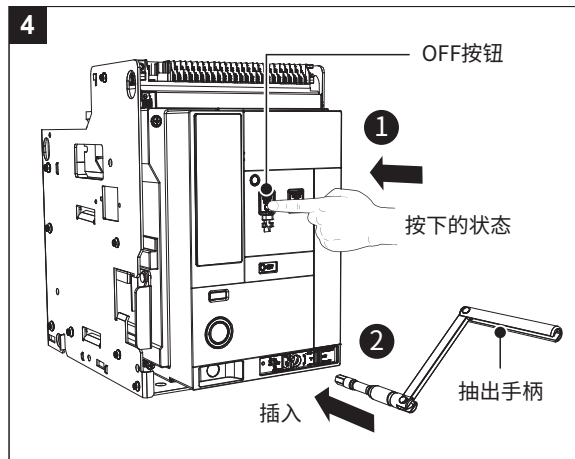
3. 左右均等地慢慢推入断路器, 直到断路器不再移动为止。倾斜推动时, 无法顺利地将本体推入。断路器安装在高处时, 请由2人进行操作。



4. 按下OFF按钮的状态下插入抽出手柄。
请确认抽出位置指示器显示DISCONNECT（分离）。



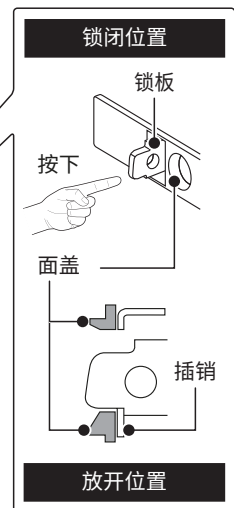
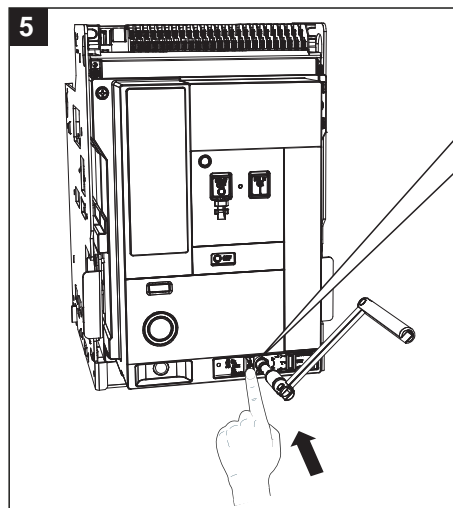
(禁止)
没有按下OFF按钮时请勿强行插入抽出手柄。否则,有可能损坏产品。



5. 请充分推动锁板,直到锁板锁住为止,此时,方可放开锁板。



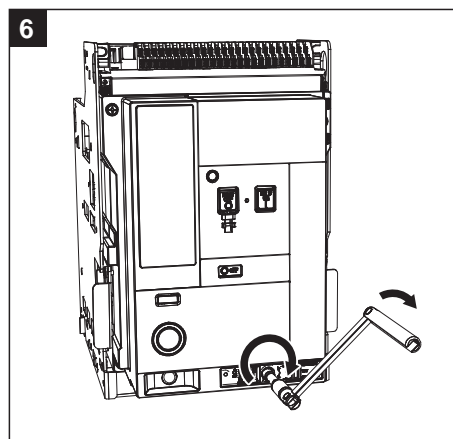
(注)
a. 如果不能完全推动锁板,则需要向左、向右转动抽出手柄。
b. 确保充分将锁板推入到放开位置,否则,抽出位置指示器可能无法正常工作。



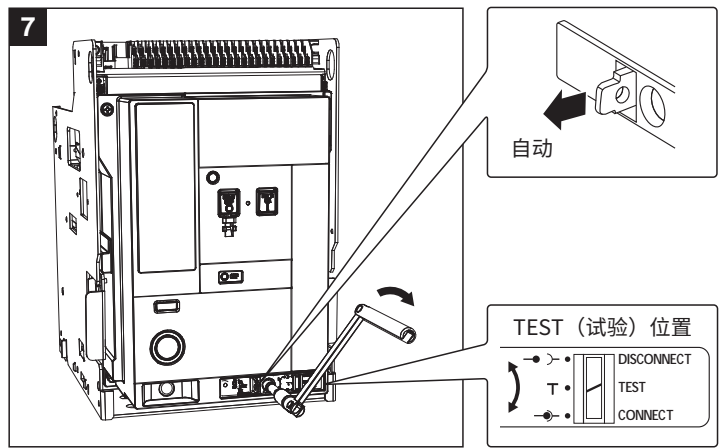
6. 在放开锁板以后,顺时针转动抽出手柄。



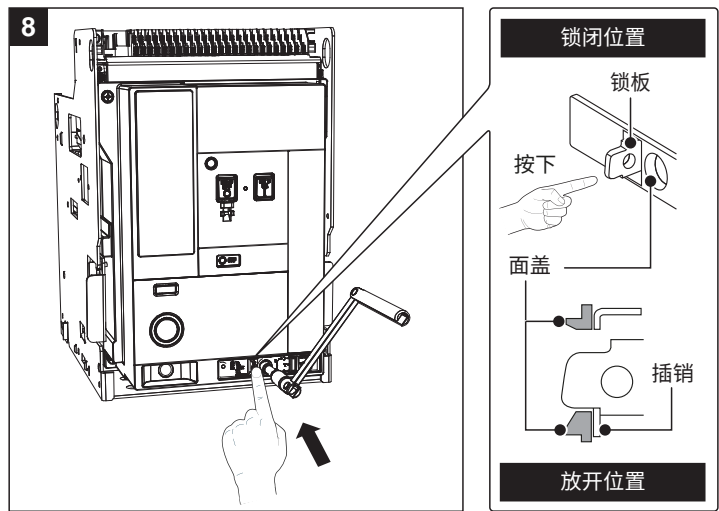
(注)
请勿在操作途中进行反向转动,有可能不能正确显示抽出位置。如果进行了反向转动的情况下,请从头开始重新进行操作。



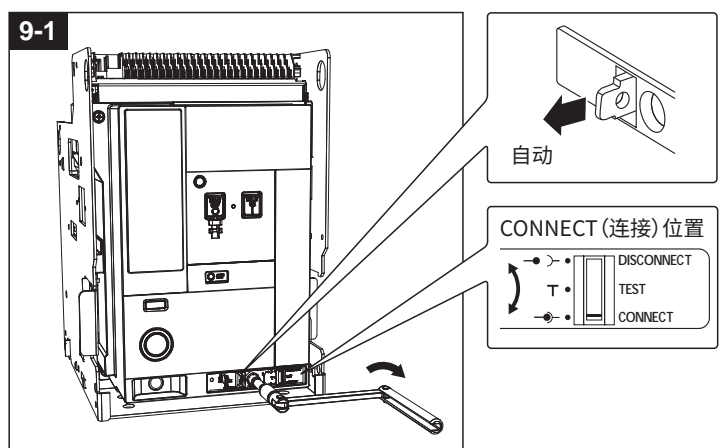
7. 在将断路器插入到TEST (试验) 位置时, 抽出位置指示器显示TEST (试验) 位置, 同时, 锁板自动突出并锁闭抽出手柄。



8. 在放开锁板后, 顺时针转动抽出手柄。

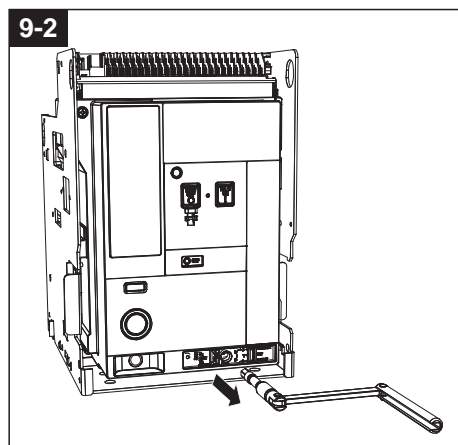


9. 在推动锁板后, 顺时针转动手柄。将断路器插入到CONNECT (连接) 位置时, 锁板会自动突出, 插入操作完成。此时, 抽出位置指示器显示CONNECT (连接) 位置。



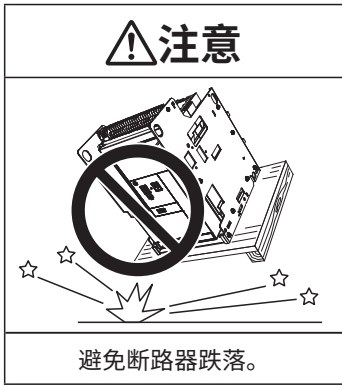
⚠ 注意
 插入断路器, 直到锁板突出为止。如果锁板没有突出, 则表明断路器有可能没有完全连接起来。

- (注)
- 在插入完毕以后, 不得继续转动抽出手柄。
 - 抽出位置指示器 (CONNECT (连接)、TEST (试验)) 显示了锁板突出时断路器的位置。当锁板处于放开状态时, 指示器显示出基准位置。
 - 插入抽出手柄时不能闭合断路器。



7. 搬运

搬运时, 请避免本体跌落或翻倒。



重量 (kg)

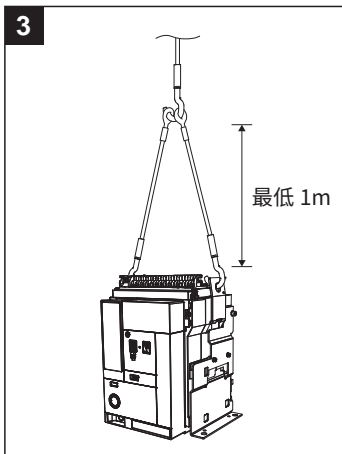
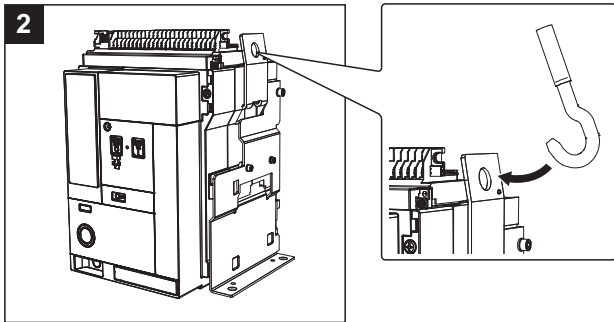
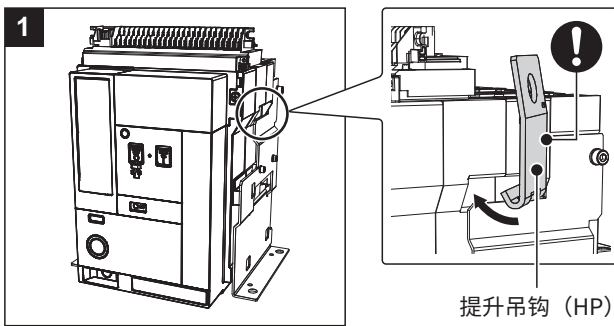
型号		AED630-CV to AED1600-CV
固定型	3 极	37
	4 极	43
抽出型	3 极	57
	4 极	66

(注)
a. 重量是代表值, 并非保证值。
b. 重量是包含包装的重量, 不包含附带选件的重量。

■ 固定型

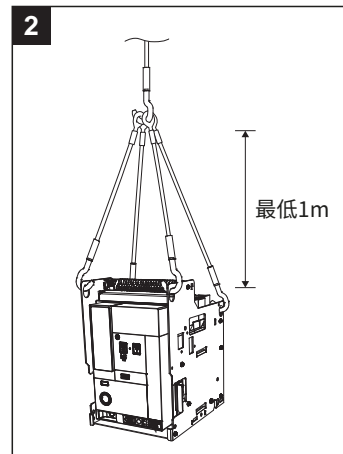
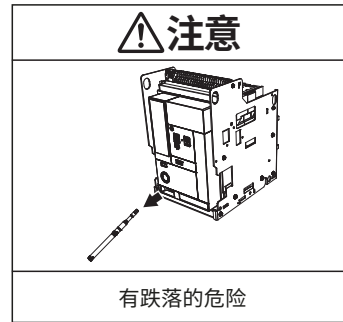
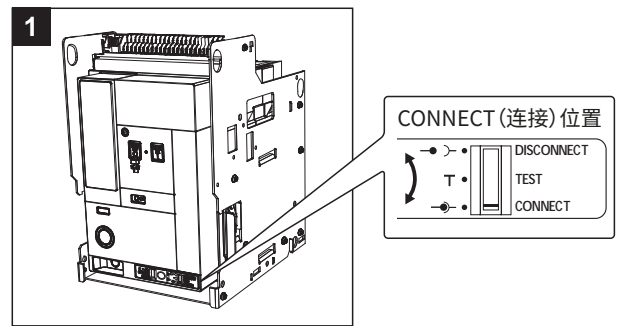
请使用包装中附带的提升吊钩 (HP) 进行固定型的搬运。

❗ (注)
如下图所示, 请将提升吊钩 (HP) 挂在本体。



■ 抽出型

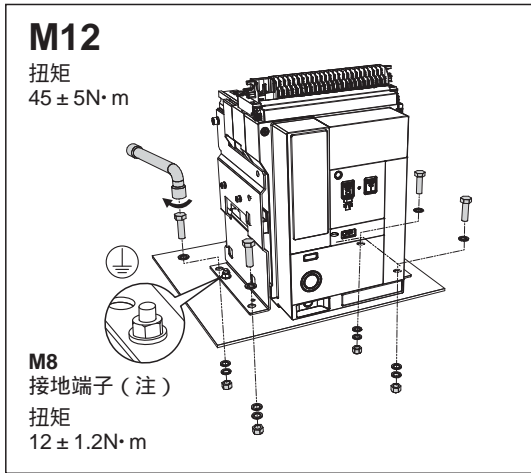
请取出抽出手柄并确认本体为CONNECT (连接) 位置后再进行抽出型的搬运。



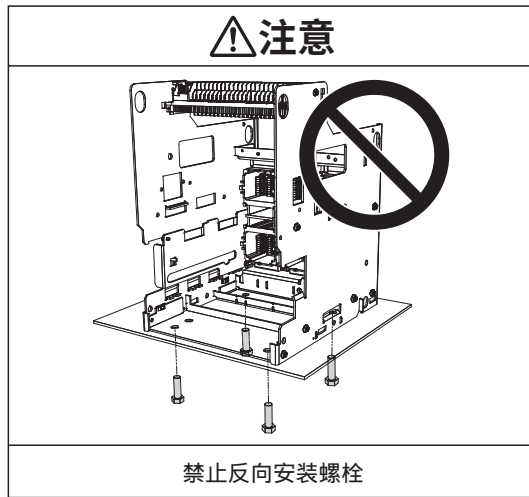
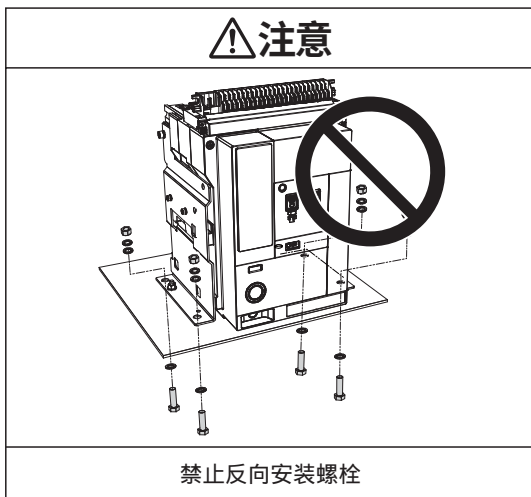
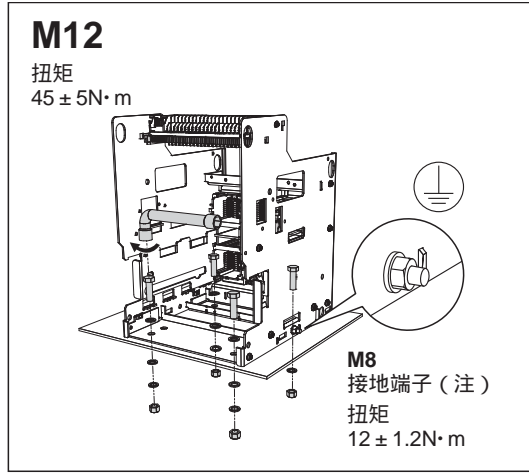
8. 安装

请按图进行安装。

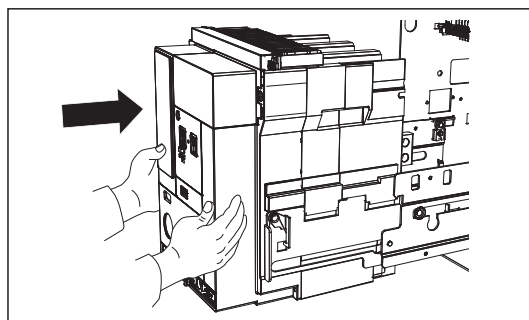
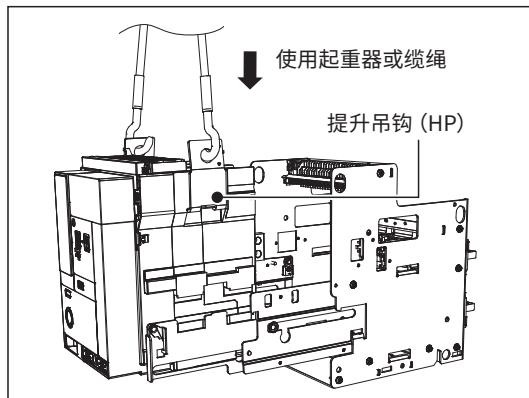
■ 固定型



■ 抽出型



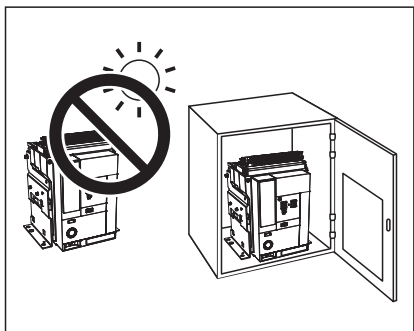
(注)
接地端子:除非另有规定,为安全起见,请将保护接地端子接地。



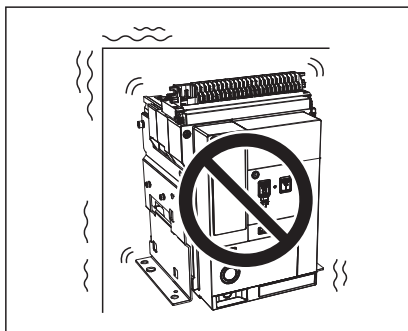
抽出框架的详细操作方法请确认P14~P16。

⚠ 注意

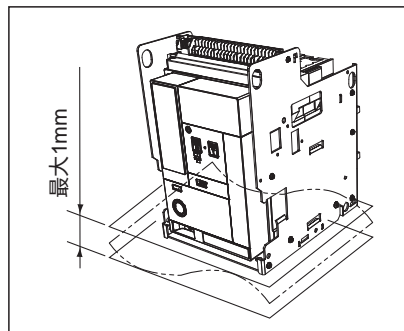
本体的安装请按照下述要领。



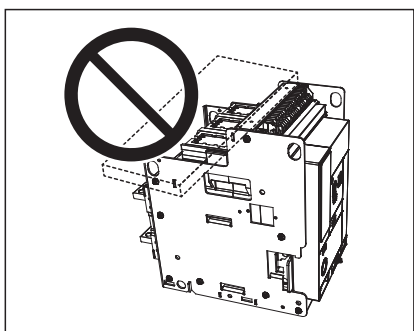
在柜内使用。注意灰尘、碎屑。



避免振动或撞击。

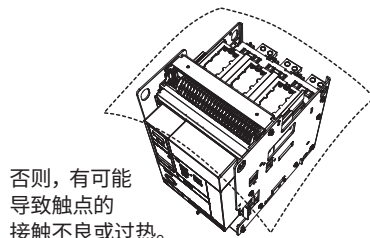


断路器支撑物平整度误差 $\leq 1\text{mm}$



不要堵塞排气口。

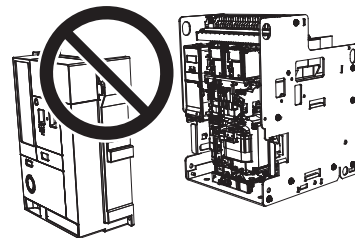
施工时，请使用遮盖物等覆盖。



否则，有可能导致触点的接触不良或过热。

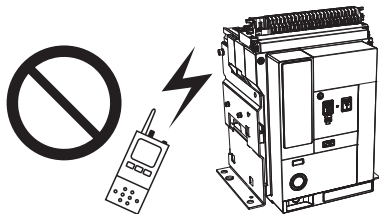
请勿从排气口混入异物。

否则，有可能导致误动作或不动作。

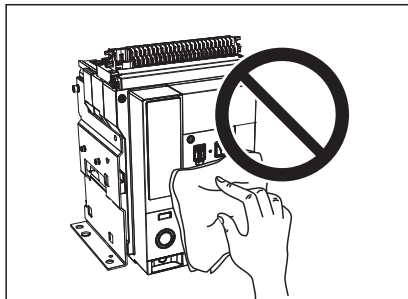


不要拆卸。

请在距离1m及以上的地方使用对讲机。

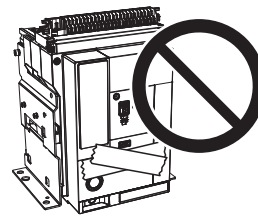


请避免强磁场。



请勿使用稀释剂、洗涤剂或一次性化学抹布进行擦拭。

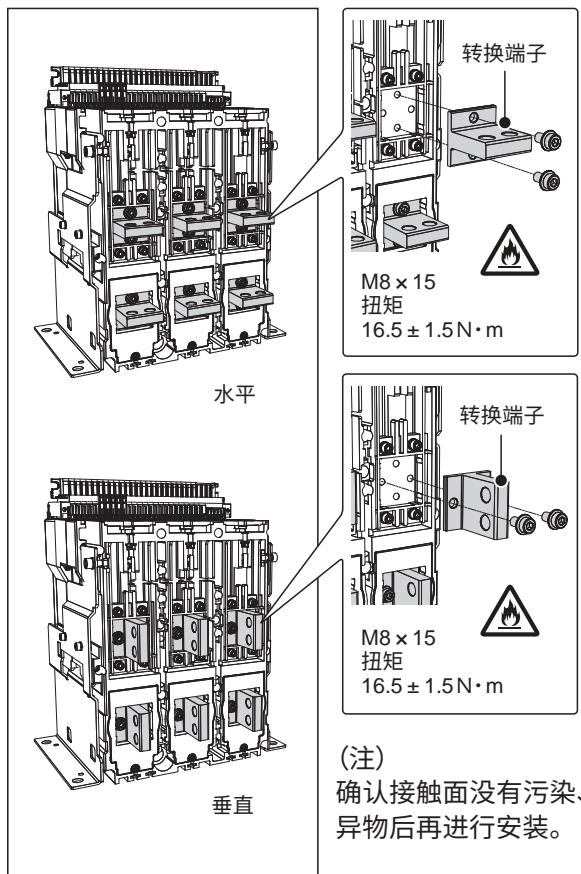
否则，铭牌有可能脱落。



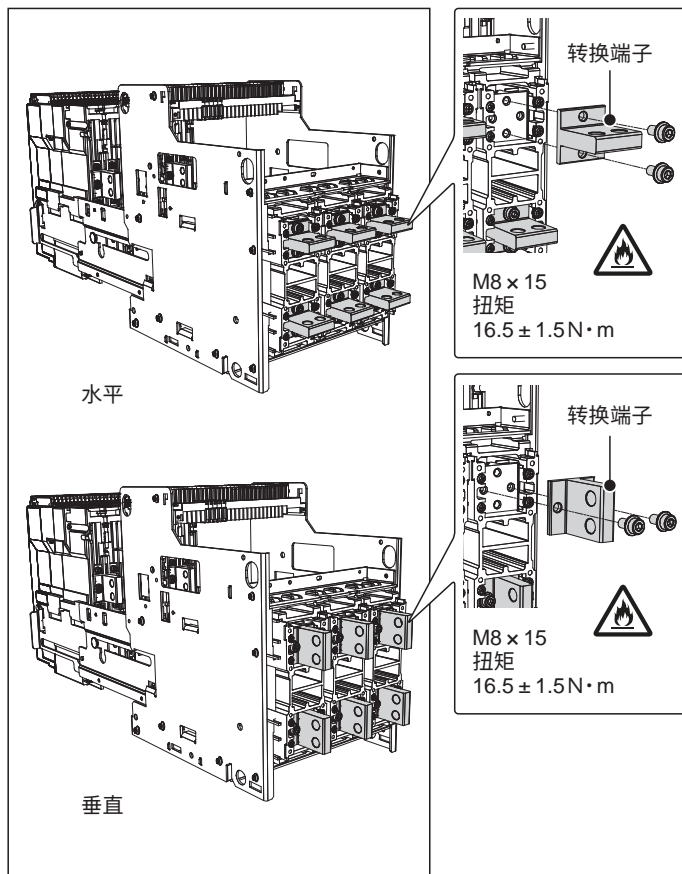
不要在铭牌上粘贴胶带。

8.1 转换端子

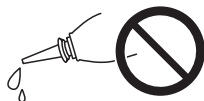
■ 固定型



■ 抽出型

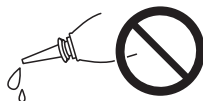


⚠ 注意



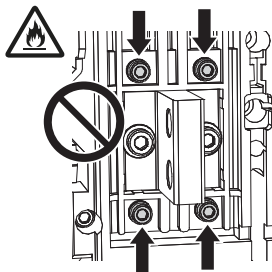
禁止润滑

⚠ 注意



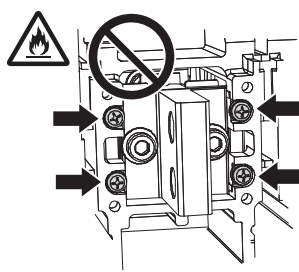
禁止润滑

⚠ 注意



请勿松开本体的螺丝

⚠ 注意



请勿松开本体的螺丝

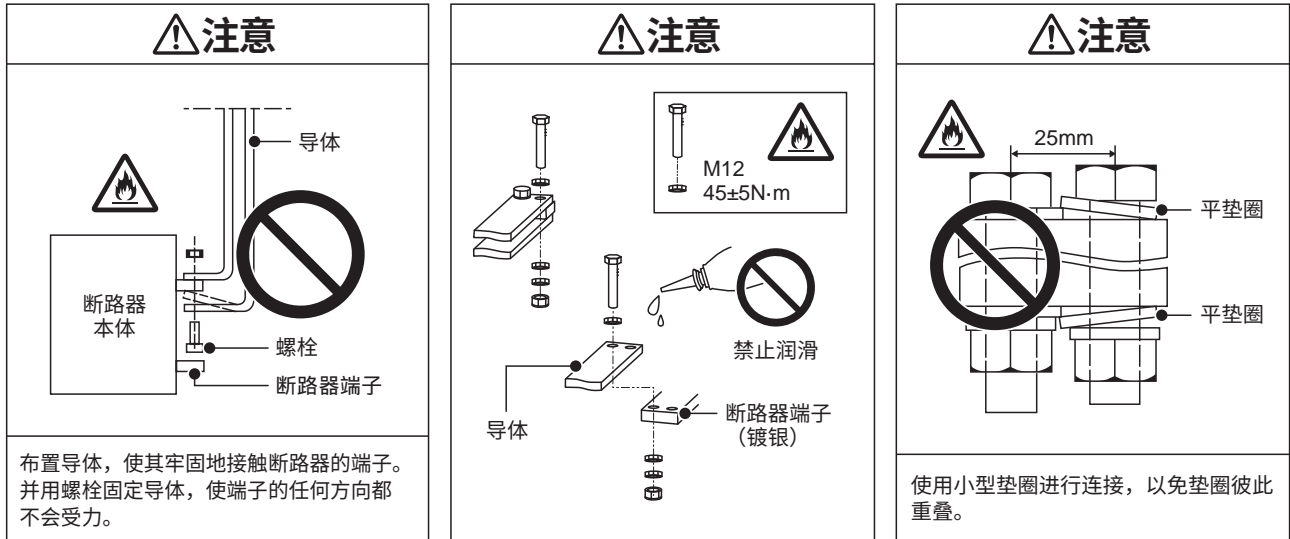
(注)
水平端子的包装中附带使用说明书, 关于目录记载的水平端子 (FT) 的安装, 请参考该使用说明书。

8.2 连接注意事项

使用M12螺栓、平垫圈和弹簧垫圈连接导体。清洁导体表面后连接到断路器的(镀银)端子,并用正确的扭矩(M12: $45 \pm 5 \text{N}\cdot\text{m}$)牢固拧紧螺栓。
可连接导体范围尺寸会根据端子形状而有所不同。

标准拧紧扭矩

螺钉尺寸	拧紧扭矩(N·m)
M12	45±5

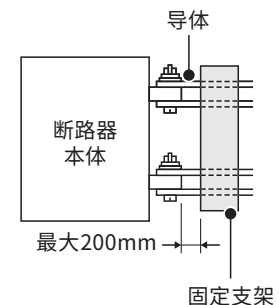


由于流过导体的故障电流会引起较大的电磁力,因此应使用下表中的值做参考将导体牢固固定。固定支架和导体之间的最大距离应小于200mm。

每1m导体中的电磁力(三相短路)

(N)

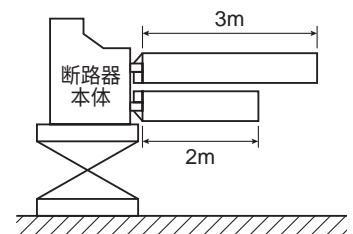
型号	AED630-CV~AED1600-CV
导体距离(mm)	85
预期故障电流kA(pf)	
30(0.2)	7,700
42(0.2)	15,100
50(0.2)	21,400



选择要连接到断路器的导体时,请确保它们具有足够的电流容量。请参阅下表。

导体尺寸(环境温度:露天 40°C)(符合GB/T 14048.1、IEC 60947-1)

最大额定电流(A)	导体(铜母线)		
	配置	数量(注)	导体尺寸(mm)
630	垂直的长表面	2	40×5
1000		2	60×5
1250		2	80×5
1600		2	100×5



(注) 数值表示各极和端子内的数量。



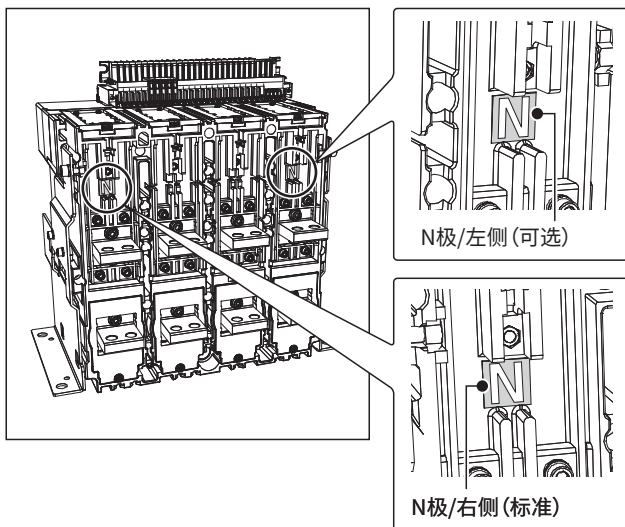
(注)

上表显示了在环境温度 40°C 以及露天条件下,基于IEC60947-1的导体规格。测试回路如上图所示。

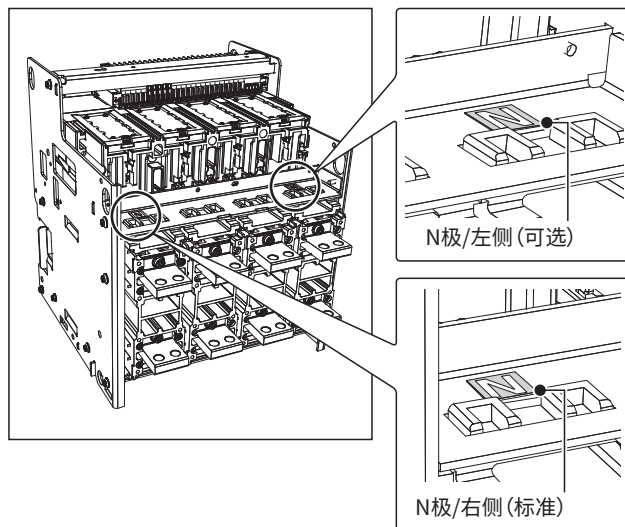
8.3 N极的位置确认 (4-Pole产品)

N极的位置可选。请确认断路器背面的铭牌的位置。

■ 固定型



■ 抽出型



8.4 控制电路

■ 压装端子尺寸

连接端子请使用M3.5用端子。
尺寸如右图所示。

推荐的端子如下所示。

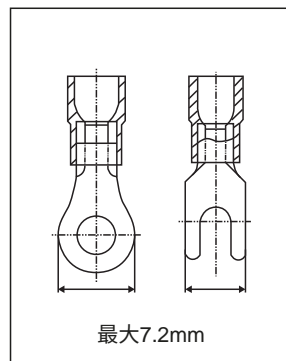
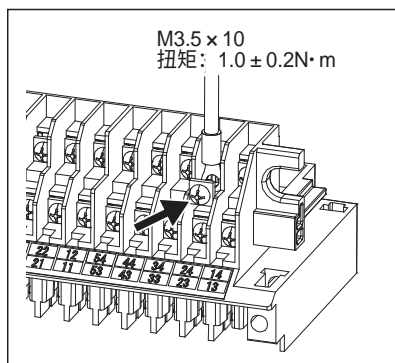
1.25mm²~2.0mm²线缆

N2-M3 (RAP2-3.5)

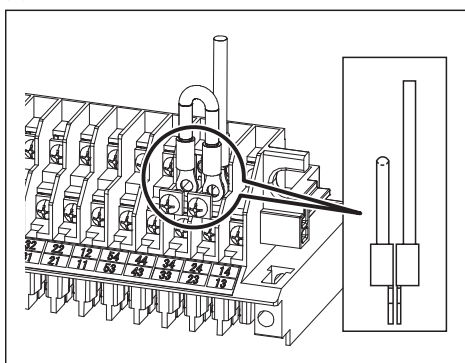
FN2-M3 (RBP2-3.5)

N2-YS3A

制造商: J.S.T. Mfg. Co.,Ltd.



并接

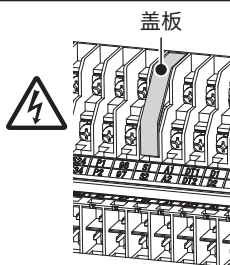


(注)

如果过度拧紧螺丝,端子与螺丝有可能受损。请按照规定的扭矩来拧紧螺丝。请使用直径与十字形槽口直径相符的螺丝刀。

螺丝刀尺寸:PH2

⚠ 注意

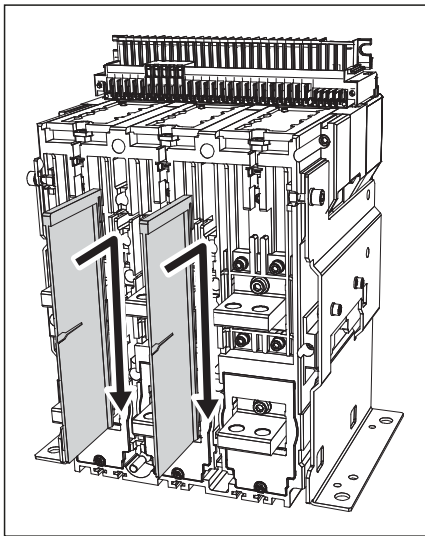


会对端子编号 [S1]、[S2] 施加电压,因此请注意。
带有附带的欠压脱扣装置 (UVT) 的情况下,对端子台的 [DT1] 与 [DT2] 也会施加电压,因此请勿触碰。为了安全,在没有接线时,请将安装在 [S1]、[S2]、[DT1]、[DT2] 的盖板保持安装的状态。

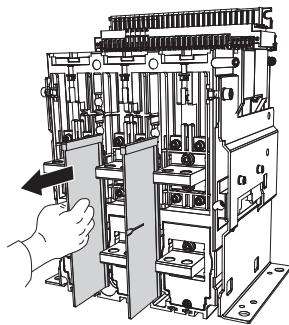
9. 相间隔板的安装

请沿着箭头, 将其插入到断路器上的沟槽中。

■ 固定型

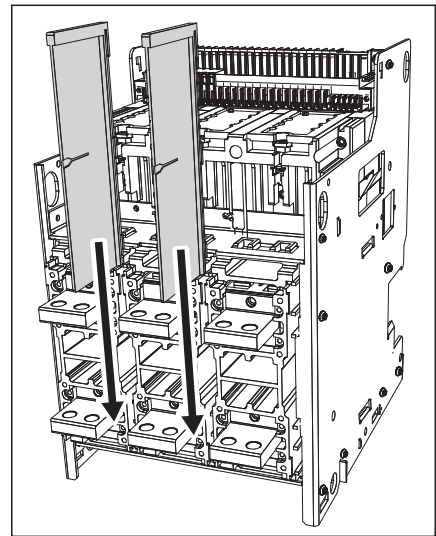


⚠ 注意



组装后, 请将其往面前拉拽从而确认是否已正确插入沟槽。

■ 抽出型

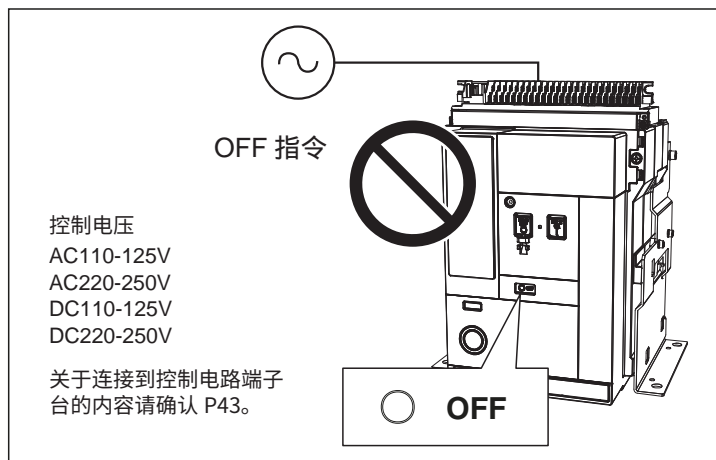


10. 分闸/合闸操作

10.1 可进行闭合操作的条件

当下述所有条件均得到满足时, 可进行ON操作。

1. 断路器处于 OFF 状态
2. 对控制电路端子台的 **A1**、**A2** 施加 ON 操作电压。对 **A1**、**A2** 施加的电压、电源容量请按照“断路器(螺线管)控制额定值”的表格。
3. 没有 OFF 指令和没有分闸指令的状态 (下述条件)
 - 没有对分励脱扣装置 (SHT) 施加电压
 - 未通过圆柱锁进行机械锁定
 - 对欠压脱扣装置 (UVT) 施加电压
 - 未处于脱扣状态
 - OFF 按钮的挂锁已被解锁 (使用了挂锁时)



⚠ 注意

请遵守施加到控制电路端子台的 **A1**、**A2** 的断路器操作电压。施加了不同的电压的情况下, 有可能损坏断路器。

断路器(螺线管)控制额定值

额定电压(V)	适用电压范围(V)	施加电压(V)	电流(峰值)(A)	工作时间(s)	功率要求标准	
AC (50/60Hz)	110-125	93.5~137.5	110	6.5	≤0.3	1000VA
		125	7.7			
	187~275	220	3.3			
		250	3.9			
DC	110-125	93.5~137.5	110	7.1	≤0.3	1000W
		125	8.4			
	187~275	220	3.5			
		250	4.2			

(注)考虑到电压下降,将电磁的电源容量设置为不低于工作电压。

10.2 直接分闸/合闸操作

10.2.1 闭合

通过对控制电路端子台的 **A1**、**A2** 施加ON操作电压,并按下本体的ON按钮,从而断路器闭合且ON/OFF状态显示窗显示“ON”。操作负载为50N或以下。本装置内置单脉冲电路,对于1次闭合指令仅进行1次动作。当断路器连接了欠压脱扣装置(UVT)时,如果没有对 **D1**、**D2** 端子加电,则断路器无法被闭合。(在向欠压脱扣装置(UVT)加电以后,需要等待1.5秒钟,断路器才能被闭合。)



(注)

如果没有对控制电路端子台 **A1**、**A2** 施加ON操作电压,则即使按下ON按钮也无法闭合断路器。在使用OFF状态的锁具(挂锁、圆柱锁以及castell锁等)时,请解除锁定状态后进行闭合操作。抽出型断路器时,请务必在CONNECT(连接)或者TEST(试验)位置且锁板为突出状态下进行分闸/合闸。如果使用了欠压脱扣装置(UVT),请施加额定电压进行分闸/合闸。

- 由于连接到 **S1**、**S2** 的控制电路(或开关)的误动作,断路器本体有可能会无意中闭合(ON)。
- 断路器闭合控制电路由半导体器件构成,施加了标准及标准以上的浪涌或噪声的情况下,有可能发生电路故障。
- 虽然内置了即使发生了故障时也不进行无意中的操作的安全电路,但是为了降低风险,长时间不闭合本体的情况下,推荐不要对 **A1**、**A2** 通电。

10.2.2 分闸

按下OFF按钮时断路器将分闸,同时,ON/OFF状态显示窗将显示“OFF”。操作负载为50N或以下。

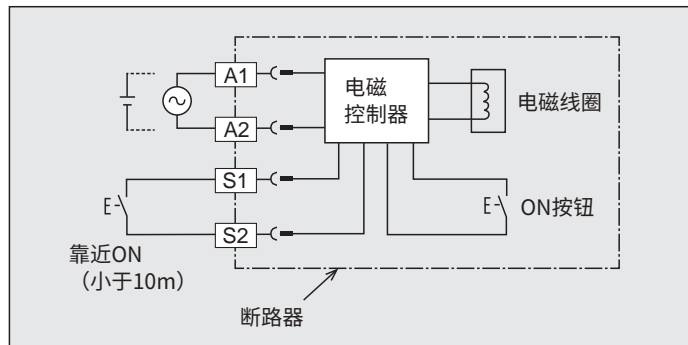
10.3 远程分闸/合闸操作

10.3.1 闭合

通过对控制电路端子台的 [A1]、[A2] 施加ON操作电压,并将本体外部ON开关 [S1]、[S2] 置为ON,可以闭合断路器。控制电路端子台的 [S1] 与 [S2] 上带有盖板,因此请在移除后进行接线。

本装置内置单脉冲电路,对于1次闭合指令仅进行1次动作。当断路器连接了欠压脱扣装置(UVT)时,如果没有对 [D1]、[D2] 端子加电,则断路器无法被闭合。(在向欠压脱扣装置(UVT)加电以后,需要等待1.5秒钟,断路器才能被闭合。)

标准控制器图



(注)

闭合时,请勿通过在将 [S1] 与 [S2] 之间置为ON的状态下对 [A1] 与 [A2] 之间施加电压,从而闭合断路器。请勿以1min/次或更短时间间隔对断路器本体进行分闸/合闸。长时间不闭合本体的情况下,请勿对 [A1]、[A2] 通电。

- 由于连接到 [S1]、[S2] 的控制电路(或开关)的误动作,断路器本体有可能会无意中闭合(ON)。
- 断路器闭合控制电路由半导体器件构成,施加了标准及标准以上的浪涌或噪声的情况下,有可能发生电路故障。虽然内置了即使发生了故障时也不进行无意中的操作的安全电路,但是为了降低风险,长时间不闭合本体的情况下,推荐不要对 [A1]、[A2] 施加电压。

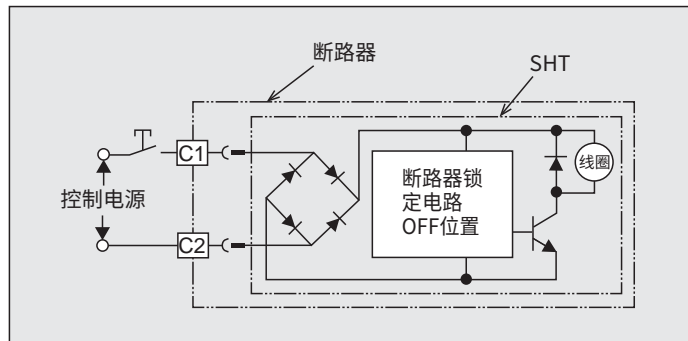
10.3.2 分闸

使用分励脱扣装置(SHT)或者欠压脱扣装置(UVT)时,可电动进行分闸操作。在使用分励脱扣装置(SHT)时,请向控制电路端子台上的 [C1]、[C2] 施加额定电压。在使用欠压脱扣装置(UVT)时,请打开控制电路端子台上的脱扣端子 [DT1]、[DT2]。(出厂时,控制电路端子台的 [DT1]、[DT2] 上安装了短路棒和盖板。请在使用前拆下。)或者请将 [D1]、[D2] 的电压OFF。

(注)

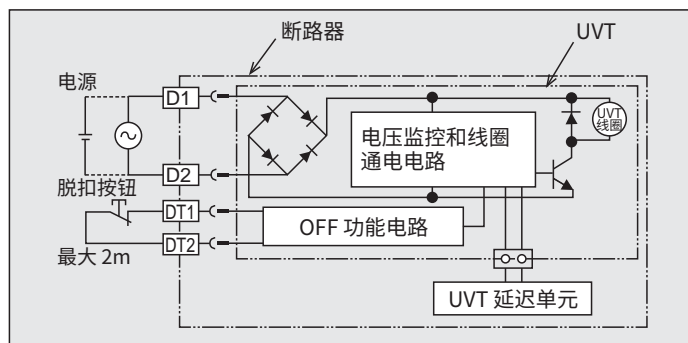
SHT、UVT是选件。

SHT电路图



二极管整流器不用于控制源DC24-30V和DC48-60V。

UVT 电路图



11. OCR报警 (AL) [MRE: 手动复位型]

带有智能脱扣器 (ETR) 的情况下, AL是标准配备。

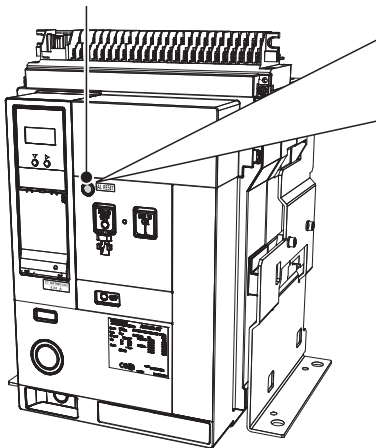
由于LTD、STD、INST或GF而导致脱扣的情况下, 手动复位按钮会突出, 并会连续输出AL。

脱扣后, 如果不按下断路器正面的手动复位按钮使其处于复位状态, 就无法解除AL且断路器不会进行ON动作。

⚠ 注意

断路器脱扣的情况下, 请在排除原因后再对断路器进行ON操作。

手动复位按钮



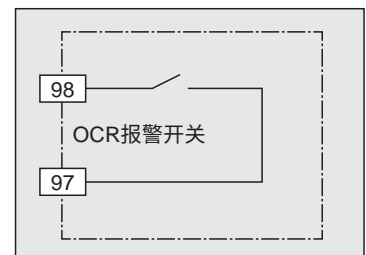
⚠ 注意

脱扣状态 (手动复位按钮突出)	复位状态 (手动复位按钮不突出)
<p>手动复位按钮突出时, 即使进行ON操作, 断路器也不会进行ON动作。</p>	<p>用手指按下突出的手动复位按钮直到听见“咔嚓”声为止, 当其处于复位状态时, 可以解除AL, 并可以重新闭合断路器。</p>

AL开关的电容如下表所示, 内部接线图如下图所示。

开关额定值

电压 (V)		电流 (A)	
		电阻负载	电感负载
AC (50/60Hz)	240	3	2
	125	5	3
DC	240	0.2	0.2
	125	0.4	0.4
	30	4	3



(注1) 带有触点输出的电源部的情况下, 可对每个过电流脱扣原因进行触点输出, 并获得与AL相同的功能, 但是需要控制电源。

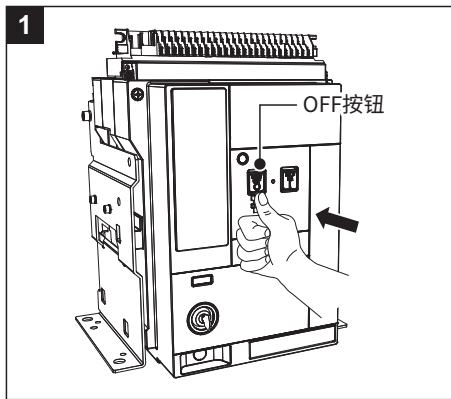
(功能说明请参照16.3节 (P32)。)

(注2) 进行了OFF操作 (SHT操作、UVT操作、按下OFF按钮) 的情况下, AL将不进行输出。

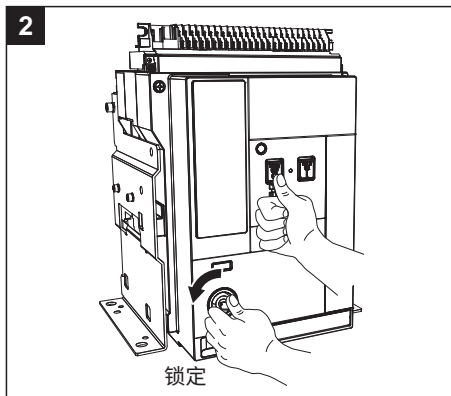
12. 圆柱锁 (CYL) 任选

12.1 锁定步骤

1. 按下OFF按钮，将断路器OFF。

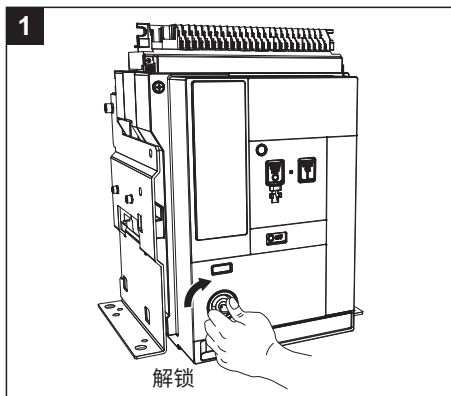


2. 在按下OFF按钮的状态下往锁闭侧转动钥匙。随后，可以移开钥匙，此时，断路器将在OFF状态下被锁定。

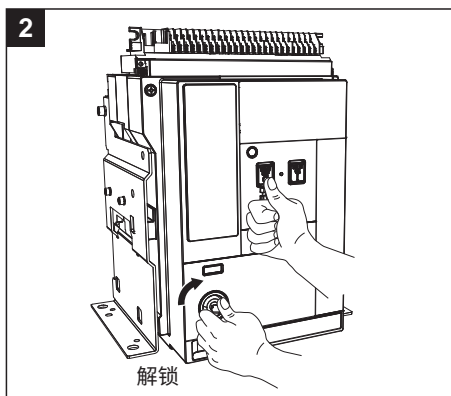


12.2 解锁步骤

1. 请插入钥匙，并往解锁侧转动钥匙。



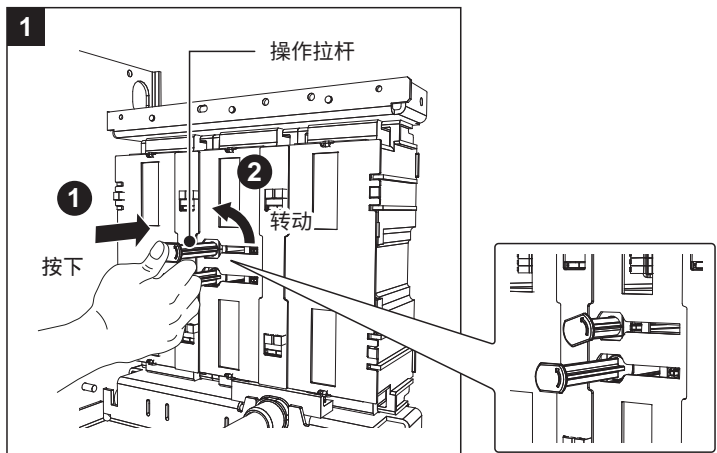
2. 如果钥匙不能均匀转动，请在按下OFF按钮的状态下，往解锁侧转动钥匙。



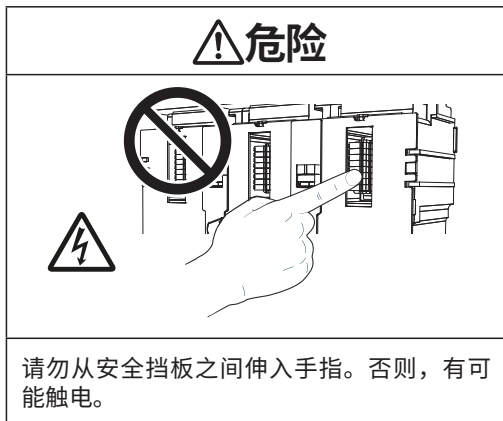
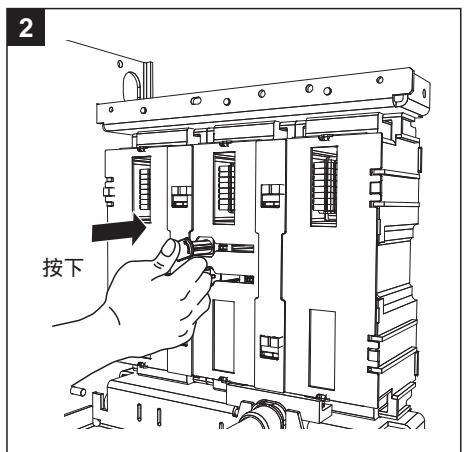
13. 安全挡板 (SST) 任选

安全挡板 (SST) 中有上部挡板与下部挡板, 可以使其分别保持打开的状态。

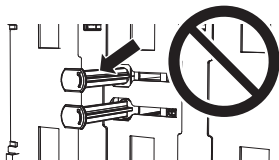
1. 请将希望保持侧的操作拉杆推入到挡板打开为止, 并按照拉杆所示的方向进行转动。



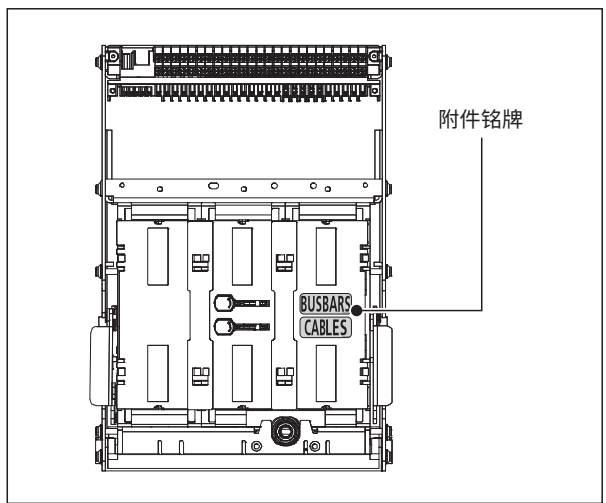
2. 关闭打开的挡板的情况下, 请推入拉杆解除保持状态。



- (禁止)** 请勿从侧面推动操作拉杆, 否则, 有可能损坏产品。



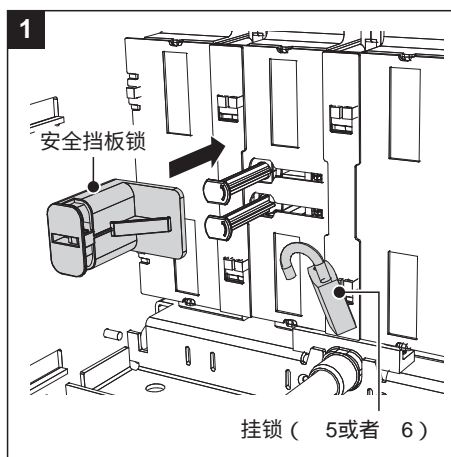
安全挡板上使用包装中附带的“BUSBARS”、“CABLES”的标签时, 请参照右图粘贴方法。



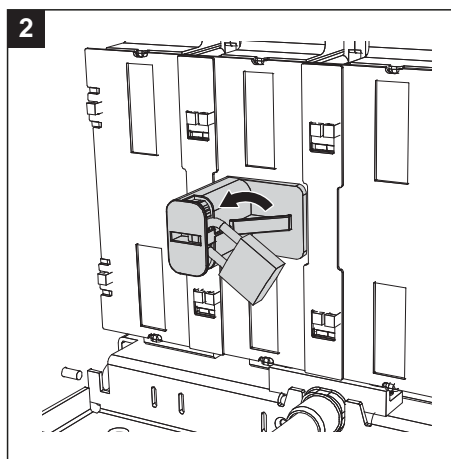
14. 安全挡板锁 (SST-Lock) 任选

可以将安全挡板在关闭位置锁定, 以避免触碰带电部件。挂锁需要客户自己准备。

1. 请在安全挡板上安装安全挡板锁。



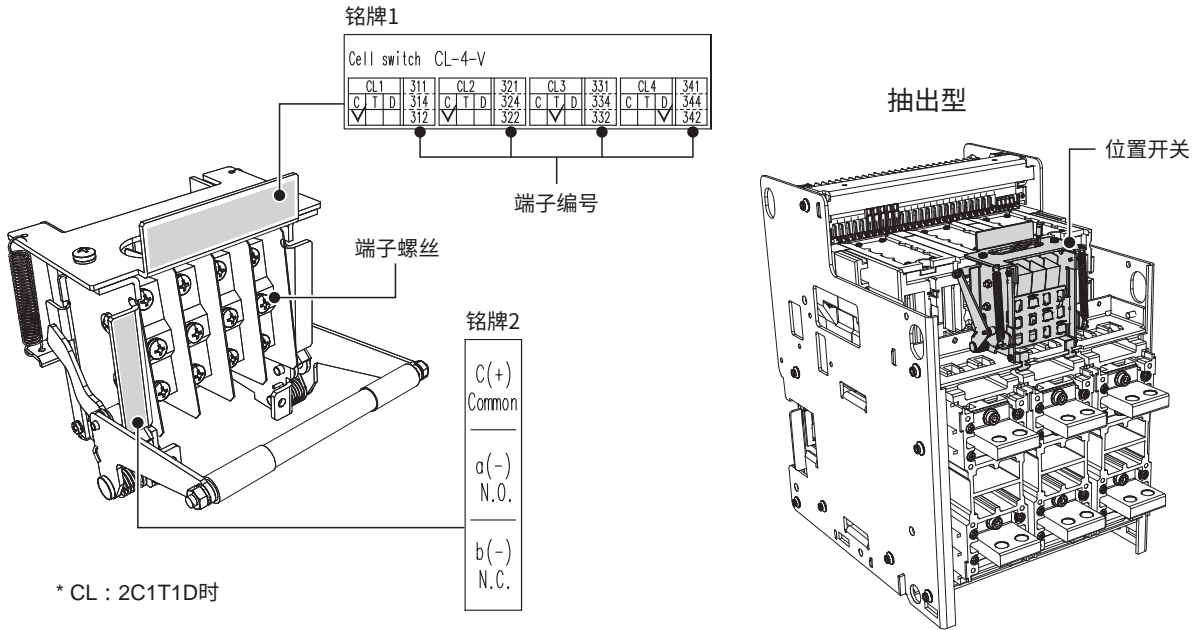
2. 请将挂锁安装在安全挡板锁上。



15. 位置开关 (CL) 任选

15.1 规格的确认方法

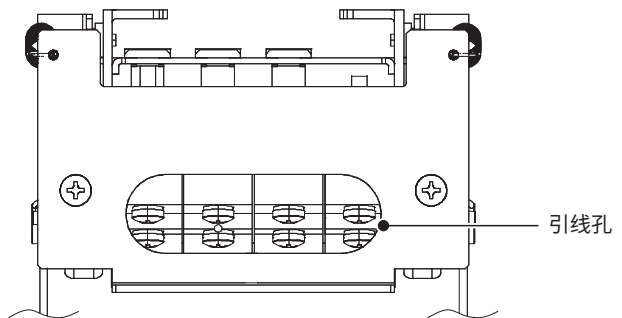
铭牌的端子编号对应位置开关本体的端子螺丝的排列。



15.2 连接到端子的方法

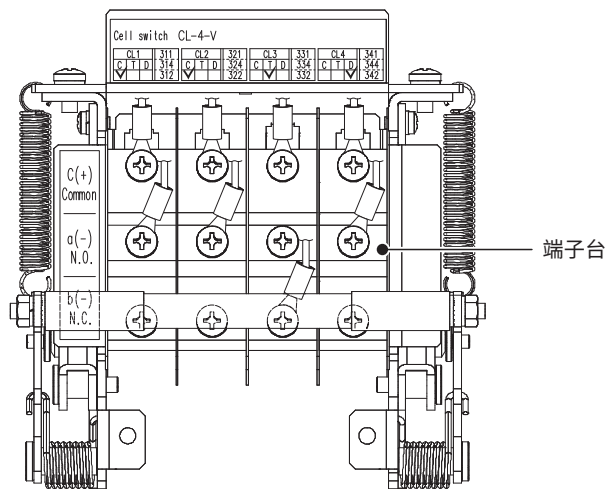
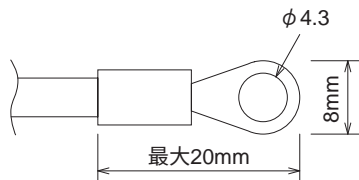
请按照规定的拧紧扭矩将电线连接到端子台。根据开关的规格,显示断路器的抽出位置。接线时请避免损坏电线,操作时请避免施加过大的拉拽力。接线后,请确认接线不会影响操作并根据断路器的抽出位置正确切换输出。

规格	抽出操作的显示位置
CL-C	CONNECT (连接)
CL-T	TEST (试验)
CL-D	DISCONNECT (分离)



! (注) 如果过度拧紧螺丝,则端子与螺丝有可能受损。

端子螺丝使用M4紧固螺丝。可适用的环型端子如下图所示。



端子螺丝 (M4)
安装扭矩: $0.98 \pm 0.2 \text{N}\cdot\text{m}$

16. 智能脱扣器 (ETR) 各部位功能

1. ERR. LED与触点输出

如果在ETR中发现了异常情况或设置故障, 则提醒异常情况。当电源类型为P3/P4时, 在控制电路端子台上的 [513] 与 [574] 之间提供触点输出功能。

- ETR功能异常 (微处理器、H/W)
- 与ETR相关的内部接线异常

2. RUN LED

该LED表明ETR仍工作正常。当施加控制电源或者流过额定电流的10%时LED将闪亮。

3. 脱扣指示器 (LED与触点报警输出)

LED表明脱扣或者预报警状态。当电源类型为P3/P4时, 在控制电路端子台上的 [513] (共用) 与 [524]、[534]、[544] 和 [554] 之间提供触点输出。

当电流超过预报警电流设置时, PAL LED将闪烁。当LTD时间 (LT1/2) 过去后, PAL LED将闪亮, 同时, 触点输出。

4. 附带DP的ETR的频率切换开关 任选

为了确保测量精度, 将根据所使用的电路的频率 (50Hz或60Hz) 进行设置。



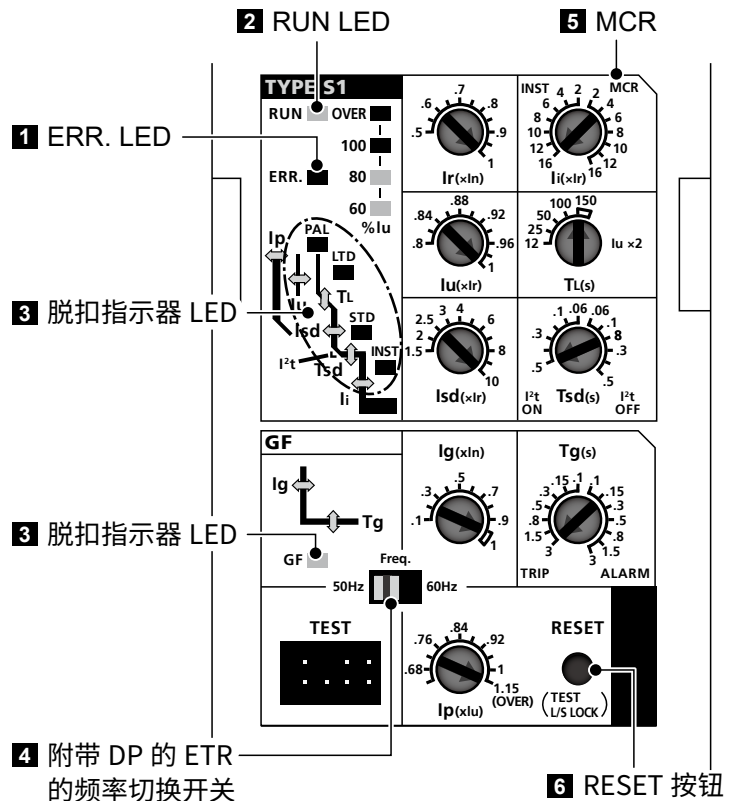
为了确保附带DP的LED的测量精度, 将根据所使用的电路的频率进行设置。

5. MCR (电流释放)

只有在闭合断路器的瞬间 (从OFF到ON), 方具备INST功能。在闭合断路器后, INST功能将被禁用。本体中内置MCR开关, ETR可切换MCR或INST。

6. RESET按钮

按下ETR前面板上的“RESET”按钮或者将控制电路端子台上的 [RS1] 和 [RS2] 之间短路, 即可复位脱扣指示器 (LED与触点输出)。此外, 通过专用的现场测试仪器来测试INST功能时, 需要临时提供一种功能, 从而锁闭LTD、STD。(操作说明请参照现场测试仪器使用说明书。)



16.1 负载电流指示LED

作为负载电流指示LED基准的电流值根据特性的设置而变化。

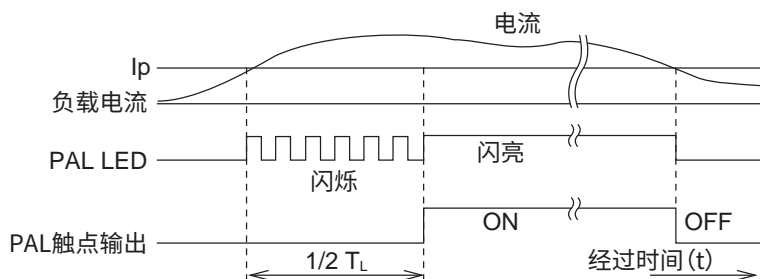
用途	ETR类型	LED指示基准电流	LED指示
一般保护用途	S1	I_u 连续电流	OVER ■ 100 ■ 80 ■ 60 ■ % I_u

当“OVER”的LED闪亮时，电流值超过LTD始动电流。在超过设置时间后，断路器将脱扣。

16.2 预报警功能

当电流超过预报警电流设置 (I_p) 时，PAL LED将闪烁。当LTD时间 ($T_L/2$) 过去后，PAL LED将闪亮，同时，触点输出。操作时间请参照特性曲线图。

附带DP的ETR的情况下，负载电流超过预报警电流设置 (I_p) 的同时，液晶画面的背光灯将从白色变为红色。(仅背光灯变为红色，液晶画面上不显示关于预报警的信息。)



16.3 控制电源

脱扣指示器 (LED与触点输出) 的操作，液晶显示器的电流显示与故障原因的储存需要控制电源。关于过流/短路保护，即使没有控制电源时也可以通过内部CT的能量进行操作。

电源模块

类型	额定电压 (V)	适用电压范围 (V)	功率要求标准 (VA)	报警输出
P3	AC100-240 (50/60 Hz)/ DC100-125	AC85-264 DC85-138	15	5 个输出触点
P4	DC24-60	DC18-72	10	5 个输出触点

触点容量 (P3和P4型)

电压 (V)		电流 (A)	
		电阻负载	电感负载
		$\cos \phi = 1.0$	$\cos \phi = 0.4$ $L/R = 0.7$
AC (50/60 Hz)	240	1	0.5
	120	1	1
DC	125	0.1	0.05
	30	1	1

(注) 请在考虑到断路器以外的原因引起的电压下降的基础上，设置电源容量的工作电压范围。

5触点的自保持/自动复位设置

1. LTD	2. STD/INST	3. GF	4. PAL	5. ERR.
自保持	自保持	请参阅下表	自动复位	自动复位
		ETR旋钮	GF	
		TRIP 侧	自保持	
		ALARM侧	自动复位	

自保持：在复位前输出始终保持。

自动复位：如果恢复到正常状态，输出将被复位。

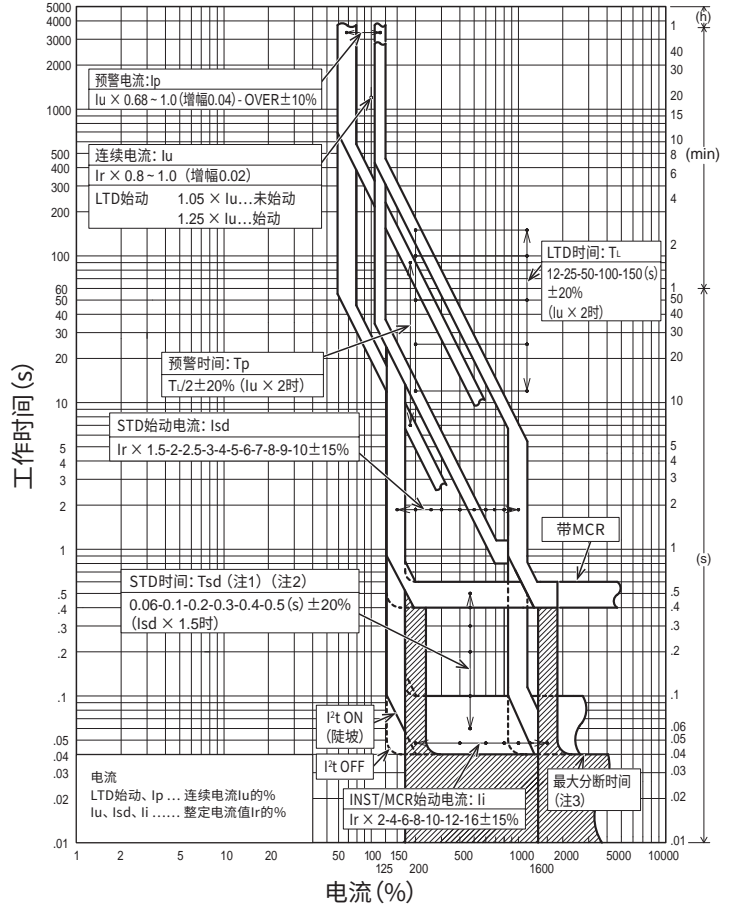
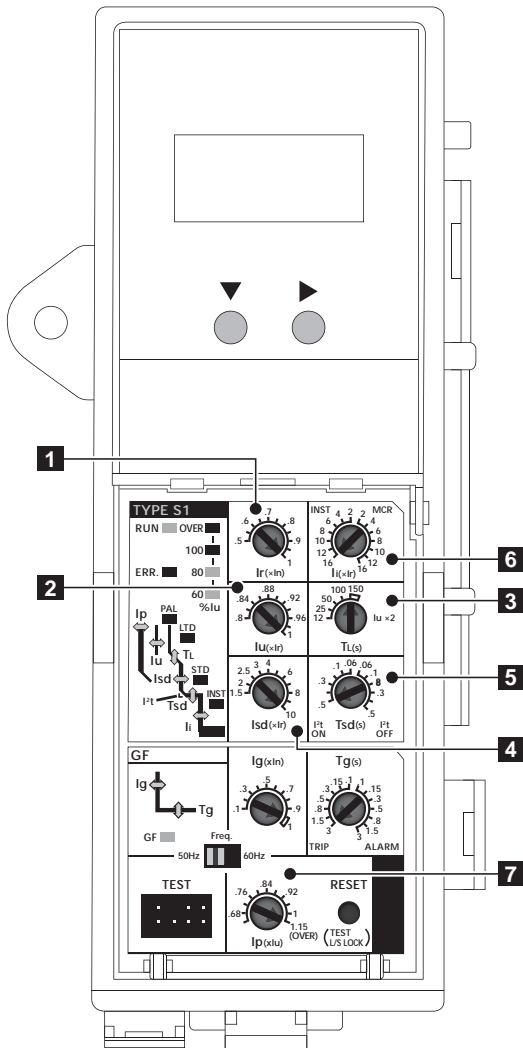
注意

当电源类型为P3、P4时，触点输出使用高敏感继电器。因此，根据柜安装条件，在进行断路器分闸/合闸等操作期间，触点输出有可能造成颤动噪声（大约1ms的误输出）。以响应性快速的顺序使用的情况下，请安装大约几毫秒的过滤器电路，或者进行抽样双重阅读等。

17. 智能脱扣器 (ETR) 的特性设置

17.1 智能脱扣器特性的设置

工作特性曲线 (一般用途: S1型)



(注1) (O操作) 当Tsd = "0.06" 设置时, 工作时间为0.04~0.1s。
 当Tsd = "0.1" 设置时, 工作时间为0.1s ± 50%。
 (CO操作) 当Tsd = "0.06, 0.1" 设置时, 工作时间为0.04~0.15s。
 (注2) I²t 可选: ON或OFF。
 (注3) CO操作时, 最大分断时间为0.135s。

可调设置范围

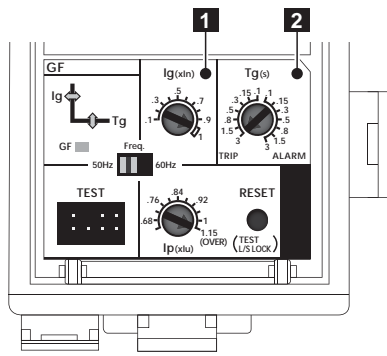
编号	设置项目	符号	可调设置范围	精度	出厂默认值
1	整定电流值	Ir	0.5 ~ 1.0 (增幅0.05) × In (CT额定值)	—	1.0
2	连续电流	lu	0.8 ~ 1.0 × Ir (增幅0.02), 始动电流: 1.15 × lu	1.05 × lu ... 未始动 1.25 × lu ... 始动	1.0
3	LTD时间	T _L	12-25-50-100-150s lu × 2时	± 20%	150
4	STD始动电流	I _{sd}	1.5-2-2.5-3-4-5-6-7-8-9-10 × Ir	± 15%	10
5	STD时间	T _{sd}	0.5-0.4-0.3-0.2-0.1-0.06 - 0.06-0.1-0.2-0.3-0.4-0.5s (I ² t ON) (I ² t OFF) (I _{sd} × 1.5时)	± 20% (注)	0.5 (I ² t ON)
6	INST/MCR始动电流	li	16-12-10-8-6-4-2 - 2-4-6-8-10-12-16 × Ir (INST) (MCR)	± 15%	16 (INST)
7	预警电流	lp	lu × 0.68 ~ 1.0 (增幅0.04) - OVER	± 10%	OVER
	预警时间	T _p	1/2 T _L lu × 2时 (1/2 T _L 后, PAL触点输出打开。)	± 20%	—

表格和图形均包含可选显示模块。预警电流“OVER”的设置为lu × 1.15。

(注) (O操作) 当Tsd = "0.06" 设置时, 工作时间为0.04~0.1s。

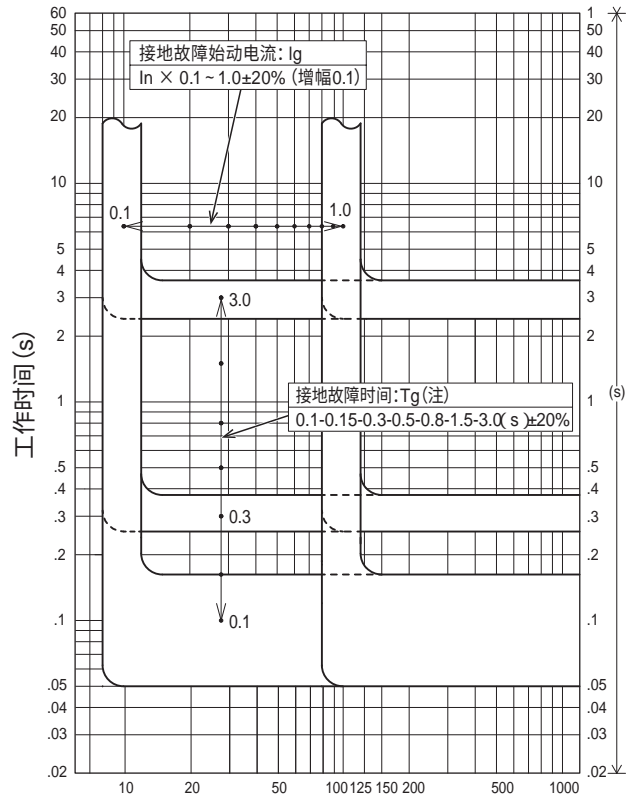
当Tsd = "0.1" 设置时, 工作时间为0.1s ± 50%。

(CO操作) 当Tsd = "0.06, 0.1" 设置时, 工作时间为0.04~0.15s。



(注)
 当三相4线制系统中使用了3极断路器时，N极CT (NCT) 可用于接地故障保护。关于规格，请参照目录。关于NCT安装，请参照使用说明书(包装中附带提供)。使用接地故障电流Ig为0.1时，需要控制电源。

接地故障保护特性



接地故障电流 (CT额定值In的%)

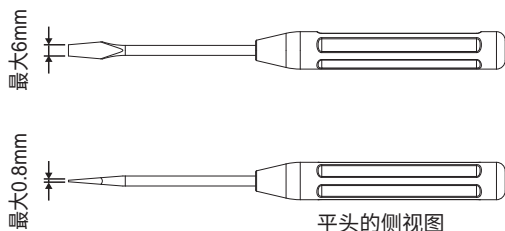
(注1) 当Tg = “0.1” 的设置时，工作时间为0.1s ± 50%。
 当Tg = “0.15” 的设置时，工作时间为0.15s ± 30%。

编号	设置项目	符号	可调设置范围	精度	出厂默认值
1	GF始动电流	I _g	0.1-0.2-0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0 × I _n	± 20%	1.0
2	GF时间	T _g	3-1.5-0.8-0.5-0.3-0.15-<0.1 - <0.1-0.15-0.3-0.5-0.8-1.5-3 s 脱扣 报警 (1.5 × I _g 时)	± 20% (注)	3s (脱扣)
	报警输出	—	脱扣设置: 自保持/报警设置: 自动复位		脱扣设置 (自保持)

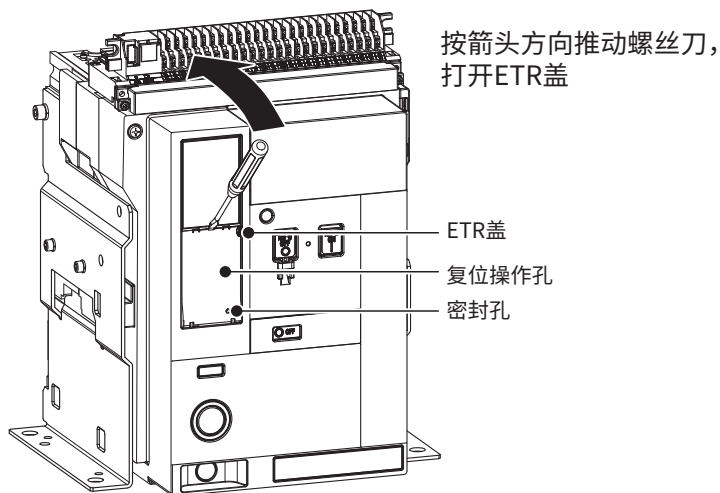
(注) 当Tg = “0.1” 的设置时，工作时间为0.1s ± 50%。
 当Tg = “0.15” 的设置时，工作时间为0.15s ± 30%。

17.3 设置步骤

1. 准备一个平头螺丝刀。



2. 将平头螺丝刀插入ETR盖的开口处。然后，如右图所示，将螺丝刀轻轻向上旋转，ETR盖将会打开。



3. 有两种开关，分别用于特性设置和脱扣指示器复位。其使用方法如下。

a. 步进调节

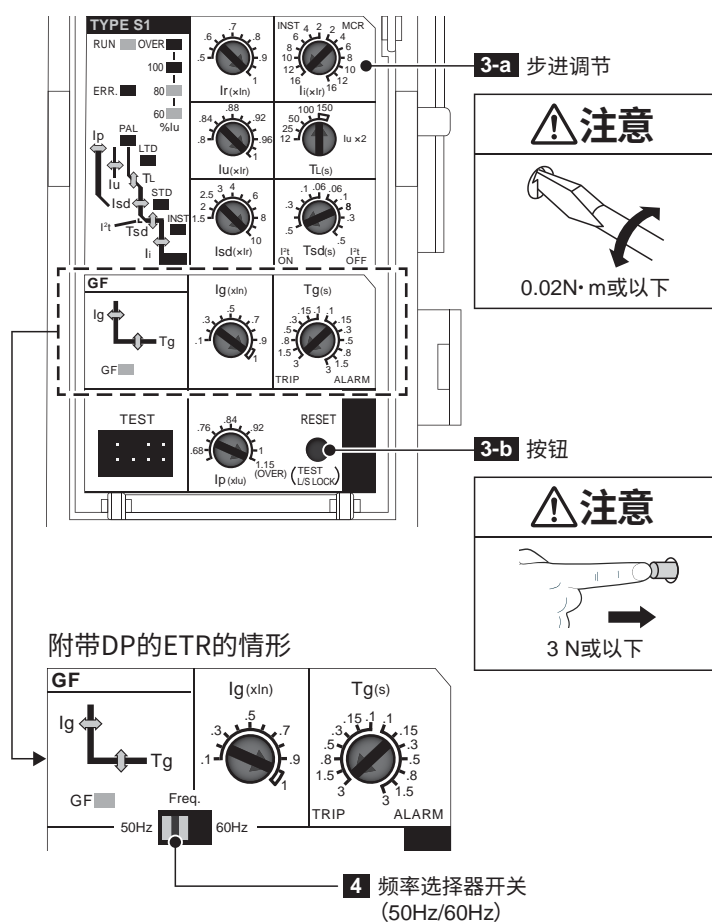
使用旋转码开关。禁止将开关设置在中途点。当开关位于粗线处时，设置值相同。（以 $0.02N \cdot m$ 或以下的扭矩设置开关。）



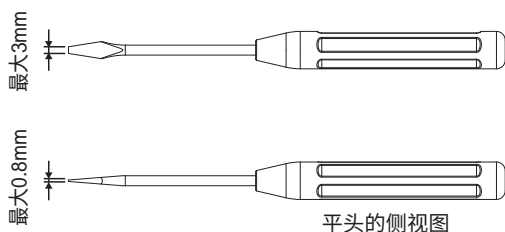
(注) 如果将开关设置在步进之间的点上，则将在步进的任一端确定特性设置值。

b. 按钮

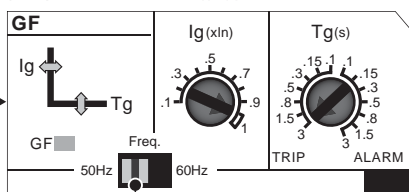
用于临时操作，请以 $3N$ 或以下的扭矩按下。



4. 对于附带DP的ETR（任选），如左图所示，有一个滑动型开关（频率选择器开关）。禁止将开关设置在滑动中途点。操作开关时，请使用以下尺寸的平头螺丝刀。

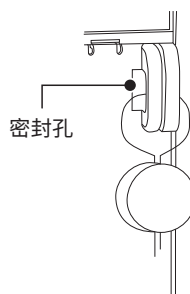


附带DP的ETR的情形



5. 设置特性后，请使用现场测试仪器等仪器来确保已设置所需的特性。

6. 密封时，请使用ETR盖顶部的密封孔密封ETR盖。



17.4 通过现场测试仪器进行特性检查时的注意事项

⚠ 注意

请确认断路器的主电路电源断开后再进行试验。否则可能发生触电。



(注)

型号为Y-2005及Y-2000 (停产型号) 的现场测试仪器的使用方法, 请参照现场测试仪器中附带的使用说明书。

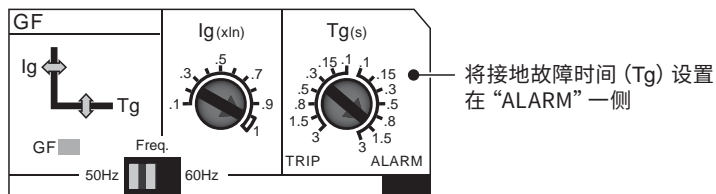
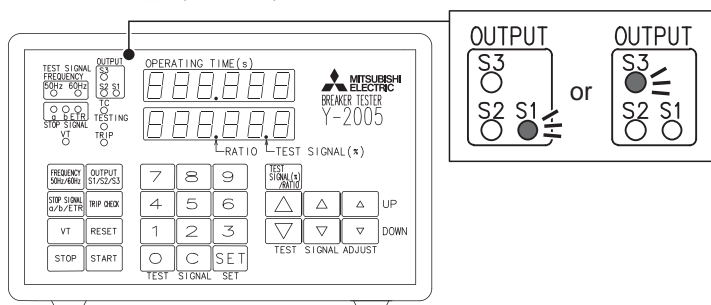
使用型号为Y-2005及Y-2000 (停产型号) 的现场测试仪器进行智能脱扣器 (ETR) 的特性检查时, 需如下事先设置智能脱扣器的特性设置开关。

1. 将现场测试仪器的信号输出脚设置在S1或S3上, 以进行过电流脱扣动作或预报警告动作测试时

使用带有接地故障保护特性 (GF) 的产品, 将测试仪器的信号输出脚设置在S1或S3上以进行过电流动作测试时, 应将接地故障时间 (T_g) 的设置开关设置在“ALARM”一侧。

如将接地故障时间 (T_g) 的设置开关设置在“TRIP”一侧进行测试, 根据接地故障动作特性的设置, 可能会发生接地故障动作脱扣而无法确认过电流动作的情况。

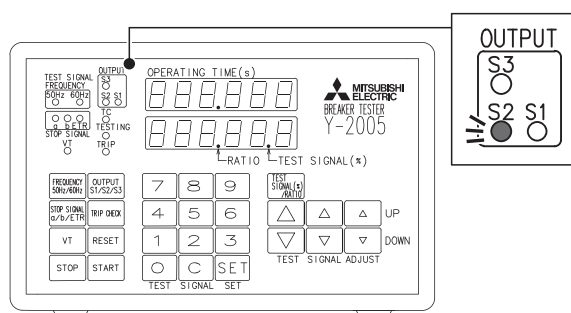
现场测试仪器 (Y-2005)



2. 将现场测试仪器的信号输出脚设置在S2上, 以进行接地故障脱扣动作或接地故障报警输出测试时

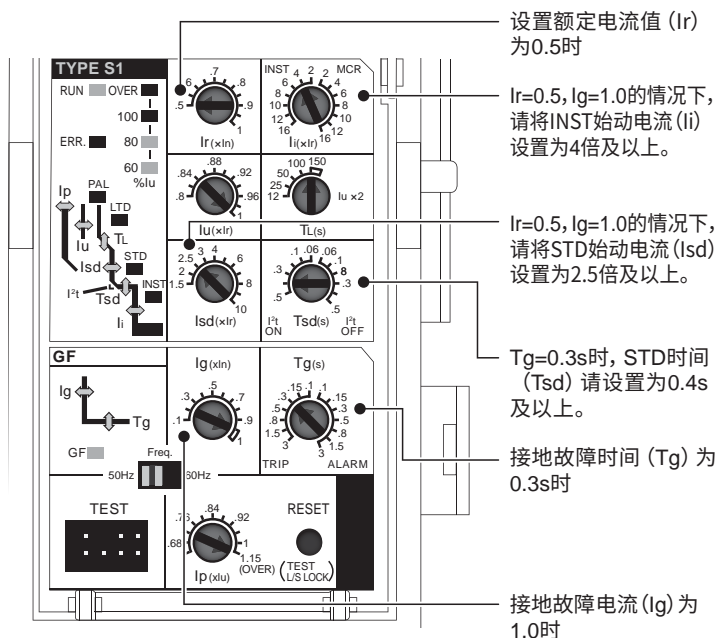
将现场测试仪器的信号输出脚设置在S2上, 以进行接地故障脱扣动作或报警输出测试时, 应将STD始动电流 (I_{sd})、STD时间 (T_{sd})、INST始动电流 (I_i) 设置为大于接地故障电流 (I_g)、接地故障时间 (T_g)。

如未按照上述内容设置, 将可能会发生过电流动作脱扣而无法确认接地故障动作的情况。



(例)

设置额定电流值 (I_r) : $0.5 \times I_n$
 接地故障电流 (I_g) : $1.0 \times I_n$
 接地故障时间 (T_g) : 0.3s (TRIP) 时



18. 液晶显示部的使用方法 任选

为防止刮花, LCD的显示部上贴有保护膜。运转开始前请撕下保护膜。

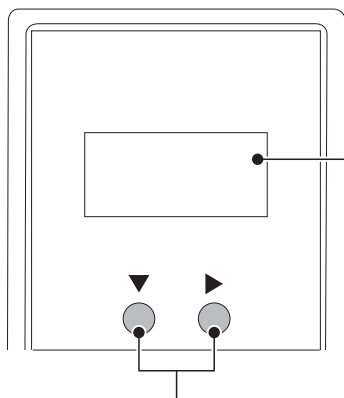
撕下保护膜时, 因静电产生可能会导致LCD显示部亮灯, 但过段时间后自然放电即会灭灯。此外, 因刷新显示所需的内部处理有可能会致导致屏幕闪烁。

18.1 显示项目一览

测量项目一览

测量项目		测量	显示指示		备注
电流 (A)	各相电流	0~200% In	***** A (In = 630A~1600A)		同时指示1 至N相 (条形图显示可用)
	最大值				—
谐波 (HI)	各相的基本谐波	0~100% In	***** A (In = 630A~1600A)		指示1 至N相
	各相/度的谐波 (第3、第5、第7、第9)				
	各相合计值				
	各相总畸变率		***. * %		
	各相/度的含有率				
故障记忆	脱扣原因/故障电流	0~2000% In	LTD STD INST	***** A (0~19999A) ***. * kA (20000A及更高)	—
		0~200% In	GF	***** A	GF为选项
	脱扣后经过的时间	0~24:00	h: m		记录时间最长达24小时

18.2 液晶显示部



液晶 (LCD) 画面

显示负载电流的测量值、脱扣信息及液晶的设置。

在下述情况下, 背光灯由白色变为红色:

- 脱扣动作
- 预报警输出

▼(下)、▶(右) 键

进行液晶画面上显示菜单的选择及确定。
(使用3N或者以下的作用力来按压按键。)

18.3 基本操作

按下液晶 (LCD) 画面下的“▼”、“▶”键, 进行画面操作。

▼(下) 键: 按由上往下的顺序选择并移至画面内的项目。所选中的项目会闪烁显示。

▶(右) 键: 确定选中的项目, 移至选择项目的显示画面。

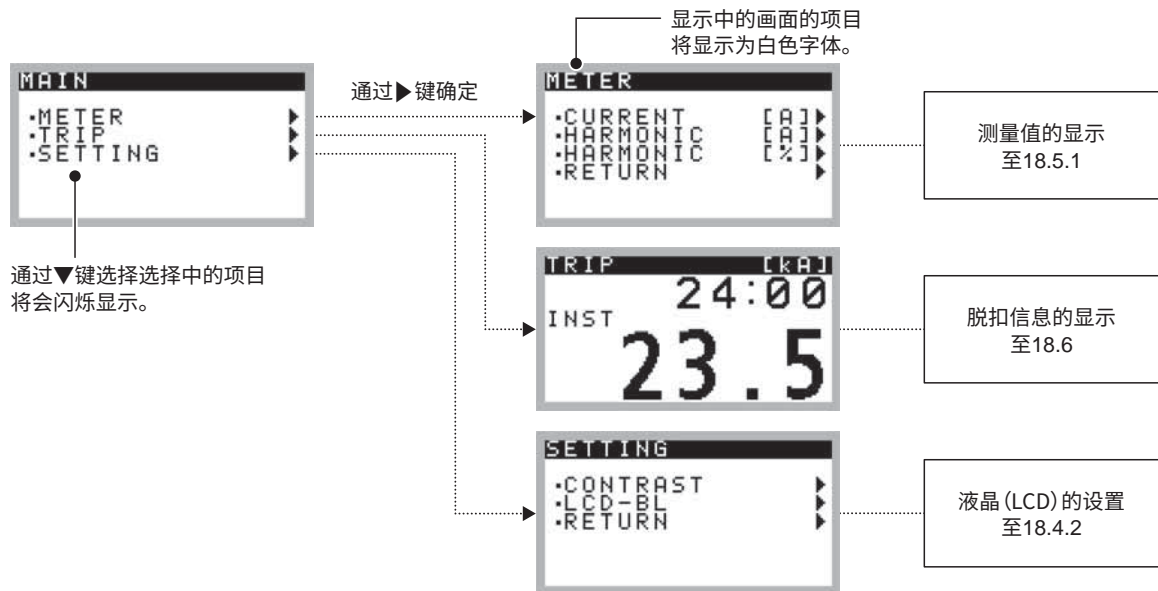
选择“RETURN”的项目并按下▶键, 即移至上一级项目的画面。

18.4 画面显示与液晶的设置

18.4.1 菜单的选择与画面显示

选择MAIN画面的菜单, 即移至各项目的画面。

- METER : 测量值的显示
- TRIP : 脱扣信息的显示
- SETTING : 液晶 (LCD) 设置



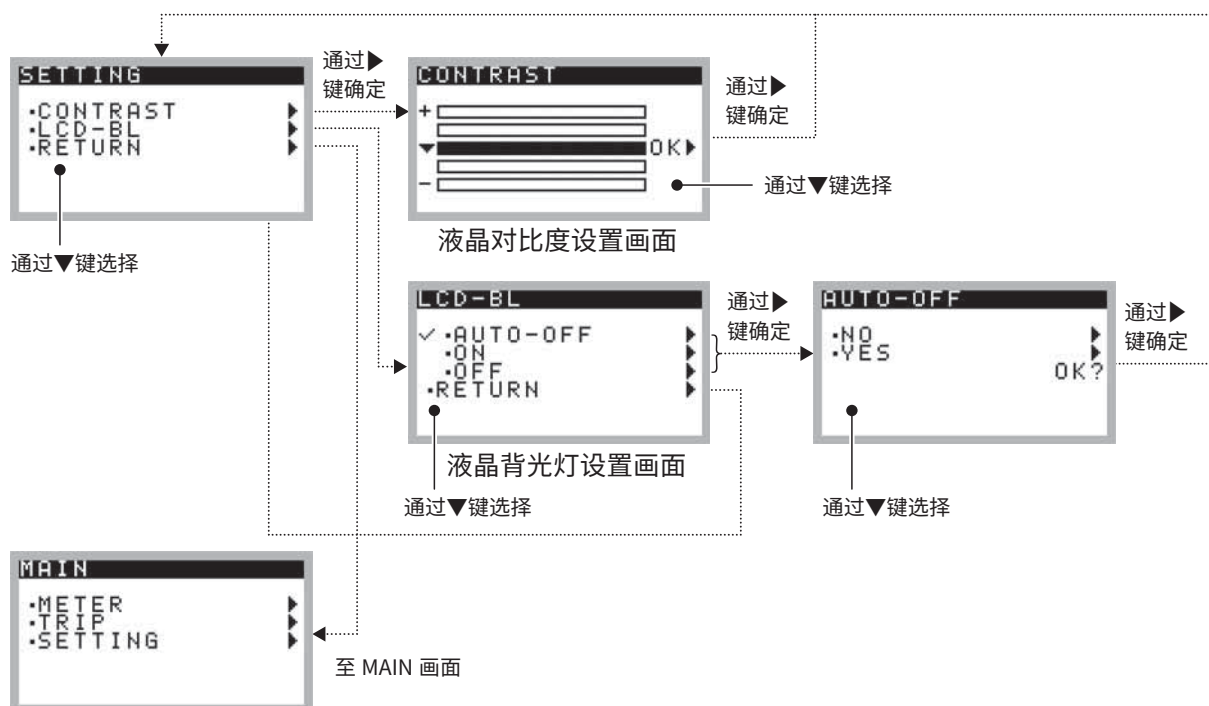
18.4.2 液晶 (LCD) 的设置 (对比度与背光灯)

SETTING菜单的设置规格如下表所示。

设置项目	设置内容 (范围)	初始设置值	
SETTING	CONTRAST (对比度)	-2/-1/0/+1/+2	0
	LCD-BL (液晶背光灯)	AUTO OFF (注) /平时 ON/平时 OFF	Auto OFF

(注) 液晶背光灯设置为“AUTO OFF”时, 按键5分钟处于无操作状态下背光灯会自动灭灯。灭灯时按下任意键即会亮灯。

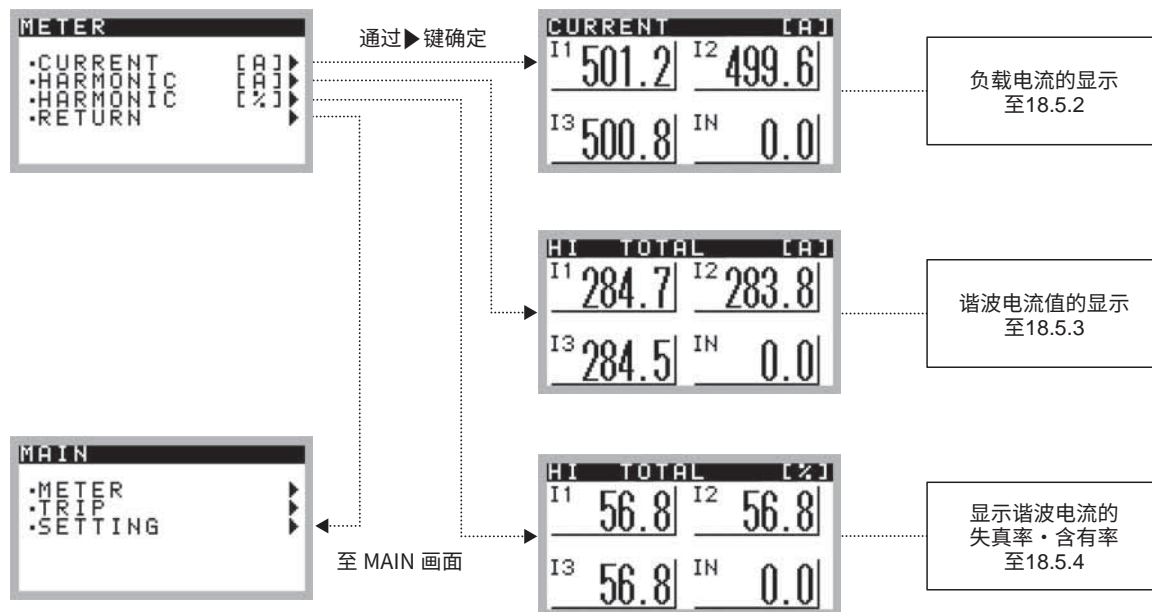
液晶画面 (LCD) 的对比度与背光灯的设置方法如下所示。



18.5 测量值的显示

18.5.1 测量项目

通过METER菜单,可显示负载电流(CURRENT)与谐波电流(HARMONIC)的测量值。



18.5.2 负载电流

■ 显示项目

- 各相当前值
- 最大相当前值
- 柱状图形显示
(以相对于连续电流 (I_u) 的比率来显示)

! (注)
为确保测量精度, P31中记载的频率切换开关应根据所使用的电路频率进行设置。

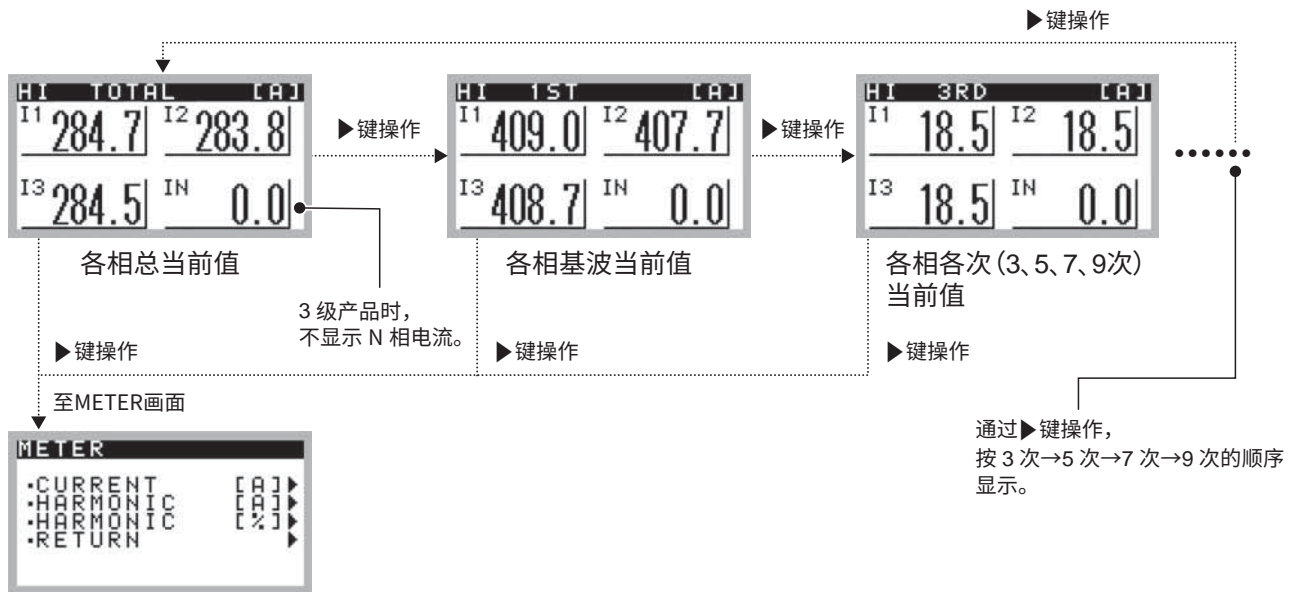


18.5.3 谐波电流

■ 显示项目

- 各相基波当前值
- 各相各次(3、5、7、9次)当前值
- 各相总当前值

❗ (注)
为确保测量精度, P31中记载的频率切换开关应根据所使用的电路频率进行设置。

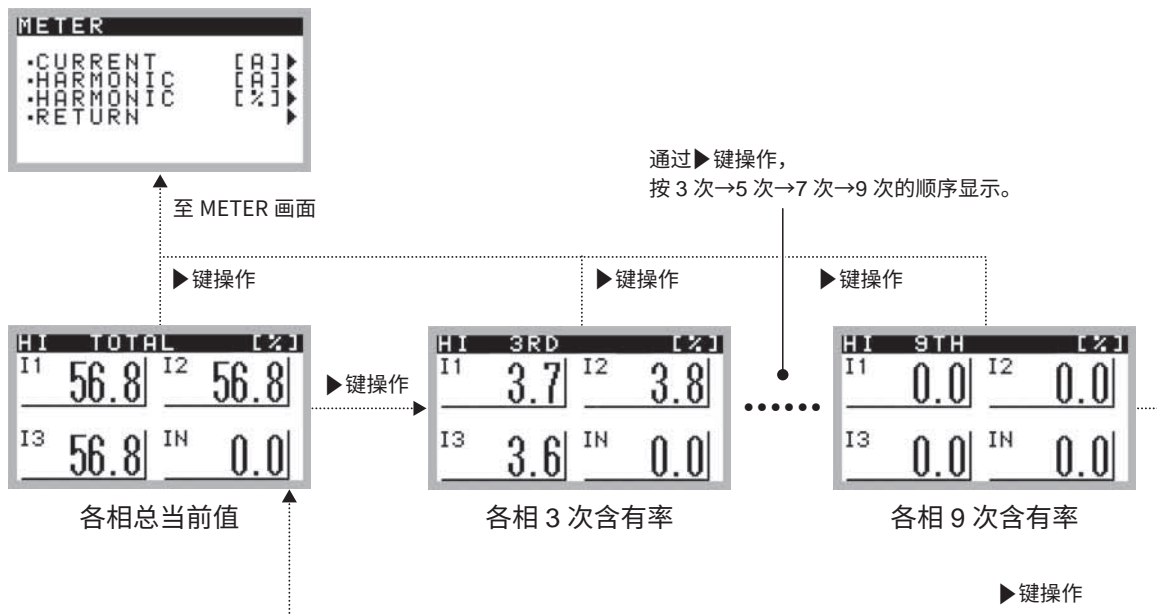


18.5.4 谐波电流 (失真率·含有率)

■ 显示项目

- 各相总失真率
- 各相各次含有率

❗ (注)
为确保测量精度, P31中记载的频率切换开关应根据所使用的电路频率进行设置。



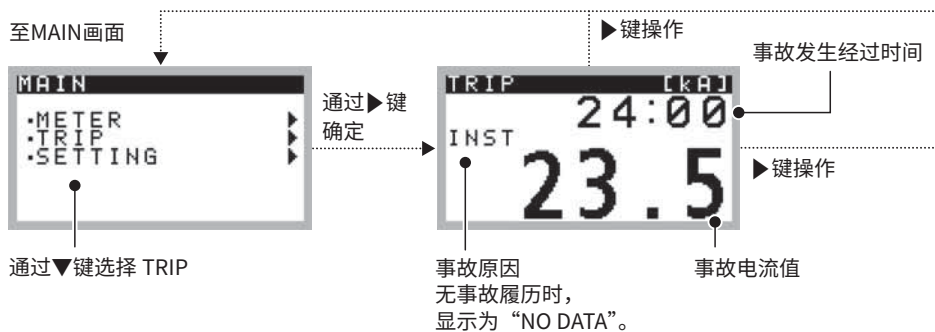
18.6 脱扣信息

发生脱扣时,会自动显示脱扣发生画面,且背光灯从白色变为红色。进行复位之前,脱扣发生画面将一直显示。TRIP菜单中显示过去一次的故障原因的履历信息。

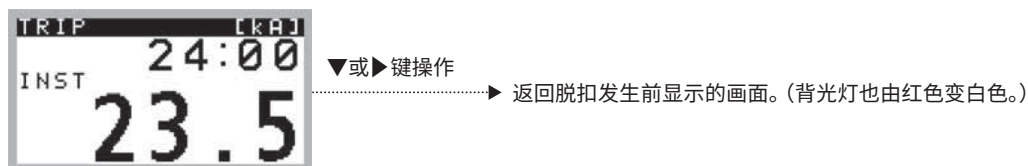
■ 显示项目

- 事故原因
- 事故电流值
- 事故发生经过时间(最多24小时)

(注)
为了储存故障原因,需要对P32中记载的控制电源(P3/P4)通电。



在脱扣发生画面中操作“▼”或“▶”键,即返回脱扣发生前显示的画面。



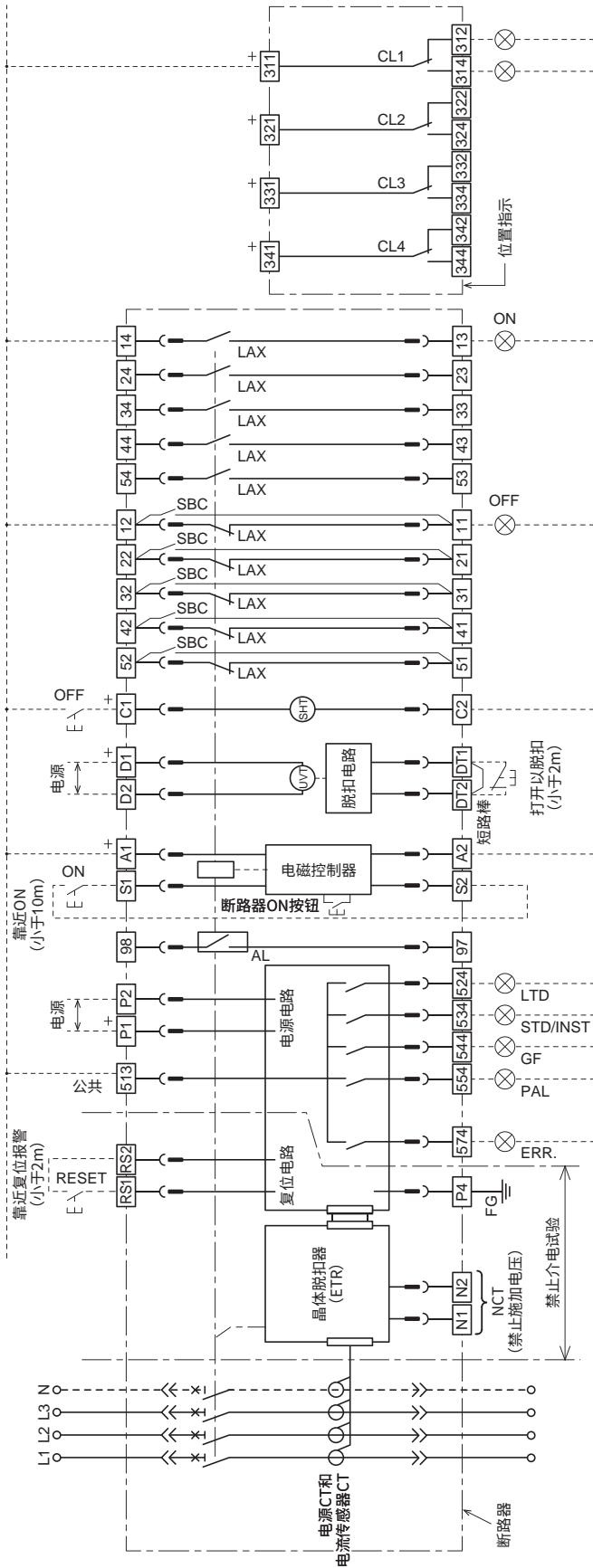
19. 发生疑似故障时

使用中发生疑似故障时，请调查以下事项。

1. 通过现场测试仪器进行试验时，电流显示为 0A。
规格设计为通过现场测试仪器输入试验信号及电压时，液晶 (LCD) 显示部的电流值会显示为 0A。若通过控制电源 (P3 或者 P4) 对 ETR 供电的同时，通过现场测试仪器进行脱扣试验，则会出现以下的情况。
 - 输入试验信号时负载电流·谐波电流的各个值均显示为 0A。
 - 通过现场测试仪器输入超出预报警电流设置 (Ip) 的试验信号时，电流会一直显示为 0A，背光灯会由白色变红色。
 - 通过现场测试仪器进行脱扣动作时，背光灯会由白色变红色，脱扣信息画面中会显示事故电流值。
使用现场测试仪器通过测试端子提供电压期间，液晶的电流显示会一直显示为 0A。
2. 通电中而负载电流却显示为 0A。
电流值低于测量额定电流的 1.5% 时，将显示为 0A。
3. 事故发生经过时间显示为“----”。
对智能脱扣器 (ETR) 施加电源后经过时间太短的情况下，当事故发生后控制电源 (P3 或者 P4) 变为 OFF 时，对智能脱扣器内的停电用蓄电池电路的充电不足够，导致事故发生经过时间有时会显示为“----”。要使事故发生经过时间显示到 24 小时后，需要通过控制电源对智能脱扣器施加电源 36 小时以上。
4. 智能脱扣器 (ETR) 的 LED 显示部发出微弱的亮光。
处于灯光较暗的场所时，发光的 LED 亮光有可能会漏光至旁边的 LED 显示部。
5. 其他的测量仪与本机器测量的电流值有差异。
本机器指出的是有效值。请确认用于比较的测量仪是否能正确测量有效值。若是测量平均值的测量仪，电流产生失真时测量值与有效值做比较会有很大差异。

20. 接线图

下图所示为附件齐全的情形。对于N极，下图显示了附件安装在右侧的情形（标配）。



- 主回路
- 晶闸脱扣器 (ETR)
- 控制电源电路/报警触点
- OCR报警
- 电气运行回路
- 辅助开关 (常闭)
- 辅助开关 (常开)
- 位置指示开关

端子说明

13 14	~ 53 54	辅助开关触点
11 12	~ 51 52	辅助开关b触点
D1 D2		UVT的电压输入端子
DT1 DT2		UVT的脱扣端子 (远程脱扣)
A1 A2		电磁控制器电源
S1 S2		外部ON (通过远程控制闭合)
C1 C2		分励脱扣
97 98		OCR报警
P1 P2		ETR电源
P4		电源的FG (FG: 框架接地)
RS1 RS2		报警复位 (脱扣原因、报警触点)
513, 524, 534, 544, 554, 574		脱扣原因、报警触点
N1 N2		用于中性极CT (NCT)

附件符号

(SHT)	分励脱扣装置
(UVT)	UVT线圈
LAX	辅助开关标准型
AL	OCR报警开关
SBC	短接b触点
CL	位置指示开关

- 内部接线
- - - 外部接线 (用户接线)
- ⊣ 控制电路连接器 (抽外型)

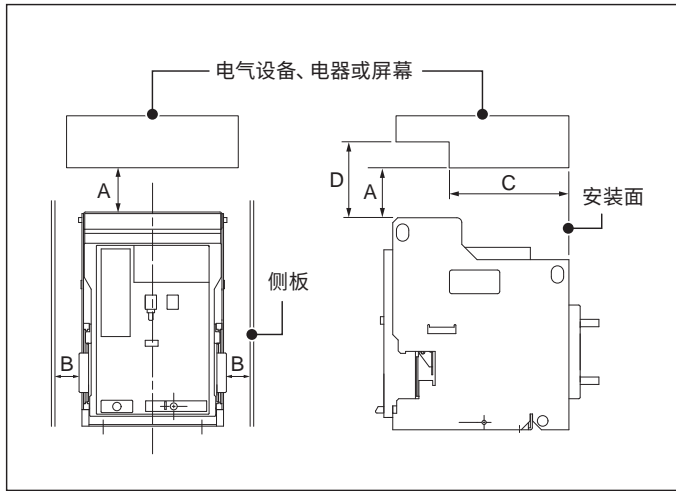
当向[A1]与[A2]端子供电时，[S1]与[S2]端子将变为带电部件。当向[D1]与[D2]端子供电时，[DT1]与[DT2]端子将变为带电部件，请勿触摸端子。

- 对于抽外型，电缆的长度应允许控制电路端子台向左或向右移动5mm。
- 当线圈负载连接到与ETR相同的控制电路中时，需要浪涌吸收器吸收浪涌电压。
- 由于某些端子已极化，因此当控制电压为直流电时，应按照接线图中所示的极性正确进行接线。
- 如需远程闭合断路器，请在端子[S1]和[S2]之间连接一个开关。用于远程闭合的开关的额定值应为DC30V 10mA或更高（最小适用负载DC15V 1mA或更低）。
- 对于P3或P4型电源，根据面版放置条件，在ON和OFF操作期间，触点输出中使用的高灵敏度继电器可能会引起抖动噪声（1ms电平的错误输出）。在快速响应序列中使用时，应提供几毫秒（ms）的滤波电路，或者应执行重复读取采样。
- 报警复位（端子[RS1]和[RS2]）和报警触点（端子[513]、[524]、[534]、[544]、[554]、[574]）仅适用于P3、P4型电源。
- 欠压脱扣装置（UVT）用于远程脱扣的开关的额定值应为DC30V 10mA或更高（最小适用负载DC15V 1mA或更低）。远程脱扣端子在出厂时带有短路棒，因此在使用此功能之前请将其移除。主电路的介电试验期间，断开电压输入线。

21. 技术资料

21.1 电弧距离

当短路电流中断时,排出的热气会从灭弧室的排气口吹出,因此需确保其间距,如下表所示。
在使用抽出型产品的情况下,需要确保适当的距离(B部分)从而防止在抽出操作时夹住手指。



尺寸 (mm)

型号		AED630-CV~AED1600-CV
适用电压		AC500V或以下
固定型	A	0 (注1)
	B	50
	C	162
	D	50 (注2)
抽出型	A	0
	B	50
	C	240
	D	50 (注2)

(注1) 检查灭弧室和触点必须有300mm或以上的间距。
(注2) 控制端子台所需的配线空间。

21.2 可进行逆接

主电路端子没有电源侧/负载侧的区别,因此可以根据客户使用情况选择正接或逆接。

21.3 工作条件

1. 标准使用环境

将满足下述所有使用条件时作为标准使用环境,在没有特别指定的情况下,请在该环境中使用AE V系列断路器。

a. 标准使用环境温度

请在最高+40°C,最低-5°C的范围内使用。但是,24小时的平均值不得超过+35°C。

b. 海拔

2000m (6600英尺) 或者以下。

c. 环境条件

空气必须清洁,同时,最高温度+40°C的相对湿度为85%或者以下且无结露。请勿在硫化物气体/氨气等的腐蚀性气体环境中使用、储存。(H₂S≤0.01ppm, SO₂≤0.05ppm, NH₃≤0.25ppm)

d. 安装条件

在安装AE V系列断路器时,请按照目录、使用说明书的操作指示。

e. 更换基准

在标准使用环境下的预期寿命大约是15年。更换时间取决于使用环境。请参照使用说明书的维护/检查的内容。

2. 特殊使用环境

在非标准使用环境中使用的情况下,有可能比标准使用环境条件的预期寿命要短。

a. 特殊环境条件

在高温、高湿度的环境下使用时。在含腐蚀性气体的环境下使用时。

b. 特殊环境温度

如果环境温度超过了+40°C,则连续电流额定值将下降。详细信息,请参照目录。

c. 特殊海拔高度

由于在超过2000m的海拔下使用会降低散热率,从而会降低工作电压、连续电流容量及分断容量。而且,绝缘性能也由于大气压力而下降。请参照详细信息。

22. 检查与维护

根据使用条件, 检查·维护的项目与所需的周期会有所不同。检查·维护将由三菱电机的售后服务持证人员进行。联系信息记载在本使用说明书的最后一页, 请在确认后与三菱电机联系。此外, 关于由客户进行的检查, 请在熟读“22.3 检查详情”的基础上进行。

22.1 检查与维护工作的指导原则

检查: 对断路器进行检查来早期检测那些性能可能下降的部件, 从而通过及时更新消耗部件与性能下降部件的方式维持断路器的性能并防止由于断路器接近于使用寿命末期而可能造成的事故。

维护: 为了维持断路器的性能, 需要进行定期维护, 例如: 上润滑油或根据需要进行指定部件的更换等。

22.1.1 按照使用期限与使用环境的不同而提出的检查与更换指导原则

建议按照检查与维护 and 更新指导原则, 在设备开始使用后每个月需要进行定期的检查工作, 从而确保能够稳定、长期地使用断路器。

环境		特例	检查指导	维护指导	更换指导
标准环境	无腐蚀性气体、灰尘较小的室内环境。	个别不具备防尘与空气调节功能的电气室中的配电板。	每个2到3年检查一次	定期检查 每二次时一次进行	大约7年至15年内
恶劣环境	存在着严重腐蚀性气体和灰尘的地方, 这些地方不适合人长期停留。	地热发电站、废水处理、钢厂、造纸厂、纸浆厂等。化工厂、采石场以及矿区等。	每半年一次	每年一次	大约1年至3年内

22.1.2 根据分闸/合闸次数而确定的维护与更换的基准

型号	检查指导原则		产品性能				
	在电流下周期数 (注1)	在低于电流情况下的周期数	周期数限制 (注2)			在过载情况下周期数限制	
			电流	不通电	总计	电流	周期数
AED630-CV	每500个周期	每2,000个周期	6,000	4,000	10,000	额定电流的6倍	12个周期
AED1000-CV							
AED1250-CV							
AED1600-CV							

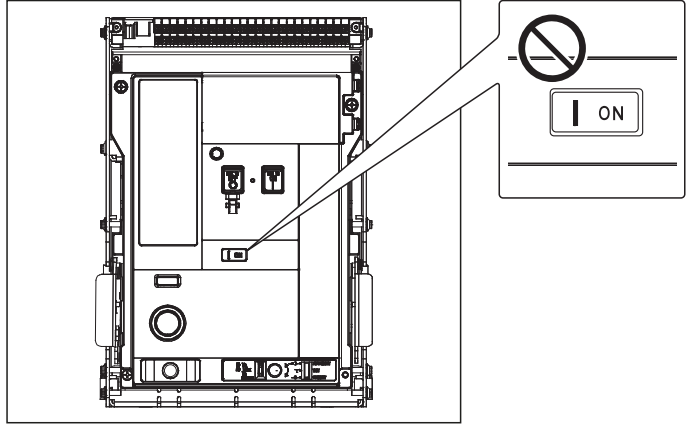
(注1) 即使电流大大低于断路器的最大额定电流, 操作循环周期数也将被视为在额定电流下的操作循环周期数。

(注2) 是由三菱电机的售后服务持证人员根据使用期间、使用环境进行维护·检查时的参考值。

22.2 维护前的准备

⚠ 注意

请在分闸（OFF）主断路器并确认没有电的基础上实施通常的维护。断路器为ON的情况下，请在分闸（OFF）断路器后进行抽出操作。



⚠ 注意



- 由相关的专门技术人员进行维护/检查工作。注意，可能有发生触电的危险。
- 在切断主断路器并确保无电流存在以后方可进行维护/检查工作。注意，可能有发生触电的危险。

在不可避免的情况下，如果必须在不切断电源的情况下进行维护/检查工作，请戴上橡胶手套以及鞋底铺上橡胶鞋垫的绝缘靴。只能使用绝缘工具与仪器。当工作人员在维护与检查中有必要接触带电部件时，必须注意人体与带电部件之间的绝缘状况。带电部件盖上了绝缘模制外壳或者类似保护罩，可以安全地完成分闸/合闸操作。

22.3 检查详情

⚠注意

检查时发现异常的情况下，请立即采取相应措施。如果在异常状态下使用，可能会因断路器的故障而导致连带事故的发生。

22.3.1 初始检查

22.3.1-1 在加电前进行检查。

在安装断路器以后、加电以前,进行如下检查。

检查项目	原则
1. 电线与短棒是否稳固地连接到了外部线路连接用的主端子上?	必须按照指定拧紧扭矩旋紧。(M12螺丝:45±5N·m)
2. 是否有导电性异物,如螺丝、钉子、面板上掉下的处理器芯片等以及进行耐压测试所使用的连接导线遗留在端子附近?	必须完全清除。
3. 是否前保护罩、底座等出现裂缝或者受损?	决不能有裂缝或者受损迹象。
4. 断路器是否进水或者是否有凝露?	不能进水或者有凝露。

(注1) 在进行耐压测试时,需要按照22.3.1-2中的标准进行。

(注2) 在使用500V兆欧表测量绝缘电阻的时候,需要按照22.3.1-2中的标准进行。

22.3.1-2 绝缘电阻试验与耐压试验的位置

测试位置	绝缘电阻测试 (MΩ) (注1)		耐压测试 (AC V) (注2)	
	ON	OFF	ON	OFF
主电路与接地线的带电部件之间	≥5	≥5	3500	3500
不同极带电部分之间	≥5	—	3500	—
主电路上部端子与下部端子之间	—	≥5	—	3500
主电路与控制电路端子板带电部分之间	≥5	≥5	3500	3500
控制电路端子板与接地线之间(注3)	≥5	≥5	2000	2000

(注1) 对于单独的断路器,必须为50MΩ及以上。

(注2) 施加电压的时间为1分钟。

(注3) 有无法进行耐压试验的位置。请确认下述注意事项。

⚠注意

下述端子编号禁止用于耐压试验。

N1、**N2**、**P4**、**RS1**、**RS2**、**D1**、**D2**、**DT1**、**DT2**

此外,安装在柜内的状态下进行耐压试验时,请断开 **D1**、**D2**、**DT1**、**DT2** 的接线。

22.3.2 用户检查

建议客户在开始使用一个月左右进行一次检查,然后根据环境,进行本项目中记载的用户检查。此外,关于22.1中记载的定期检查(由售后服务持证人员进行的检查),请与三菱电机联系。

22.3.2-1 断路器的外部结构

检查项目	检查方法	原则	处理方法
1. 灰尘与污染	目视检查	不得有有害的灰尘与尘土沉积	每次定期检查时需要用空气喷吹表面,或者使用干燥的布清洁与清除灰尘 不得使用诸如稀释剂之类的溶剂
2. 主电路端子松动	使用扭矩扳手旋紧	必须牢固地旋紧 (M12螺丝:45±5N·m)	在必要的情况下,再次旋紧
3. 控制端子松动	使用螺丝刀旋紧	必须牢固地旋紧 (M3.5螺丝:1.0±0.2N·m)	在必要的情况下,再次旋紧
4. 前保护罩、底座与控制电路端子板裂缝、破裂或者变形、变色情况	目视检查	不得存在裂缝、破裂或者变形、变色情况	如果前保护罩或者控制电路端子板出现异常情况,请与我司联系 如果发现底座有问题,可更换断路器
5. 进水与浸入水中	目视检查	不得进水或者浸入水中	如果发生了进水或者浸入水中情况,则需要更换产品
6. 抽出导轨	目视检查	导轨的抽出·插入应顺畅	导轨有异常时请与我司联系

22.3.2-2 主电路导电部件(外部)

检查项目	检查方法	原则	处理方法
1. 绝缘电阻测量	使用DC500V绝缘电阻测量仪(兆欧表)来测量绝缘电阻	不得低于5兆欧(对于单独的AED-CV,不得低于50兆欧) 测试位置如22.1.节所示	在再次测量以前,需要清除灰尘 一旦无法恢复绝缘,请更换断路器并抽出框架
2. 主电路导体污染	目视检查	不得有有害的灰尘或者煤烟沉积	清洁主导体
3. 主电路接头的异常	目视检查	不得有接头的变色、脱落	如果出现了异常情况,请更换框架

22.3.2-3 消弧室与动/静触点

检查项目	检查方法	原则	处理方法
1. 煤烟与污渍	目视检查	无有害的灰尘与尘土沉积	每次检查时必须清除灰尘并清洁表面
2. 消弧室状况	目视检查	1. 不得有损坏 2. 不得有明显的灭弧板焊接痕迹	如果出现了异常情况,请与我司联系
3. 动/静触点	目视检查	触点不得有明显的磨损痕迹	如果出现了异常情况,请与我司联系
4. 消弧室紧固螺丝松动	使用M6螺丝扳手旋紧	必须紧固地旋紧 (M6螺丝:5.4±0.8N·m)	在必要的情况下,再次旋紧

22.3.2-4 智能脱扣器

检查项目	检查方法	原则	处理方法
1. 智能脱扣器外观	目视检查	外部部件与旋钮不得存在破裂或者变形情况	如果存在破裂或者变形情况,请与我司联系
2. 灰尘与污染	目视检查	不得存在灰尘和尘土的有害沉积	使用干燥的布清除灰尘 不可以使用稀释剂等溶剂
3. 智能脱扣器的操作特性	使用现场测试仪器(Y-2005)	使用现场测试仪器(Y-2005)来确认这些特性值在标准参数值范围内	如果测量值偏离了标准值,请与我司联系

22.3.2-5 附属装置(一般性附属装置)

检查项目	检查方法	原则	处理方法
1. 分励脱扣装置 (SHT)	在断路器为ON的状态下,对端子编号 [C1]、[C2] 施加规定的电压	必须将断路器从ON的状态变为OFF的状态	如果存在异常情况,请与我司联系
2. 辅助开关 (LAX)	检查LAXa与LAXb的连续性	必须根据断路器的分闸/合闸切实进行切换	如果存在异常情况,请与我司联系
3. 欠压脱扣装置 (UVT)	在断路器为ON的状态下,对端子编号 [D1]、[D2] 施加规定的电压	施加额定电压的85%的电压,可以正常的合闸 从额定电压渐渐地降低到额定电压的45%时会脱扣	如果存在异常情况,请与我司联系
4. 安全挡板 (SST)	抽出/插入操作	1. 部件不得有破裂 2. 能够毫不费力地完成抽出/插入操作	如果存在异常情况,请与我司联系 1. 清除有害于抽出/插入操作的断裂部件 2. 如果无法进行抽出/插入操作,请与我司联系
5. 位置开关 (CL)	抽出/插入操作	可以顺利切换成“DISCONNECT (分离)”位置、“CONNECT (连接)”位置	如果存在异常情况,请与我司联系

(注) 关于上述以外的附属装置,请参照各附属装置的用户手册。

22.3.3 分断动作后的检查工作

当断路器由于过载电流或者短路电流而分断动作以后,需要检查定期检查(第22.3.2节)详细说明的项目。如果满足了相关原则,则有可能重新使用断路器。在确认并清除故障原因以前,不得再次合闸电路(本地或者远程合闸)。然而,建议在发生较为严重的故障电流后,尽可能快地更换断路器。在更换前,应该监控断路器异常的温升情况以及其他异常情况。请参照下面有关断路电流与将要进行的处理工作的图表:

断路电流水平	断路器受损程度	处理
1. 分断电流是额定电流(LTD、STD范围)的6倍以下	1. 无法目视检查外部部件的异常情况 2. 触点轻微磨损、污染等	再利用 关于额定电流下开关的使用寿命,请参阅第22.1.2节的内容
2. 分断电流为额定分断能力的70%以下(STD、INST范围)	1. 排气孔受到炭黑的轻微污染 2. 触点与消弧室整体受到轻度损伤	再利用 如果满足了第22.3.2节中的相关原则,则可以使用断路器
3. 分断电流接近于额定分断能力	1. 排气孔整体受到炭黑较为严重的污染 2. 触点与消弧室也受到较为严重的损伤	1. 需要立即更换 2. 如果不可能立即更换,在满足了第22.3.2节中相关原则的情况下,需要逐渐降低电流来小心使用断路器 作为一项附加试验,需要在使用两倍于额定绝缘电压(即2000V)的情况下,对断路器主电路的带电部分进行耐压测试 然而,仍需尽可能立即更换断路器

(注1) 在使用具备脱扣指示功能的智能脱扣器的情况下,可以判断LTD(长时延迟)、STD(短时延迟)或者INST(瞬时延迟)层次上的脱扣原因。

(注2) 如果故障电流的大小无法估算,则需要按照第22.3.3节中的第三项要求进行处理。

22.4 故障诊断

异常情况类型与状况	故障/可能的原因	处理方法	
		调查/主要的处理方法	后续处理方法
1. 无法闭合	1. 无法进行闭合操作 1.1 OFF闭锁 (CYL、CAL与挂锁) 没有解锁	对OFF闭锁 (CYL、CAL与挂锁) 进行解锁	如果在主要的处理方法实施完毕以后,仍无法合闸断路器,请与我司联系
	1.2 抽出位置不正确	设置为“CONNECT (连接)”、“DISCONNECT (分离)”或者“TEST (试验)”位置	
	1.3 插入抽出手柄	移除抽出手柄	
	1.4 没有向UVT加压	对欠压脱扣装置 (UVT) 施加电压	欠压脱扣装置 (UVT) 异常的情况下,请参照10.3.2节
	1.5 没有对控制电路端子台的 [S1] 与 [S2] 施加电压	检查操作电路,确认是否施加了电压	—
	2. 进行闭合操作 进行闭合操作的同时进行脱扣 (OFF)	请与我司联系	—
	3. ON按钮损坏或者无法按下	请与我司联系	—
	4. AL的按钮突出	请按下AL的RESET按钮从而进行复位	—
	5. 本体的安装处于倾斜状态	请确认19页的安装条件,并在范围内修改	—
2. 无法打开	1. 即使在按下“OFF”按钮后,也无法打开触点	请与我司联系 (注)	—
	2. SHT无法运行 (可手动进行“OFF”操作)	1. 如果没有加压,则需要检查控制电路	—
		2. 在加压情况下,断路器可能存在故障 请与我司联系	—
3. OFF按钮损坏或者无法按下	请与我司联系	—	
3. 异常的温升	1. 连接导体松动	再次旋紧	如果观察到导体或者端子铸模出现变色情况,请与我司联系
	2. 接头的接触压力扁平弹簧受损	请与我司联系	—
	3. 接触器的接触电阻提高 (DC电阻值为目录值×1.5或以下的值)	清洁接触表面 (使用钢丝刷)	即使在清洁了接触表面后,温度仍未下降,请与我司联系
	4. 触点磨损严重	更换断路器	—
4. 异常的智能脱扣器 (ETR) 4.1 误脱扣	1. 额定电流或额定电流以下时脱扣	检查ETR负载电流与属性设置情况 使用现场测试仪器来检查特性设置情况	如果出现异常情况,请与我司联系
	2. 负载启动时跳闸	检查ETR冲击电流与STD/INST设置	如果出现异常情况,请与我司联系
	3. 噪声/浪涌造成的跳闸	请将ETR设置切换到较高值 (暂时使用) 请检查框架接地端子 [P4] 的连接情况	降低噪声/浪涌或者增加浪涌吸收器
4.2 特性异常	1. 即使在过流情况下,断路器也没有脱扣	检查ETR负载电流与属性设置情况 使用现场测试仪器来检查特性设置情况	如果出现异常情况,请与我司联系
	2. 特性异常 (根据现场测试仪器测量得到的结论)	检查现场测试仪器设置情况	如果出现异常情况,请与我司联系
4.3 指示功能或者触点输出异常情况	1. 跳闸指示器液晶显示屏或者报警触点输出端无法运行	确认已对控制电路端子台的 [P1] 与 [P2] 供应电压,并确认RUN LED为闪亮	请与我司联系
	2. 显示模块没有显示		
	3. ERR. LED闪亮	ETR微处理器的功能或内部接线存在异常 请与我司联系	—
	4. RUN LED没有闪亮	闪亮条件确认 (施加控制电源或负载电流为20%及以上时闪亮)	请与我司联系
	5. 负载电流LED没有闪亮	确认负载电流是否为60%及以上	请与我司联系
	6. 不能对显示屏按键进行操作	请再确认第18节	请与我司联系

异常情况类型与状况	故障/可能的原因	处理方法	
		调查/主要的处理方法	后续处理方法
5. 无法进行抽出操作	1. 无法插入抽出手柄	在按下OFF按钮后,插入抽出手柄	如果在按下OFF按钮时仍无法插入抽出手柄,请与我司联系
	2. 无法推入锁板	轻轻地左右转动抽出手柄,并将锁板推入到锁板可以轻易进入的地方	如果无法按入锁板,请与我司联系
	3. 锁板在“TEST (试验)”或者“CONNECT (连接)”位置不突出	请与我司联系	—
	4. 塞头栓断裂,因此,尽管锁板已经突出于“TEST (试验)”与“CONNECT (连接)”位置,仍无法锁定插入操作	请与我司联系	—
	5. 抽出指示器上的指示内容没有变化	请与我司联系	—
	6. 无法转动抽出手柄	推入锁板	请与我司联系
	7. 接头断裂并影响了抽出/插入操作	请与我司联系	—
	8. 控制电路端子破裂并影响了抽出/插入操作	请与我司联系	—
6. 安全挡板 (SST) 无法运行	1. 安全挡板 (SST) 的隔断破裂	请与我司联系	—
	2. 安全挡板 (SST) 拉杆断裂	请与我司联系	—
7. 控制电路端子无法与“TEST (试验)”和“CONNECT (连接)”位置接触	控制电路端子台是否损坏或变形	请与我司联系	—
8. 辅助开关无法运行	辅助开关活动部件断裂	请与我司联系	—
9. UVT无法接入 (UVT控制器中出现异常情况)	1. 所使用的电压太低 (或者所使用的电压太高)	检查所使用的电压并按照UVT控制器的额定电压值来调整所使用的电压	请与我司联系
	2. 所使用的电压容量不足	检查所使用的电压容量	请与我司联系
	3. 脱扣端子 ([DT1] 与 [DT2]) 已打开	检查脱扣端子 [DT1] 与 [DT2] 是否短路 在使用按钮进行脱扣的情况下,需要使用b-触点型按钮 (通常为闭合按钮)	请与我司联系

(注) 强制抽出断路器时,请在断开上一级的断路器以后再进行抽出。在接通电源的情况下抽出断路器,有可能导致严重事故。

23. 销售网络

■ 三菱电机自动化（中国）有限公司

地区	地址	邮编	电话	传真
上海	上海市虹桥路1386号三菱电机自动化中心	200336	(021) 2322-3030	(021) 2322-3000
北京	北京市朝阳区酒仙桥路20号颐堤港一座第5层504-506号	100016	(010) 6518-8830	(010) 6518-8030
沈阳	沈阳市和平区和平北大街69号总统大厦C座2302室	110003	(024) 2259-8830	(024) 2259-8030
大连	大连经济技术开发区东北三街5号	116600	(0411) 8765-5951	(0411) 8765-5952
天津	天津市河西区友谊路35号城市大厦2003室	300061	(022) 2813-1015	(022) 2813-1017
南京	南京市中山东路90号华泰大厦18楼S1座	210002	(025) 8445-3228	(025) 8445-3808
西安	西安市二环南路88号老三届·世纪星大厦24层DE室	710065	(029) 8730-5236	(029) 8730-5235
武汉	武汉市汉口建设大道568号新世界国贸大厦1座46层18号	430022	(027) 8555-8043	(027) 8555-7883
成都	成都市青羊区光华北三路98号光华中心C栋15楼1501-1503号	610000	(028) 8446-8030	(028) 8446-8630
深圳	深圳市龙岗区雅宝路1号星河WORLD B栋大厦8层	518129	(0755) 2399-8272	(0755) 8218-4776
广州	广州市海珠区新港东路1068号中洲中心北塔1609室	510335	(020) 8923-6730	(020) 8923-6715
东莞	东莞市长安镇锦厦路段镇安大道聚和国际机械五金城C308室	523859	(0769) 8547-9675	(0769) 8535-9682

■ 三菱电机自动化（香港）有限公司

地区	地址	电话	传真
香港	香港太古城英皇道1111号太古城中心一座20楼	+852-2510-0555	+852-2887-7984

三菱电机自动化
400-821-3030
CALL CENTER 技术支持热线

MITSUBISHI Low Voltage Air Circuit Breakers World Super AE V Series

三菱低压空气断路器 World Super AE V Series

MODEL

型号

AED-CV

MITSUBISHI ELECTRIC CORPORATION

東京都千代田区丸の内2-7-3 (東京ビル) 〒100-8310

HEAD OFFICE: TOKYO BLDG., MARUNOUCHI, 2-7-3, CHIYODAKU, TOKYO 100-8310. TELEX: J24532 CABLE: MELCO TOKYO

三菱電機株式会社 福山製作所

〒720-8647 広島県福山市緑町1番8号 TEL (084)921-3211 FAX (084)931-4714

MITSUBISHI ELECTRIC FUKUYAMA WORKS

三菱电机低压电器(厦门)有限公司

邮编: 361021 厦门市集美区英瑶路122-126号(双号)2层 TEL: +86-592-6153030 FAX: +86-592-6283030

MITSUBISHI ELECTRIC LOW VOLTAGE EQUIPMENT(XIAMEN)CO.,LTD.