

# Automatic Transfer Circuit Breaker

## User's Manual



Nov. 2020

Ver5.0

**O-Sung Electric Machinery Co., Ltd**

111-3 Youngtae-ri, Wollong-myeon, Paju city Kyunggi-do Korea

Tel. : (82 31) 944-3521~3

Fax : (82 31) 944-3525

# - TABEL OF CONTENTS -

1. Safety Precautions
  - 1.1 Handling & Moving
  - 1.2 Installation & Connection
  - 1.3 Operation
  - 1.4 Maintenance and Repairing
2. Environmental Conditions
  - 2.1 Normal service condition
  - 2.2 Special service condition
3. External View
4. Rated Specification
5. Storage & Moving
6. Installation & Connection
7. Operation
  - 7.1 Manual charging
  - 7.2 A-power closing when both power sources are OFF
  - 7.3 B-power closing when both power sources are OFF
  - 7.4 Manual Tripping
  - 7.5 Draw in & out
  - 7.6 Emergency Closing Device
8. MDTR-III Protection Relay
9. Maintenance
10. Periodic Check
11. After Sales Service

## 1. Safety Precautions

READ ALL INSTRUCTIONS - This manual stated important information for the users safety. Failure to follow the SAFETY PRECAUTIONS may result in radio equipment failure and serious personal injury

Precautions identify [DANGER] and [CAUTION] as follows risk level as under.



### **Danger**

Cause Death or serious personal injury in urgent if failure to follow the instructions.



### **Caution**

Cause Lesion or light personal injury in potential if failure to follow the instructions.

### 1.1 Caution during Moving



#### **Danger**

- Do not stand under products during lift products using by lift and hoist.

This products is heavy weight things, and it may cause death or serious injury if product drop down.

### 1.2 Caution during Installation and Connection



#### **Caution**

- Only qualified personnel should works installation.

- The ATCB must be disconnected from power during installation works, and upstream and loads side as well.

**Electrical shocks may caused**

- Be sure fasten bolts and nuts of terminal or bus bar as strong as torque power manufacturer recommended.

**Fire may caused.**

- The ATCB must be placed on the concreted footprint in kept horizontally.

- Avoid severe environmental area where high temperature, high humidity, dusty, corrosive gas, vibration and shocks area.

**Fire and incorrective operating may caused.**

- Prevent dust, concrete, iron, water, salt water get inside the ATCB.

**Fire and incorrective operating may caused.**

### 1.3 Caution in Operation



- Do not touch main circuit and control terminal while ATCB powered ON.  
**Electrical shocks may caused.**
- Do not kept ATCB in draw-out position for long minute.  
**Heavy weight product may drop down.**



- Draw-in and out operation shold be done while ATCB power opened.  
**Product damage and fire may cause.**

### 1.4 Caution in Maintenance, Check & Replacement.



- Only qualified personnel should be done maintenance, Check and replacement of components.
- All works should be done after power off of upstream breaker, and check discharging main circuits and control circuits.  
**Electrical shocks may caused.**
- Torque pwoe of Main circuit terminal connection should be done periodic checking.  
**Fire may caused when fixing is loosen.**
- Re-fasten terminal connection of control circuits in periodical.  
**Incorrective operation may caused when fix is loolsen.**
- Arcing chamber must be built.  
**Electrical shocks or fire may caused when incorrective built-in or not built.**

## 2. Environmental Conditions

### 2.1 Normal service condition

The ATCB should be used under following normal condition unless otherwise specified.

#### a. Ambient temperature

Max +40°C, Min -5°C, but the average temperature for 24 hours shall be lower +35°C, and temperature shall be measured on enclosure if it built.

#### b. Altitude

Below 2000m.

#### c. Environmental conditions

Clean air, and relative humidity shall be less than 50% at temperature +40°C in maximum, and less than 90% at +20°C.

It shall not be allowed to use or store within the area of petrochemicals, ammonia or corrosive gas (  $H_2S \leq 0.01\text{ppm}$ ,  $SO_2 \leq 0.01\text{ppm}$ ,  $NH_3 \leq$  a few ppm.)

#### d. Storage temperature

Max +60°C, Min -20°C, but the average temperature for 24 hours shall be lower than +35°C

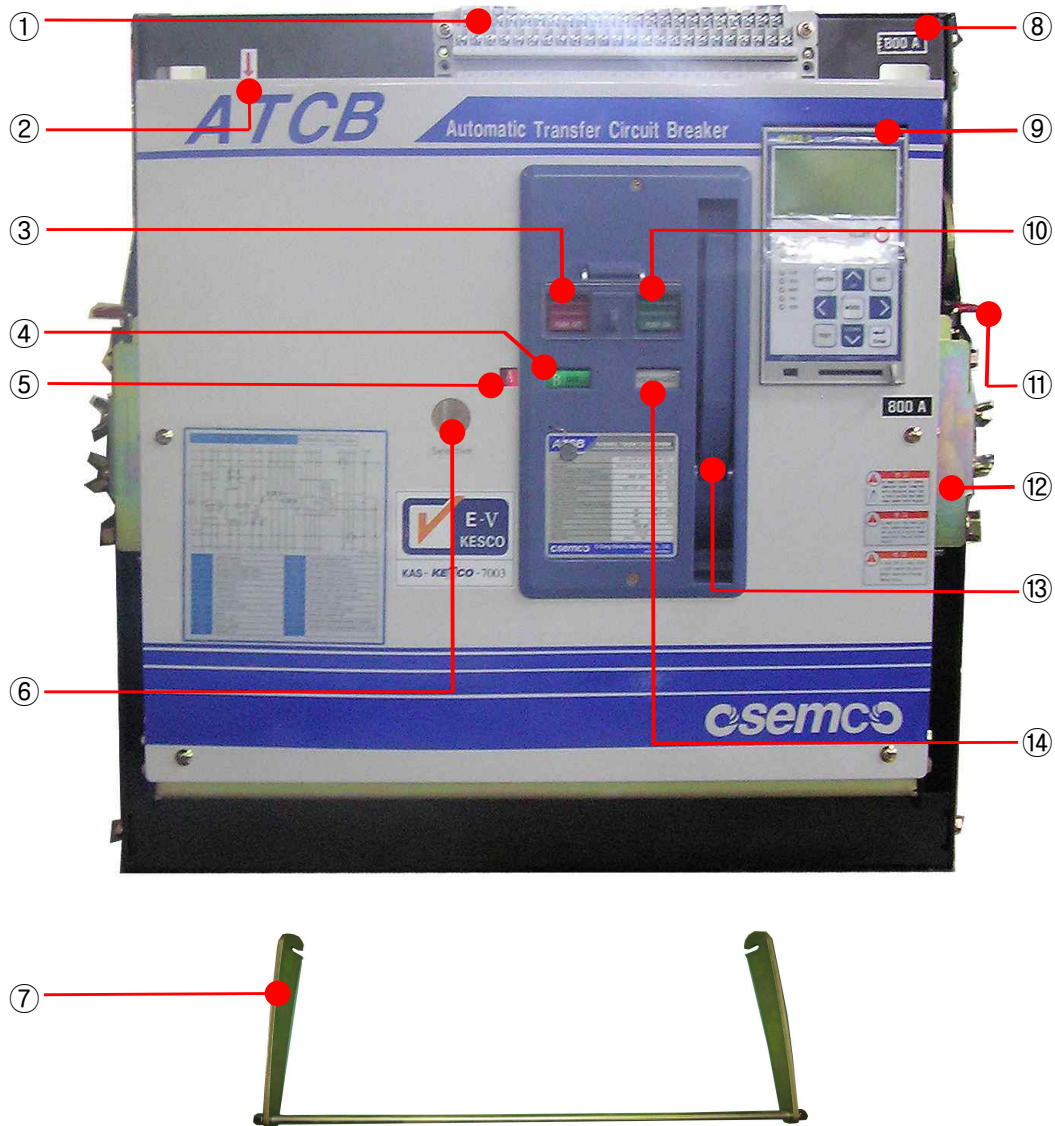
### 2.2 Special Service Conditions

In case of special service condition, modified ATCB is available.

Please specify when ordering, and please be note that service life may be reduced depending on the service conditions.

- (1) In case of using the ATCB other area than mentioned in 2.1
- (2) Strong sea wind
- (3) High humidity
- (4) High Vapor or VOCs
- (5) Explosive gas, Inflammable gas and other harmful gas area.
- (6) Excessive dust
- (7) Vibration and shocking
- (8) Other abnormal area

### 3. External View



① Connector terminal block	⑧ Cradle
② Draw in & out indicator	⑨ MDTR-III Protective relay
③ Trip button	⑩ Closing button
④ ON-OFF indicator	⑪ Draw in & out trigger
⑤ Transfer status indicator	⑫ Draw in & our trigger cover
⑥ B-Power closing selection button	⑬ Manual charging handle
⑦ Draw in & out handle	⑭ Charging indictor

### 4. Rated Specification

TYPE		606 -ATCB	608 -ATCB	610 -ATCB	612 -ATCB	616 -ATCB	620 -ATCB	625 -ATCB	632 -ATCB		
Standards		IEC 60947-6-1[CB] , IEC 60947-2[B] , KS C 4620									
Rated Operational Voltage (VAC)		Ue		600							
Rated Insulation Voltage (VAC)		Ui		1000							
Rated Impulse Withstand Voltage (VAC)		Uimp		8000							
Rated Current		In		630A	800A	1000A	1250A	1600A	2000A	2500A	3200A
Neutral Phase Current		630A	800A	1000A	1250A	1600A	2000A	2500A	3200A		
kind of Throw		Double Throw									
Connection way		Back									
Number of Pole		3P , 4P									
Rated short-circuit breaking capacity O-3min-CO-3min-CO	Icu Ics	AC 600V		42kA				50kA			
		AC 480V		50kA				65kA			
Rated short-circuit making capacity		Icm		88.2kA				105kA			
Rated short-time withstand current (0.5sec)		Icw		42kA				50kA			
Switching Capacity		AC-33B(10 Ie making/10 Ie breaking cosØ=0.35)									
Switching Frequency		20Time / Hour						10Time / Hour			
Operating Current (A peak)	Closing coil	"A" Power		DC110~125V=3A, AC100~110V=3A, AC200~240V=5A							
		"B" Power		DC110~125V=8A, AC100~110V=8A, AC200~240V=8A							
	Trip coil		DC110~125V=5A, AC100~110V=5A, AC200~240V=6A								
Motor spring charging	Charging time		≤ 8sec								
	Current		DC110~125V=3A, AC100~110V=3A, AC200~240V=5A								
Operating time	Making	"A" Power		≤ 90ms							
		"B" Power		≤ 170ms							
	Breaking		AC220V : ≤ 30ms , DC110V : ≤ 40ms								
Number of operating cycle (A/B)	No Loads		2,500 / 2,500				1,500 / 1,500				
	Load		500 / 500				500 / 500				
Cautions		1. For complete operation, be sure to provide control source for more than 0.5sec. 2. When control source will be provided to A side and B side simultaneously, coil may be damaged.									

TYPE			640-ATCB	650-ATCB
Standards			IEC 60947-6-1[CB] , IEC 60947-2[B] , KS C 4620	
Rated Operational Voltage (VAC)	Ue		600	
Rated Insulation Voltage (VAC)	Ui		1000	
Rated Impulse Withstand Voltage (VAC)	Uimp		8000	
Rated Current	In		4000A	5000A
Neutral Phase Current			4000A	5000A
kind of Throw			Double Throw	
Connection way			Back	
Number of Pole			3P , 4P	
Rated short-circuit breaking capacity O-3min-CO-3min-CO	Icu Ics	AC 600V	65kA	65kA
		AC 480V	85kA	85kA
Rated short-circuit making capacity		Icm	143kA	143kA
Rated short-time withstand current (0.5sec)		Icw	65kA	65kA
Switching Capacity			AC-33B(10 Ie making/10 Ie breaking cos∅=0.3)	
Switching Frequency			10Time / Hour	
Operating Current (A peak)	Closing coil	"A" Power	DC110~125V=3A, AC100~110V=3A, AC200~240V=5A	
		"B" Power	DC110~125V=8A, AC100~110V=8A, AC200~240V=8A	
	Trip coil		DC110~125V=5A, AC100~110V=5A, AC200~240V=6A	
Motor spring charging	Charging time		≤ 8sec	
	Current		DC110~125V=3A, AC100~110V=3A, AC200~240V=5A	
Operating time	Making	"A" Power	≤ 90ms	
		"B" Power	≤ 170ms	
	Breaking		AC220V : ≤ 30ms , DC110V : ≤ 40ms	
Number of operating cycle (A/B)	No Loads		1,500 / 1,500	
	Load		500 / 500	
Cautions			1. For complete operation, be sure to provide control source for more than 0.5sec. 2. When control source will be provided to A side and B side simultaneously, coil may be damaged.	

## 5. Precautions

### 5.1 Points to check after receiving

- 1) Please check the ratings of rated current, control voltage and etc specified in the name plate whether ATCB is delivered in accordance with ordered specification.
- 2) Please check whether there is no any damage during the transportation.

### 5.2 Storage

ATCB is recommended to install and use as soon as possible after receiving. If not in immediate use, please pay attention following points.

- 1) Please avoid any place of high temperature and high humidity.
- 2) Please avoid any place of noxious gases and dust. Particularly, please avoid the mixture of cement with moisture because these causes corrosion on various parts.
- 3) Please place ATCB on horizontal plane.
- 4) Please do not put ATCB on the ground.

### 5.3 Caution in Moving

When moving ATCB, please pay attention on following points.

- 1) Please choose horizontal plane where ATCB will be placed.
- 2) Please avoid any impact during moving.

## 6. Installation and Connection

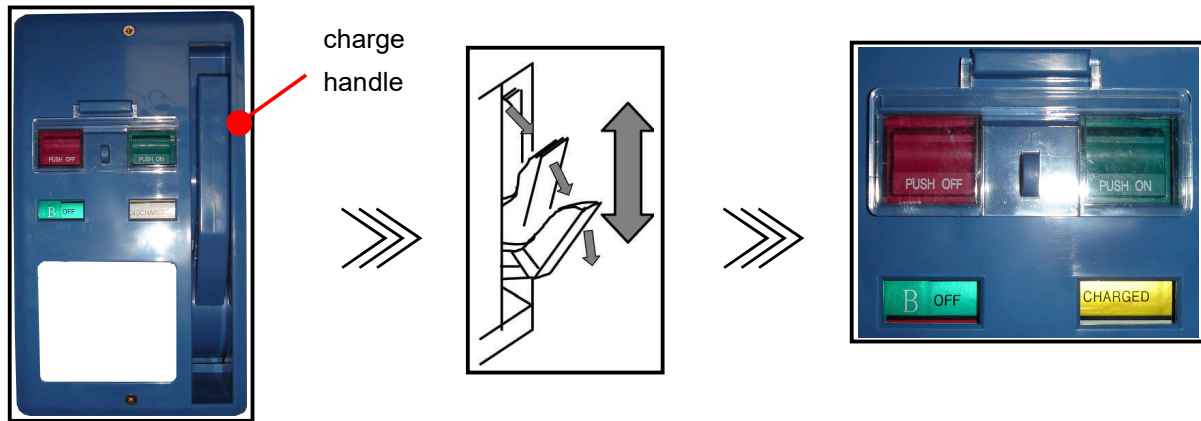
Please place ATCB so that name plate can be clearly read from the front.

When fitting connectors, please do not over-fix so that connectors of mains circuit should be kept horizontally.

## 7. Operation Method

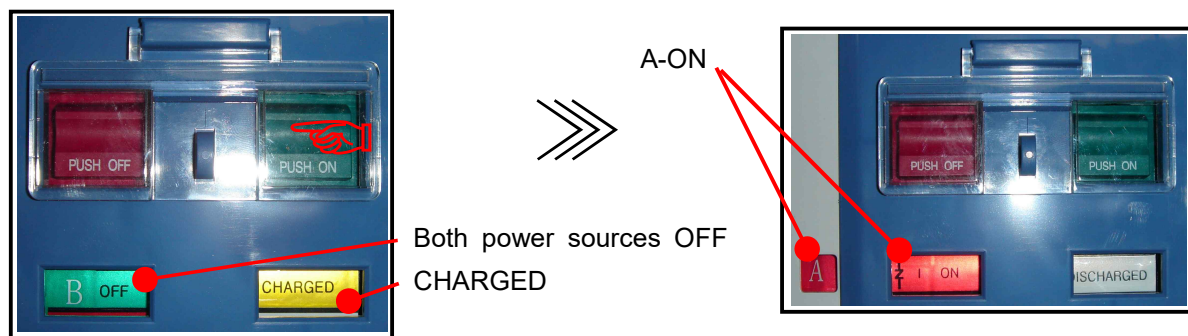
### 7.1 Manual charging

- 1) Charge the handle 7-8 times with full strokes.
- 2) When the closing spring is completely charged, the charging indicator shows "CHARGED".



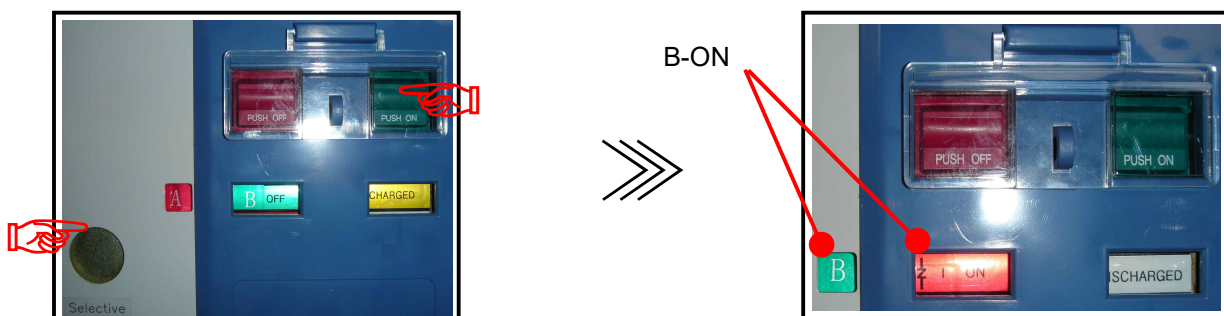
### 7.2 A-power closing when 새호 power sources are off

- 1) Check whether "CHARGED" is shown on charging indicator.
- 2) Press the Close button.
- 3) When ATCB is closed, "A" is shown on transfer status indicator, and "ON" is shown on On-Off indicator.



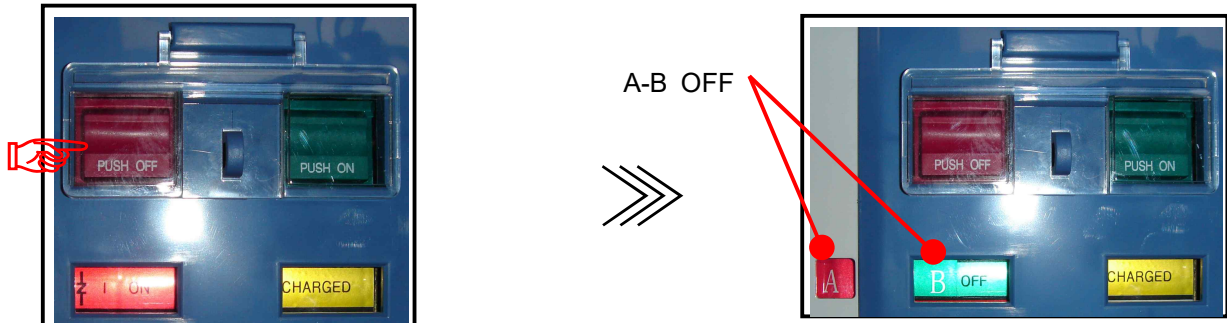
### 7.3 B-power closing when both power sources are off

- 1) Check whether "CHARGED" is shown on charging indicator.
- 2) While pressing selective button for B-power closing, press the close button.
- 3) When ATCB is closed, "B" is shown on transfer status indicator, and "ON" is shown in On-Off indicator.



### 7.4 Manual Tripping

- 1) Push the OFF button, then ATCB will be tripped.
- 2) The ON-OFF indicator shows "OFF".



### 7.5 Draw In and Out method (In case of Draw type)

#### 7.5.1 Draw In

- Make both power "OFF" while press Trip button.(article 7.4)
- Push up draw in & out lever which located at left and right side of cradle. (2 left and right)

Be refer lever's location mentioned on external view.

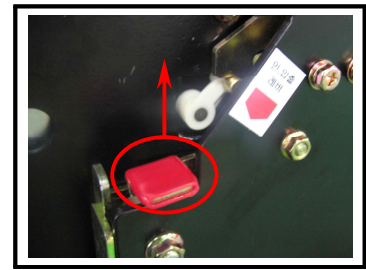
**Note)** It may cause damage of ATCB, if lever were not push up.

#### 1) Disconnected position

Status of main circuit terminal and operation circuit terminal is disconnected.

- Place ATCB on the rail of cradle where located on left and right side, and then push ATCB into inside of panel until draw in-out lever downed back.

Draw in-out rail



"Disconnected" will shows in Draw in-out indicator.



2) TEST position

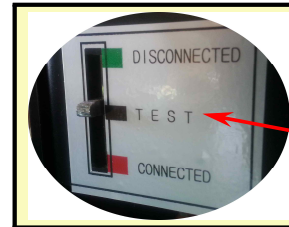
Test and checking is available while main circuits terminal is disconnected, but operation circuit is connected.

- At disconnected position, push up draw in-out lever located in both side of cradle.

Caution) It may cause damage if draw in-out lever were not push up.

- Push ATCB into inside of panel until draw in-out lever downed back. "Test" will shows in Draw in-out indicator.

Caution) Please check if draw in-out lever downed. (If not downed, incorrective operation may happen during test.)



TEST

- Make off of both power sources for draw in operation.(refer article 7.4)

3) Connected position

Normal operation position while ATCB and main circuit connected.

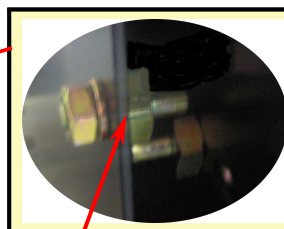
- Push up draw in-out lever at TEST position.

Caution) It may cause damage if draw in-out lever were not push up.

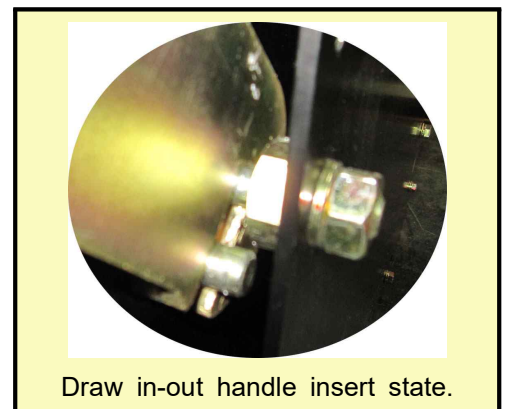
- push ATCB into inside of panel until draw in-out lever downed back.

Caution) ATCB may be offed automatically when push ATCB while "OFF" status. This is Auto tripping function.

- Push ATCB back surely as draw in-out handle reached in locking pin.

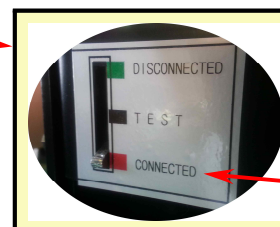


Draw in-out pin



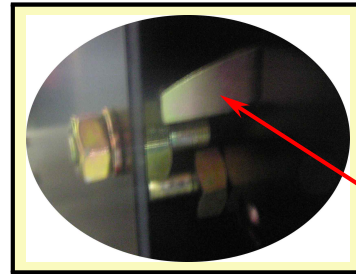
Draw in-out handle insert state.

- After push ATCB back, please push down draw in-out handle, and check if draw in-out indicator is "Connected" position. Draw in-out lever may be downed back.



Connected

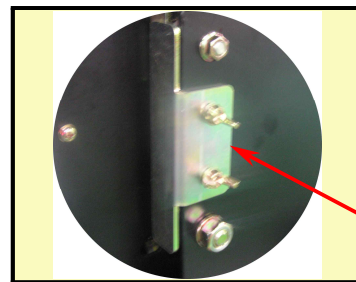
Caution) Make ATCB "OFF" if draw in-out handle is not inserted while ATCB "ON" status



Safety bar for Draw in-out

- After draw in complete, place cover of draw in-out and fix butterfly bolts. (2 bolts)

Caution) ATCB may draw out if cover is not fixed due to vibration.



Cover for draw in-out lever

#### 7.5.2 Draw out [refer article 7.5.1 3)]

- Make "OFF" both power sources by trip button pressing(refer article 7.4)
- Remove cover for lever by unfix butterfly bolts.
- Insert draw in-out handle while draw in-out lever push up.

Caution) Safety bar will not allow draw in-out handle inserting under ATCB "ON" status.

- ATCB may draw out into "TEST" position while draw in-out handle inserted and push up. In this time draw in-out lever may downed.

- At "TEST" position, push draw in-out lever up, and pull ATCB out until "Disconnected" position.

Caution) ATCB may fall down if ATCB over the disconnected position or faster draw out forced.

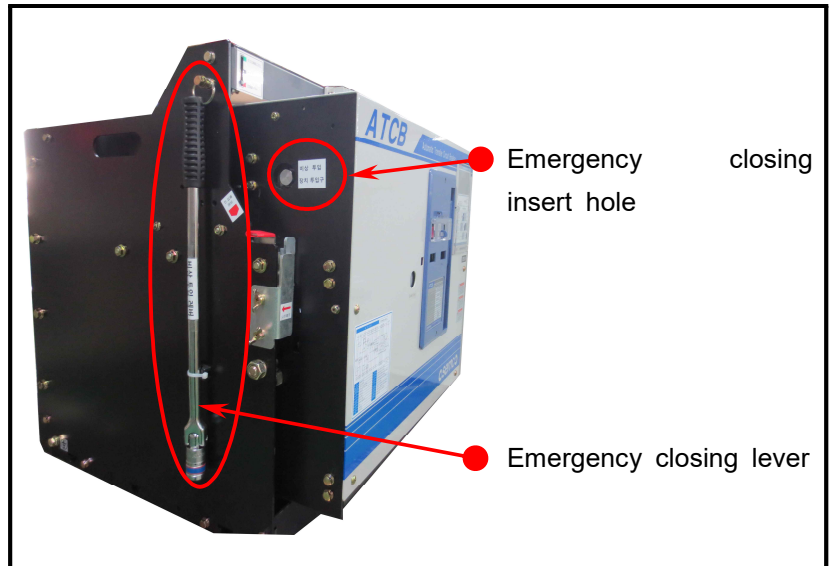
- Remove ATCB from cradle while draw in-out lever push up at "Disconnected" position.

7.6 Emergency Closing Device







Emergency Closing Device shall be operated once ATCB is not available to operate in electrically and mechanically, and you want to make ATCB closing. Please read this procedures, otherwise serious accident will be caused.

**CAUTION**

- 1) Check ATCB is tripped by protection relay.
- 2) Emergency closing should be done under no load condition.
- 3) ATCB shall be under OPEN condition.

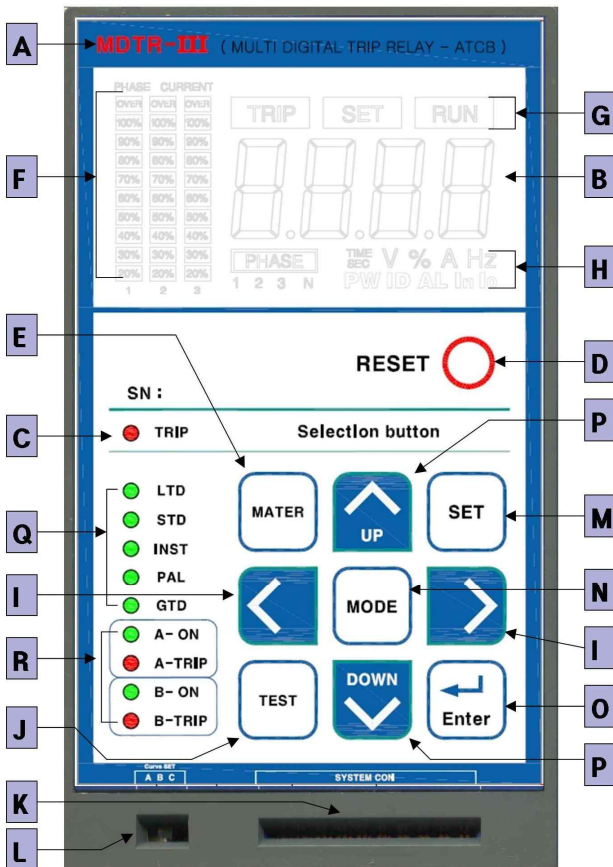


7.6.1 Closing method

Closing to Utility source	Closing to Standby source
 <p>Insert lever into the hole from 2 o'clock direction</p>	 <p>Insert lever into the hole from 2 o'clock direction, and press selection button.</p>
 <p>Pull lever down, then ATCB will be closed.  Lever will be returned to original position if closing is not made.</p>	 <p>While selection button pressed, pull lever down.  Lever will be returned to original position if closing is not made.</p>
 <p>Check closing status.  Transfer indicate</p>	 <p>Check closing status.  Transfer indicate</p>

## 8. MDTR-III Protection Relay

### 8.1 Outer configuration



- Ⓐ Model name, MDTR-III
- Ⓑ Disply window.
- Ⓒ Trip Indicator
- Ⓓ Reset button
- Ⓔ Meter function button
- Ⓕ Bar graph for comparing 3-phase current
- Ⓖ Operation indicator
- Ⓗ Disply unit indicator
- Ⓘ Setting change button
- Ⓝ Test button
- Ⓚ System connector
- Ⓛ Operation feature selection button
- Ⓜ Setting button
- Ⓝ Operation changing button
- Ⓞ Setting completion button
- Ⓟ Input value increase/decrease button
- Ⓠ Basic function display lamp
- Ⓡ ATCB status indicate lamp

### 8.2 Setting indicate lamp

Protection	Function	Protection	Function
LTD (Long time display)	Basic	TRIP	Basic
STD (Short time display)	Basic	A-ON (A source ON)	Basic
INST (Instantaneous)	Basic	A-TRIP (A source Trip)	Basic
PAL (Pre-alarm)	Basic	B-ON (B source ON)	Basic
GTD (Ground fault time display)	option	B-TRIP (B source Trip)	Basic

8.3 Setting range

Classification		Range (Red: default value) error ±10%	Unit
Setting current	In	300-400-500-600-630-800-1000-1200-1250-1600-2000-2500-3150-3200-4000-5000-6300	A
LTD (Long time display)	Current	30-35-40-45-50-55-60-65-70-75-80-85-90-95-100	%
	Time	10-20-30-40-50-60-70-80-90-100-110-120-OFF	sec
STD (Short time display)	Current	200-250-300-350-400-450-500-550-600-650-700-750-800-850-900-950-1000-OFF	%
	Time	0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0-1.1-1.2-1.3-1.4-1.5-OFF	sec
INST (Instantaneous)	Current	400-450-500-550-600-650-700-750-800-850-900-950-1000-1050-1100-1150-1200-1250-1300-1350-1400-1450-1500-1550-1600-OFF 오차 ±15%	%
	Time	Less than 0.07	sec
PAL (Pre alarm)	Current	70-75-80-85-90-95-100-OFF (% of LTD current)	%
	Time	10-20-30-40-50-60-70-80-90-100-110-120-OFF	sec
GTD (Ground fault time display)	Current	15-20-25-30-35-40-45-50-OFF	%
	Time	0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0-1.1-1.2-1.3-1.4-1.5-OFF	sec

- Caution -

- 1) See article 8.7 for setting value of ATCB.
- 2) Setting current is set not by frame but by the current ratio of installed CT on ATCB in factory.
- 3) GTD is not operated by leaked current not by unbalance concept. Available for 3P and 4P.
- 4) Lower current of CT than ATCB frame current can be fitted.

8.4 Button operation procedure and description

Check for setting	Description	Display range	Unit	Status	Auto return time
Initial display value after relay power on (Basic display)	Highest current value among each phase in %.	10~150	%	RUN	Keep display
Step pressing Mode button.	R current in %	10~150	%	RUN	Return to basic display after 30 sec
	S current in %	10~150	%	RUN	
	T current in %	10~150	%	RUN	
	Operation voltage in V	50~300	V	RUN	
	Operation frequency in Hz	40~70	Hz	RUN	
	Each phase current in %, orderly.	10~150	%	RUN	Keep display
Press METER button for 2 sec on basic display	Highest current value among each phase in A.	10~150%	A	RUN	Return to basic display after 50 sec
Step pressing Mode button.	R current in A	10~150%	A	RUN	
	S current in A	10~150%	A	RUN	
	T current in A	10~150%	A	RUN	
	Operation voltage in V	50~300	V	RUN	

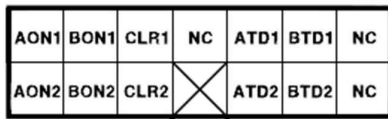
Check setting value	Description	Auto return time
Once pressing ENTER button on basic display	Rated setting current(A) is displayed and lamps for implemented options are blinked.	Return to basic display after 3 sec.
Continuous pressing ENTER button	Setting value for implemented options are displayed sequentially.	Return to basic display immediately.

Note) Relay will be operated normally while checking the measuring or setting value.

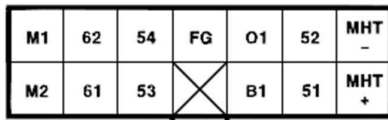
8.5 Test trip

Operation test	Description	Auto return time
Press the TEST button for 4 sec at basic display	Implemented option's indicating lamps are blinked twice and testing for internal system is proceeded.	Return to basic display after test (When cancel for testing, press RESET button)
Press the TEST button one once more in step 1 of relay operation test.	After displaying the rated current and 10 times On/Off of implemented alarm contacts relay, trip relay(MX) repeats 10 times On/Off and ATCB will be tripped.	Return to basic display after test

8.6 Output terminal configuration



ATCB-CONNECTOR



POWER-CONNECTOR



CT-CONNECTOR

Note 1) LTD, STD, INST & Trip alarm contact commonly use 51 & 52 contacts.

Note 2) GTD trip alarm contact commonly use 53 & 54 contacts.

Note 3) M1 & M2 available to use 85V~250V in AC and DC.

Terminal	Classification	Application
CT CONNECTOR	R	R-phase CT connection
	S	S-phase CT connection
	T	T-phase CT connection
	N	N-phase CT connection
	COM	CT common terminal
	NC	Spare terminal
POWER CONNECTOR	MHT+,-	Output terminal for MHT control
	O1,B1	ATCB Trip contact
	51,52	OCR Trip alarm contact
	53,54	GTD Trip alarm contact
	61,62	Pre-Alarm contact
	M1,M2	Relay control source
ATCB CONNECTOR	FG	Earth
	AON1,AON2	Input terminal for A-source status check
	BON1,BON2	Input terminal for B-source status check
	CLR1,CLR2	Input terminal for remote RESET
	ATO1,ATO2	Output terminal for A-source fault trip
	BTO1,BTO2	Output terminal for B-source fault trip
	NC	Spare terminal

8.7 Protection relay setting

Function		After supply of control power source, Press SET button for 4 sec.
Setting increase : UP	^	* Each pressing of button changes the setting value or setting step. * By using left and right button, select setting step.
Setting decrease : DOWN	∇	* Increase or decrease of setting value is made within setting range.. * Display is different according to the option.
Previous moving	<	* Relay protection is not functioned during the setting process. * When next pressing is not made for 20 sec, setting value is saved and display returns to initial stage.
Next moving	>	* During setting process, changed setting value is saved automatically and maintained without power supply.
Change to initial setting value	MODE	* Relay protection function will paused when setting button is pressed. * If relay is tripped continuously by faulty setting value, press setting button and reset. Then setting change or OFF can be made in Setting mode.
Setting completion	Enter	* When setting button is pressed, built-in buzzer beeps.

1) Input A-source setting value and B-source setting value

- Available different value setting between A-source and B-source according to source capacities.
- After setting A-source's LTD, STD, INST, PAL & GTD, make setting B-source's LTD, STD, INST, PAL & GTD.
- When setting for A-source, A-ON and A-TRIP indicate lamp blink, and When setting for B-source, B-ON and B-TRIP indicate lamp blink.

8.8 Other function

1) ATCB closing status indicating

Closing status may indicate by lamps of MDTR-III relay.

- A-ON indicate lamp when A-source closed
- B-ON indicate lamp when B-source closed
- Lights out A-ON, B-ON lamps when ATCB "OFF"

2) Relay trip fault indicating

A-TRIP, B-TRIP lamps blink when ATCB tripped by MDTR-III relay.

- A-source trip: protection function (LTD,STD,INST,GTD) lamps and A-TRIP lamp blink
- B-source trip: protection function (LTD,STD,INST,GTD) lamps and B-TRIP lamp blink

Note 1) Keep blink Trip lamp when reset or recovery after black out.(not continue lamp blink during black out situation)

Note 2) Fault trip reset

- Trip will be resetted when after reset button pressed while DOWN button pressing.
- In remote control case, make short circuit CLR1 & CLR2 terminal for 0.5 sec.

3) Output fault contacts when tripped by relay.

Contact outputs made thru ATO1,ATO2,BTO1 & BTO2 terminal when ATCB tripped by MDTR-III relay.

- A-source trip: ATO1, ATO2 terminal output
- B-source trip: BTO1, BTO2 terminal output
- LTD,STD & INST: 51, 52 terminal output
- GTD: 53, 54 terminal output

Note 1) Keep blink Trip lamp when reset or recovery after black out.

Note 2) Fault trip reset

- Trip will be resetted when after reset button pressed while DOWN button pressing.
- In remote control case, make short circuit CLR1 & CLR2 terminal for 0.5 sec.

4) MDTR-III fault trip history check.

Check	Description	Auto return time
Press METER button after ENTER button pressed at basic display.	<ul style="list-style-type: none"> <li>- Select history number using by UP &amp; DOWN key (No 1 is latest event)</li> <li>- No indicator and fault source lamp and description of fault lamp will blink.</li> <li>- If no key touch for 4 sec, returns to RUN status.</li> </ul>	Auto return to basic display if not key touch for 4 sec.

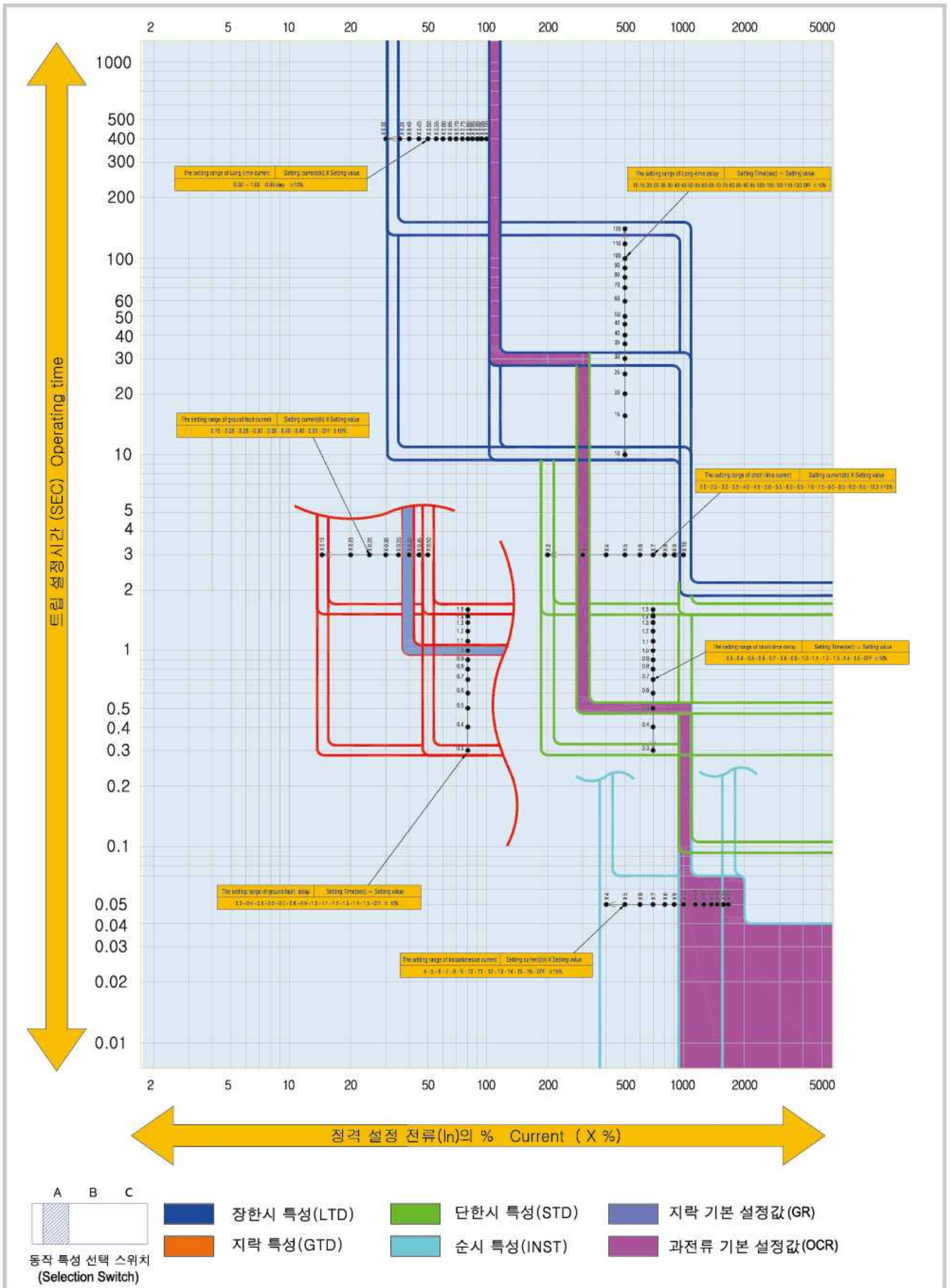
MDTR-III relay available to check (16) trip histories.

- Not checked Trip date and time.
- Just number displayed when no trip history, and status lamps will not blink.

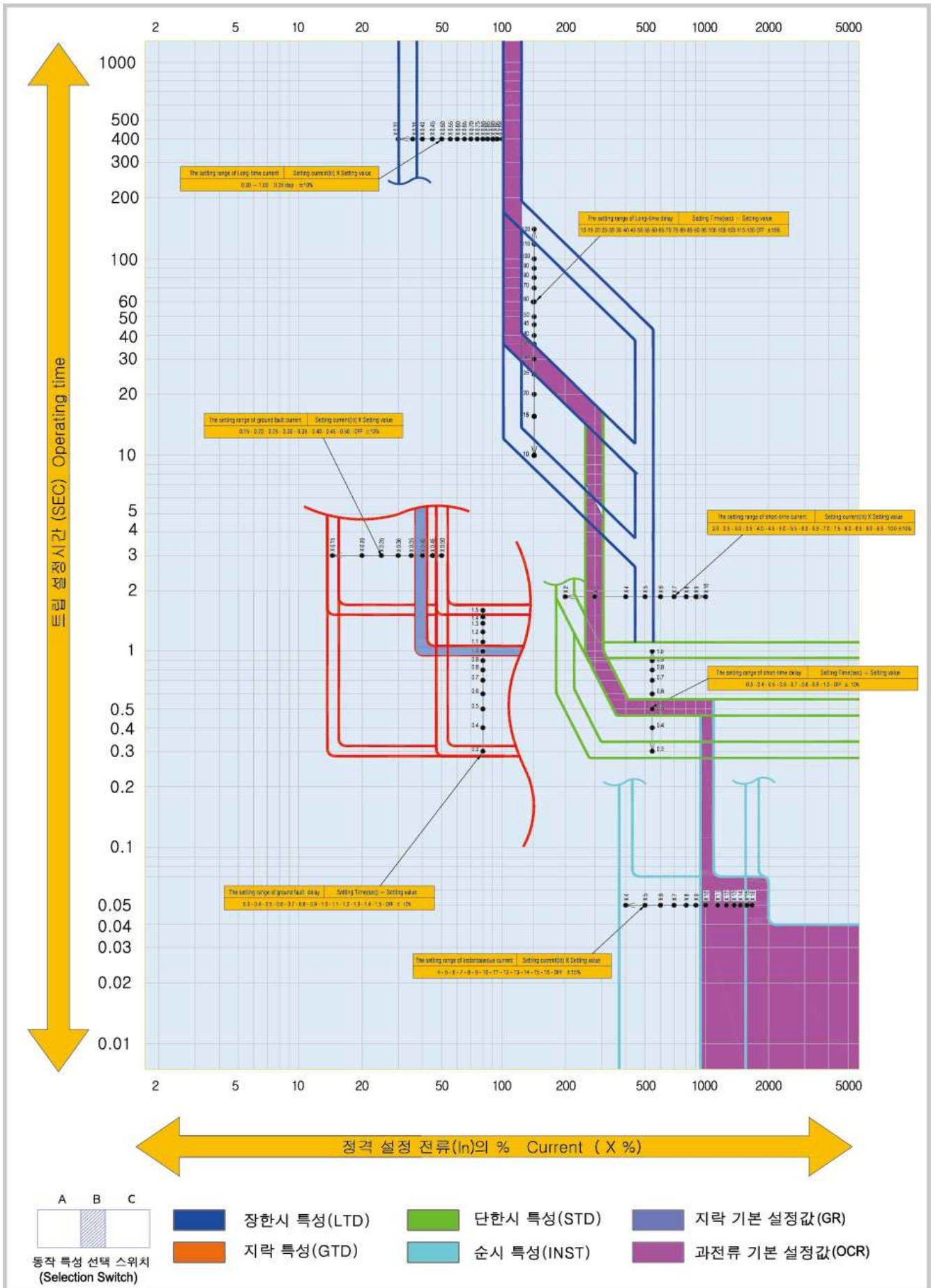
5) Caution

- ATCB tripped immediately when re-closing of fault source without reset of fault trip (Article 3)  
 주) Possible normal source closing, and relay will operate normally.
- Trip signal will keep output for 0.5 set as INST trip.
- Protection function will not be operated if operation power is not supplied into ATCB and MDTR-III relay.

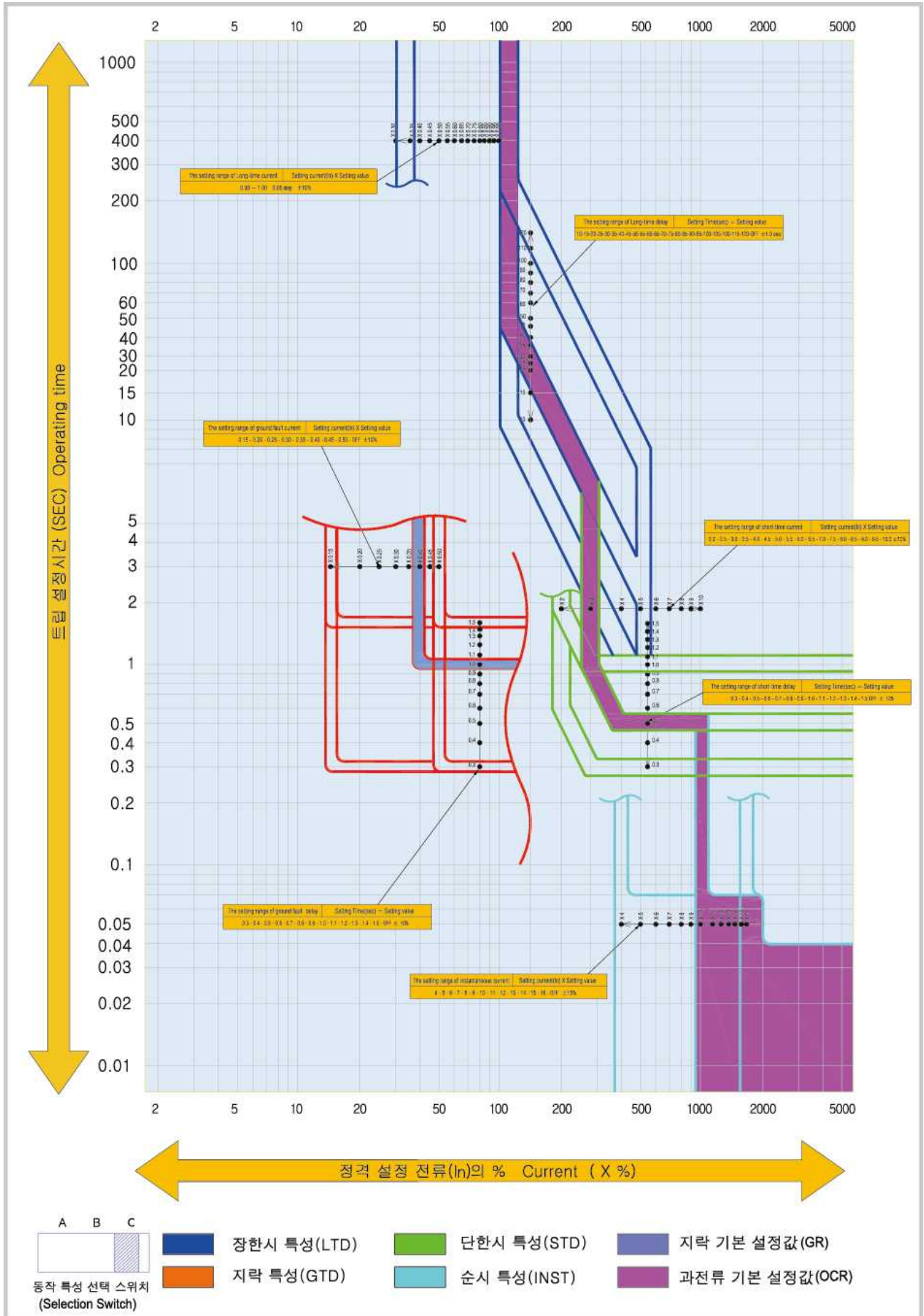
8.9 Time-Current characteristic curve Type A (Definite time)



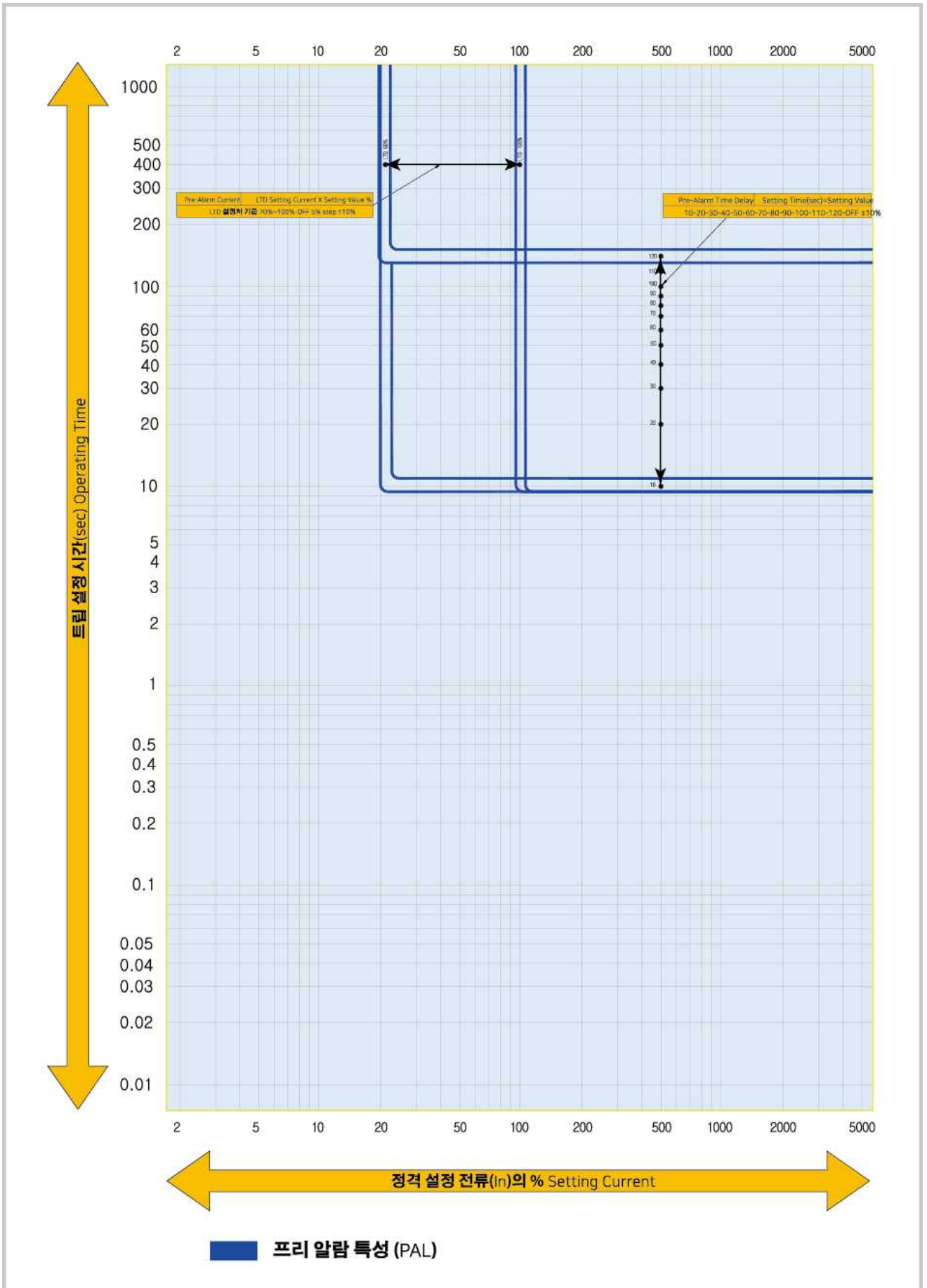
8.10 Time-Current characteristic curve Type B (Normal time)



8.11 Time-Current characteristic curve Type C (Very Inverse)



8.12 Time-Current characteristic curve of PAL



## 9. Maintenance

Please read this article and do maintenance as follows below instruction for to keep sound ATCB service and operation.

9.1 Every 6 month, clean the dust and oil which residue on the ATCB.

9.2 Naked eye check distortion or discolour of contacts area.

9.3 Do ON-OFF operation of ATCB (1) time for a year to check rust, oxidation or dust placed.

9.4 Caution in safety during maintenance, and check loose of bolts and nuts.

9.5 Check requirements

Check class	Check interval	
	General environmental	Severe environmental
Instantaneous	1 time 6 month	1 time 1 month
Periodic	1 time 1 year	1 time 6 month
Temporary	If necessary	

9.6 Instantaneous check.

Check class	Check point
Naked eye check	<ul style="list-style-type: none"> <li>• Over heat and discolour of terminal</li> <li>• Rusts</li> <li>• Dusts</li> <li>• Abnormal smell</li> <li>• Damage, breakage, distortion and discolour of insulation materials.</li> </ul>

**10. Periodic checks**

Check item		Check requirements	Solutions and trouble shooting
Insulation Materials	Contacts enclosure & Insulation Frame.	• No damage or crack on Insulation materials?	• Stop service and consider to replace parts.
		• No humidity and dust is found on surface?	• If serious humidity and dust, stop service and clean it up.
		• Any loosen of bolts?	• Fix bolts as well as specified torque. Bolts fix should be balanced.
	Arching chamber	• Nor arcing scratch on insulation barrier?	• If serious, assume damage of contacts and arching chamber. Then consider to replace those parts.
		• Serious damage on arching chamber?	• Considered normal condition if discolor of arching chamber inside but if insulation barrier is broken, must consider to replace those parts.
Insulation resistance	• Serious damage of arching barrier?	• Consider replace those parts.	
		• Between phase and Ground • Insulation resistance of operation circuit	• 5MΩ over • 20MΩ over
Conductive devices	Contacts	• Any damage of auxiliary contacts?	• Light discolor, clean up busing by sand paper or file in high density. If serious, replace those parts.
		• Keep good contacts?	• Bad contacts may cause over heating.
		• Any wrinkles or scratch on contacts?	• As a result of over heating, discolor, flashing and smelling founded.
		• Discolouring due to over heating on contacts?	• If serious, deep discolure and distortion occurred.
		• Any loosen bolts on contacts?	• Loosen bolt may cause over heating, re-fixing as much as specified torque.
Driving and operation	Mechanical drive	• Rotate and lubricant device is keep smooth?	• Do lubricant
		• No damage or rust on rotate and lubricant device?	• Cause incorrective operation
		• No rust and damage on springs?	• Replace damaged parts
		• No loosen on bolts and nuts?	• Fix again as much as specified torque
		• No loosen and damage on E-ring and stopper pins?	• Replace or fix it on right position

## 11. After sales service

### 11.1 Check point before service request

- 1) Lower voltage or voltage drop of operation voltage?
- 2) Can mee required voltage and frequency from the generator source?
- 3) Enough capacity of transformer for operation?
- 4) Enough cable volume if battery power used?

### 11.2 Service center information

- 1) After check information on name plate, and trouble status of product please call or fax in below.  
TEL : +(82 31) 944-3521~3  
FAX : +(82 31) 944-3525