SF_6 gas insulated
Three-phase Automatic Line Sectionalizer

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1. DESCRIPTION

JK-ACSBS type electronically controlled sectionalizer is a self-contained, circuit-opening device used in conjunction with source-side protective devices, such as reclosers or circuit breakers, to automatically isolate faulted sections of electrical distribution systems.

The sectionalizer senses current flow above a preset level, and when the source-side protective device opens to de-energize the circuit, the sectonalizer counts the over-current interruption.

Depending upon the coordination scheme, the sectionalizer will open during the first, second, or third open interval of the fault interruption device to isolate permanent faults and confine outages to smaller section of line.

The sectionalizer does not interrupt fault current but can be closed into a faulted line. It opens during the open interval of the back-up device. For this reason, it must always be used in series with a fault-interrupting back-up protective reclosing device. Also, it will reset counts that do not reach the counts-to-open setting within the selected reset time due to clearing temporary faults.

This "count-restraint" feature prevents the sectionalizer from counting over-currents interrupted by down-line devices.

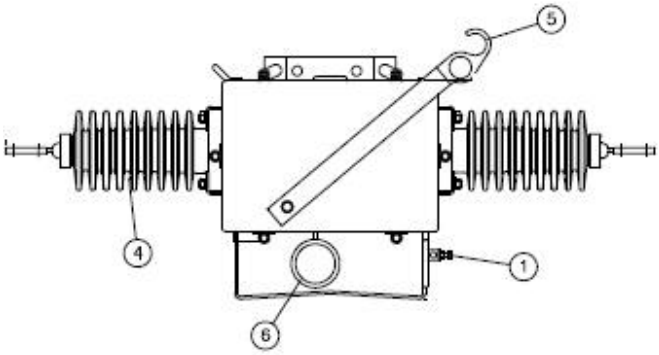
The sectionalizers are also equipped with an inrush-current restraint feature which distinguishes between inrush currents and fault currents

2. RATINGS

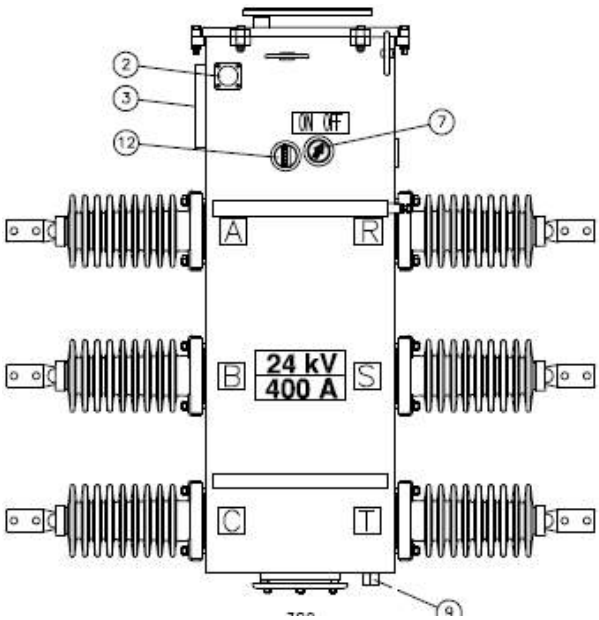
Type / Description		JK – ACSBS-CGA
Rated Voltage		24 kV
Rated Current		200/400 A
Rated Frequency		50/60 Hz
Rated short-time Current	current(Asym)	15 kA
	1 sec(Sym)	10 kA
	10 sec(Sym)	3 kA
Unload transformer switching current		12 ~16 A
Line-charging Interrupting Current		5 A
Power Frequency Withstand Voltage Level • Dry, 1 minute		50 kV
Impulse Insulation Level(1.2×50μs) • Phase to Earth • Across Interrupter		125 kV 125 kV
Minimum pick-up current	Phase(A)	16, 24, 40, 56, 80, 112, 160, 224, 256, 300, 448, 640A and Block
	Ground(A)	3.5, 7, 18, 28, 40, 56, 80, 112, 160, 160, 224, 320 and Bypass
Number of counts to open		1, 2, 3
Count reset		15, 30, 60, 90, 120, 180 sec
Inrush Time • Phase(cycle) • Ground(sec)		5, 10, 15, 20 0.3, 0.7, 1.5, 3, 5
Approximate weight(Body/ controller)		140 kg/20 kg
Environmental service condition • Ambient temperature • Relative humidity • Altitude		up to 50 ℃ up to 95 % up to 2000 meters above sea level
Applied standard		ANSI C37.63

3. CONSTRUCTIONS

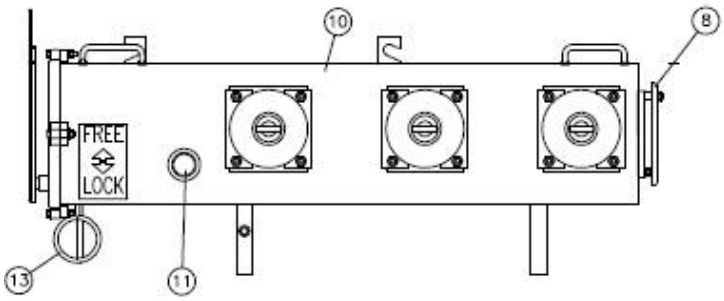
3.1 SECTIONALIZER BODY



(Front view)



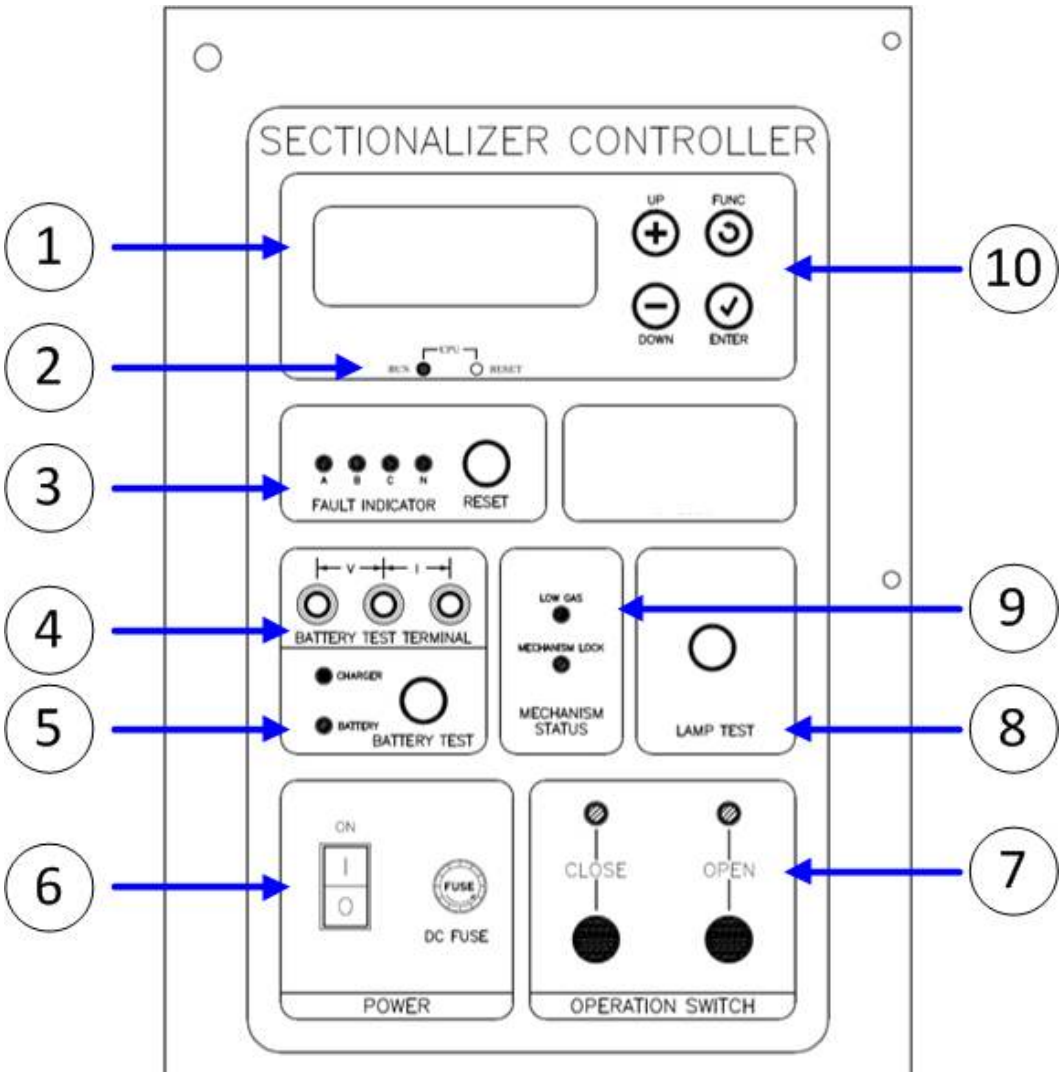
(bottom view)



(side view)

1) Earth terminal to connect grounding cable of 22 ~ 60 SQ
2) Receptacle to be interface with control unit through control cable
3) Name plate
4) Porcelain bushing with NEMA 2 hole terminal for high voltage cable connection
5) Manual closing handle to close the sectionalizer
6) Manual tripping handle to open
7) Position indicator(ON/OFF)
8) Safety membrane
   When the internal gas pressure rise up to 1 ~ 2 kg/cm^2, the high pressure release device is activated to release the internal high gas pressure for safety.
9) Gas filling valve to re-fill the gas and check the gas pressure inside of switch tank with gauge
10) Stainless steel tank
11) Low pressure target
    When the gas pressure drops to 0.1 ~ 0.2 kg/cm^2 the white color indicator is changed to red color. At the same time, the switch is interlocked to lock the operation mechanically and electrically.
12) Counter to record the number of sectionalizer operation
13) Mechanical locking device to lock the sectionalizer operation

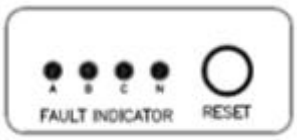
3.2 CONTROLLER



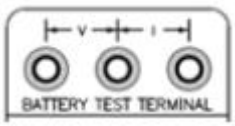
① LCD DISPLAY / ② CPU STATUS LED

	◈ LCD display to enter/set/check by using four(4) function keys. ◈ CPU status LED It is blinked every 1 sec.

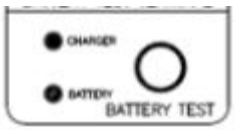
③ FAULT INDICATION LED & RESET BUTTON

	◈ Fault indicator LED each for phase A, B, C and N) to be turned on when fault current happens. ◈ Reset button to reset the fault indicator When line current is over than preset minimum pick up current for phase and ground, the lamp shall be turned on. If the line current is restored to normal condition, the lamp shall be turned off automatically. Also, it can be reset by pushing the reset button.

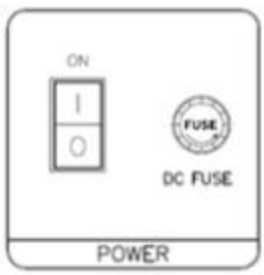
④ BATTERY TEST TERMINAL

	◈ Battery test terminal to check battery voltage(V) and charging current(I).

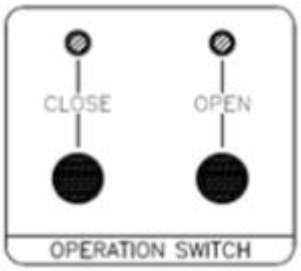
⑤ BATTERY TEST BUTTON

	◈ Battery test button When pushed, if the battery voltage and charging is normal, the LED is turned on.

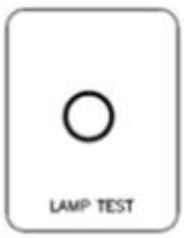
⑥ POWER S/W and FUSE

	◈ Controller power switch(ON/OFF) ◈ DC fuse(2A 250V) to protect control circuit

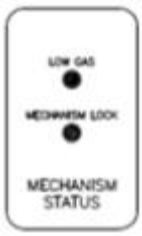
⑦ CLOSE/OPEN SWITCH

	◈ Close/open push button switch to close/open the sectionalizer

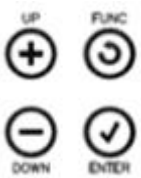
⑧ LAMP TEST SWITCH

	◈ Lamp test switch When pushed, all lamps provided on control panel shall be turned on and then turn off after 1 sec. at the normal condition.

⑨ STATUS INDICATION LED(for sectionalizer body)

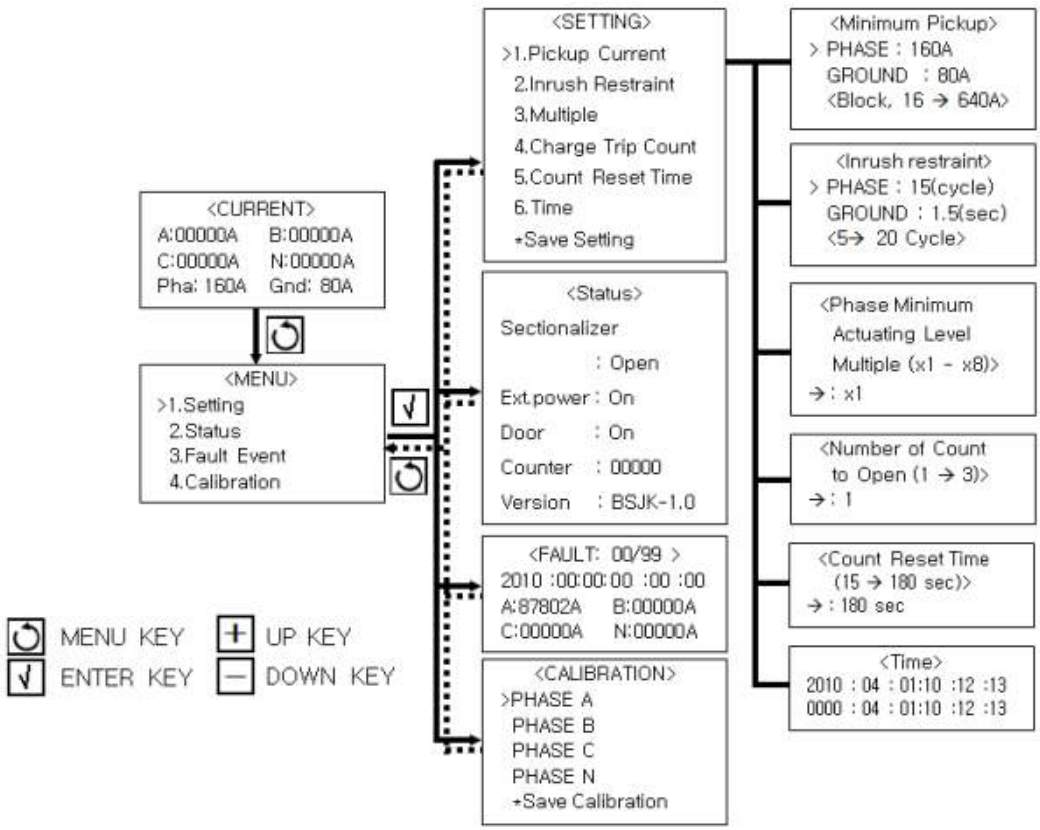
	◈ LOW GAS LED is turned on under low gas pressure condition. ◈ MECHANICAL LOCK LED is turned on under the sectionalizer mechanically locked condition.

⑩ FUNCTION KEYS(UP / DOWN / MENU / ENTER)

	◈ MENU KEY to set, enter, select, or move in menu tree. - UP key : to move menu or increase the value - DOWN key : to move menu or decrease the value - MENU : to move the sub-menu or return back to upper menu - ENTER : to set/select or enter the sub-menu

4. LCD MENU

The following figure is showing the menu tree.



<LCD MENU TREE >

The LCD MENU is accessed with the following four(4) function keys.

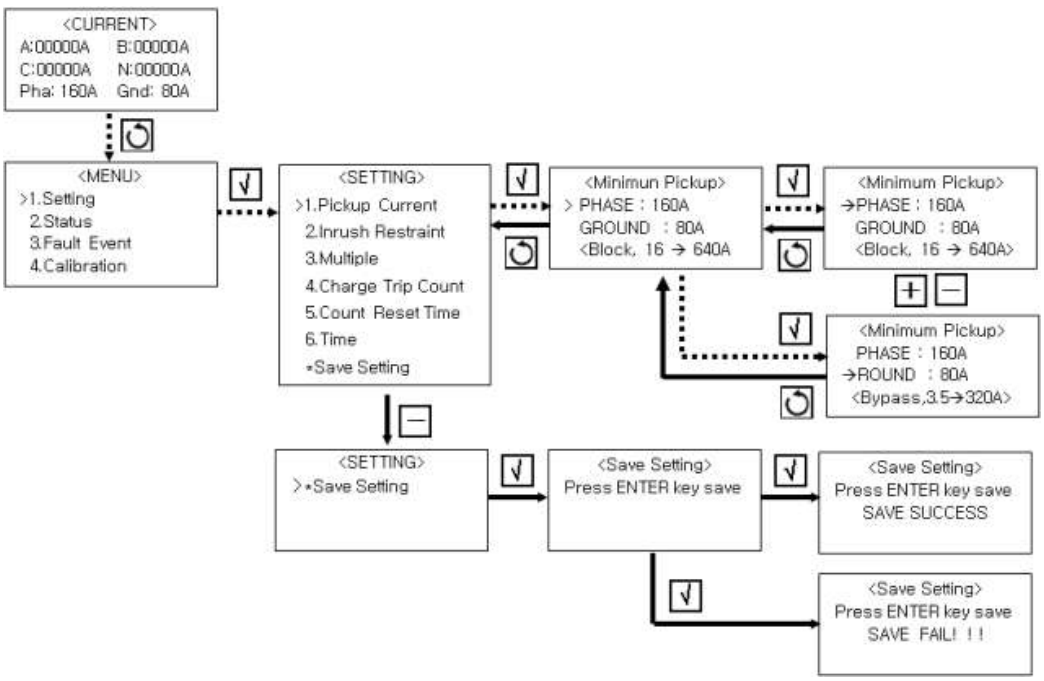
At the initial LCD display, if you press MENU key( ), Main Menu is displayed.
The Main Menu is composed of four(4) main items, SETTING, Status, Fault Event and Calibration.

At the Main Menu, if you press ENTER key( ), you can select the sub-menu, Setting, Status, Fault Event and Calibration.

4.1 SETTING MENU

SETTING menu is composed of six(6) sub-menu, Pickup Current, Inrush Restraint, Phase minimum Actuating Level Multiple, Charge Trip Count, Count Reset Time and Time.

4.1.1 PICKUP CURRENT



< Pickup Current setting >

The minimum pick up current levels for both phase and ground are determined by the minimum pick up current selector.

Normally these setting are approximately 80 % of the minimum trip settings of the backup protective device such as recloser or circuit breaker.

The available setting value of minimum pick-up current each for phase and ground is as follows.

* Phase : BLOCK, 16, 24, 40, 56, 80, 112, 160, 224, 256, 300, 448, 640
* Ground : Bypass, 3.5, 7, 18, 28, 40, 56, 80, 112, 160, 224, 320

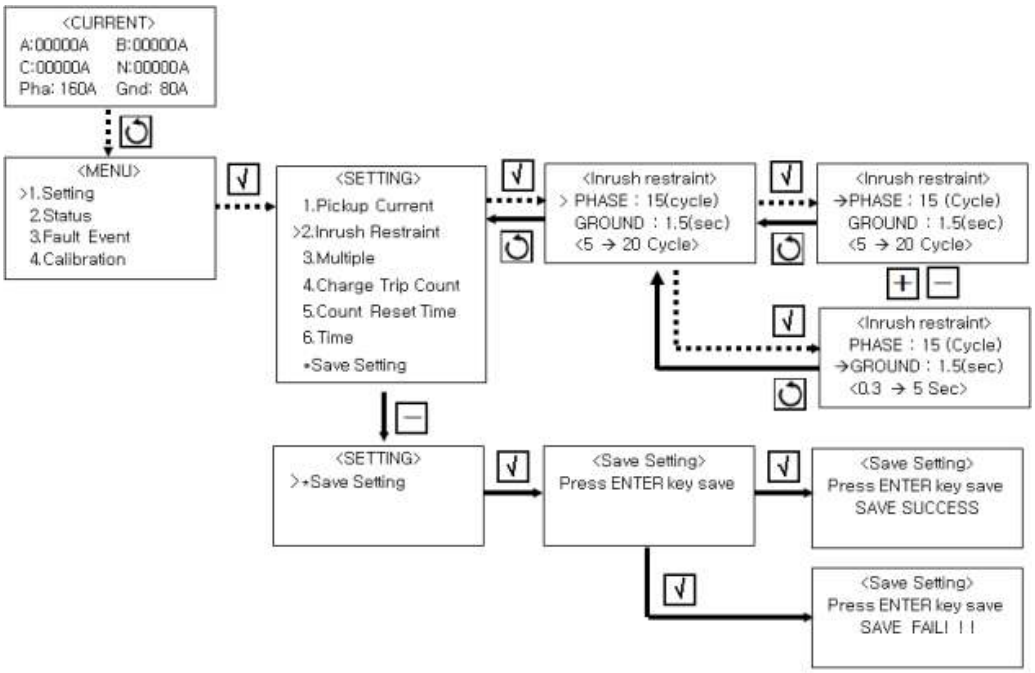
Setting value can be adjusted by using UP() and DOWN() key.
(This UP/DOWN key is also used to move to other sub-menu.)

After selecting the value, you can save by pressing ENTER() key.
(This ENTER key is also used to select sub-menu that you want to enter.)

The MENU() key is used to return back to upper-menu.

After changing the value, it is required to return to Setting menu and select "* Save Setting" to save.

4.1.2 INRUSH RESTRAINT



< Inrush Restraint >

On the Setting menu, if you move to Inrush Restraint, you can select the time for inrush restraint.

The inrush restraint time is available each for phase and ground as follows.

* Phase : 5, 10, 15, 20 [Cycle]

* Ground : 0.3, 0.7, 1.5, 3.0, 5.0 [Sec]

The setting is made as shown in the figure above.

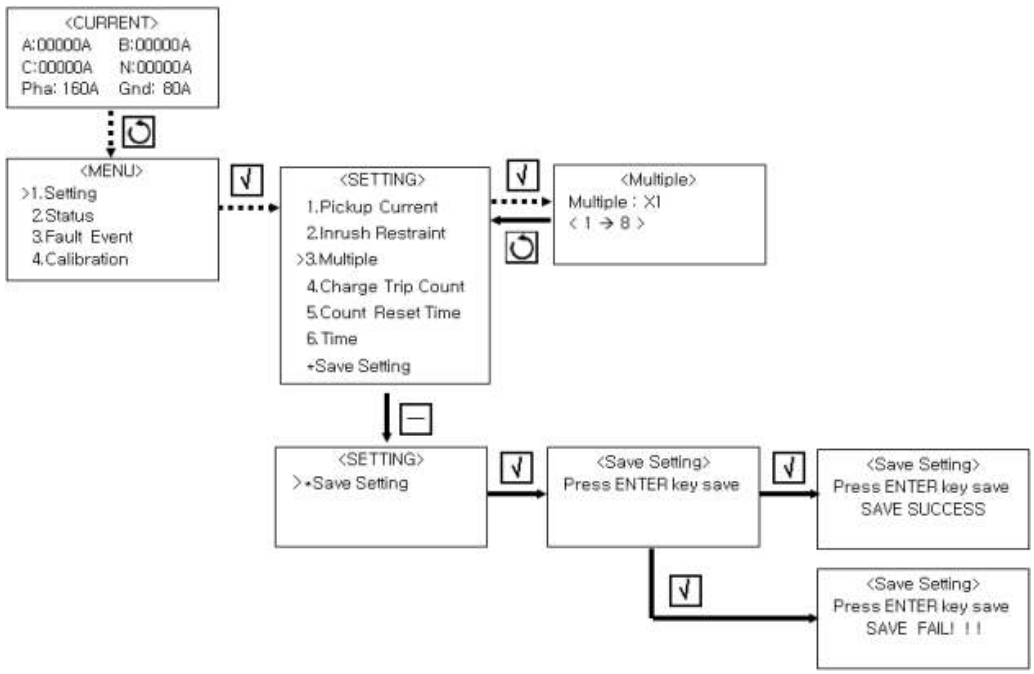
> After changing the value, it is required to return to Setting menu and select "* Save Setting" to save.

The inrush-current restraint feature raise the phase minimum pick up level of the sectionalizer by a multiple X"(1, 2, 4, 6, 8 times) or it blocks over-current detection entirely for a period of time "Y"(5, 10, 15, or 20 cycles), after current flow through the sectionalizer is restored and the over-current has been determined to be inrush current.

At the same time, ground over-current detection is blocked entirely for a period "Z"(0.3, 0.7, 1.5, 3 or 5 seconds).

For this feature to operate effectively, the values selected for X, Y and Z must be expected inrush current.

4.1.3 MINIMUM ACTUATING LEVEL MULTIPLIER



<Minimum Actuating Level Multiple >

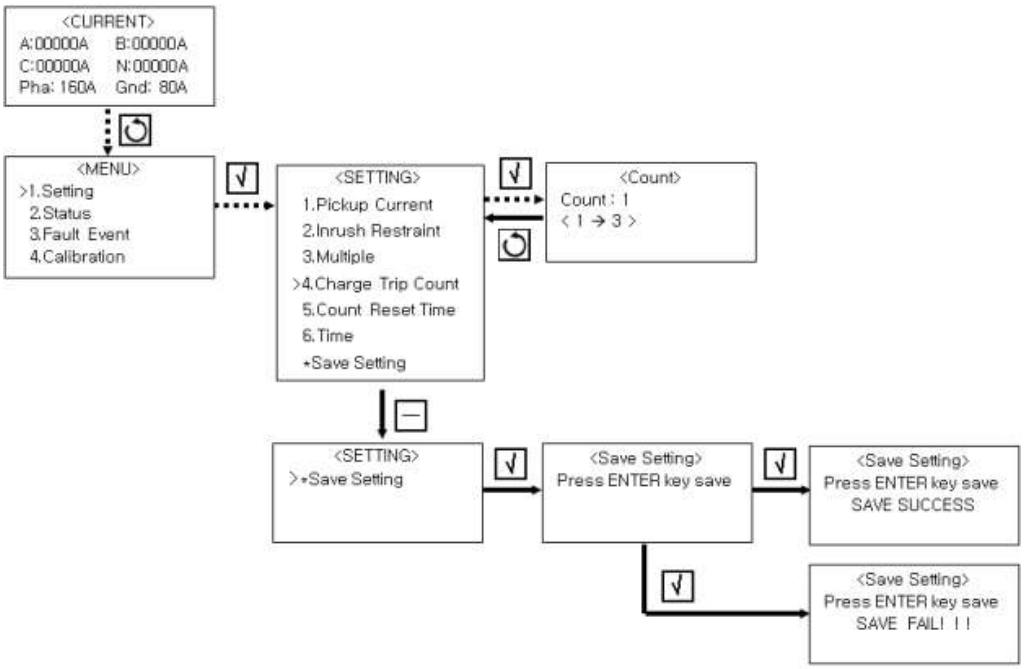
The minimum actuating level multiplier is available with the following.

* Multiple : 1, 2, 4, 6, 8 [Times]

The setting is made as shown in the figure above.

> After changing the value, it is required to return to Setting menu and select "* Save Setting" to save.

4.1.4 CHARGE TRIP COUNT(count to open)



< Charge Trip Count >

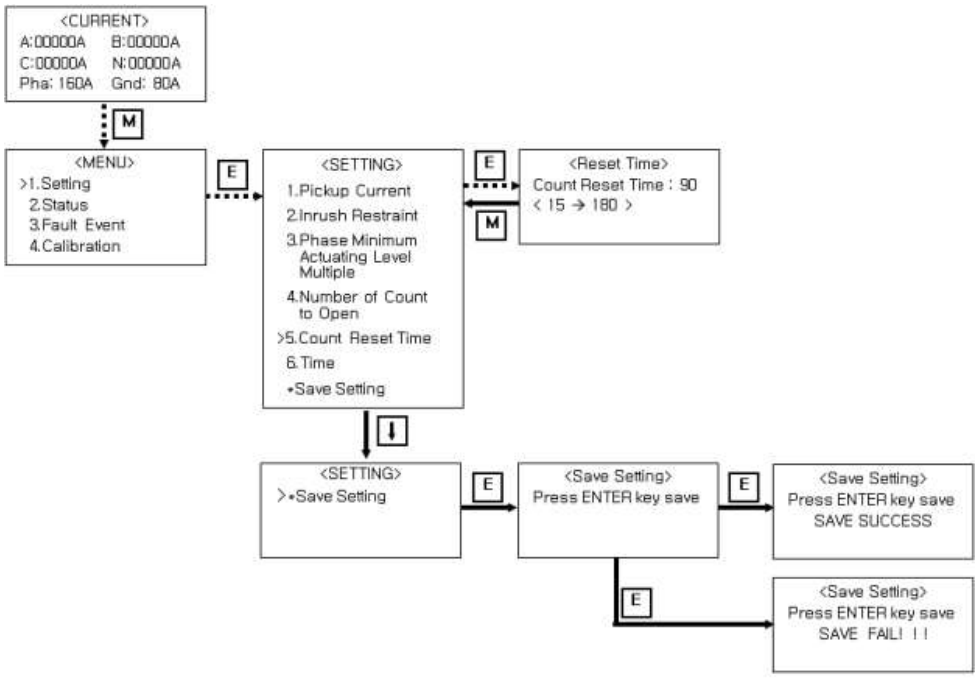
The time(count) to open is available with 1, or, 2 or 3.

The setting is made as shown in the figure above.

Normally, this setting is one less than the number of operations to lockout of the backup protective device.

After changing the value, it is required to return to Setting menu and select "* Save Setting" to save.

4.1.5. COUNT REST TIME



< Count Reset Time >

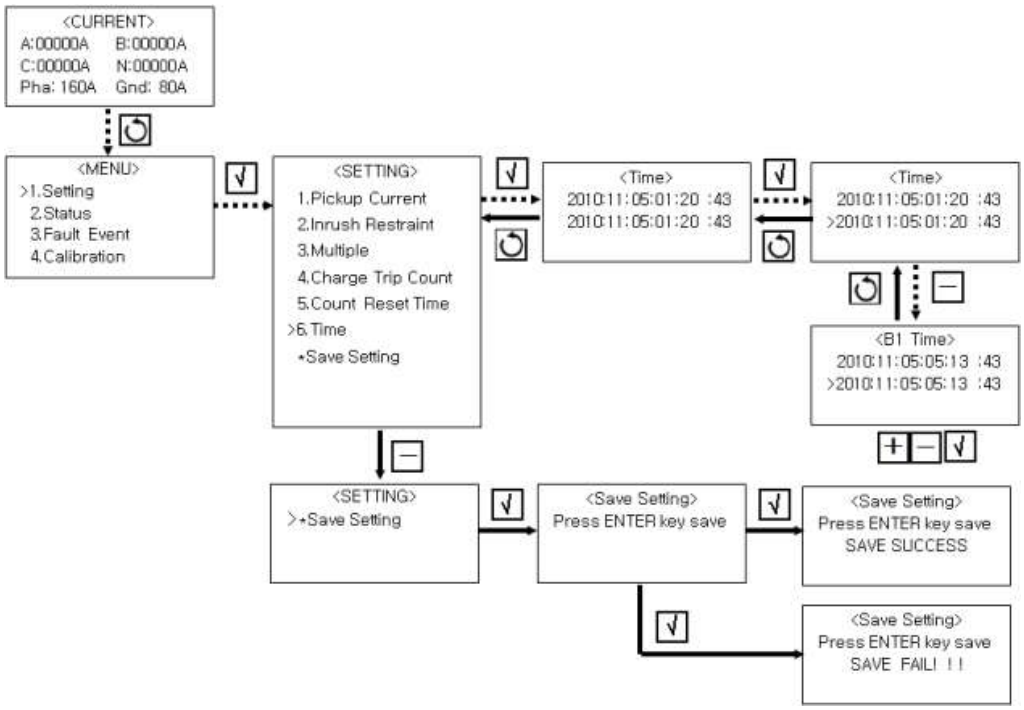
Reset times of 15, 30, 60, 90, 120 and 180 seconds are available. This feature resets to zero, and any accumulated counts are canceled, whenever current, below the minimum pick up level, flows through the sectionalizer without interruption for longer than time programmed.

The reset feature will operate with minimum load below phase or ground pickup levels and voltage of phase to earth.

The setting is made as shown in the figure above.

After changing the value, it is required to return to Setting menu and select "* Save Setting" to save.

4.1.6 TIME

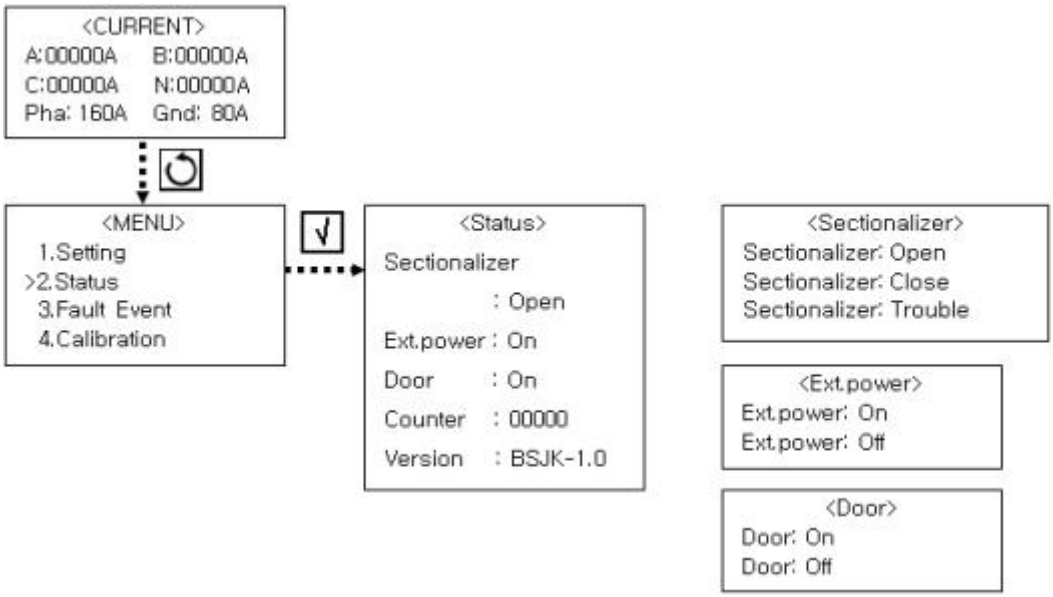


Through this Time Setting, you can set the real time of the control unit.
The setting is made as shown in the figure above.

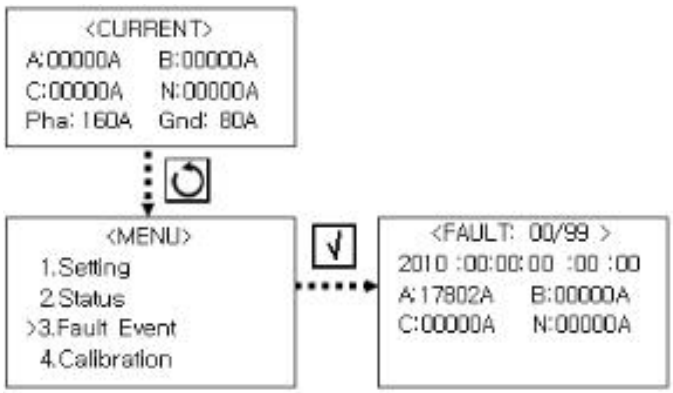
> After changing the value, it is required to return to Setting menu and select "* Save Setting" to save.

4.2 STATUS MENU

As shown in the figure below, the Status menu is composed of five(5) sub-items, Sectionalizer ON(closed)/OFF(open), Ext. Power ON/OFF, DOOR ON(closed)/OFF(open), Counter(number of sectionalizer operation) and Version(of controller firmware).



4.3 FAULT EVENT MENU



< FAULT EVENT >

If you enter the FAULT EVENT menu, you can check the fault history on :

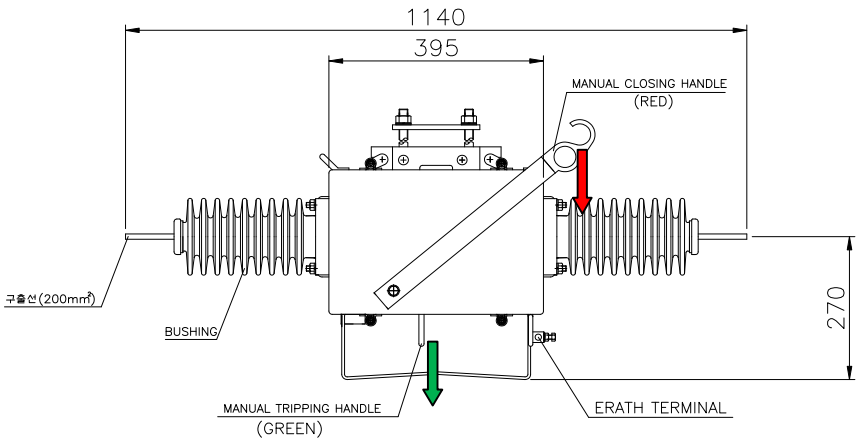
- Which phase fault current happens.
- How big fault current happens.

- When the fault current happens.

5. OPERATION

5.1 MANUAL OPERATION

The Sectionalizer closed manually by pulling down the manual closing handle with NEMA hook-stick and is opened manually by pulling down the manual opening handle with NEMA hook-stick as shown in the figure below.



5.2 ELECTRICAL OPERATION

The Sectionalizer is closed or opened electrically by pushing the OPEN/CLOSE button on the control panel.

6. INSTALLATION

6.1 CHECKING POINTS BEFORE INSTALLATION

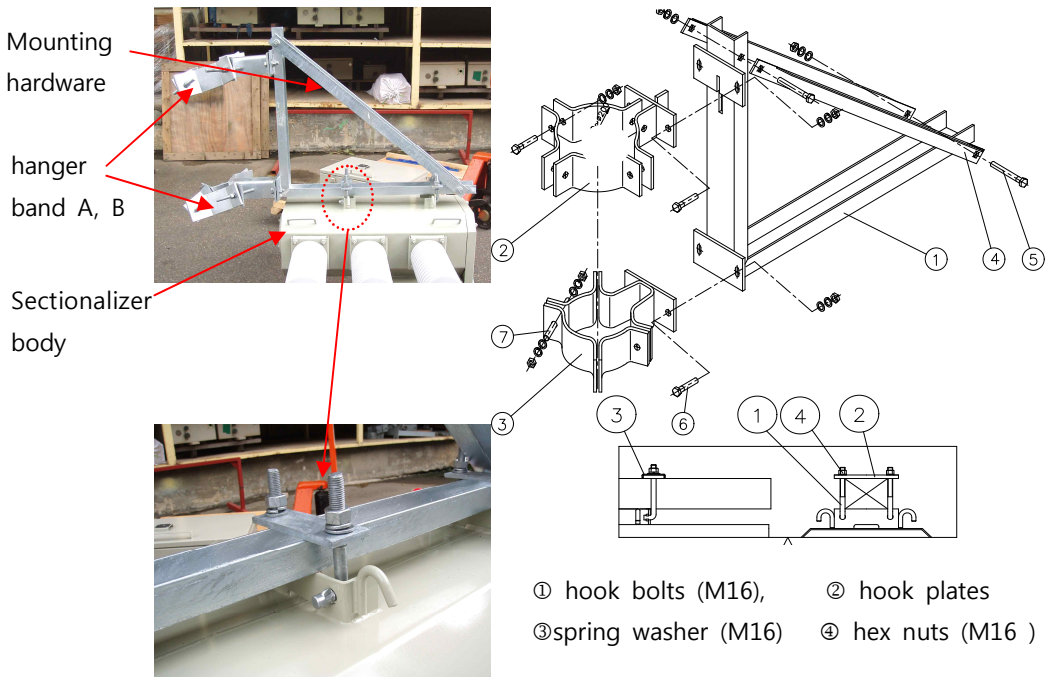
Before installing the Sectionalizer, the following shall be checked carefully.

- After unpacking, check if there is damage, deformation, cracks, scratches and etc.
- All of lamps on control panel is in normal condition by pushing the LAMP TEST BUTTON.
- The Sectionalizer is operated well both by manually and electrically through controller.
- Check if the Sectionalizer keeps normal gas pressure.

6.2 INSTALLATION

When lifting the Sectionalizer, use the carrying handle located on the top of the tank and follow approved procedure. At this point, the contacts are opens. Never use its bushing, bushing terminals nor manual trip handle. These handling will cause the damage to the Sectionalizer

• ASSEMBLY OF MOUNTING HARDWARE ON THE SECTIONALIZER BODY



① hook bolts (M16), ② hook plates
③spring washer (M16) ④ hex nuts (M16)

• ***GROUNDING***

Make the ground to the earth terminal of Sectionalizer and control cabinet.

Ground the Sectionalizer body

Make ground connections to the ASS ground connector located on the side of front leg the Sectionalizer. It will accommodate 22 mm^2 to 60 mm^2 steel ground connector with solderless clamp type .Make ground connections in accordance with approved utility standards.

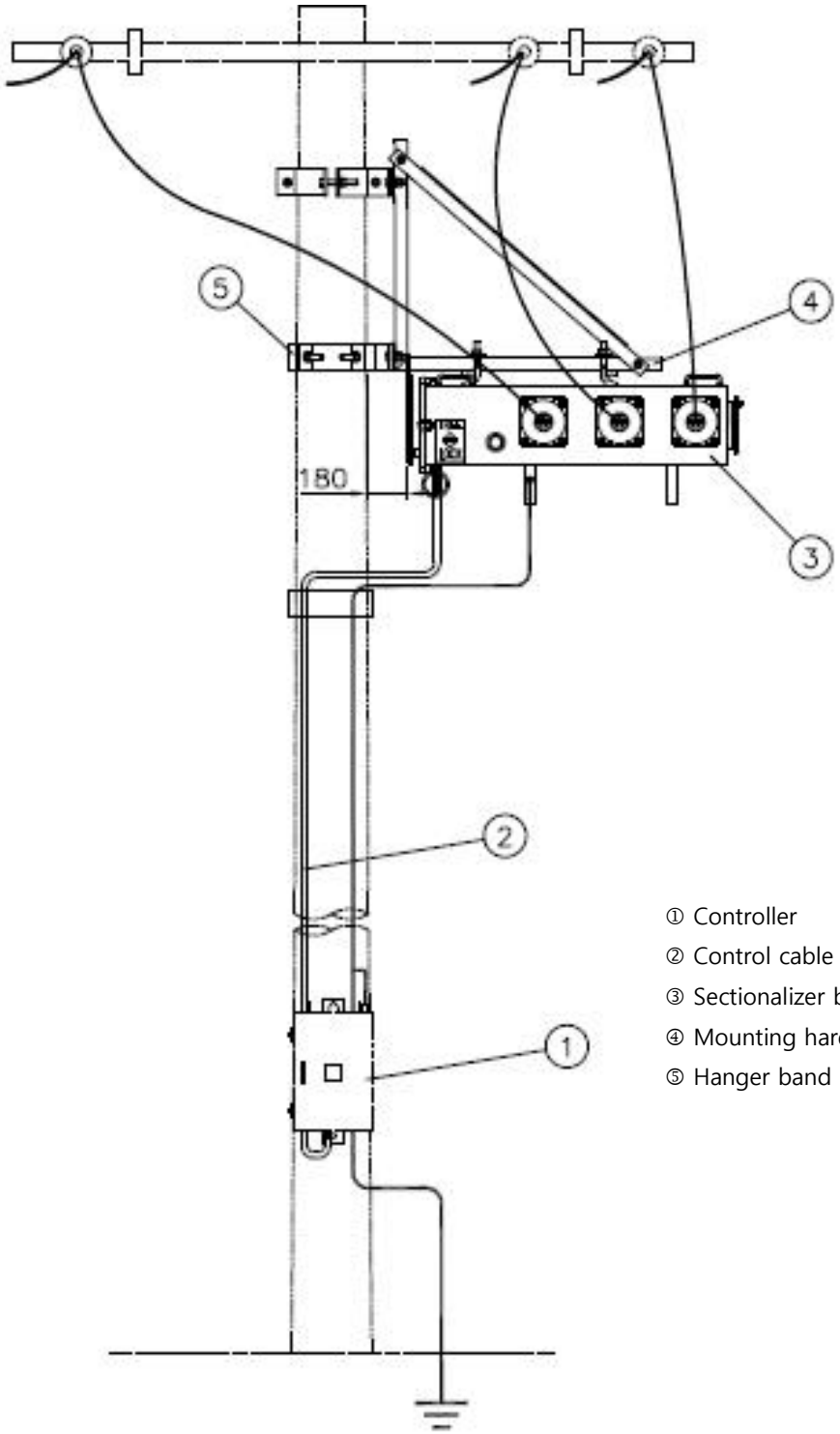
② ***Ground the controller***

Make ground the control using the ground connector provided at the upper of the control cabinet for connecting 22 mm^2 to 60 mm^2 stranded grounding cable with solderless clamp type. Make ground connections in accordance with approved utility standards.

Make sure the control is grounded and properly programmed for the planned installing

• ***CABLE CONNECTION***

The control cable is fabricated with receptacles on both ends. The length of our standard control cable is 8 m. It must be supported along its length to prevent repeated movement due to wind or other outside forces which can damage the cable. Connect male receptacle of the control cable to the receptacle of the Sectionalizer and female receptacle of the control cable to the receptacle extending from bottom of the control cabinet. Make certain that all connections are positioned correctly and securely tightened.



① Controller
② Control cable
③ Sectionalizer body
④ Mounting hardware
⑤ Hanger band

(Typical pole installation of sectionalizer)

7. MAINTENANCE

7.1 GENERAL

All components in the sectionalzier tank are maintenance-free for the declared life expectancy of the product.

At least once in a year, it is recommended to check for :

1) Any damage or cracks on bushing and Sectionalizer body
2) Any corrosion of metal part of Sectionalizer body and controller
3) The number of switch operation
4) Gas pressure in Sectionalizer body

7.2 BATTERY CHECK

The battery is 24 V(12 V x 2), 2AH, which is automatically charged from high voltage.

But, if the Sectionalizer have been in non-service for more than 6 months after it was shipped out from factory, 25% of battery capacity is expected to be discharged, so, the battery should be checked for its capacity to operate.

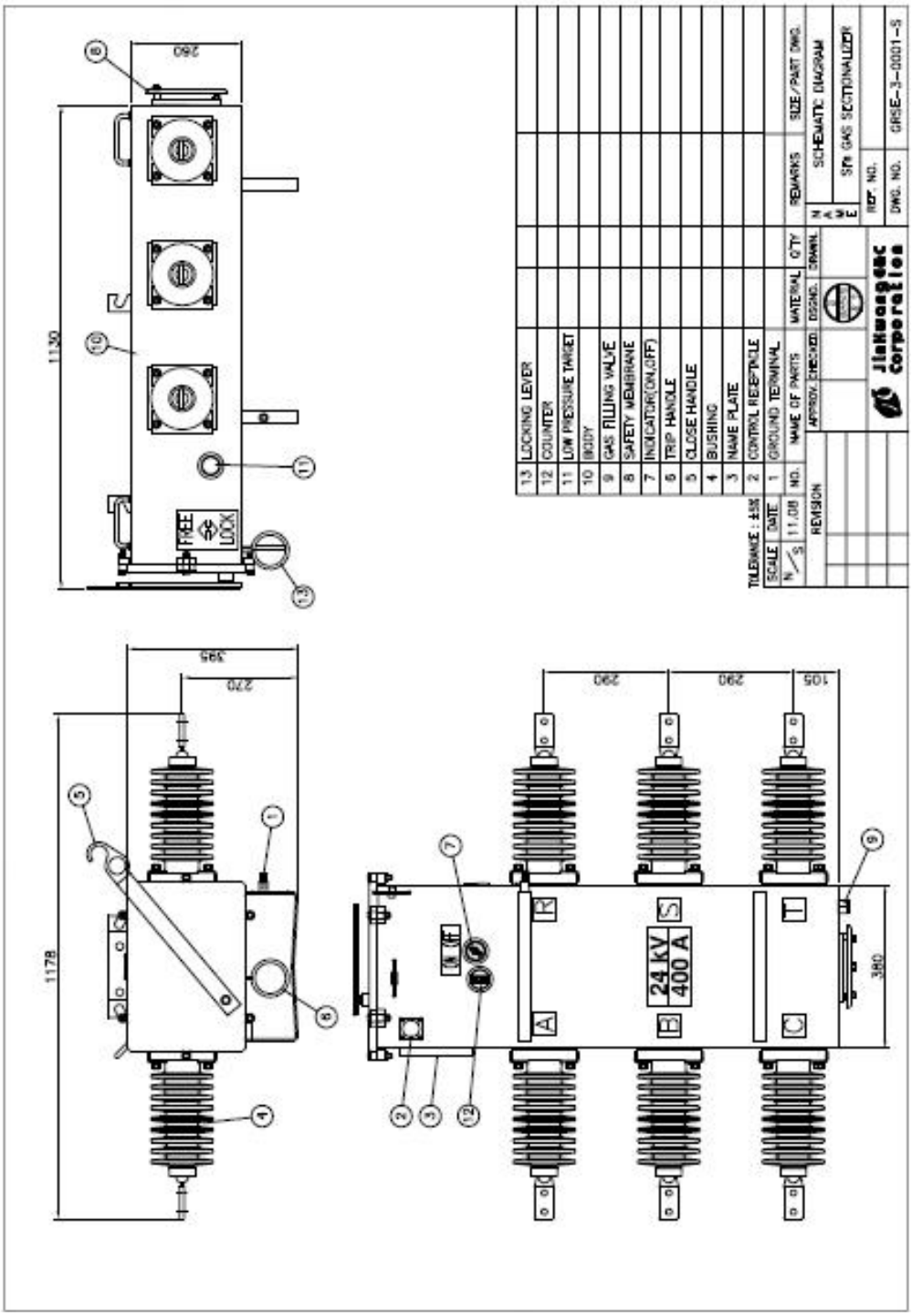
1) When checked, if voltage is more than 24 V, it is considered to be no problem to operate the switch. If the battery voltage is so low that switch cannot be operated by motor, battery is required to charge.
2) When the switch is put into service, the battery charging current can be measured from test terminal on control panel.
3) Battery life time

   In normal service condition, the batter will have 3~4 years service life time.

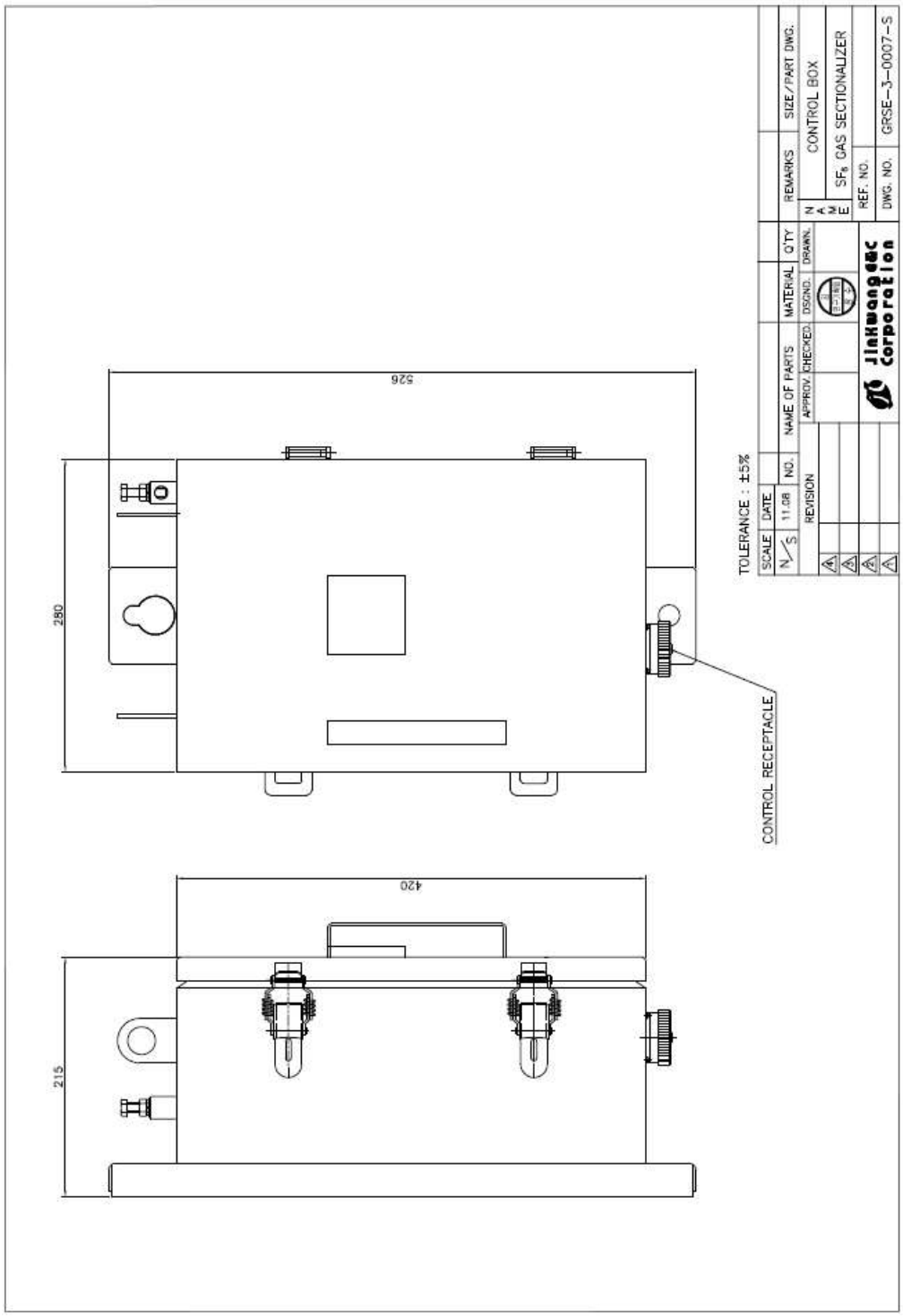
   It is recommended to replace the battery with new one every 3 years after checking it.

APPENDIX 1. DIEMENSIOANL INFORMATION.

- **SECTIONALIZER BODY**



- **CONTROL BOX**


526
280
420
215
CONTROL RECEPTACLE
TOLERANCE : ±5%
SCALE
N/S
DATE
11.08
NO.
REVISION
NAME OF PARTS
APPROV.
CHECKED.
DSGND.
MATERIAL
DRAWN.
Q'TY
REMARKS
SIZE / PART DWG.
NAME
CONTROL BOX
SF6 GAS SECTIONALIZER
REF. NO.
DWG. NO.
GRSE-3-0007-S
Jinkwang Corporation

APPENDIX 2. CIRCUIT DIAGRAM