Digital ATS Controller

ACD-M

User's Manual

REV. 1.1

ATS Control Device – Multi Type

※ OSEMCO reserves the right, without notice, to change design or construction of any products and to discontinue.

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1. Safety instructions

This document contains important instructions that must be obeyed during the installation, operation and maintenance of the Controller. Read all of the instructions before operating the equipment. Keep this manual for future reference.

The following table explains the safety-related signs used in this document.

DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in serious injury or death.

CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury, or damage to your machine.

1.1 Precaution for transportation

Caution

- Do not throw equipment or do not stack anything on top of the equipment.
- Do not open the box with knife or sharp tool.

1.2 Precaution for installation.

Caution

- Installation of controller must be done by qualified personnel who has electrical certificate.
- Before you start any installation or service work, make sure that all electrical power sources are disconnected. It may present a risk of electrical shock.
- Bolted connections must be tighten follows tightening torque outlined in these instructions.

  It may present a risk of burn.
- The equipment must be placed and fixed on the flat area.
- Do not install the controller in the area of high temperature, humidity, corrosive gas, vibration, impact present.

  It may present a risk of burn and malfunction.

  It may present a risk of electrical shock, malfunction and damage of equipment when water or conductive materials penetrate inside of equipment.

  Do double-check all status and condition before electrical power sources are connected.
- The controller must be protected from dust, concrete powder, iron powder and salt.

  It may present a risk of burn and malfunction.

- Do double-check terminal connection.

It may present a risk of malfunction.

1.3 Operating caution

- Do not contact main circuit and terminal block.

It may present a risk of electrical shock.

Danger

- Do not stored outside. It may present risk of dew condensation.

It may present electrical shock, burn and damage of the equipment.

1.4 Maintenance and repairing caution

Caution

- All maintenance and repairing work must be performed only by service personnel qualified and authorized by OSEMCO.
- After check disconnecting the power and, discharging of main and control circuit make set up manual operation mode of ATS switch.

It may present electrical shock

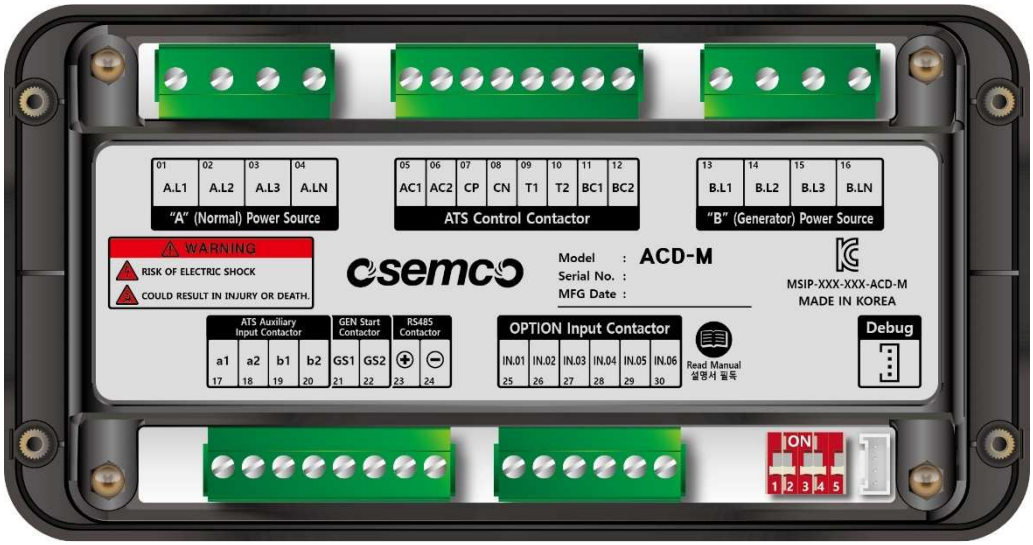
- Do periodic check bolt connection of main circuit and terminal block.

It may present a risk of burn and malfunction.

2. Construction and features.

2.1 Front face

2.2 Back side



2.3 Specifications

1) Model name: ACD-M
2) Dimensions: (W)169.3mm x (H)88.7mm x (D)57mm
3) Weights: 1.0 kg
4) Ambient operating temperature: -25℃ ~ 70℃
5) LED display: 2-DIGIT FND, high brightness LED
6) Voltage input: L-N 110[V] ~ 270[V] / 50[Hz] ~ 60[Hz]
7) ATS control relay: 250[VAC] / 16[A] 3 contacts
8) Generator starting relay: 250[VAC] / 5[A] 1 contact
9) Contact input: ATS status 2 contacts. ATS BYPASS 2 contacts, Lift running 1 contact / 18[VDC]
10) Communication interface: RS485
11) EMC, KC certified.

2.4 Major functions

Local/Remote control, ATS Manual/Automatic, 2-position/3-position, single/three phase power sensing, synchronized transferring, RS48, Generator starting.

2.5 FND window

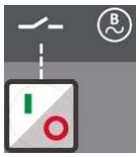
1) Time count-down when close and open operation.
2) Synchro angle when synchronized transferring.
3) Fault status, lift operation status.
4) Set up figure.

2.6 LED window

1) Menu Setting(Yellow)	ON – Menu setting	OFF – General status
2) LOCAL/REMOTE	Green – LOCAL status	Red – REMOTE status
3) AUTO/MANUAL	Green – AUTO mode	Red – MANUAL mode
	MANUAL blinking – BY-PASS close status	
4) A FAULT(Red)	ON – A-power fault	OFF – A-power normal
	0.25s blinking – External protective relay close	
5) B FAULT(Red)	ON – B-power fault	OFF – B-power normal
	0.25s blinking – External protective relay close	
6) GENERATOR(White)	ON – Generator starting ON	OFF – Generator starting OFF
7) POWER(Green, Red)	ON – Power normal	OFF – Power abnormal
	2times blinking – Low voltage	3time blinking – Over voltage, over or lower frequency.
8) CLOSE(Green, Red)	ON – ATS close	OFF – ATS open
	0.5s blinking – Close or open operating	
	2times blinking – Close fault	3times blinking – Open fault
	4times blinking – synchronizing fault	
9) LOAD(Green, Red)	ON – Load power close	OFF – Load power open

2.7 Operational button

Symbol	Button name	Description
	Menu Setup (Use at manual mode)	Change to "Menu setting" while press for 2sec or longer Change to "Communication setting" while press Lamp Test button for 2sec or longer Alarm sound mute.
	LOCAL/REMOTE	LOCAL <-> REMOTE changing LOCAL: control by controller at local. / REMOTE: remote control.
	AUTO/MANUAL (Use at local mode)	At LOCAL mode AUTO <-> MANUAL mode changing Reset of voltage and malfunction.
	A CLOSE (Use at local mode) (Use at manual mode)	[ATS type: A<->B type, setting DIP S/W No. 3 = ON] >At ATS B-power close, A-power and B-power normal (Synchronizing mode) While press "A CLOSE" button for 0.5sec, ATS B->A-power manual synchronized transfer. >At ATS B-power close, A-power normal While press "A CLOSE" button for 0.5sec ATS B->A-power manual transfer. [ATS type: A<->O<->B], setting DIP S/W No. 3 = OFF] At ATS both power open, A-power manual closing while press 0.5sec At ATS A-power close, A-power manual open while press for 1.0sec >At ATS B-power close, A, B-power normal (Synchronizing mode) While press "A CLOSE" button for 0.5sec, ATS B> Open ->A-power manual synchronized transfer. >AT ATS B-power close, A-power normal While press "A CLOSE" button for 0.5sec ATS B→ Open (1sec delay)> A-power manual open and transferring. [A close output test] If press "A CLOSE" button for 3sec or longer at manual mode whatever voltage condition, alarm sound and generate A output signal until button unpressed. [OPEN output test] [ATS type: A<->O<->B], setting DIP S/W No. 3 = OFF] If press "A/B CLOSE" button for 3sec or longer at manual mode whatever voltage condition, alarm sound and generate OPEN output signal until button unpressed.

	B CLOSE (Use at Local mode) (Use at Manual mode)	[ATS type: A<->B type, setting DIP S/W No. 3 = ON] >At ATS A-power close, A, B-power normal (Synchronized transfer mode) While press "B CLOSE" button for 0.5sec, ATS A->B-power manual synchronized transfer. >At ATS B-power close, A-power normal While press "B CLOSE" button for 0.5sec, ATS A->B-power manual transfer [ATS type: A<->O<->B], setting DIP S/W No. 3 = OFF] At ATS both power open, press for 0.5sec, ATS B-power manual close At ATS B-power close, press for 1.0sec ATS B-power manual open >At ATS A-power close, A, B-power normal (Synchronized transfer mode) While press "B CLOSE" button for 0.5sec, ATS A > Open ->B-power manual synchronized transfer. >At ATS A-power close, B-power normal While press "B CLOSE" button for 0.5sec, ATS A→ Open (1sec delay)> B-power manual open and transfer. [B close output test] If press "B CLOSE" button for 3sec or longer at manual mode whatever voltage condition, then alarm sound and generate A output signal until button unpressed. [OPEN output test] [ATS type: A<->O<->B], setting DIP S/W No. 3 = OFF] If press "A/B CLOSE" button for 3sec or longer at manual mode whatever voltage condition, then alarm sound and generate OPEN output signal until button unpressed.
	GENERATOR START/STOP (Use at Local mode) (Use at manual mode)	At manual mode, At Generator starts out put OFF while press button for 2.0sec or longer, then generator starts output ON. At generator starts out put ON, press button for 2.0sec or longer, then generator starts out put OFF. AT manual mode, when utility power and generator power is fault, generator starts ON. Automatic mode If utility power is fault, generator starts output be generated. After recover utility power while generator power is using, transferring be completed.
	OVERRIDE DOWN	Normal status: ATS close/open or at time switch activated while synchronized transfer, then skip the time switch running. Menu status: Changing menu While menu setting: Decrease setting figure

	LAMP TEST UP	Normal status: LED & FND test available Menu status: Change menu While menu setting: Decrease setting figure

2.8 Terminal blocks

"A"(Normal) Power Source

No.	Terminal name	Signal	Terminal description
01	A.L1	Power	"A" power close Power range: L-N 110[V] ~ 270[V] / 50[Hz] ~ 60[Hz] At setting of single phase: A.L1, A.LN terminal close
02	A.L2		
03	A.L3		
04	A.LN		

ATS Control Contactor

No.	Terminal name	Signal	Terminal description
05	AC1	Relay output	ATS "A" power input relay output (250[VAC] / 16[A])
06	AC2 (A.LN)		
07	CP	Power	T1, T2 open power input [ATS type: A<->O<->B], setting DIP S/W No. 3 = OFF] available
08	CN		
09	T1	Relay output	ATS relay open output (250[VAC] / 16[A]) [ATS type: A<->O<->B], setting DIP S/W No. 3 = OFF] available
10	T2 (CN)		
11	BC1	Relay output	ATS "B" power relay close output (250[VAC] / 16[A])
12	BC2 (B.LN)		

"B"(Normal) Power Source

No.	Terminal name	Signal	Terminal description
13	B.L1	Power	"B" power close Power range: L-N 110[V] ~ 270[V] / 50[Hz] ~ 60[Hz] At setting of single phase: B.L1, B.LN terminal close
14	B.L2		
15	B.L3		
16	B.LN		

ATS Auxiliary Input Contactor

No.	Terminal name	Signal	Terminal description
17	11	Contact close	ATS A-power contact status close
18	14		
19	31		ATS B-power contact status close
20	34		

GEN Starts Contactor

No.	Terminal name	Signal	Terminal description
21	GS1	Relay output	Generator starts signal output (250[VAC] / 5[A])
22	GS2		

RS485 Contactor

No.	Terminal name	Signal	Terminal description
23	+	Communications	RS485 communication port
24	-		

OPTION Input Contactor

No.	Terminal name	Signal	Terminal description
25	IN.A1	Contact close	A-power BY-PASS contact close
26	IN.A2		
27	IN.B1	Contact close	B-power BY-PASS contact close
28	IN.B2		
29	IN.C1	Contact close	Lift running contact close
30	IN.C2		

2.9 Function setting DIP switches

DIP S/W	기능	설정	버튼 설명
1	Execution priority	ON (Use)	Use ATS execution priority (As set SW2)
		OFF (Not use)	Not use ATS execution priority >If power condition is normal, maintain normal status, and generator starts is not available.
2	Priority ownership	ON (A-power)	ATS A-power priority > At ATS A-power is utility, if A-power abnormal, generator starts automatically.
		OFF (B-power)	ATS B-power priority > At ATS B-power is utility, if B-power abnormal, generator starts automatically.
3	Neutral transfer	ON (Normal)	ATS type: A<->B type > ATS: T3, T3-B, TO, TO-B, TN, TN-B, PC, PSO available
		OFF (Neutral)	ATS type: A<->O<->B type > ATS: TN, TN-B, ATCB, PCN available
4	Phase	ON (Single)	Power input: Single input (L1- LN) / 220V, 230V, 240V
		OFF (Three)	Power input: Three input (L1-L2-L3-LN) + phase open monitoring.
5	Synchronized transfer	ON (Use)	Synchronized transfer: Use
		OFF (Not use)	Synchronized transfer: Not use

2.10 Setting DIP S/W & fault sticker

우선권 사용 Priority Use, Priority Not use

A-power priority B-power priority, A<->B transfer A<-OFF->B transfer,

1P Use, 3P phase open, Synchronized Use, Synchronized Not use

한전 Authority 발전 Generator 상용 Commercial 비상 Abnormal 1 호계 Line 1 2 호계 Line 2

Power 램프상태 Power lamp status ON Normal power OFF No power source.

2 회점멸 2times blinking Low voltage Low frequency 3times blinking over voltage over frequency

FAULT Lamp status. 소등 OFF-Power & service normal, Blinking-External trip signal 2times blinking close abnormal

3times blinking open abnormal 4times blinking synchronized abnormal

설정방법 How to set-up

Press Menu Setup button for 2 sec at manual mode.

정격상전압 설정 for voltage, for frequency, A-power close time delay(sec) B-power close time delay(sec)

A-power open time delay(sec) B-power open time delay(sec), Synchronized time delay(sec)

The sticker for function set-up DIP s/w shall be provided, and you may adhere to back of the controller.

The sticker for lamp status shall be provided, and you may adhere to the controller.

The sticker for power source shall be provided, and you may adhere to the controller if you need identify A-power and B-power.

3. Set-up

3.1. Basic set-up

Setting >> Press Menu Setup button for 2 sec at manual mode.

>P0	Setting range: 22, 23, 24	Default: 220V
Set rated voltage. (phase voltage) - 22 = 220[V] - 23 = 230[V] ACMR - 24 = 240[V]		

>P1	Setting range: 50, 60	Default: 60Hz
Set rated frequency. - 50: 50[Hz] - 60: 60[Hz]		

>P2	Setting range: 00s ~ 99s	Default: 05s
Set A-power close time delay.		

>P3	Setting range: 00s ~ 99s	Default: 05s
B-power close time delay.		

>P4	Setting range: 00s ~ 99s	Default: 05s
A-power open time delay. Only open type ATS activate.		

>P5	Setting range: 00s ~ 99s	Default: 05s
B-power open time delay. Only open type ATS activate.		

>P6	Setting range: 00s ~ 99s	Default: 05s
Synchronized transfer time delay. Only synchronizing type ATS activate.		

3.2. Communication set-up

Set-up >> At manual mode, while press “Lamp Test” button press “Menu Setup” button for 2sec or longer, then you may go communication set-up.

>C0	Setting range: 01 ~ 99	Default: 01
Set address of RS485.		

>C1	Setting range: 96, 19, 38	Default: 19
Set baud rate of RS485. - 96: 9600bps - 19: 19200bps - 38: 38400bps		

4. Panel foot print

5. Communication interface

5.1 MODBUS protocol

1) Type : 2-Wire RS485
2) Protocol : MODBUS RTU
3) Function : REQUEST(04h), COMMAND(05h)
4) Digits : 1~99
5) BAUD RATE : 9600[bps], 19200[bps], 38400[bps]
6) Parity : None
7) Data stop bit : 8[Bit] / 1[Bit]
8) Min interval : 250[ms]
9) Packet ending time : 5[ms]

5.2 COMMAND (05h)

TX EXAMPLE : 01 05 00 02 FF 00 CRC16 → add no. 0003 ATS A-power manual close signal

Address	Description	Data
0001	Change to MANUAL mode	0xFF00 Automatic clear
0002	Change to AUTO mode	
0003	A-power manual close	
0004	B-power manual close	
0005	Manual open	
0006	Generator manual starts	
0007	Generator manual stop	
0008	Over wright	

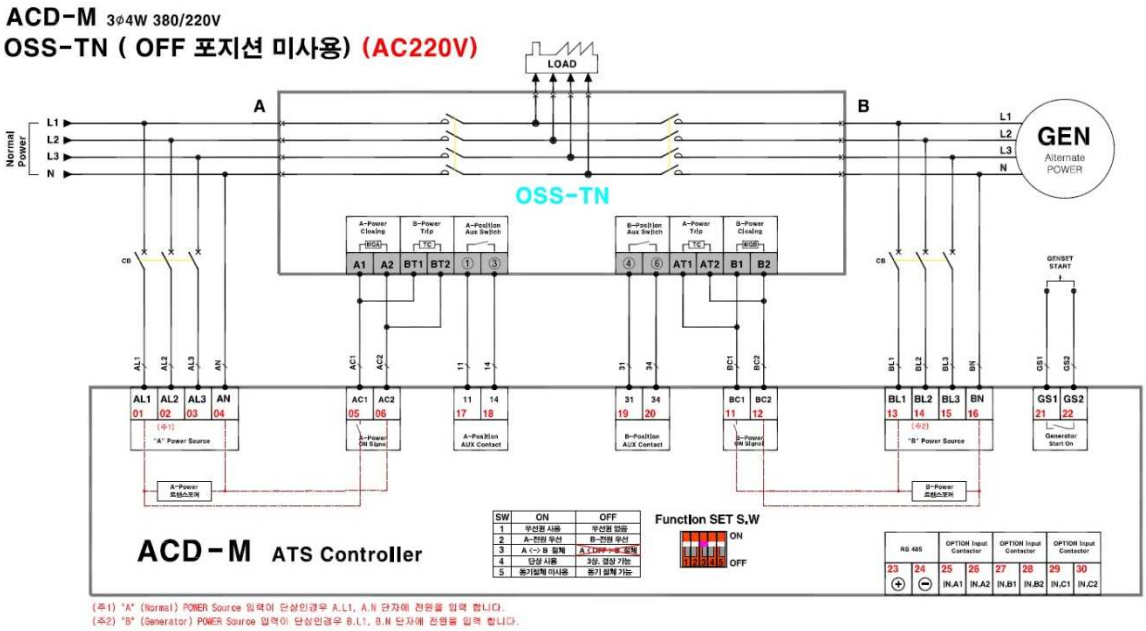
5.3 REQUEST (04h)

TX EXAMPLE : 01 04 00 00 00 0E CRC16 → Request data from add no. 30001 to 14th

Address	Description		Data type	Data indicate
30001	Device model name		UNSIGNED 16BIT	-
30002	A-power L1-LN phase voltage		UNSIGNED 16BIT	XXX [V]
30003	A-power L2-LN phase voltage		UNSIGNED 16BIT	XXX [V]
30004	A-power L3-LN phase voltage		UNSIGNED 16BIT	XXX [V]
30005	A-power frequency		UNSIGNED 16BIT	XX.X [Hz]
30006	B-power L1-LN phase voltage		UNSIGNED 16BIT	XXX [V]
30007	B-power L2-LN phase voltage		UNSIGNED 16BIT	XXX [V]
30008	B-power L3-LN phase voltage		UNSIGNED 16BIT	XXX [V]
30009	B-power frequency		UNSIGNED 16BIT	XX.X [Hz]
30010	Phase angle of synchronizing.		UNSIGNED 16BIT	XXX [°]
30011	ATS status		UNSIGNED 16BIT	-
	Bit 0: MANUAL mode	Bit 8: A-power abnormal		
	Bit 1: AUTO mode	Bit 9: B-power abnormal		
	Bit 2: LOCAL status	Bit 10: A-power BY-PASS close		
	Bit 3: REMOTE status	Bit 11: B-power BY-PASS close		
	Bit 4: A-power normal	Bit 12: Generator starts signal		
	Bit 5: B-power normal	Bit 13: Generator stop signal		
	Bit 6: **A-power close**	Bit 14: Reserved		
	Bit 7: **B-power close**	Bit 15: Reserved		
30012	A-power fault status		UNSIGNED 16BIT	-
	Bit 0: A-power low voltage	Bit 8: A-power status contact abnormal		
	Bit 1: A-power over voltage	Bit 9: A-power close fault		
	Bit 2: A-power low frequency	Bit 10: A-power open fault		
	Bit 3: A-power over frequency	Bit 11: A-power manual open fault		
	Bit 4: A-power phase reverse	Bit 12: A-power synchronized transfer fault		
	Bit 5: Reserved	Bit 13: Reserved		
	Bit 6: Reserved	Bit 14: Reserved		
	Bit 7: A-power protective relay close	Bit 15: Reserved		
30013	B-power fault status		UNSIGNED 16BIT	-
	Bit 0: B-power low voltage	Bit 8: B-power status contact fault		
	Bit 1: B-power over voltage	Bit 9: B-power close fault		
	Bit 2: B-power low frequency	Bit 10: B-power open fault		
	Bit 3: B-power over frequency	Bit 11: B-power manual open fault		
	Bit 4: B-power phase reverse	Bit 12: B-power synchronized transfer fault		
	Bit 5: Reserved	Bit 13: Reserved		
	Bit 6: Reserved	Bit 14: Reserved		
	Bit 7: B-power protective relay close	Bit 15: Reserved		
30014	Fault status		UNSIGNED 16BIT	-
	Bit 0: A-power status contact close	Bit 8: A-power close signal output		
	Bit 1: B-power status contact close	Bit 9: B-power close signal output		
	Bit 2: IN.A1, IN.A2 close status	Bit 10: Open signal output		
	Bit 3: IN.B1, IN.B2 close status	Bit 11: Generator starts signal output		
	Bit 4: IN.C1, IN.C2 close status	Bit 12: Reserved		
	Bit 5: Reserved	Bit 13: Reserved		
	Bit 6: Reserved	Bit 14: Reserved		
	Bit 7: Reserved	Bit 15: Reserved		

6. Wiring

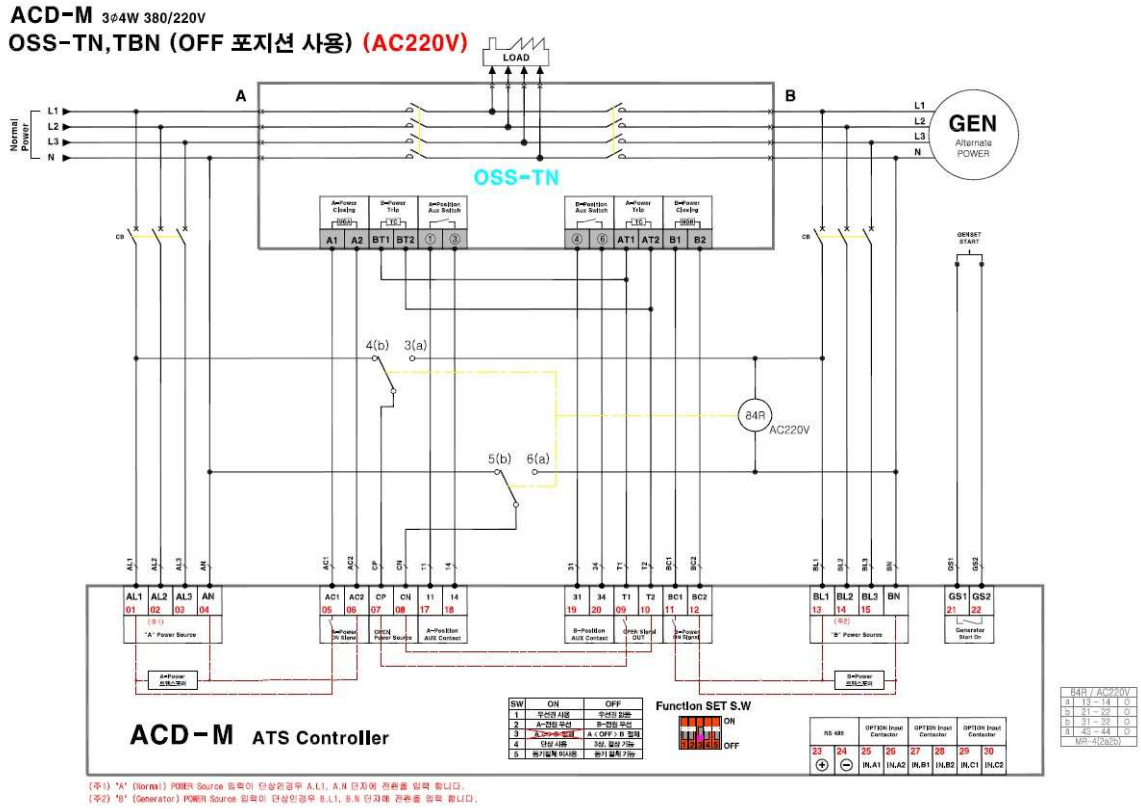
6.1 OSS-TN wiring



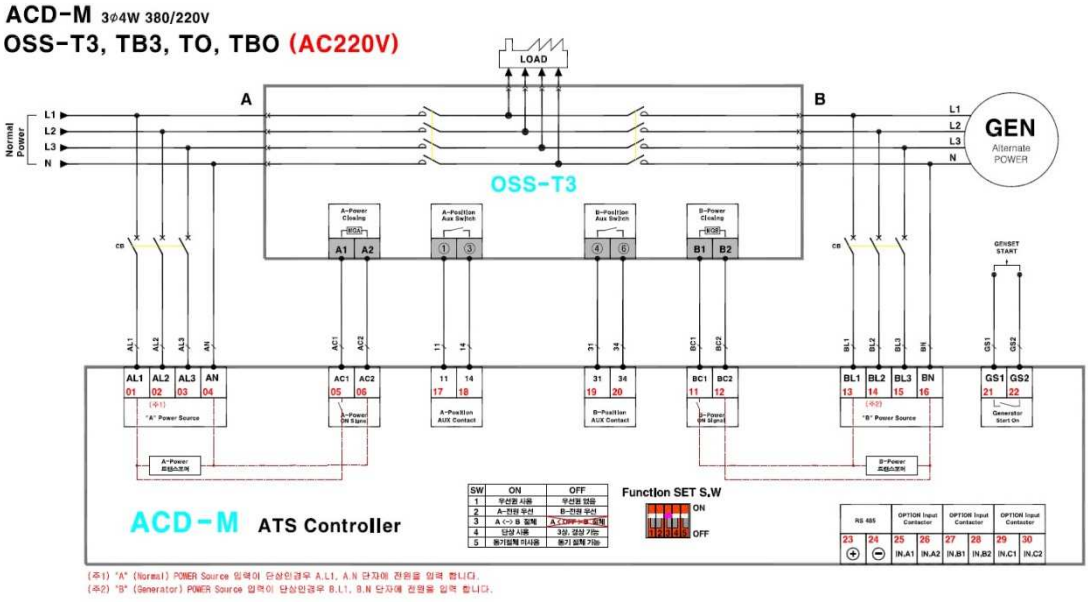
OFF 포지션 미사용 Not use OFF position

주 1. Note 1. Connect A, L1, A, N if A-power is single phase

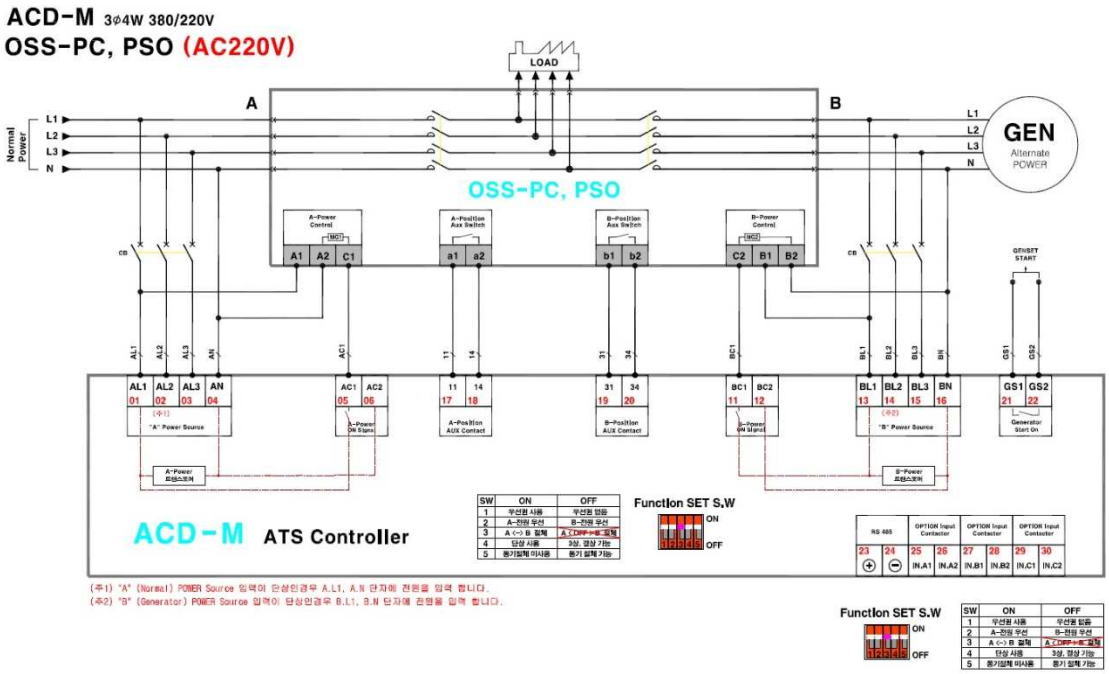
주 2. Note 2. Connect B, L1, B, N if B-power is single phase.



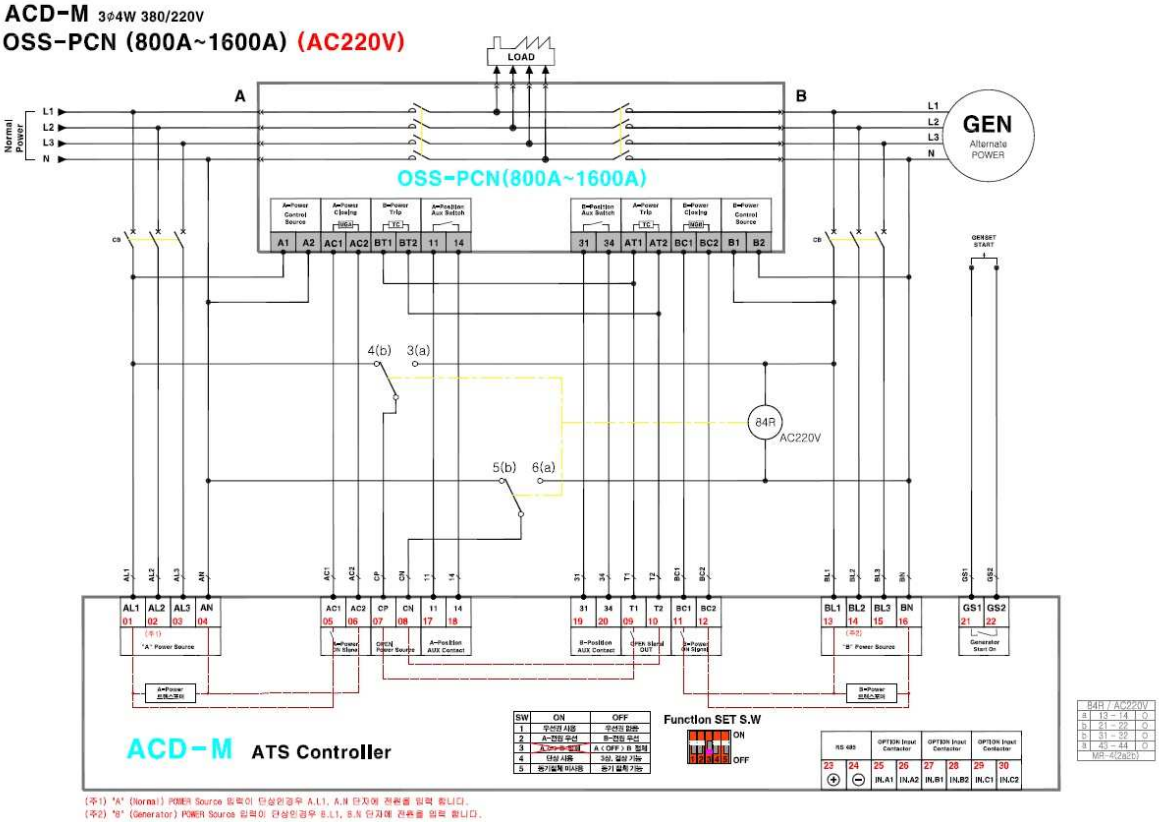
6.2 OSS-T3, TB3, TO, TBO wiring

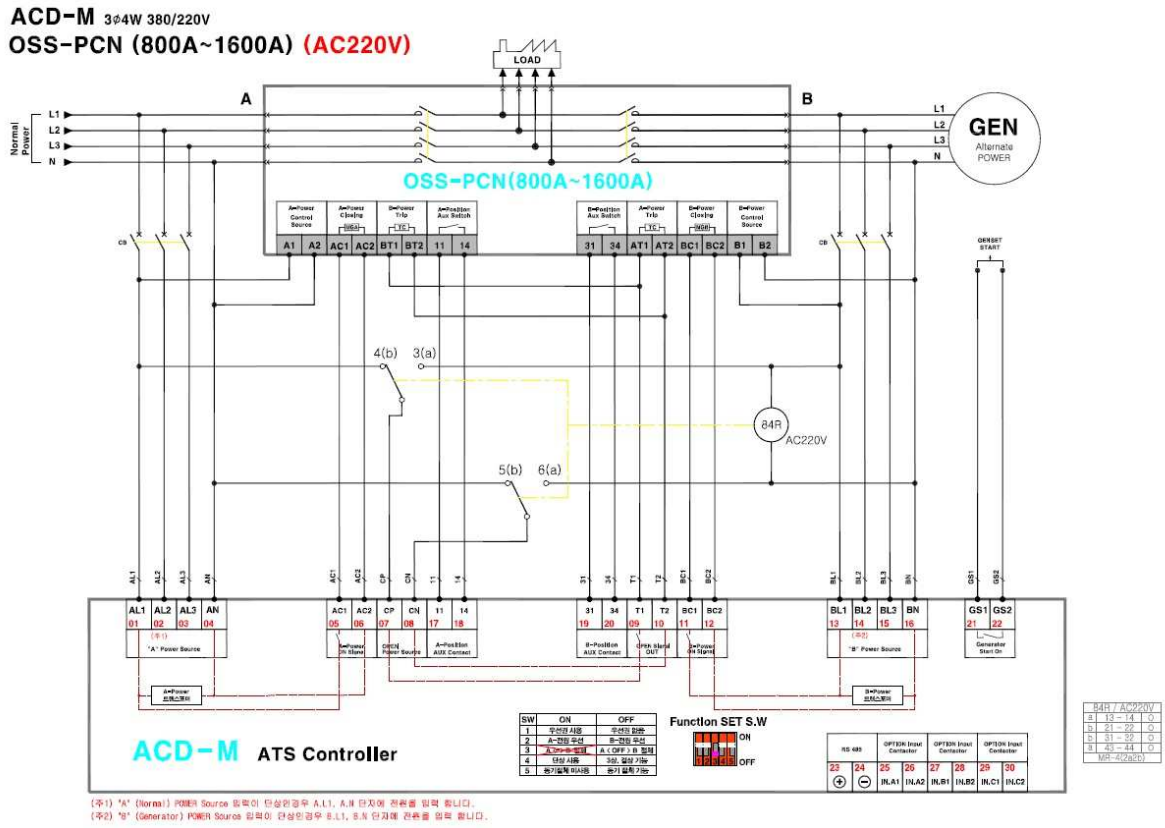


6.3 OSS-PC wiring



6.4 OSS-PCN wiring





6.5 OSS-ATCB wiring