디지털 ATS컨트롤러

ACD-M-D

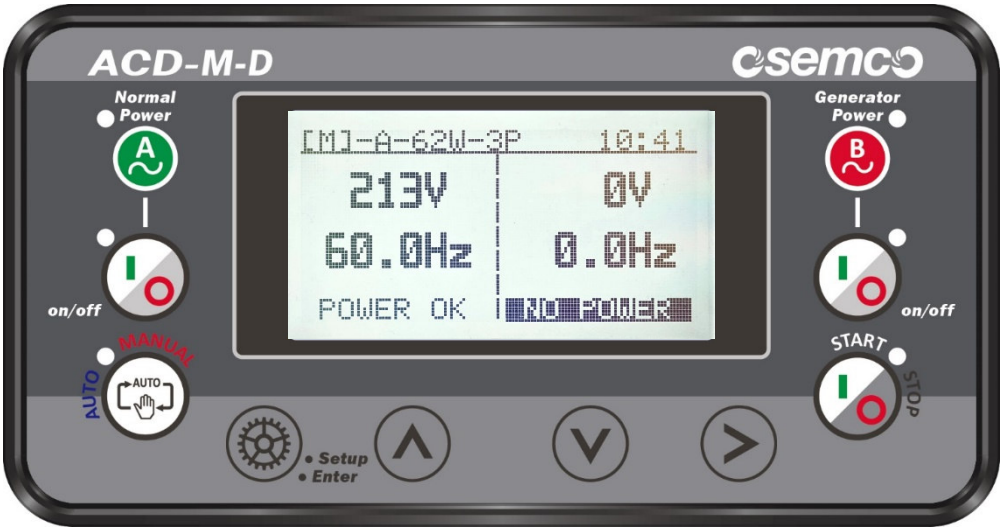
User's Manual

rev : 1.0

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ACD - M - D

ATS **C**ontrol **D**evice **M**ulti-Type **D**isply



※ **Specifications of this product are subject to change without notice for the purpose of product improvement.**

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1. Safety Precautions

READ ALL INSTRUCTIONS - This manual states 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 Precautions During Transportation



Caution

- Do not drop the product or place heavy objects on it during transportation.
- Do not open the packaging with a knife or any sharp tools.

1.2 Precautions During Installation (Mounting and Wiring)



Caution

- Only qualified personnel should works installation.
- Ensure the power is turned off by switching off the main circuit breaker or equivalent before installation. **Risk of electric shock.**
- Be sure fasten bolts and nuts of terminal or bus bar as strong as torque power manufacturer recommended. **Fire may caused.**
- Attach this device firmly to a flat surface.
- Avoid installing the unit in environments with excessive heat, humidity, dust, corrosive gases, vibration, or shock.
  Condensation or the ingress of water may result in damage, malfunction, electric shock, or fire.
- Do not allow foreign substances such as dust, concrete powder, metal particles, rainwater, or salt to enter the device. **Doing so may cause malfunction or fire.**
- Check that all connectors are properly and securely engaged.
  Loose connections may cause malfunction.

1.3 Precautions During Operation

- Do not touch the main circuit or control terminals while the power is on.
  Risk of electric shock.



Danger

- Do not leave the device unattended in outdoor or harsh environments.
  (especially where condensation may occur)
  This device is neither waterproof nor moisture-resistant.
  Exposure to water or condensation may result in electric shock, equipment damage, or fire.

1.4 Precautions During Maintenance, Inspection, and Replacement

- Maintenance, inspection, and replacement must be performed by personnel with sufficient technical knowledge.



Caution

- Before performing any work, ensure that the main circuit breaker is turned OFF in manual operation mode, and verify that the main and control circuits are not energized. **Risk of electric shock.**

- Periodically check the tightening of main circuit terminals and connection connectors.
  Loose connections may lead to malfunctions or fire hazards.

1.5 Precautions Before Use

> Before wiring, refer to the wiring diagram corresponding to the ATS type.
Improper wiring may cause malfunction.

> After wiring, configure the “Operation Mode, Voltage, and Frequency” according to the ATS type, then proceed with testing.

> Before test operation, check that the phase rotation, voltage, and frequency of both A-Power and B-Power are normal.
(If the controller’s LED is blinking, refer to section 2.3.3 for troubleshooting.)

> In case of any abnormality, take photos or videos of the controller screen and LED lamp status, and contact the manufacturer.

2. Product Overview

2.1 Specifications

2.1.1 Technical Specifications

1) Model Name : ACD-M-D
2) Control Power : Operates using A/B-Power input voltage.
To activate LCD and communication functions during a blackout, auxiliary power must be supplied.
3) Auxiliary Power : DC 24V / 0.5A (Min 12V ~ Max 27V)
4) Dimensions : (W)170mm x (H)89mm x (D)57mm
5) Weight : 1.2Kg (Including Packaging Box)
6) Operating Temperature : -25 ~ 70[℃]
7) Power Input : Refer to section 2.3.8 for A/B-Power input specifications.

2.1.2 Hardware Specifications

1) Microcontroller : 32-BIT / 16 MHz
2) Display : 128 × 64 Graphic LCD, High-brightness LED
3) Input Contacts : 2 points for ATS status, 3 points for optional inputs
4) Relay Outputs
- 1 point for each ATS-A/B transfer signal (AC 250V, 16A)
- 1 point for ATS-OFF neutral position signal (AC 250V, 16A)
- 1 point for generator start signal (AC 250V, 5A).
5) Communication : 1 point for RS485

2.1.3 Main Functions

1) Automatic ATS operation (priority and operation time configurable)
2) Manual ATS operation
3) Generator start output: 1a contact
4) Scheduled operation (up to 5 individual schedules)
5) Remote Auto/Manual mode switching (Open Contact : Manu , Close Contact : Auto)
6) Supports Korean and English menus with event logging

2.1.4 Protection Functions

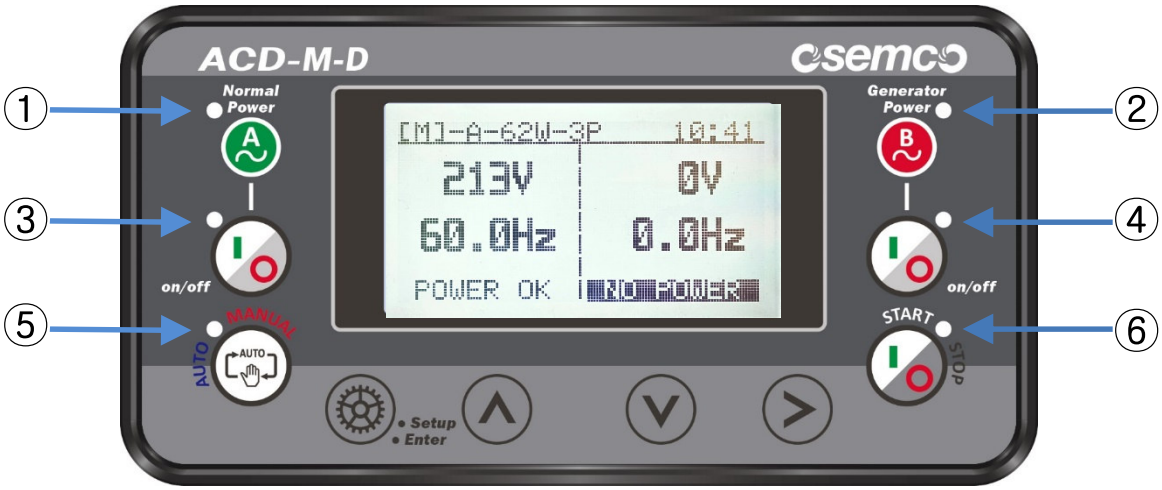
1) A-Power : Overvoltage, Undervoltage, Overfrequency, Underfrequency, Phase rotation, Phase loss
2) B-Power : Overvoltage, Undervoltage, Overfrequency, Underfrequency, Phase rotation, Phase loss

2.2 Certification Standards (KS C 9610-6-4, KS C 9610-6-2)

KC (EMC) Certification Number : OS0-ACD-M-D

2.3 Appearance

2.3.1 Front View



2.3.2 LED Indicator Lamps

No.	Function	Lamp Color	Description
①	A-Power Input	Green	ON - Power normal OFF - No power
②	B-Power Input	Red	
③	ATS A-ON Status	Green	ON - ATS-ON state OFF - ATS-OFF state
④	ATS B-ON Status	Red	
⑤	Operation Mode	Blue	AUTO : Automatic Mode
		Red	MANUAL : Manual Mode
⑥	Generator Start Status	White	ON - Generator is running OFF - Generator is stopped

2.3.3 Lamp Blinking Patterns

Blinking Pattern	A/B-Power Lamps ①,②	ATS Status Lamps ③,④
0.5s Interval	-	ATS-ON/OFF Timer Active Synchronous Transfer Standby
2 blinks	Under voltage/frequency	ATS-ON Failure
3 blinks	Over voltage/frequency, Phase Reversal	ATS-OFF Failure
4 blinks	-	Synchronous Transfer Failure
* Manual reset available via Auto/Manual button		

2.3.4 Operation Button

Button	Name	Description
	ATS-A Manual Control	In Manual Mode : > For 2-Position type: ATS-A Manual ON > For 3-Position type: ATS-A Manual ON or OFF
	ATS-B Manual Control	In Manual Mode : > For 2-Position type: ATS-B Manual ON > For 3-Position type: ATS-B Manual ON or OFF

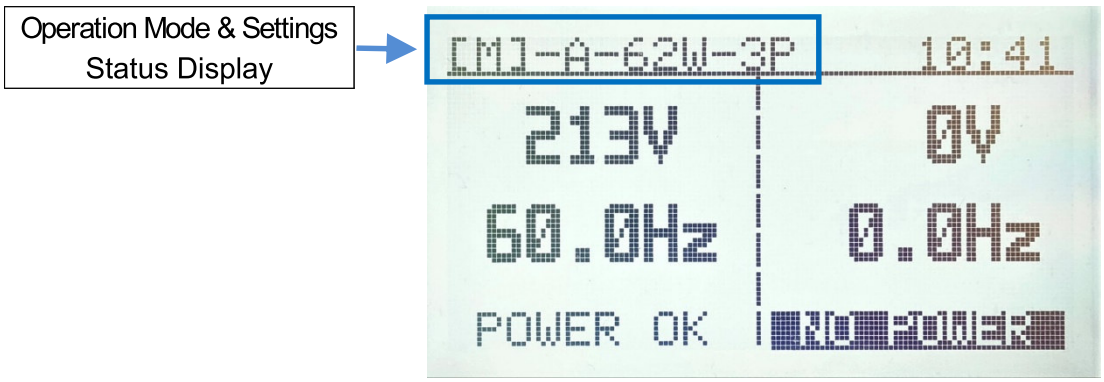
* 2-Position ATS (A↔B) / 3-Position ATS (A↔O↔B)
* To prevent accidental operation, the control button is activated only when pressed for approximately 0.5 seconds.

	AUTO / MANUAL	Toggles between AUTO and MANUAL operation modes.
	GENERATOR START / STOP	In Manual Mode : > Press and hold the button for more than 2 seconds to start the generator. > While the generator is running, press and hold for more than 2 seconds to stop it. In Auto Mode : > In case of normal power failure: The generator will start automatically. > When normal power is restored (recovery): The generator will stop automatically. > The startup/shutdown delay time can be adjusted in the settings.(Refer to section 3.6, Timer Settings in this manual.) When the generator starts: Output is ON. When the generator stops: Output is OFF.

2.3.5 Setting Button (The setting is available in Manual mode.)

Button	Name	Description
	Setup / Enter	On the Main Screen (Setup) : > Press and hold for 1 second to enter setting mode. * Automatic operation and ATS control functions are disabled while in setting mode. In the Setting Screen (Enter) : > Returns to the main screen or saves the modified value.
	UP	On the Main Screen : > Switches display pages. In the Setting Screen : > Navigates between items and increases/decreases setting values.
	DOWN	
	MOVE	In the Setting Screen : > Enters the detailed setting of the selected menu item. > Moves the cursor between digits when editing a value.

2.3.6 LCD Display Status (Main Screen)



[M] – A – 62W – 3P

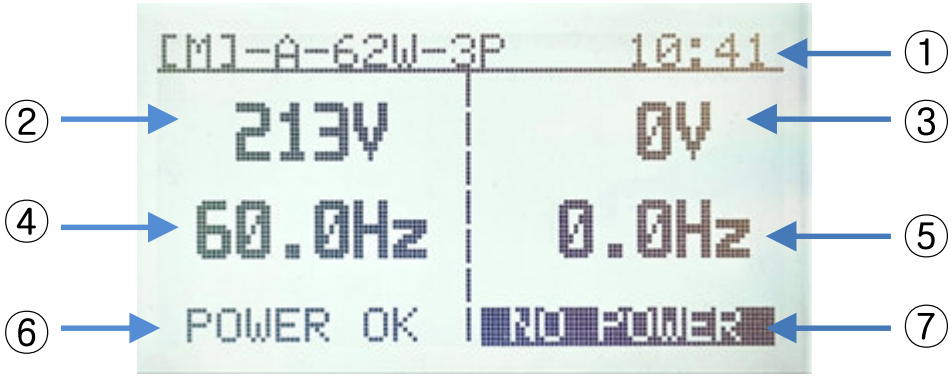
▶ Operation Mode Status
[A] : Automatic Mode
[A] : Remote Auto Control - Inverted Text Indication
[M]: Manual Mode

▶ Power Priority Setting Status
A : Priority given to ATS-A
B : Priority given to ATS-B
N : No set priority; transfer based on condition only

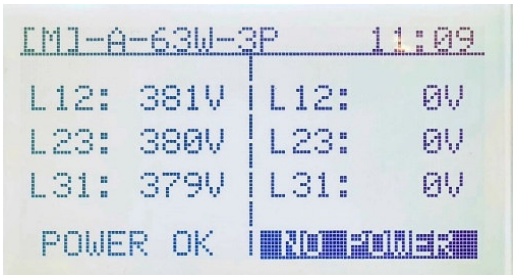
▶ Frequency Setting Status
5 : 50Hz
6 : 60Hz

▶ Wiring Configuration
2W : 1 Phase (Connected to L1 and L3)
3W : 3 Phase (Connected to L1, L2, and L3)

▶ ATS Transfer Method
2P : 2-Position ATS (A↔B Transfer only / Applicable Products : T3, TO, PC, PSO)
3P : 3-Position ATS (A↔O↔B Transfer / Applicable Products : TN, PCN, ATCB)



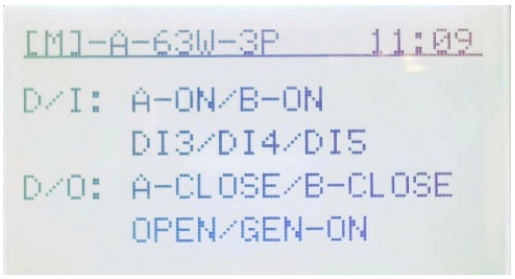
No.	Function	Description
①	Current Time	Time is displayed in 24-hour format (00–24 hours : 00–59 minutes) Modifiable in system settings (see section 3.2) When remote peak control is active : > Time display shows "PEAK" When BYPASS input is active : > Time display shows "ByPassA"or "ByPassB" When waiting for synchronous transfer : > Time display shows phase angle "SYSxxx"
②	A-Power Voltage	Displays the line-to-line voltage : Display range : 110 ~ 6600V > In case of abnormal voltage : The voltage value blinks with inverted text. > In case of phase reversal : The voltage value is displayed in inverted text.
③	B-Power Voltage	
④	A-Power Frequency	Frequency display range: 40Hz to 70Hz > In case of abnormal frequency : The value blinks with inverted text.
⑤	B-Power Frequency	
⑥	Status of ATS-A (Power or Timer)	Indicates the current power condition and the ATS transfer delay timer. > In case of power or ATS failure : An error status message is shown
⑦	Status of ATS-B (Power or Timer)	



LCD Display (3-Phase Voltage Screen)

1) Displayed only when the input voltage is set to 3-phase.
2) On the main screen, press the UP or DOWN button to toggle to this screen.
3) Displays line-to-line voltage values for A/B-Power sources.

* The screen automatically returns to the main display after 1 minute of inactivity.

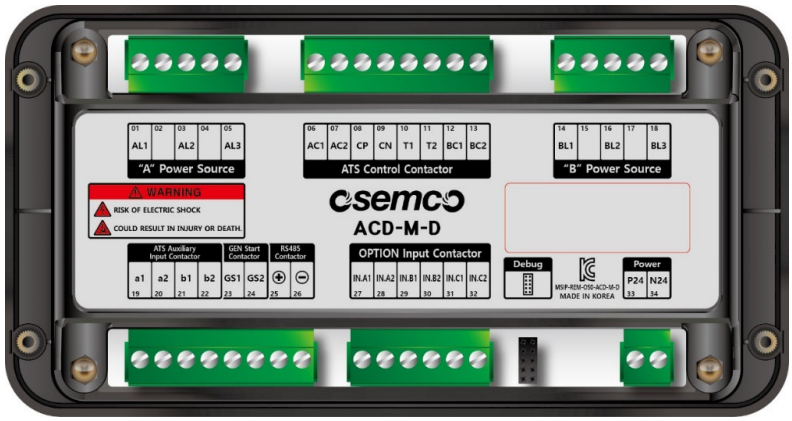


LCD Display (Input/Output Status Screen)

1) On the main screen, press the UP or DOWN button to toggle to this screen.
2) Indicates I/O status
   Active signals are displayed with inverted text for easy identification.

* The screen automatically returns to the main display after 1 minute of inactivity.

2.3.7 Rear View



2.3.8 Terminal block configuration

A-Power Source			
No.	Terminal Label	Signal	Description
01	A L1	Voltage Input	A-Power Voltage Input
02			
03	A L2		
04			
05	A L3		

Wiring Method		Input Voltage	Frequency
3 Phase	L1 , L2 , L3	AC220V ~ 440V	50Hz or 60Hz
1 Phase	L1 , L3	AC220V ~ 440V	50Hz or 60Hz

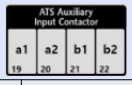
* For voltages other than the input voltage, a **"PT (Potential Transformer)"** must be used.

ATS Control Contact			
08 / 09	CP / CN	Voltage Input	Control Power Input for OFF Function of 3-Position ATS (A↔OFF↔B) Refer to the wiring diagram in Section 8 for the power supply method.
10 / 11	T1 / T2	Voltage Ouput	ATS-OFF Voltage Ouput
06 / 07	AC1 / AC2	Relay Ouput 250V 16A	ATS A-ON output (activated when input command is held for 0.5 s)
12 / 13	BC1 / BC2		ATS B-ON output (activated when input command is held for 0.5 s)
* In manual mode, the contact output is maintained while the button is pressed to control the ATS.			

B-Power Source			
14	B L1	Voltage Input	B-Power Voltage Input
15			
16	B L2		
17			
18	B L3		

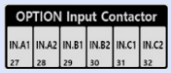
Wiring Method		Input Voltage	Frequency
3 Phase	L1 , L2 , L3	AC220V ~ 440V	50Hz or 60Hz
1 Phase	L1 , L3	AC220V ~ 440V	50Hz or 60Hz

* For voltages other than the input voltage, a **"PT (Potential Transformer)"** must be used.

AUX Contact 			
No.	Terminal Label	Signal	Description
19	a1	Contact Input	ATS A-ON Status Contact Input
20	a2		
21	b1		ATS B-ON Status Contact Input
22	b2		
⚠ **Caution** : Use only **"Dry Contact"** for input signals. (Risk of damage) Do not connect to any equipment other than ATS AUX, as it may cause malfunction.			

GEN Start Contact 			
23	GS1	Relay Ouput 250V 5A	Generator Start Signal Output (Dry Contact)
24	GS2		

RS485 Contact 			
14	⊕	Communi cation	RS485 Communication Port, MODBUS / RTU
15	⊖		

OPTION Input Contact 			Note) The function can be changed in the input settings.
27	IN.A1	Contact Input	When using a 3-Position ATS (A↔OFF↔B) >ATS-A Trip and Close Inhibit Input
28	IN.A2		
29	IN.B1		When using a 3-Position ATS (A↔OFF↔B) > ATS-B Trip and Close Inhibit Input
30	IN.B2		
31	IN.C1		Change to Auto Mode from External Source
32	IN.C2		
⚠ **Caution** : Use only **"Dry Contact"** for input signals. (Risk of damage)			

Auxiliary Power 			
33	P24 (+)	Power	Power Supply for LCD and Communication Activation During Power Outage > DC 24V / 0.5A (Min 12V ~ Max 27V)
34	N24 (-)		
⚠ **Caution** : Pay attention to polarity and overvoltage when supplying auxiliary power. (Risk of damage)			

3. Settings

Pressing the **"Generator Start" button will reset the settings to the default factory values**.

If no button operation occurs during the setting process, the system will switch to manual mode after 1 minute.

3.1 Language Setting

> Language Setting	Selection : 한국어 , ENGLISH	Factory Default : 한국어
Set the display language.		

3.2 System settings

> ATS Transfer Method	Selection : A-B , A-O-B	Factory Default : **A-B**
Configure the ATS transfer method. . > A↔B : 2-Position ATS / Applicable Models : T3, TO, PC, PSO > A↔O↔B : 3-Position ATS / Applicable Models : TN, PCN, ATCB		
* A↔O↔B type allows intermediate stop (OFF) during transfer.		

> Rated Voltage	Range : 100 ~ 6,600[V]	Factory Default : **380** [V]
Set the rated voltage for A/B-Power. > When using **3-phase input (L1, L2, L3)**, enter the **line-to-line rated voltage** (Min 220V – Max 440V) > When using **1-phase input (L1, L3)**, enter the **single-phase rated voltage** (Min 220V – Max 440V).		
* For voltages above 440V, **"use a PT (110V for single-phase, 190V for three-phase)"** and configure the **"PT ratio"** accordingly.		

> Rated Frequency	Selection : 50Hz , 60Hz	Factory Default : **60** [Hz]
Set the rated frequency for A/B-Power.		

> Voltage PT Ratio	Range : 00.10~90.00 / 1	Factory Default : **01.00/1**
Set the PT (Potential Transformer) ratio when using a PT. > **Single-phase** : When using 440V single-phase through a 110V PT input (440 / 110 = **04.00 : 1)** > **Three-phase** : When using 380V three-phase through a 190V PT input (380 / 190 = **02.00 : 1)** > **High voltage** : When using 6.6kV three-phase through a 190V PT input (6600 / 190 = **34.73 : 1)**		

> Voltage Input	Selection : 1 Phase , 3 Phase	Factory Default : **3 Phase**
Set the voltage input method for A/B-Power. > For **1-phase input** : Connect to L1 and L3 > For **3-phase input** : Connect to L1, L2, and L3		
* When 1-phase is selected, Phase Loss Protection and Phase Reversal Detection are automatically set to Disabled.		

> Power Priority	Selection : A-Power, B-Power, No Priority	Factory Default : **A-Power**
Set the power priority to **A-Power** or **B-Power** (used in Auto Mode) > **A-Power Priority** : A-Power is recognized as the **"Normal Power Source"** and the system automatically transfers to A-Power. > B**-Power Priority** : B-Power is recognized as the **"Normal Power Source"** and the system automatically transfers to B-Power. > **No Priority** : If the currently used power source is normal, the system maintains the current transfer state.		

> Phase Rotation	Selection : CW , CCW	Factory Default : **CW**
> Normal (CW) : When using 3-phase input, phase rotation is set to clockwise > Reverse (CCW) : When using 3-phase input, phase rotation is set to counterclockwise		
* If the phase rotation does not match the configured value, an **"alarm and voltage abnormality"** will be triggered.		

> Display OFF	Selection : Disable, 10 min, 30 min, 1 hour	Factory Default : **10** [min]
Configure the automatic LCD backlight off time. > If there is no button input or power status change during the set time, the backlight will automatically turn off. > When the backlight is off, it will automatically turn back on if a button is pressed or the power status changes.		

> Date Setting	Indication : 20YY-MM-DD-DOW
Set the current **year**, **month**, **day**, and **day of the week**. > Used for scheduled operations and event logging.	

> Time Setting	Indication : HH-MM-SS
Set the current **year, month, day**, and **day of the week.** > To minimize time deviation, please calibrate the clock every 6 months. > Used for scheduled operations and event logging.	

> Password Setting	Selection : 0000 ~ 9999	Factory Default : **0000**
Set the password. > The default password is **0000**, and no password check is required when entering the menu. > Once a password is set, setting values can still be viewed, but changes will require password input.		

3.3 Remote Communication Setting

> MODBUS Slave ID	Range : 01 ~ 128	Factory Default : **01**
Set the MODBUS Slave ID for the RS485 communication port		

> MODBUS BAUD	Range : 9600, 19200, 38400[bps]	Factory Default : **9600** [bps]
Set the baud rate for the RS485 communication port.		

3.4 Input Setting

> IN.A Input Setting	Factory Default : **ATO** Protection
> IN.B Input Setting	Factory Default : **BTO** Protection
> IN.C Input Setting	Factory Default : **Auto Mode Input**

> **ATO Protection Operation :** Prohibits ATS-A insertion and triggers trip/alarm.

> **BTO Protection Operation :** Prohibits ATS-B insertion and triggers trip/alarm.

> **A-Power Bypass :**
When used with a bypass ATS, input via dry contact switches the system to manual mode.
B-ON of the main ATS is prohibited.

>**B-Power Bypass :**
When used with a bypass ATS, input via dry contact switches the system to manual mode.
A-ON of the main ATS is prohibited.

> **Auto Mode Input** :
When the external switch is ON (Dry Contact), the system switches to Auto Mode.
When the external switch is OFF, the system switches to Manual Mode.

> **Not Used** : No function assigned to this input terminal.
(However, the input status can be monitored via communication.)

3.5 Power Setting (Set A-power and B-power individually)

> AP/BP Overvoltage Pick-up	Range : 105 ~ 130 [%]	Factory Default : **110** [%]
Set the overvoltage pick-up level (% of rated voltage).		

> AP/BP Overvoltage Drop-out	Range : Overvoltage Pickup Value -1 [%]	Factory Default : **105** [%]
Set the overvoltage drop-out level (% of rated voltage). > If the overvoltage pick-up value is lower than or equal to the drop-out value, it will automatically be set to 1% below the overvoltage pick-up value.		

> AP/BP Undervoltage Pick-up	Range : 70 ~ 99 [%]	Factory Default : **85** [%]
Set the undervoltage pick-up level (% of rated voltage).		

> AP/BP Undervoltage Drop-out	Range : Undervoltage Pickup Value -1 [%]	Factory Default : **90** [%]
Set the undervoltage drop-out level (% of rated voltage). > If the undervoltage pick-up value is greater than or equal to the drop-out value, it will automatically be set to 1% above the undervoltage pick-up value.		

> AP/BP Overfrequency Pick-up	Range : 101 ~ 130 [%]	Factory Default : **110** [%]
Set the overfrequency pick-up level		

> AP/BP Overfrequency Drop-out	Range : Overfrequency Pickup Value -1 [%]	Factory Default : **105** [%]
Set the overfrequency drop-out level > If the overfrequency pick-up value is less than or equal to the drop-out value, it will automatically be set to 1% below the overfrequency pick-up value.		

> AP/BP Underfrequency Pick-up	Range : 70 ~ 99 [%]	Factory Default : **90** [%]
Set the underfrequency pick-up level		

> AP/BP Underfrequency Drop-out	Range : Underfrequency Pickup Value -1 [%]	Factory Default : **95** [%]
Set the underfrequency drop-out level > If the underfrequency pick-up value is greater than or equal to the drop-out value, it will automatically be set to 1% above the underfrequency pick-up value.		

3.6 Timer Setting

> A-Side Transfer Delay (ATS-A)	Range : 01s ~ 90m 59s	Factory Default : **05** [sec]
For 2-Position ATS (A↔B) : Set the transfer delay time from B→A. > After confirming that the normal power has stabilized during the delay time, the system proceeds with the transfer. (e.g., in case of momentary outages) **For 3-Position ATS (A↔O↔B) :** Set the transfer delay time from O→A.		

> B-Side Transfer Delay (ATS-B)	Range : 01s ~ 90m 59s	Factory Default : **05** [sec]
For 2-Position ATS (A↔B) : Set the transfer delay time from A→B. > Prevents unnecessary transfer due to short-term recovery of the normal power. (e.g., momentary power loss). **For 3-Position ATS (A↔O↔B) :** Set the transfer delay time from O→B.		

> A-Side Open Delay (ATS A-OFF)	Range : 00s ~ 90m 59s	Factory Default : **05** [sec]
3-Position ATS (A↔O↔B) : Set the transfer delay time from A→O.		

> B-Side Open Delay (ATS B-OFF)	Range : 00s ~ 90m 59s	Factory Default : **05** [sec]
3-Position ATS (A↔O↔B) : Set the transfer delay time from B→O.		

> Generator Start Delay	Range : 01s ~ 90m 59s	Factory Default : **05** [sec]
Set the delay time for the generator start signal when an abnormal condition is detected in the normal power during Auto Mode.		

> Generator Stop Delay	Range : 01s ~ 90m 59s	Factory Default : **05** [sec]
Set the delay time for the generator stop signal after the normal power is restored during Auto Mode operation.		

> Overvoltage Delay	Range : 0.1s ~ 2.0s	Factory Default : **1.0** [sec]
Set the delay time for overvoltage operation.		

> Undervoltage Delay	Range : 0.1s ~ 2.0s	Factory Default : **1.0** [sec]
Set the delay time for undervoltage operation.		

> Overfrequency Delay	Range : 0.1s ~ 2.0s	Factory Default : **1.0** [sec]
Set the delay time for overfrequency operation.		

> Underfrequency Delay	Range : 0.1s ~ 2.0s	Factory Default : **1.0** [sec]
Set the delay time for underfrequency operation.		

> Protective Relay Operation Delay	Range : 0.2s ~ 2.0s	Factory Default : **0.2** [sec]
Sets the delay time for protective relay operation when protection signals are received.(ATO, BTO)		

3.7 Generator Test

> Enable Test-n (applies in Auto Mode)	Factory Default : **Disable**
Set whether to enable periodic generator testing. > **No-Load Test** : Starts and stops the generator without load during the configured test time. > **Load Test** : Starts the generator, then transfers the ATS to the generator side to operate under load during the configured test time.	

> Test-n Interval + Day of the Week (DOW)	Factory Default : **1Week (Sun)**
When generator testing is enabled, set the test interval. [1–5 weeks / Day: Sunday to Saturday (Sun–Sat)]	

> Test-n Operation	Range : (00:00~23:59)~(00:00~23:59)	Factory Default : **00:00~00:00**
Set the generator test run time. > If the start time and end time are the same, or if the start time is set later than the end time, the test will not be executed.		

3.8 Synchronous Transfer Setting

> Synchronous	Range : Enable, Disable	Factory Default : **Disable**
Disable : In manual transfer, asynchronous switching is performed. In Auto Mode, transfer is executed based on delay timer. **Enable :** If both power sources are normal, transfer (manual or automatic) is performed only when phase and frequency synchronization between the two power sources is achieved.		
> While waiting for synchronous transfer, the upper line of the LCD displays the phase angle difference between sources (0–360°). > Since the ATS does not support CTTS (closed transition transfer), a momentary power interruption will occur during the transfer.		

> Synchronous Phase Angle	Range : 10 ~ 50 deg	Factory Default : **30** [deg]
Set the allowable phase angle difference for synchronization between the two power sources.		

> Synchronous Voltage Difference	Range : 01 ~ 20 [%]	Factory Default : **10** [%]
Set the allowable voltage difference for synchronization between the two power sources.		

> Synchronous Frequency Difference	Range : 00 ~ 2.0 [Hz]	Factory Default : **1.0** [Hz]
Set the allowable frequency difference for synchronization between the two power sources.		

> Synchronous Transfer Delay	Range : 00s ~ 90m 59s	Factory Default : **05** [sec]
Set the delay time for synchronous transfer when both power sources are in a normal condition.		

> Synchronous Transfer Timeout	Range : 00s ~ 90m 59s	Factory Default : **05** [min]
If the phase, voltage, or frequency conditions between the two power sources are not met, the system will perform an asynchronous transfer after the specified delay time.		

3.9 Equipment Check

> A-Side Transfer Count	View Only
Displays the number of **ATS A-ON operations**.	

> B-Side Transfer Count	View Only
Displays the number of **ATS B-ON operations**.	

> A-Side Operating Time	View Only
Displays the accumulated **ATS A-ON duration**.	

> B-Side Operating Time	View Only
Displays the accumulated **ATS B-ON duration**.	

> Open Time	View Only
Displays the accumulated **ATS-OFF duration**.	

3.10 Usage History

> Usage History 0001~1024	View Only

You can check the "**Transfer, Fault, and Operation history**" of the ATS and controller in chronological order.
Usage history is displayed as : Entry No. 0001 / YYYY-MM-DD / HH:MM:SS / Description
You can scroll through the records using the **UP** and **DOWN** buttons.

> Event List:
- Power ON, Auto/Manual mode switching, Test Start/End, Generator Start/Stop
- A or B-Power abnormality[1], ATS operation failure[2], ATS auto/manual transfer[3]

> Input status changes : IN.A, IN.B, IN.C
> When settings are changed (specific changes are not shown)

* External or communication-based access to usage history is not supported.

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[1] **Power Abnormality List** : Overvoltage, Overfrequency, Undervoltage, Underfrequency, Phase Loss, Phase Reversal, Normal (Power Recovery) Input
[2] **Operation Failure List** : Manual Insertion Failure, Manual Open Failure, Auto Insertion Failure, Auto Open Failure
[3] **Auto/Manual Operation List** : Auto Insertion, Auto Open, Manual Button Operation, Manual Operation Complete

4. Controller Operating Power

The ACD-M-D model can operate without a separate control power supply by using the A/B-Power source.
(A-Power and B-Power terminals L1 and L3 are used as the control power input.)
If a PT is used for voltage input, a separate auxiliary power source (DC 24V) must be supplied.

If both A/B-Power sources are unavailable and you need to maintain communication, LCD display, event logging, ATS position status, and controller operation status, the controller can be operated by supplying a separate auxiliary power source (DC 24V).

5. ATS Control (Operation Method)

Auto / Manual Mode Setting

1) Operation Mode Display : The LCD screen shows [A]AUTO or [M]MANUAL to indicate the current mode.
2) The LED lamp on the Auto/Manual selection button indicates the mode :
   - Blue : Auto Mode
   - Red : Manual Mode

5.1 Auto Operation

1) Monitors A/B-Power conditions :
   > If overvoltage, undervoltage, overfrequency, underfrequency, phase loss, and phase rotation are all within the normal range, the power source is considered normal.
2) Automatically transfers ATS after the configured delay time to the normal power source.
3) If both A and B power sources are normal, operation follows the Power Priority Setting.
4) If both power sources are abnormal, the system waits until one becomes normal.
5) If the normal power source is abnormal, a generator start signal is issued.
6) During automatic operation, if normal control fails due to ATS malfunction or incorrect wiring, the output signal is repeated three times at 3-second intervals.
   If insertion fails after three attempts, the system determines an ATS fault.
   (An alarm, buzzer, and status indication will be provided on the LCD display.)
   Manual reset is available using the Auto/Manu button.
7) Relay output duration for insertion/trip is 0.5 seconds.
8) When entering setting mode during auto operation, all automatic functions pause temporarily except generator start output.
9) The SET button is disabled in Auto Mode. To configure settings, switch to Manual Mode.

5.2 Manual Operation

1) All ATS operations can be controlled via manual buttons or communication.
2) If A-Power is normal, pressing the manual button allows ON/OFF operation of ATS-A.
   (In A↔B configuration, only insertion is possible.)
3) If B-Power is normal, pressing the manual button allows ON/OFF operation of ATS-B.
   (In A↔B configuration, only insertion is possible.)
4) Manual button must be pressed for "at least 0.5 seconds" to operate.
   (to prevent misoperation).
5) Even in manual mode, the power status is displayed on the LCD.
6) During manual operation, relay output remains active while the button is pressed.
7) In manual mode, the generator does not start automatically.
   However, if all control power is lost, the generator start contact is forced ON.
8) In A↔O↔B configuration, manual transfer includes a 1-second open delay.
9) In manual mode, pressing and holding the SET button for 2 seconds enters setting mode.

5.3 Generator Start Output in Auto Mode (GS1, GS2)

1) If an abnormal condition is detected in the normal power source (e.g., phase loss, undervoltage, overvoltage, underfrequency, overfrequency), the system issues a generator start signal (ON) after the configured start delay.
2) When the normal power is restored, the ATS transfers to the normal source, then the generator is stopped by issuing an OFF signal after the configured stop delay.
3) If all control power is lost, the generator start signal is forcibly activated.
4) Start/stop delay times can be configured in the Timer Settings under setting mode.

6. Communication

6.1 MODBUS Protocol

- Communication Type : 2-Wire RS485
- Protocol : MODBUS / RTU
- Supported Functions : REQUEST(04h), COMMAND(05h)
- Slave ID Range : 1~128
- Baud Rate : 9600 [bps], 19200 [bps], 38400 [bps]
- Parity : None
- Data Bits : 8 [Bit]
- Stop Bit : 1 [Bit]
- Minimum Communication Interval : 250 [ms]
- Packet End Timeout : 5 [ms]

6.2 REQUEST(04h)

TX EXAMPLE : 01 04 00 00 00 0E CRC16 → Requests 14 data registers starting from address 30001

Address	Item	Data Type	Data Display
30001	Device Model	UNSIGNED 16BIT	code “G”
30002	A-Power L1–L2 Voltage	UNSIGNED 16BIT	XXXX [V]
30003	A-Power L2–L3 Voltage	UNSIGNED 16BIT	XXXX [V]
30004	A-Power L1–L3 Voltage (Used when set to single-phase)	UNSIGNED 16BIT	XXXX [V]
30005	A-Power Frequency	UNSIGNED 16BIT	XX.X [Hz]
30006	B-Power L1–L2 Voltage	UNSIGNED 16BIT	XXXX [V]
30007	B-Power L2–L3 Voltage	UNSIGNED 16BIT	XXXX [V]
30008	B-Power L1–L3 Voltage (Used when set to single-phase)	UNSIGNED 16BIT	XXXX [V]
30009	B-Power Frequency	UNSIGNED 16BIT	XX.X [Hz]
30010	Phase Angle	UNSIGNED 16BIT	XXX [°]
30011	ACD-M-D Status Bit 0 : Manual Mode Active Bit 1 : Auto Mode Active Bit 2 : Reserved Bit 3 : Reserved Bit 4 : A-Side Power Available Bit 5 : B-Side Power Available Bit 6 : ATS A-Side ON Bit 7 : ATS B-Side ON Bit 8 : A-Side Fault Status Bit 9 : B-Side Fault Status Bit 10 : A-Side Bypass Active Bit 11 : B-Side Bypass Active Bit 12 : Generator Running Bit 13 : Generator Stopped Bit 14 : Reserved Bit 15 : Reserved	UNSIGNED 16BIT	-

Address	Item		Data Type
30012	A-Power Fault Status		UNSIGNED 16BIT
	Bit 0 : A-Power Undervoltage Bit 1 : A-Power Overvoltage Bit 2 : A-Power Underfrequency Bit 3 : A-Power Overfrequency Bit 4 : A-Power Phase Reversal Bit 5 : Reserved Bit 6 : Reserved Bit 7 : A-Power ATO	Bit 8 : A-Side Fault Detected Bit 9 : A-Side Insertion Failure Bit 10 : A-Side Open Failure Bit 11 : A-Side Manual Open Failure Bit 12 : A-Side Synchronous Transfer Failure Bit 13 : A-Side Bypass Failure Bit 14 : A-Side Bypass Fault Bit 15 : Reserved	
30013	B-Power Fault Status		UNSIGNED 16BIT
	Bit 0 : B-Power Undervoltage Bit 1 : B-Power Overvoltage Bit 2 : B-Power Underfrequency Bit 3 : B-Power Overfrequency Bit 4 : B-Power Phase Reversal Bit 5 : Reserved Bit 6 : Reserved Bit 7 : B-Power BTO	Bit 8 : B-Side Fault Detected Bit 9 : B-Side Insertion Failure Bit 10 : B-Side Open Failure Bit 11 : B-Side Manual Open Failure Bit 12 : B-Side Synchronous Transfer Failure Bit 13 : B-Side Bypass Failure Bit 14 : B-Side Bypass Fault Bit 15 : Reserved	
30014	Input/Output Status		UNSIGNED 16BIT
	Bit 0 : A-Side Contact Input Status Bit 1 : B-Side Contact Input Status Bit 2 : IN.A Input Status Bit 3 : IN.B Input Status Bit 4 : IN.C Input Status Bit 5 : Reserved Bit 6 : Reserved Bit 7 : Reserved	Bit 8 : A-Side Insertion Output Status Bit 9 : B-Side Insertion Output Status Bit 10 : Open (Trip) Output Status Bit 11 : Generator Start Output Status Bit 12 : Reserved Bit 13 : Reserved Bit 14 : Reserved Bit 15 : Reserved	

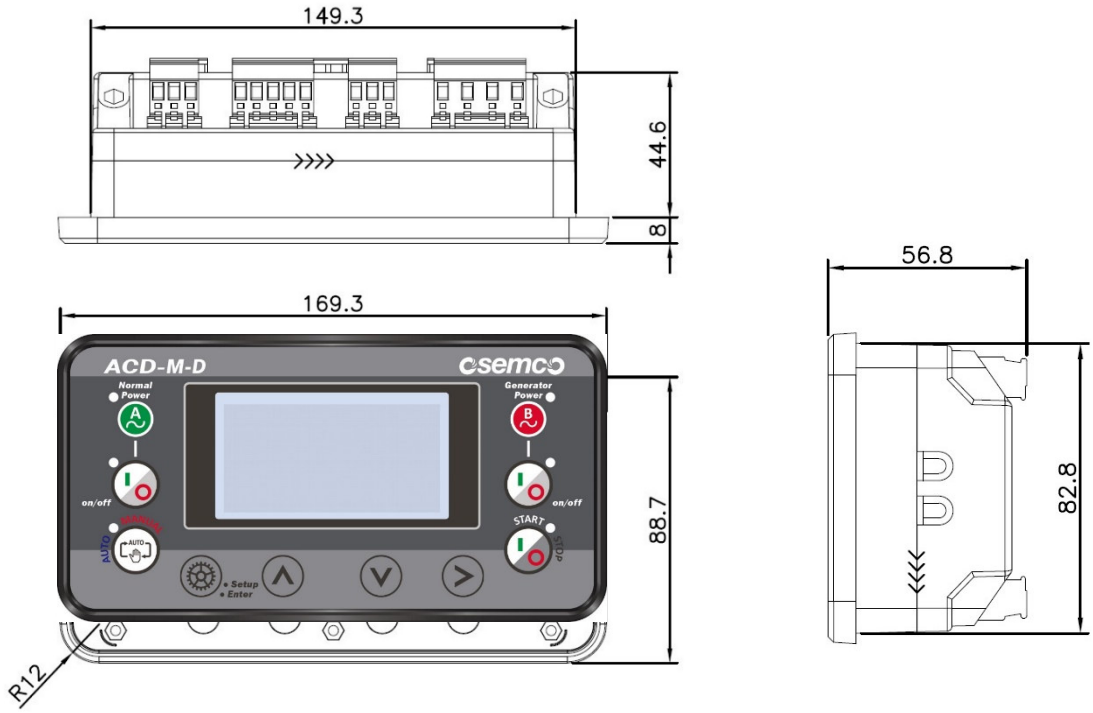
6.3 COMMAND(05h)

TX EXAMPLE : 01 05 00 02 FF 00 CRC16 → Sends a manual insertion signal to ATS A-side at address 0003h

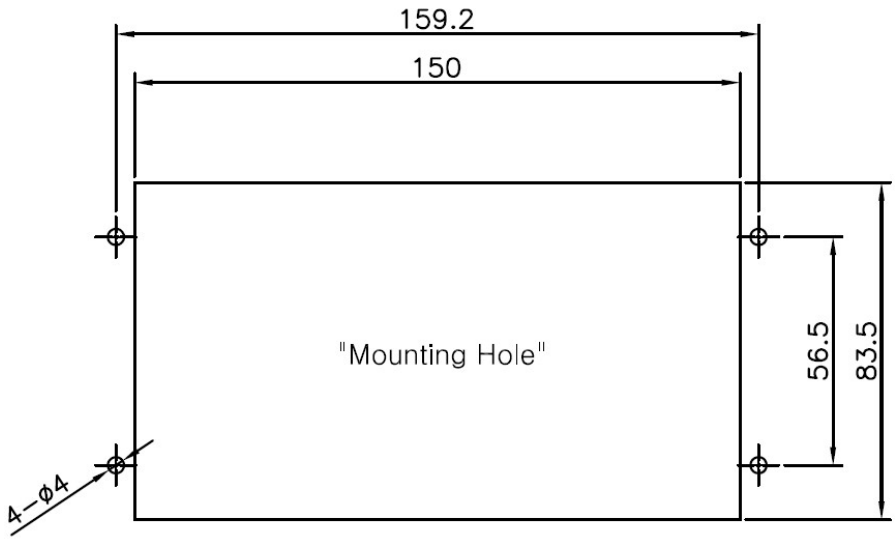
Address	Item	Data Type
0001	Manual Mode	0xFF00 Auto Clear
0002	Auto Mode	
0003	Manual activation of A side	
0004	Manual activation of B side	
0005	Manual Open	
0006	Manual Generator Start	
0007	Manual Generator Stop	

7. Product Dimensions

7.1 Outline Dimension

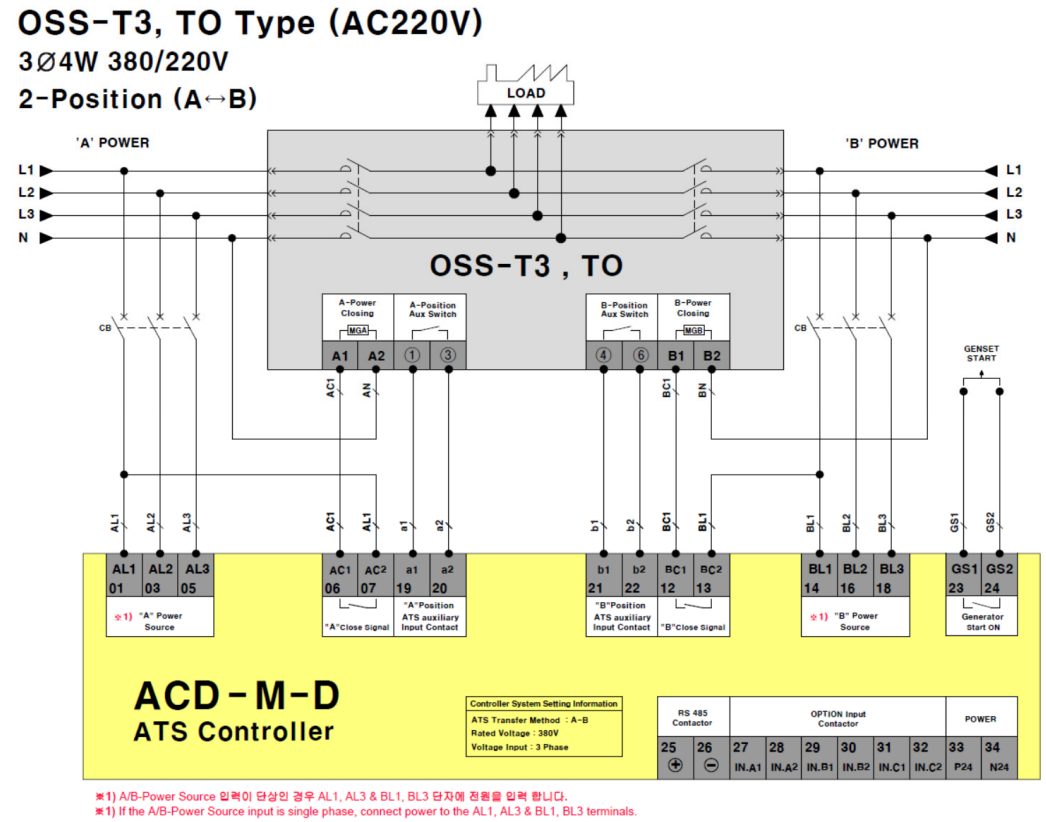


7.2 Panel Cutout Dimension



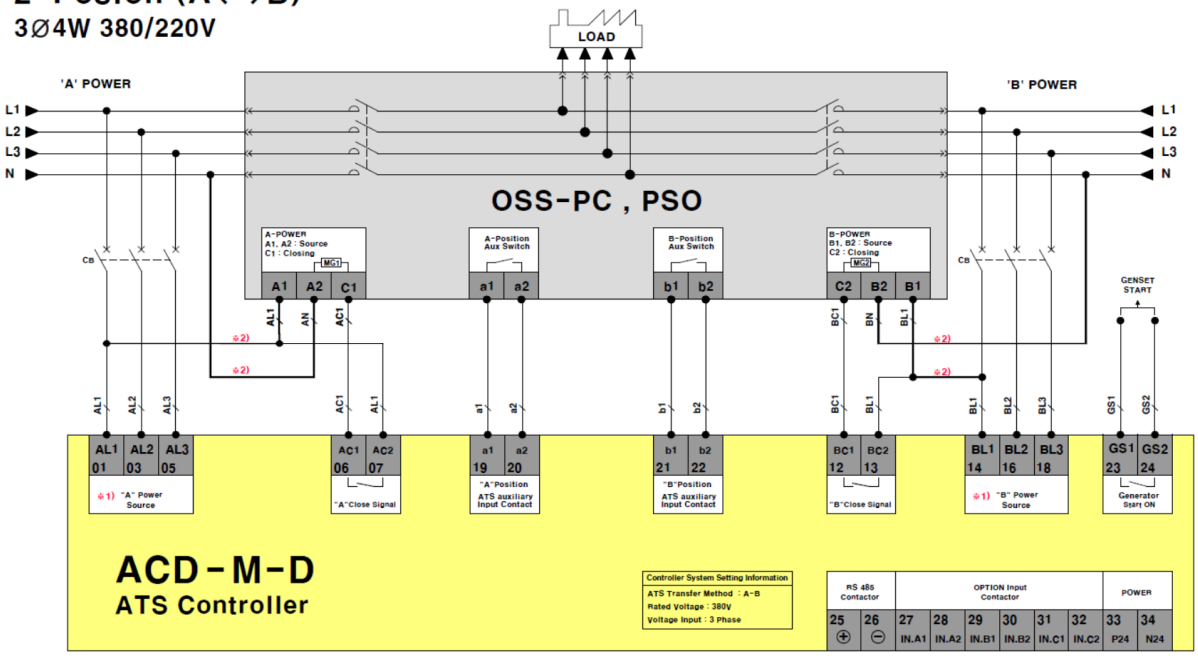
8. Wiring Diagrams

8.1 T3, TO Wiring Diagram



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

8.2 PC, PSO Wiring Diagram



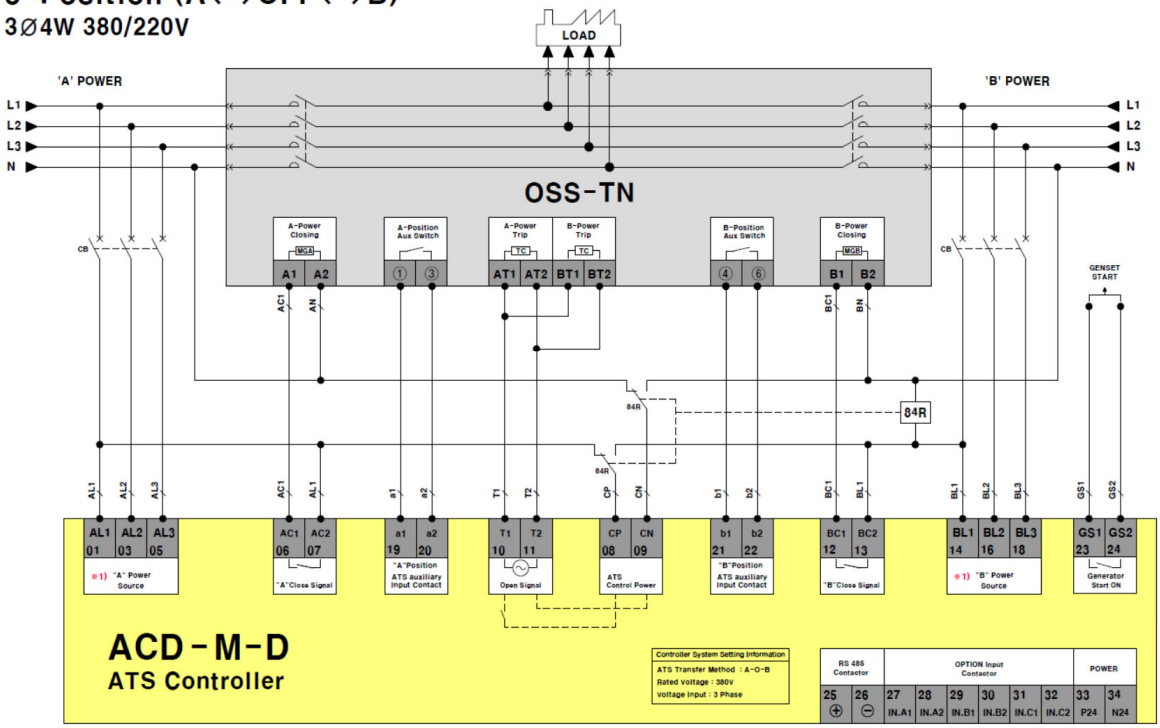
※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

※2) ATS 1,600A 이하 사용시 전선의 굵기는 2.5㎟ 이상 사용합니다.
ATS 2,000A 이상 사용시 전선의 굵기는 4.0㎟ 이상 사용합니다.
ATS 4,000A 이상 사용시 전선의 굵기는 6.0㎟ 이상 사용합니다.

※2) More than 2.5㎟ power cable used for 1,600A ATS or less.
More than 4.0㎟ power cable used for 2,000A ATS or over.
More than 6.0㎟ power cable used for 4,000A ATS or over.

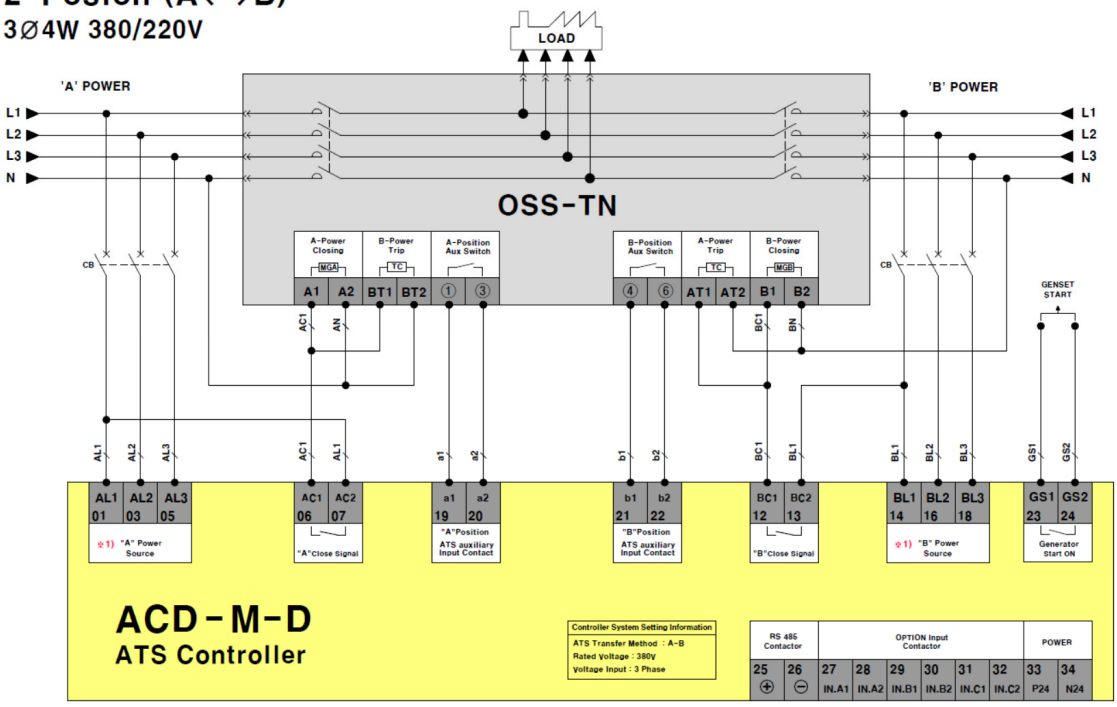
8.3 TN Wiring Diagram

OSS-TN Type (AC220V)
3-Position (A<->OFF<->B)
3Ø4W 380/220V



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

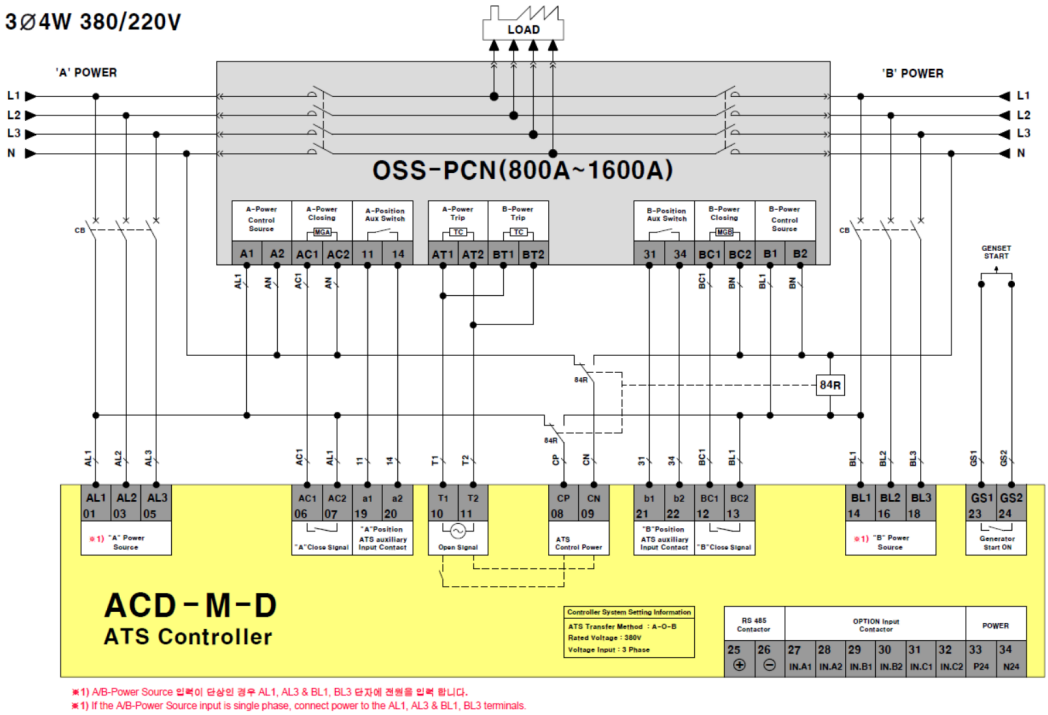
OSS-TN Type (AC220V)
2-Posion (A<->B)
3Ø4W 380/220V



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

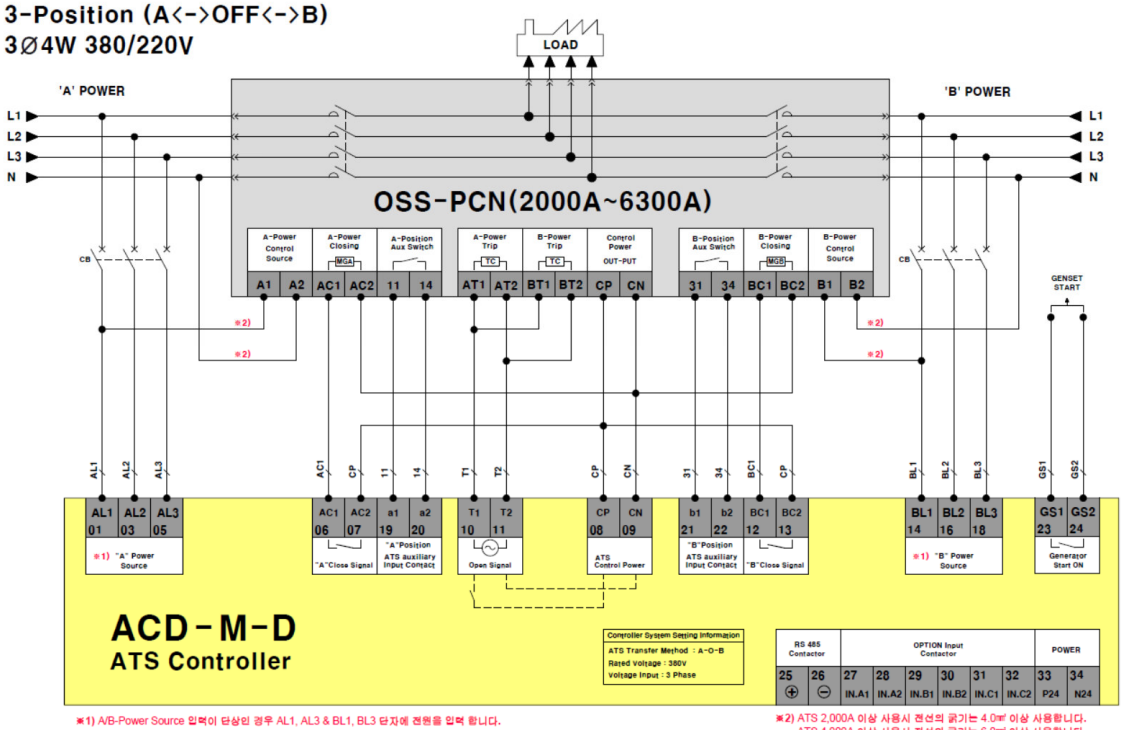
8.4 PCN Wiring Diagram

OSS-PCN Type (AC220V)
800A~1600A
3-Position (A<->OFF<->B)
3Ø4W 380/220V



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

OSS-PCN Type (AC220V)
2000A ~ 6300A
3-Position (A<->OFF<->B)
3Ø4W 380/220V



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

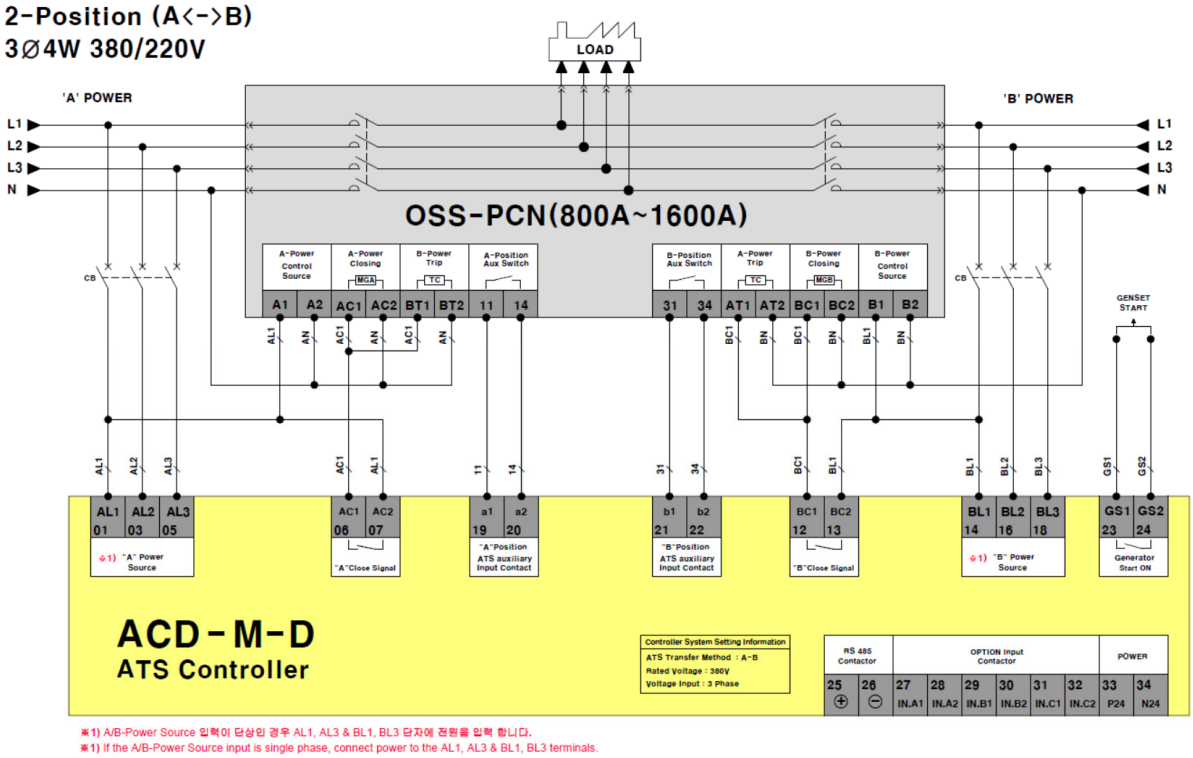
※2) ATS 2,000A 이상 사용시 권선의 굵기는 4.0㎟ 이상 사용합니다.
ATS 4,000A 이상 사용시 권선의 굵기는 6.0㎟ 이상 사용합니다.
※2) More than 4.0㎟ power cable used for 2,000A ATS or over.
More than 6.0㎟ power cable used for 4,000A ATS or over.

OSS-PCN Type (AC220V)

800A ~ 1600A

2-Position (A<->B)

3Ø4W 380/220V



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.

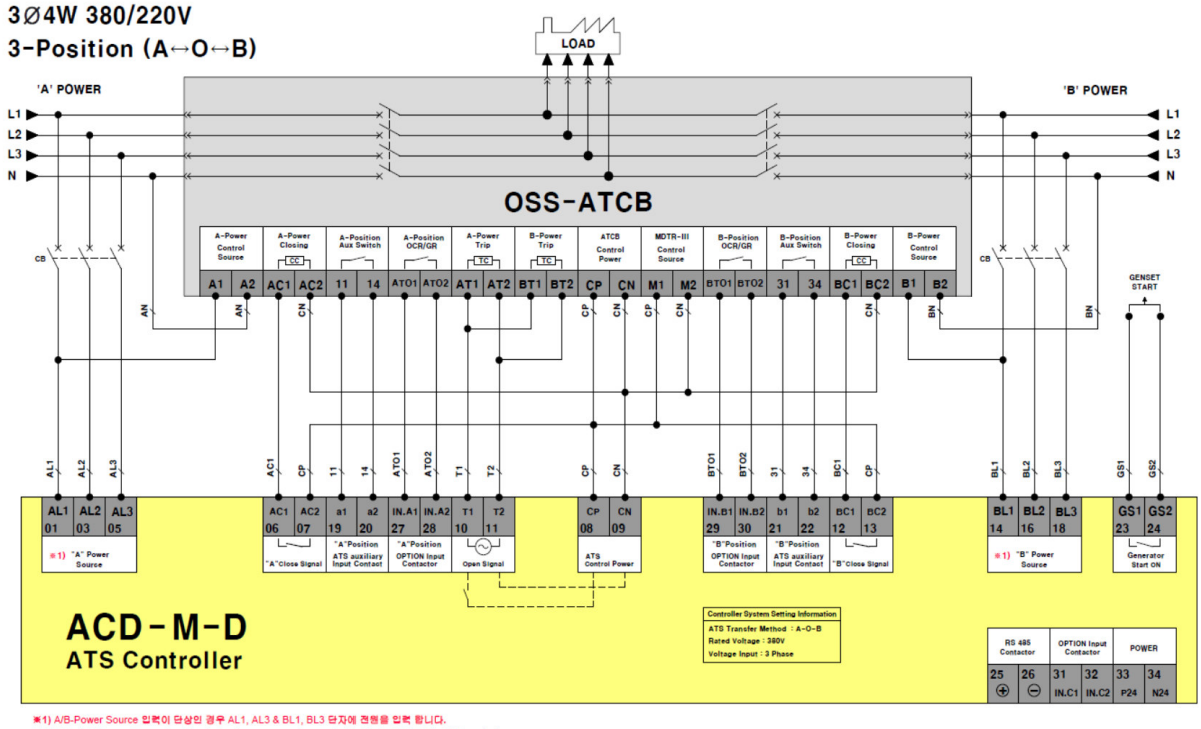
※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

8.5 ATCB Wiring Diagram

OSS-ATCB Type (AC220V)

3Ø4W 380/220V

3-Position (A↔O↔B)



※1) A/B-Power Source 입력이 단상인 경우 AL1, AL3 & BL1, BL3 단자에 전원을 입력 합니다.

※1) If the A/B-Power Source input is single phase, connect power to the AL1, AL3 & BL1, BL3 terminals.

9. Communication Test Monitoring Program

9.1 Download the ACD-M-D monitoring program from the Osung Electric homepage and install it on a Windows PC.

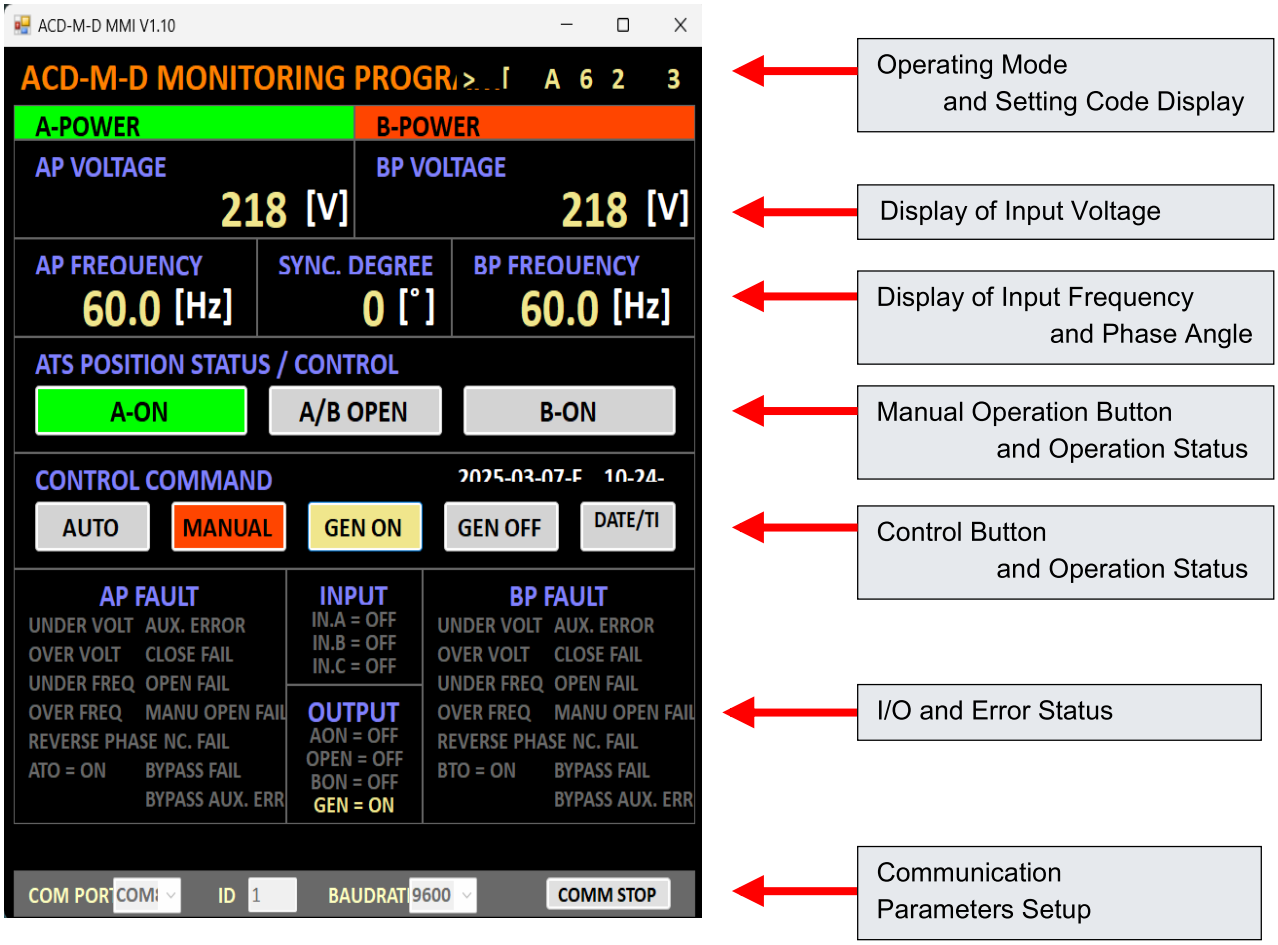
9.2 With the ACD-M-D RS485 communication properly connected and powered on, ensure a 485-to-USB converter is connected to the PC.

9.3 Launch the ACD-M-D communication test monitoring program (hereinafter referred to as the control screen)

9.4 On the control screen, check and configure the connected USB COM port (bottom COM PORT section)

9.5 On the control screen, check and set the connected ACD-M-D communication speed (baudrate) and slave ID (bottom ID and BAUDRATE fields)

9.6 Click the COMM START button on the control screen to initiate communication.



9.7 On the control screen, you can check the operating status and errors. (Setting values cannot be viewed.)

9.8 On the control screen, it is possible to change modes, control the generator, and control the ATS. (When remotely controlling the ATS in use, be cautious of switching-related issues.)

9.9 This program is intended for basic communication testing (demo use only).
For actual field communication systems, please consult a professional communication integrator to build a proper system.