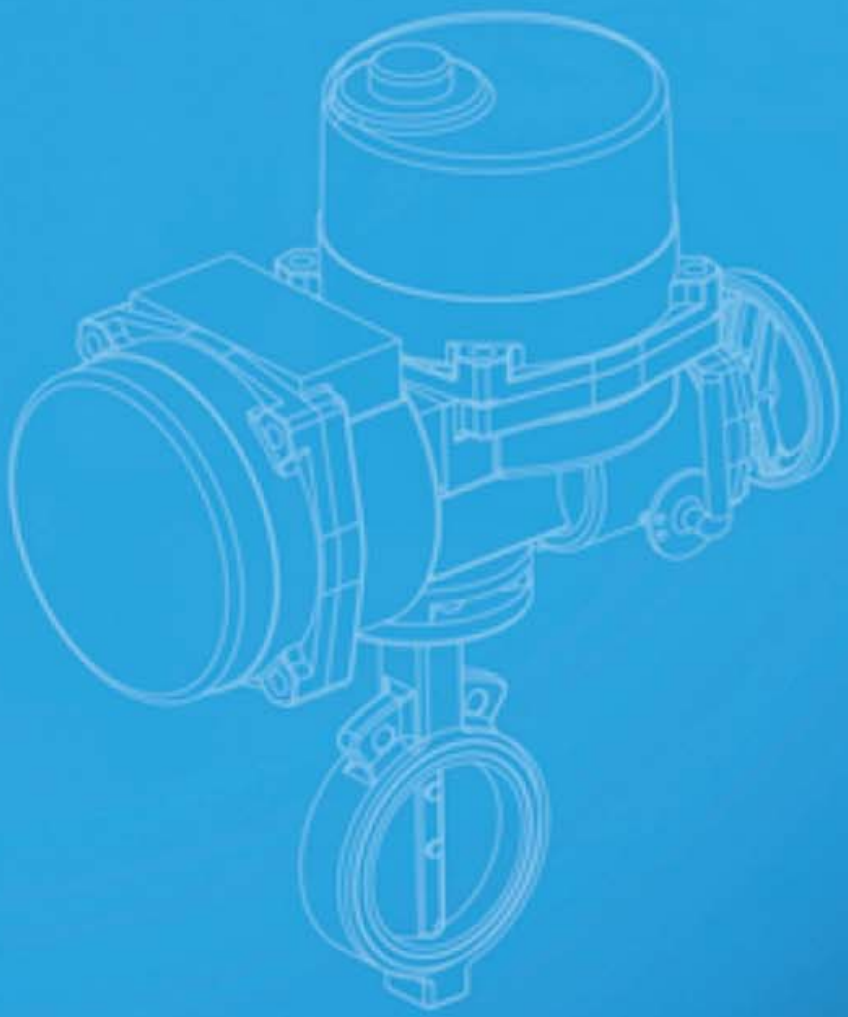
Noah®

NA-SERIES PCU MANUAL

http://www.emico.co.kr

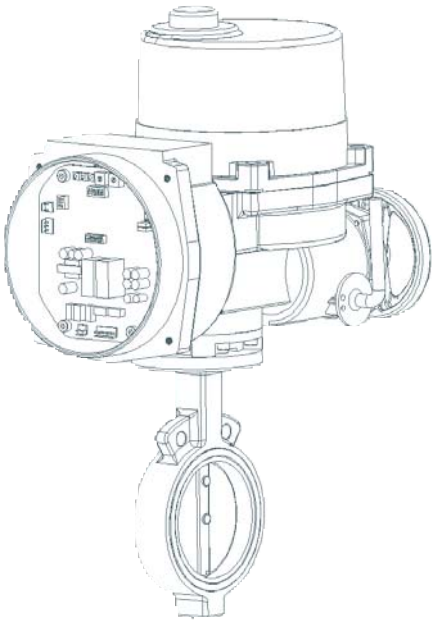


EMICO

EUNHA MACHINERY INDUSTRIAL CO.,LTD

NA

Table of Contents



1. Caution

Electrical shock hazard
To avoid serious personal injury, property damage or death, turn off all power to the actuator before removing the cover.

Before installation or use, verify the nameplate information to insure the correct model number, torque, voltage and enclosure type.

Be sure to completely review the actuator manual prior to operation.

Final limit switch adjustment must be done after mounting the actuator to the valve.
incorrect adjustment may cause actuator failure.

Over torque switches are factory set. tampering with the over torque switch settings may damage the actuator and void the warranty.

Actuator must be properly grounded. use the grounding lugs provided on the inside or outside of the actuator body.

To minimize the possible damage caused by condensation, be sure to energize the heater.

Care should be taken when wiring 3 phase actuators.
Confirm proper rotation and limit switch shutoff function during the initial operation. If the actuator rotates in the reverse direction, then the phasing needs to be corrected by switching two of the 3 phase wires on the terminal block.

2. Warranty Information

The warranty will be void under the following conditions.

2-1 Failure or damage caused by misuse or abuse.

2-2 Failure or damage caused by unauthorized modifications or repairs done to the actuator.

2-3 Failure caused by the unauthorized modification / change of the wiring.

2-4 Failure caused by a reverse phase mis-wire when using three phase power.

2-5 Failure caused by water leakage due to the improper sealing of the actuator conduit entries or by failure to install the cover properly.

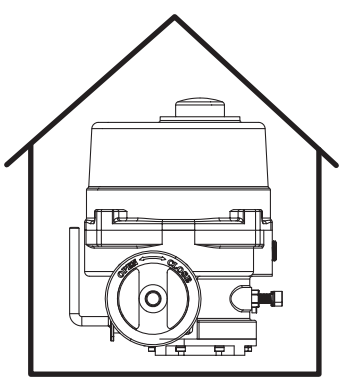
2-6 Failure caused by improperly set limit switches.

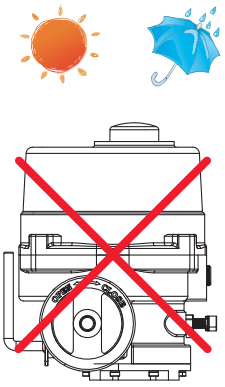
2-7 Failure caused by fire, flood damage or other "Acts of God"

2-8 Failure occuring 1 year after the shipment date.

3. Storage

The actuator must be stored in a clean, dry, temperature controlled area. The unit shall be stored with the cover installed and with the conduit openings sealed. Storage must be off the floor.
Care must be taken to guard the actuator from condensation in extreme temperature variations. Heaters should be energized as soon as actuators are installed.

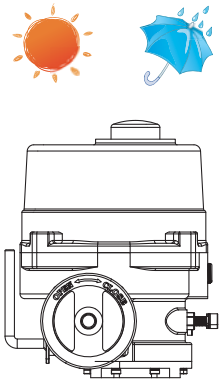




Storage Location	Indoor
Storage Temperature	18℃±5℃

Improper storage of the actuator will void warranty.

4. Environment and Temperature



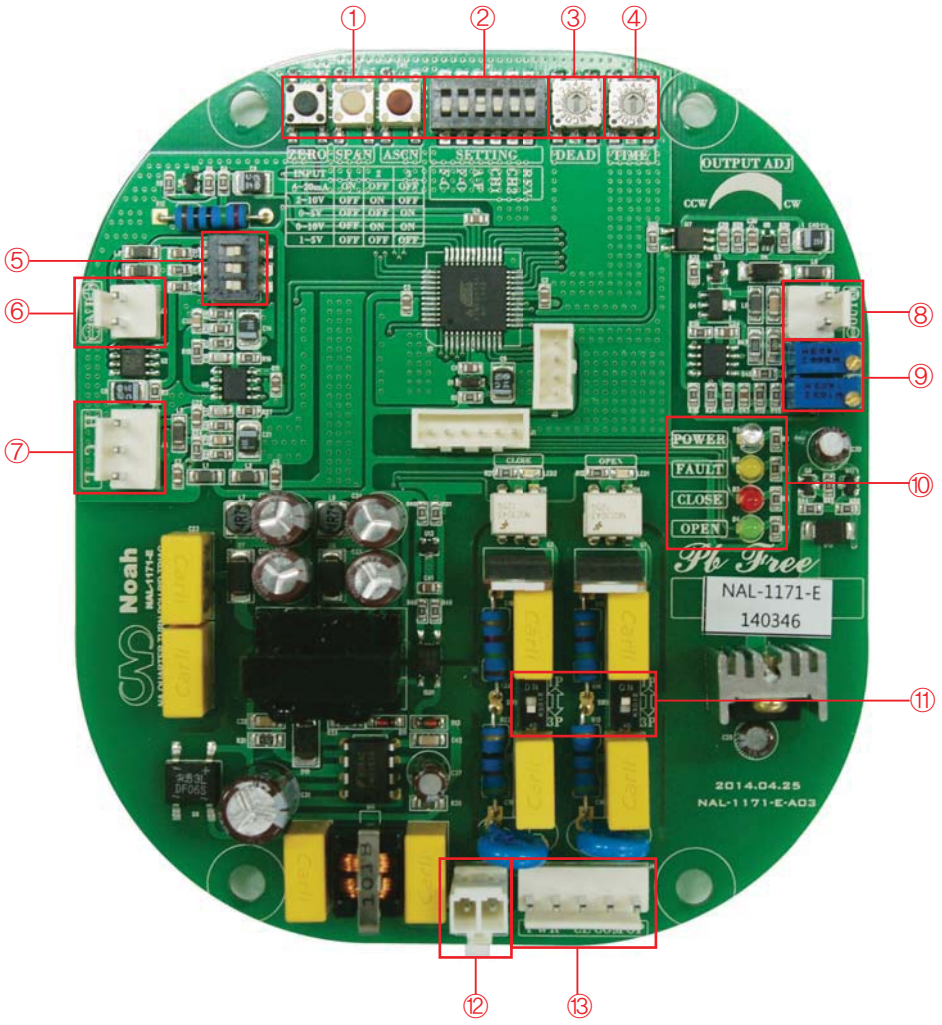
Temperature	−20℃~ +70℃
Water (SEALING)	IP67 (IP68 : OPTION)

The ACTUATOR enclosure is made from and anodized aluminium alloy whitch is also dry powder epoxy painted to help protect it from oxidation.

5. PCU Specification

	Description	Unit
Input Power	90~230V AC ±10% , 50/60Hz DC 24V / AC 24V Input Power must match Motor Ratings	
Command Signal	4~20mA DC (Default), 0~5VDC, 0~10VDC, 1~5VDC, 2~10VDC	
Dead Band	1 ~ 7.5% (1scale 0.5%)	
Output Signal	4~20mA DC	mA
Load Resistance	750Ω	Ω
Wiring Terminals	YW 396 2P(3EA), 3P, 5P connector	
Visual Indicators	Power (Blu), Fault (Yel), Open (Red), Close (Green) LEDS	
Calibration Method	ASCN (Autoscan) Button	
Output Contact	Relay contact 250V AC 16A MAX. (Inductive Load)	V
User Adjustable	Delay Time : 0.5 Sec(Step)	Sec
Parameters	Dead Band : 0.2mA(Step) Fail operation (during loss of command signal) Select input signal A Full Set or Clear	%
Resolution	Min 1/1,000	0
Ambient Temperature	−10℃ ~ +60℃	℃
Ambient Humidity	90% RH MAX. (Non−Condensing)	%
Dielectric Strength	1,500V AC 1 MIN. (Input to Output to Power to Ground)	V
Insulation Resistance	500V DC 30MΩ MIN.	Ω

6. PCU Board Specification

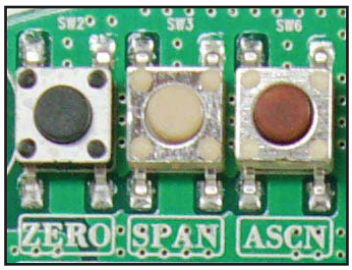


No.	NAME
①	ZERO Button
	SPAN Button
	AUTO SCAN Button
②	DIP SWITCH
③	DEAD BAND
④	TIME DELAY
⑤	DIP SWITCH FOR INPUT SETTING
⑥	INPUT CONNECTOR
⑦	POTENTIOMETER CONNECTOR

No.	NAME
⑧	OUTPUT CONNECTOR
⑨	OUTPUT VOLUME
⑩	CONTROL / WARNING LAMP
⑪	1PH/3PH Selectable DIP SWITCH
⑫	HEATER CONNECTOR
⑬	POWER, MOTOR CONTROL CONNECTOR

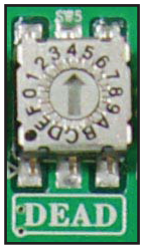
※ The above image shows PCU board for AC110/220V.
PCU board modifications are available according to the factory's circumstances. For more information, please inquire us prior to the purchase or installation.

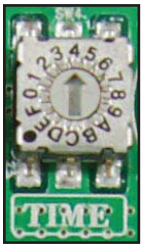
①



Name	Spec.
ZERO	Close manual control button / Input module button
SPAN	Open manual control button / Input module button
ASCN	AUTO SCAN BUTTON (ACTUATOR automatic control button) delivered from the factory the resistance value of potentiometer may can be changed if the user modifies its limit setting. Please make sure to press the autoscan button for at least 2 seconds before operating proportional control.

② ③





Name	Spec.
DEAD BAND	Mechanical steps at least (0.2ma)
TIME DELAY	Modulating starting time (1sec)

What is DEAD BAND ?

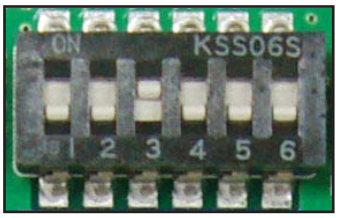
It's an area/band where no action occurs due to the ACTUATOR Input.
If the user inputs 12mA (50%), the ACTUATOR is supposed to stop exactly at 50% position. The ACTUATOR repeats from open to close in order to stop at 50% position at this point.
This is what we call hunting, and if the hunting effect repeatedly occurs the motor can ba damaged.
Therefore a dead band is set to have some area in order to prevent this from happening.
It's set to have 0.05mA per gradation. If it is at 1PH when shipped from the factory, it is set to have a 0.2mA dead band.
If it is at 3PH, on the other hand, it is set to have a 0.3mA dead band.

ex) If it is set to have a 0.2mA dead band, the ACTUATOR is positioned between 11.8mA to 12.2mA.
In case the ACTUATOR stops at the position of 12.1mA, the second least movement area will be at 12.3mA.
At this position no action occurs even when there is the input signal.

What is DELAY TIME ?

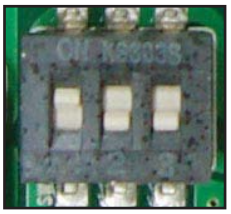
This is when there is an instant noise or disturbance from the outside affectin the input signal and therefore the ACTUATOR can't function. The delay time setting is to prevent this from happening. If the input signal does not change for more than the time set, the ACTUATOR will kick in. The setting for the delay time is 0.5 seconds per gradation. When shipped from the factory the delay time is set at 1 second.

④ DIP SWITCH



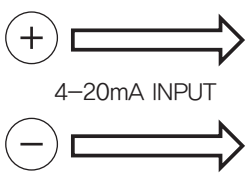
No.	Name	Spec.
1	F C	FAIL CLOSE
2	F O	FAIL OPEN
3	A F	A FULL 3.8 ~ 4.3 INPUT FULLY CLOSE 19.7 ~ 20.2 INPUT FULLY OPEN
4	CH1	DISCRETION SETTING
5	CH2	MANUAL SETTING
6	REV	REVERSE ACTION

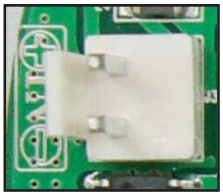
⑤ DIP SWITCH for INPUT Setting



S/W / INPUT	1	2	3
4–20mA	ON	OFF	OFF
2 – 10V	OFF	ON	OFF
0 – 5V	OFF	OFF	ON
0 – 10V	OFF	ON	ON
1 – 5V	OFF	OFF	OFF

⑥ INPUT CONNECTOR

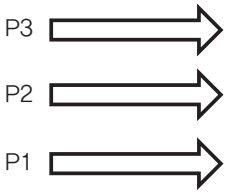


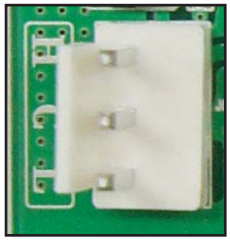


⑦ POTENTIOMETER CONNECTOR

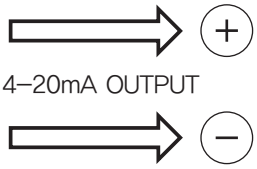
	COLOR	Resistance	
P1	White	LOW	0~1000Ω
P2	Blue	COM	
P3	Black	HIGH	

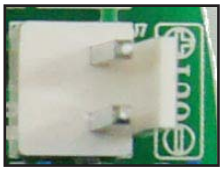
When shipped from the factory and at full close, it is set at 80~120Ω.
(* Refer to P13 for Potentiometer setting)



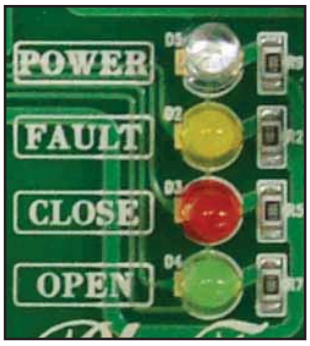


⑧ 4–20mA OUTPUT



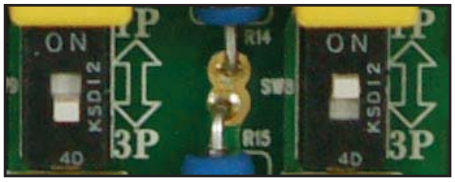


⑩ CONTROL / WARING LAMP



LED LAMP				Cause
WHITE	YELLOW	RED	GREEN	
lighting	flickering	lights out	flickering	Potentiometer Error
lighting	flickering	flickering	lights out	Potentiometer P1, P3 Error
lighting	flickering	lights out	lights out	Input Error
lighting	flickering	flickering	flickering	Pcu Card Memory Error

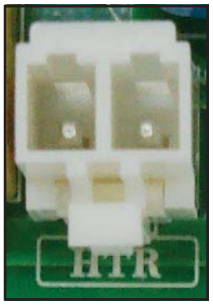
⑪ 1PH/3PH Selectable DIP SWITCH



- Micro current on the board can cause malfunction in magnetic in 3ph motor.

* Dip switches should be switched on in 1ph actuator and should be switched off in 3ph actuator. Warranty does not cover damage by incorrect dip switch setting.

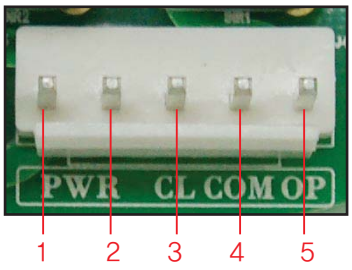
⑫ HEATER CONNECTOR



MAIN POWER	AC 110V~230V, DC 24V
W	20W

- The Heater may be attached or detached according to the user environment.

⑬ MOTOR & MAIN POWER CONNECTOR



No.	Spec.
1	MAIN POWER
2	AC110~230V, DC24V
3	MOTOR CW
4	COM
5	MOTOR CCW

7. Set up and Order

7–1 ACTUATOR FULL CLOSE

ACTUATOR manually using the lever on the handle and you will FULL CLOSE.

Refor to Page 11

7–2 CLOSE LIMIT SETTING

Set the CLOSE LIMIT SWITCH ACTUATOR.

Refor to Page 12

7–3 POTENTIOMETER CHECK

When the ACTUATOR FULL CLOSE status, POTENTIOMETER to determine the value.

※ The factory is set to 80 ~ 120Ω.
If you have not been set 80 ~ 120Ω, please reset.

Refor to Page 13

7–4 ACTUATOR FULL OPEN & OPEN LIMIT SETTING

Using the manual lever or handle to the FULL OPEN ACTUATOR then, in the same way to set the OPEN LIMIT SWITCH.

Refor to Page 11

7–5 **Electric Wiring and Power Input**

Caution

1. Confirm that the wiring diagram located in the ACTUATOR and Wiring No. on the nameplate match with each other.
2. INPUT and OUTPUT of the +, – if the substrate is changed, so Please be sure to break.

Refer to Page 14

7–6 **AUTO SCAN**

Please make sure to press the autoscan button for at least 2 seconds before operating proportional control.
ACTUATOR automatically CLOSE, OPEN, while the behavior is to automatically check for abnormalities.

Refer to Page 16

7–7 **4–20mA INPUT**

After entering the 4–20mA INPUT, ACTUATOR make sure that the normal operation. Determine when the problem occurred after the warning lamp to reset the settings of its contents.

Refer to Page 16

7–8 **4–20mA OUTPUT**

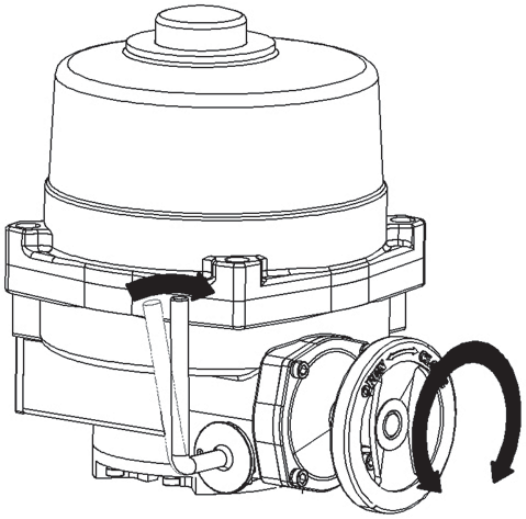
4–20mA OUTPUT not fit, the volume is set using switches.

Refer to Page 16

8. MANUAL MODE

8–1 When you pull the lever located on the side of ACTUATOR handle toward the handle, the lever stands straight. If you turn the handle in that condition, the ACTUATOR moves.

8–2 If the lever does not stand straight when you pull the lever toward the handle, turn the handle halfway while pulling the lever toward the handle.



- When you turn the handle clockwise: CLOSE
- When you turn the handle counter clockwise: OPEN

8–3 After manual operation , leave the lever as it is. It will automatically return to the previous stage of manual operation by the internal Hand /Auto Decluting System when the ACTUATOR is powered on.

8–4 If the Lever does not stand straight even if you pull it in trying to manually operate the ACTUATOR due to some problems during the ACTUATOR operation, you have to check the possibility of Jamming.

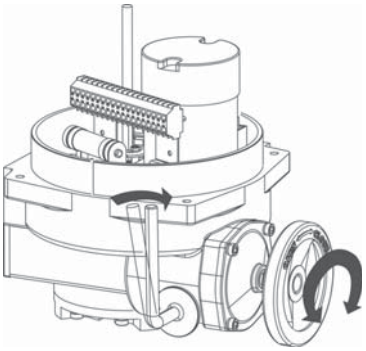
8–5 For more information, refer to the NA Series general manual.

What is Jamming effect?

It is when the worm gear is pressed by the stopper bolt and the gear does not move.
The lever and the handles will not move at this point. (See row 14 on P18 for trouble shooting)

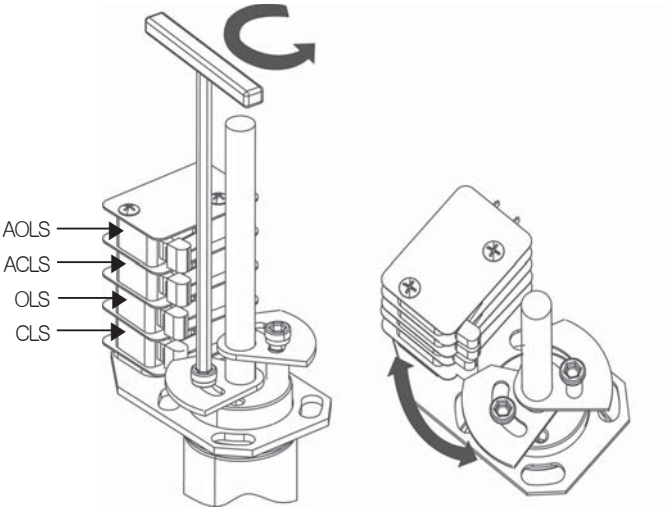
9. LIMIT Setting

9–1 Pull the lever located on the side of the handle toward the handle to make it stand straight and then turn the handle clockwise to fully close the Actuator.



9–2 Loosen the fixed bolt of Close Limit Switch and align the Limit Switch to meet the contact point of Micro Switch.

AOLS	Dry Open Limit Switch
ACLS	Dry Close Limit Switch
OLS	Open Limit Switch
CLS	Close Limit Switch

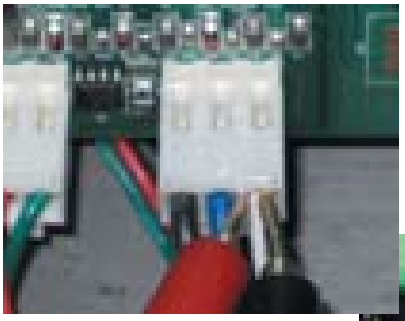


9–3 Firmly fasten the fixed bolt again.

9–4 As for Open Limit Switch Setting, follow the instruction of Close Limit Switch Setting.

9–5 For more information, please refer to the NA Series manual.

10. POTENTIOMETER Setting



POTENTIOMETER
Check

Change the potentiometer
value by altering the gear.

POTENTIOMETER Check

- Actuator delivered full close at 80 ~ 120Ω
- After limit setting it should check at closed 80 ~ 120Ω
- Make actuator full closed and power off by moving of gear

Warning when setting the POTENTIOMETER:
When setting the resistance value on the POTENTIOMETER, always operate when the ACTUATOR power if OFF.
If the power is on, the resistance value on the calibrator will not show accurately.

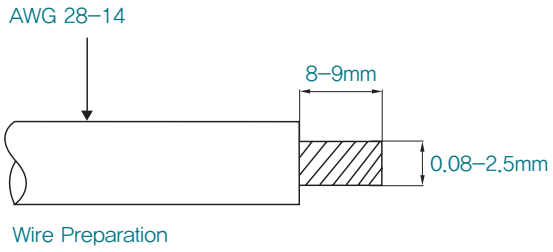
- When finished setting the device, fix the mudu bolt so that the gear will not move.

11. Electrical Wiring

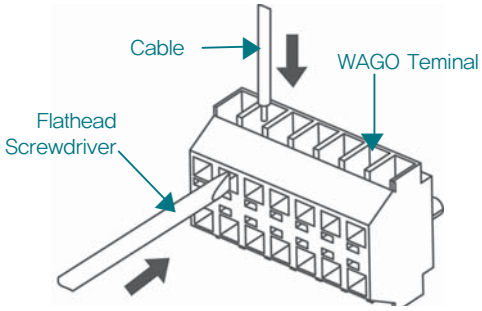
11–1 Separate the cover of the ACTUATOR by loosening the four cover bolts.

11–2 Confirm that the wiring diagram located in the ACTUATOR and Wiring No. on the nameplate match with each other.

11–3 Confirm that the main power and power supply described on the name plate of ACTUATOR match with each other.



Wire Preparation

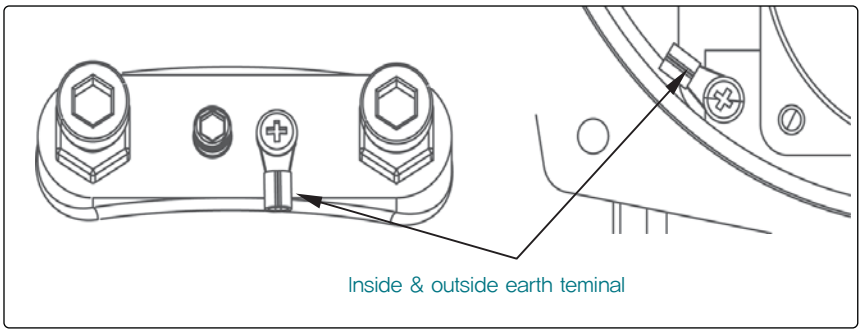


Push and Set

• Insert a small flathead screwdriver as shown to open the terminal point, then insert the wire

11–4 NA–Series uses a WAGO brand terminal strip to allow easy wiring and to protect against vibration.

11–5 Be sure to properly ground the ACTUATOR wiring to the grounding terminals provided on the inside and outside of the actuator body.



11–6 Be sure to wire and energize the heater that is provided.

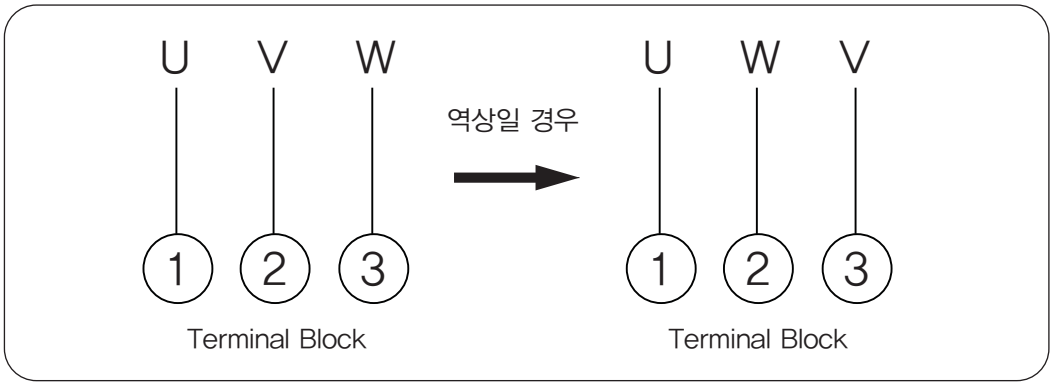
11–7 Each ACTUATOR must be powered by their own individual relays to prevent voltage feedback and ACTUATOR damage.

11–8 With a 3–phase (380V, 440V) powered ACTUATOR, care must be taken to confirm the proper motor rotation when the power and signal are applied. If the ACTUATOR rotates in the reverse direction than what is expected, the limit switches will not function correctly and a mis–wire has occured. Corrective action needs to be taken.

11–8–1
With power disconnected, manually operate the ACTUATOR to a mid position.

11–8–2
Apply power / signal to rotate the ACTUATOR open or closed and confirm the rotation is correct.

11–8–3
If the rotaion is incorrect, then shut off the ACTUATOR and re–wire two of the three wires as shown.



11–9 After the wiring is completed in the ACTUATOR, use wire ties to clean up the ACTUATOR and group wires together, and be certain that the wires are secured away from any moving parts, remove any loose debris.

11–10 When all the work is completed, replace the top cover and secure it using the four cover screws.

11–11 Apply the power and do a final check to confirm proper operation.

11–12 IN / OUTPUT of the +, – so be sure to check the change. (+, – If a change occurs in the PCU board.)

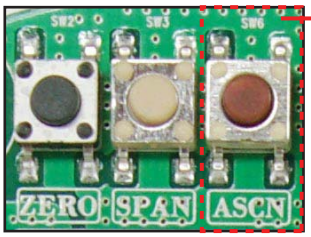
Main Power must only be applied when the top cover is re–installed on the ACTUATOR body.
If the main power is on while wiring the ACTUATOR stop work immediately and turn the power off.
Only then is it safe to proceed.

12. AUTO SCAN & OUTPUT Setting

12–1 Using the manual lever and handle, Limit settings and POTENTIOMETER to complete the setup.

12–2 ACTUATOR wire terminal block after wiring the power switch.

12–3 AUTO SCAN PUSH (2 sec)

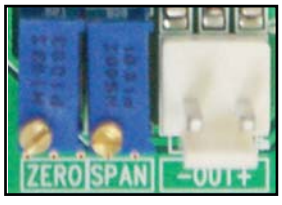


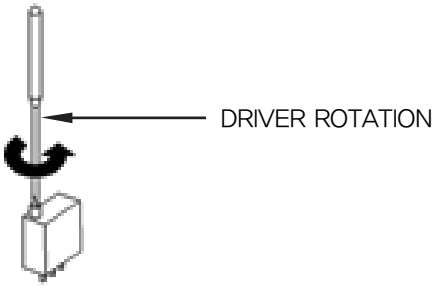
Delivered from the factory the resistance value of potentiometer may can be changed if the user modifies its limit setting.
Please make sure to press the autoscan button for at least 2 seconds before operating proportional control.

12–4 4–20mA INPUT input to verify that the normal operation.
If not, the normal operation of the DIP SWITCH INPUT no.4 optional modulation of setting please reset.

12–5 OUTPUT Setting

ZERO : 4mA VOLUME SWITCH
SPAN : 20mA VOLUME SWITCH

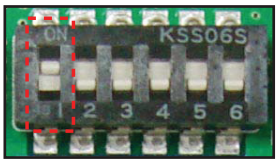




If the 4–20mA output does not work, use the volume switch and change the 4–20mA output.
Generally the error range of IN/OUTPUT is ±0.2mA.

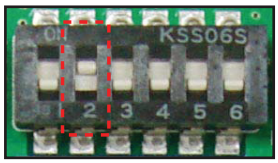
13. Other Settings

13–1 INPUT in case of error, ACTUATOR FULL CLOSE automatically when



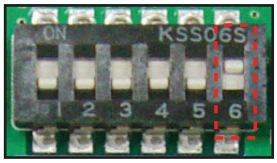
DIP SWITCH No.1 Button ON.

13–2 INPUT in case of error, ACTUATOR FULL OPEN automatically when



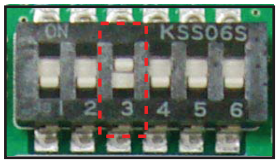
DIP SWITCH No.2 Button ON.

13–3 When the ACTUATOR reverse setting



DIP SWITCH No.6 Button ON.

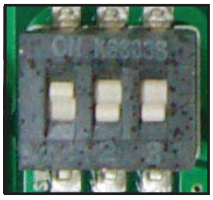
13–4 A FULL function is used



DIP SWITCH No.3 Button ON.
If the input signal is at 3.8~4.3mA, the ACTUATOR turns to a FULL CLOSE.
If the input signal is at 19.7~20.2mA, the ACTUATOR turns to a FULL OPEN.

13–5 INPUT is at 4–20mA 0–10V or 0–5V when change

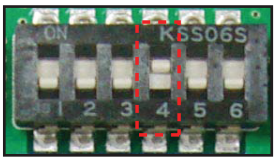
13–5–1 DIP SWITCH Change



S/W / INPUT	1	2	3
4–20mA	ON	OFF	OFF
2 – 10V	OFF	ON	OFF
0 – 5V	OFF	OFF	ON
0 – 10V	OFF	ON	ON
1 – 5V	OFF	OFF	OFF

DIP SWITCH setting to change to fit the table.

13–5–2 Optional Modulation

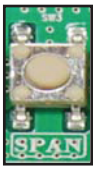


DIP SWITCH No.4 Button ON.

13–5–3 0V input, Push the ZERO BUTTON.

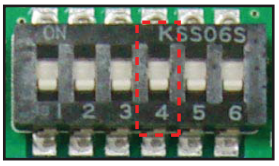
ACTUATOR CLOSE

13–5–4 After the 5V or 10V input, SPAN BUTTON push



ACTUATOR OPEN

13–5–5

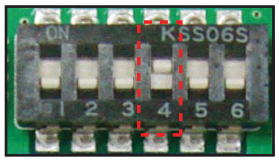


DIP SWITCH No.4 Button OFF.

13–5–6 0–10V or 0–5V input, to verify that the normal operation.

13–6 INPUT 4–20mA (0–10V) and 6–18mA (1–9V) If you want to change a

13–6–1 Optional Modulation



DIP SWITCH No.4 Button ON.

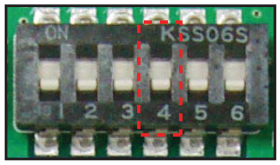
13–6–2 6mA input, Push the ZERO BUTTON.

ACTUATOR CLOSE

13–6–3 After the 18mA input, SPAN BUTTON push

ACTUATOR OPEN

13–6–4



DIP SWITCH No.4 Button OFF.

13–6–5 6–18mA input, to verify that the normal operation.

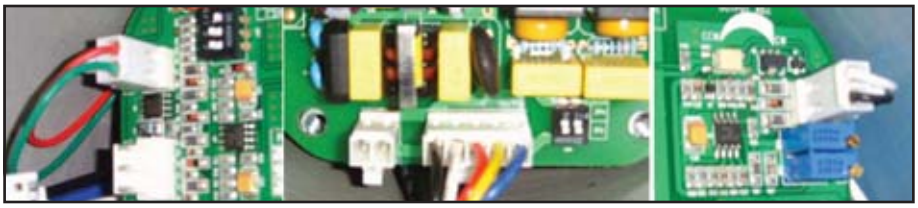
14. ASSEMBLY ORDER

POTENTIOMETER ASSEMBLE

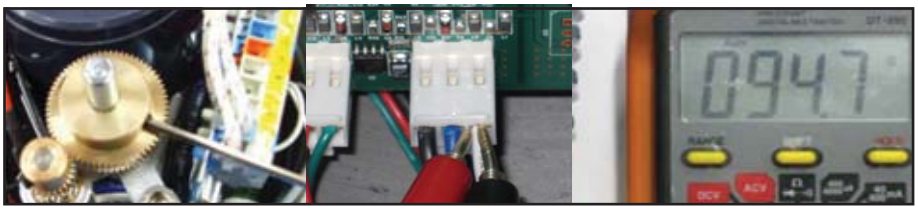
GEAR ASSEMBLE

PCU BODY ASSEMBLE

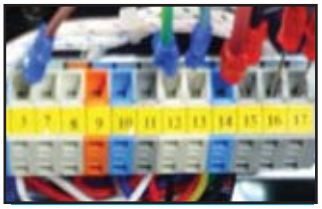
WIRE



PCU WIRE & BOARD CONNECTOR

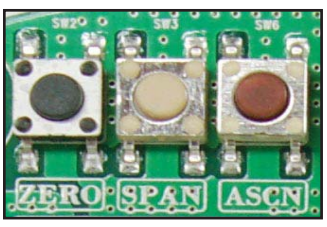


POTENTIOMETER(Ω) CHECK



WIRING & POWER ON

BOARD POWER ON
LED SIGNAL CHECK



ASCN PUSH (2SEC)
ACTUATOR FULL CLOSE/
OPEN ACTION CHECK

IN/OUT CHECK
CLOSE:4mA, OPEN:20mA

15. Troublshooting

PCU card is due to various reasons, does not function properly if you use the environment and actuators determine the frequency of use, and if there is no more than refer to the following items to verify abnormality.

Problem	Cause	Solution
Manual override will not move	The worm wheel and mechanucal limit stop is jammed	Loosen the mechanical limit stop and the valve mounting bolts. Correct the mechanical stop position and then secure the mounting bolts and limit stop.
Level will not hold position when pulled toward the handwheel		
When the OVER LIMIT SWITCH		
Actuator to move the handle when not in operation		
In manual operations, the ACTUATOR will not cycle full open or full close	Limit switch malfunction and / or mechanical limit stop set incorrectly	Reset the limit switch cam and reset the machanical limit stop
ACTUATOR suddenly stops during operation	The over torque switch has tripped	Valves torque has increased. Valve needs to be checked/ repaired or replaced, or the over torque switch has failed and needs to be reset.
When the motor does not operate	Main power failure	Main power check
	Wire disconnect or Shot circuit	Replace defective wire
	Motor or condenser is damage	Replace motor or condenser
	PCU Board failure	Replace PCU Board
When 3 phase operation rotates ACTUATOR in the oppsit direction than the signl that os applied	Phase reversal	Switch two of the 3 phase wires
When ACTUATOR continues to rotate even after the cam strikes the limit switch		
When PCU Board FAULT LAMP flashes	INPUT failure circuit & Disconnection	INPUT Check
PCU board FAULT LAMP lighted, When CLOSE LAMP flashes	POTENTIOMETER disconnection	POTENTIOMETER Check
PCU board FAULT LAMP lighted, When the lights OPEN LAMP	POTENTIOMETER P1, P3 reversal	P1, P3 re-wiring

※ In addition to the above described mechanical / electric failures, other causes may be the reason for a failure based on the site conditions. For more informaion please contact EMICO for consulation. For faster service, Please have all of the nameplate information availble calling the factory.