

# RCEL

## Digital Controller PCU Solid State

# Instruction



### CAUTION



**ELECTRICAL SHOCK HAZARD.** To avoid serious personal injury, property damage, turn off ALL power to the actuator before removing the cover.

Before installation or use, verify the nameplate information 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.

The actuator must be properly grounded. Use the grounding lugs provided on the inside and 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.

### Specifications

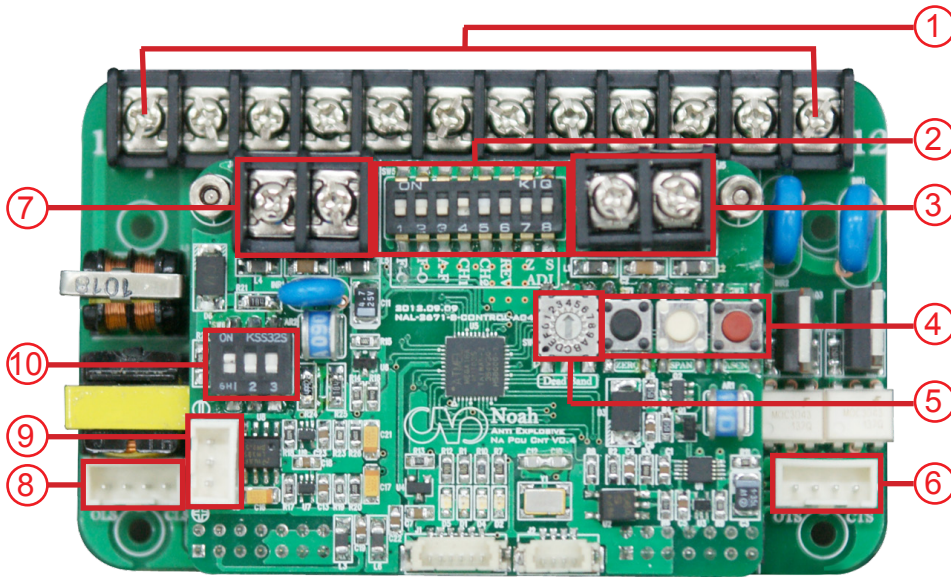
Input Power	90~230V AC $\pm 10\%$ , 50/60Hz DC 24V / AC 24V $\pm 10\%$ Input Power must match motor Ratings
Command Signal	4~20mA DC (Default), 0~5VDC, 0~10VDC, 1~5VDC, 2~10VDC
Dead Band	1 ~ 7,5% (1 scale 0,5%)
Output Signal	4~20mA DC
Load Resistance	750 $\Omega$
Terminals	1~12 Connector, +, - 2EA (In/Output)
Visual Indicators	4 LEDS, Power (Blue), Fault (Yellow), Open (Red), Close (Green)
Calibration Method	ASCN (Autoscan) Button
Output Contact	Relay Contact 250V AC 16A MAX. (Inductive Load)
Delay Time	1 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
Ambient Temperatur	-10 °C ~ +60 °C
Ambient Humidity	90% RH MAX. (Non-Condensing)
Dielectric Strenght	1,500V AC 1 MIN. (Input to Output to Power to Ground)
Insulation Resistance	500V DC 30M $\Omega$ MIN.

### Warranty Information

The warranty will be void under the following conditions:

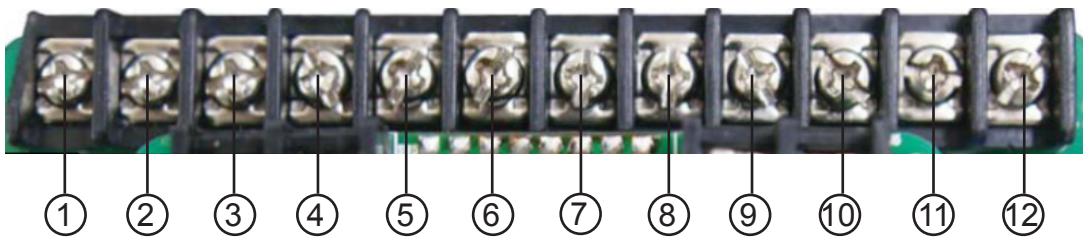
1. Failure or damage caused by misuse or abuse.
2. Failure or damage caused by unauthorized modifications or repairs done to the actuator.
3. Failure caused by the unauthorized modification / change or the wiring.
4. Failure caused by water entering the actuator due to improper sealing of the conduit entries.
5. Failure caused by improperly set limit switches.
6. Failure caused by fire, flood damage or other natural disasters.
7. Failure occurring more than one year after shipment date.

**PCU Board Spec.**

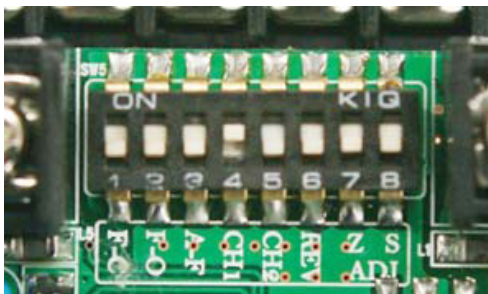


No	Name
1	No. 1 ~ 12 Connector
2	Dip Switch
3	Output Connector
4	ZERO Button
	SPAN Button
	AUTO SCAN Button
5	Dead Band
6	OTS, CTS Connector
7	Input Connector
8	OLS, CLS Connector
9	Potentiometer Connector
10	DIP Switch for Input Setting

① No. 1 ~ 12 Connector



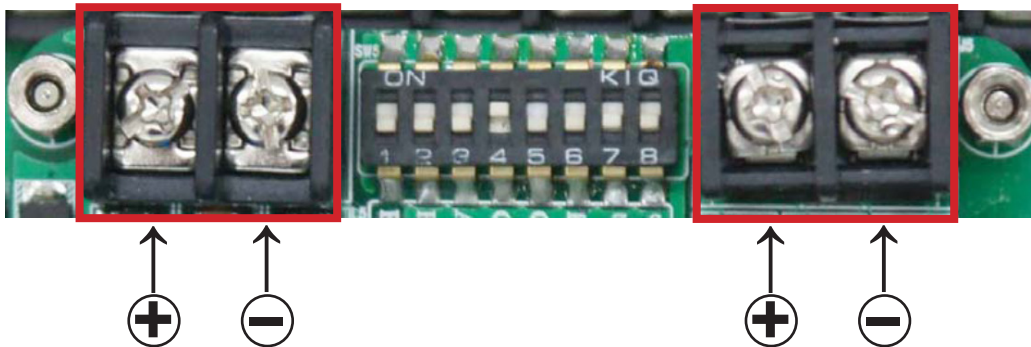
② DIP SWITCH



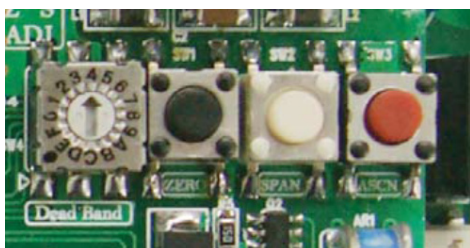
No.	1	2	3	4	5	6	7	8
Name	FC	FO	AF	CH1	CH2	REV	Full Close Output Control	Full Open Output Control
Spec.	Fail Close	Fail Open	A Full 3.8 ~ 4.3 Input Fully Close 19.7 ~ 20.2 Input Fully Open	Discretion Setting	Manual Setting	Reverse Action	—	—

1. Fail Close	When there is no input signal, the actuator automatically turns to a full close position.
2. Fail Open	When there is no input signal, the actuator automatically turns to a full open position.
3. AF	If the input signal is at 3.8 ~ 4.3mA, the actuator turns to a full close position. If the input signal is at 19.7 ~ 20.2mA, the actuator turns to a full open position.
4. CH1	Optional modulation It is used when the user voluntarily changes the input signal.  ex) When setting to 6 ~ 18mA Input ●CH1 ON → Input 6mA and press ZERO button → Input 18mA and press SPAN button. → CH1 OFF → Input and check if the device operates normally.
5. CH2	Optional modulation using manual handle. It is used when the user controls the actuator using the manual handle.  ex) When controlling using the manual handle. ●CH2 ON → Put the actuator at Full Close. → Press the ZERO Button → Put the actuator at Full Open → Press the SPAN Button → CH2 OFF → Input and check if the device operates normally.
6. REV	It is used when the actuator operates in the inverse direction. When REV is on and at 4mA, the actuator turns to a full open position, and to a full close position when at 20mA.
7. Full Close Output Control	If the output is 3.7mA (not 4mA), put no.7 switch up and put SPAN button. Whenever the button is put, the output increase. When it reaches at 4mA, put ASCN button for a second to save it. (If the output is higher than 4mA, (4.2mA), put ZERO button to decrease.)
8. Full Open Output Control	If the output is not 20mA, follow the same step as above (7. Full Close Output Control).

③ ⑦ In / Output Connector



④



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.

⑤ **DEAD BAND**

**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 be damaged. Therefore a dead band is set to have some area in order to prevent this from happening.

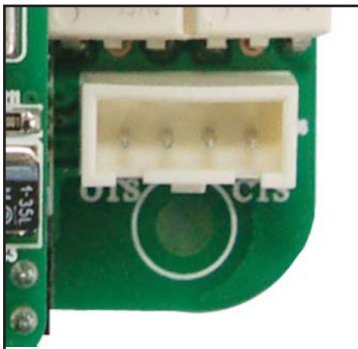
It's set to have 0.05mA per gradation. If it is at 1PH when shipped from the factory, it is set to have a 0.2mA dead band. If it is at 3PH, on the other hand, it is set to have a 0.3mA dead band.



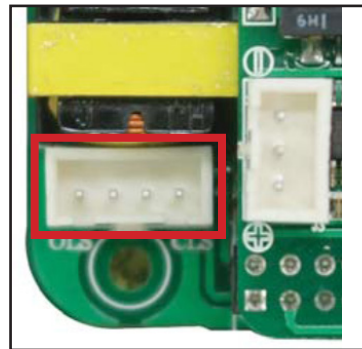
ex) If it is set to have a 0.2mA dead band, the actuator is positioned between 11.8mA to 12.2mA. In case the actuator stops at the position of 12.1mA, the second least movement area will be at 12.3mA. At this position no action occurs even when there is the input signal.

Name	Spec.
DEAD BAND	Mechanical Steps at least 0.2mA

⑥ **OTS, CTS Connector**



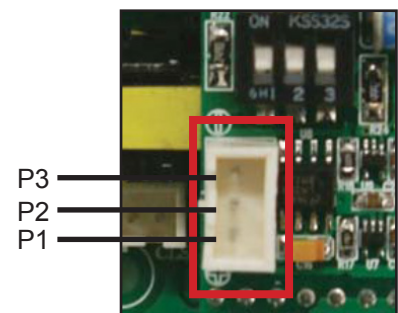
⑧ **OLS, CLS Connector**



⑨ **Potentiometer Connector**

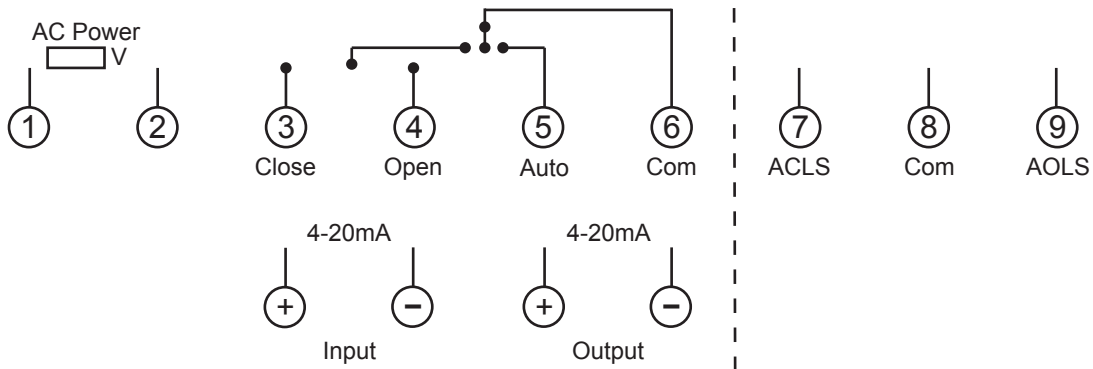
	Color	Resistance	
P1	White	LOW	0 ~ 1000Ω
P2	Blue	COM	
P3	Black	HIGH	

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

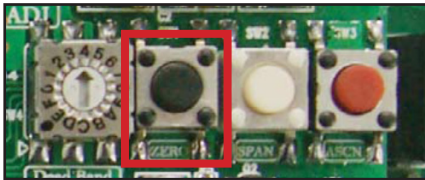


## How to use

1) Wire according to the product.



2) AUTO SCAN Push (2 sec)



- Auto Scan Button (Actuator automatically setting 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.

3) Check the input and output are correct. (Standard: In/Output 4-20mA)

- If the input is not 4-20mA, refer to P9 CH1.

### 10 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

#### • 0 ~ 10V INPUT Setting

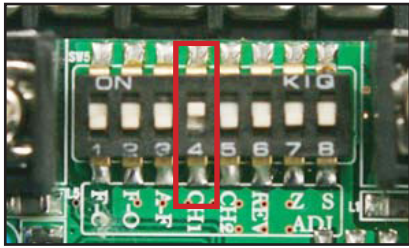
1) DIP SWITCH CHANGE



ON  
↑  
↓  
OFF

	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

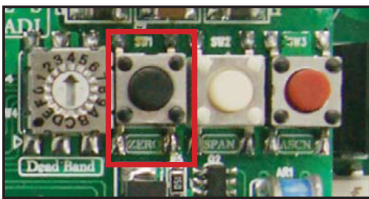
2) CH1 BUTTON ON



ON  
↕  
OFF

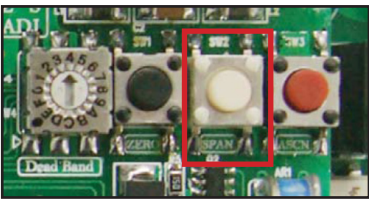
NO	NAME
1	FAIL CLOSE
2	FAIL OPEN
3	A FULL
4	CH1
5	CH2
6	REV
7	Full Close Output Control
8	Full Open Output Control

3) 0V INPUT



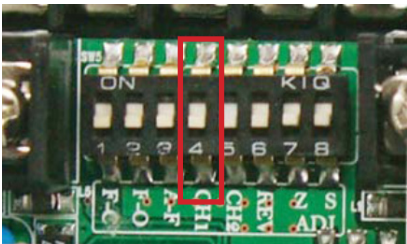
← ZERO Button  
PUSH

4) 10V INPUT



← SPAN Button  
PUSH

5) CH1 BUTTON OFF

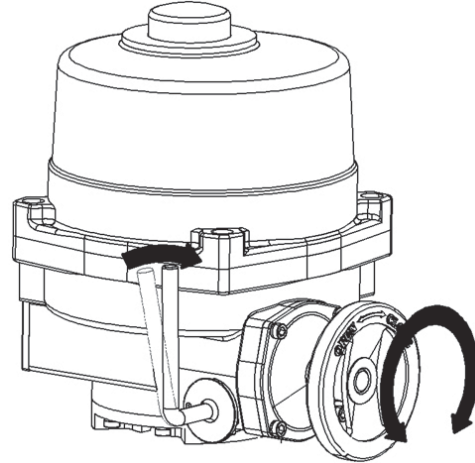


ON  
↕  
OFF

## Manual Mode

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.

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.



- Turn the handle clockwise for CLOSE
- Turn the handle counter clockwise for OPEN

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 Declutching System when the actuator is powered on.

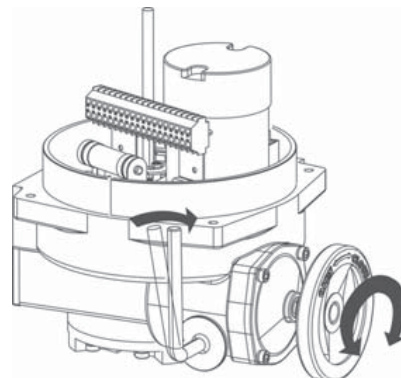
4. If the lever does not stand straight even if you pull it in trying to manually operate the actuator due to some problems during the actuator operation, you have to check the possibility of Jamming.

### What is Jamming effect?

It is when worm gear is pressed by the stopper bolt and gear does not move. The lever and the handles will not move at this point.

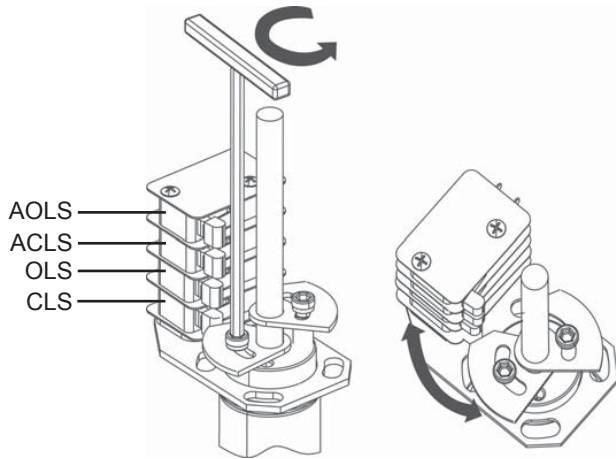
## Limit Setting

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



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

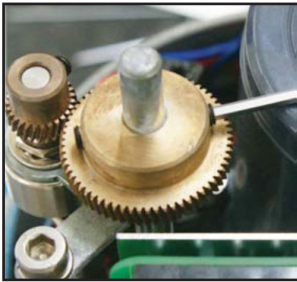
AOLS	Dry Contact Open Limit Switch
OLS	Open Limit Switch
ACLS	Dry Contact Closed Limit Switch
CLS	Closed Limit Switch



3. Firmly fasten the fixed bolt again.

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

## Potentiometer Setting



Change the potentiometer value by altering the gear.



Potentiometer Check

- Actuator delivered full close at 85 ~ 120Ω
- After limit setting it should check at closed 85 ~ 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 is OFF.

If the power is on, the resistance value on the calibrator will not show accurately.

- When finished setting device, fix the stop screw so that the gear will not move.

## Electrical wiring

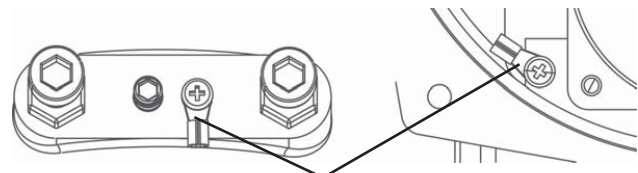
1. Confirm that the wiring diagram located in the actuator and Wiring No. on the name plate match with each other.

2. Confirm that the main power and power supply described on the name plate of the actuator match with each other.

3. Insert a small flathead screwdriver to open the terminal point, then insert the wire.

4. Be sure to properly ground the actuator wiring to the grounding terminals provided on the inside and outside of the actuator body.

The internal grounding wire size shall be at least the same with the conductor used and the external grounding wire size shall be 4.5 ~ 5.0mm<sup>2</sup> at least.



Inside & Outside earth terminal

5. Be sure to wire and energize the heater that is provided.

6. Each actuator must be powered by their own individual relays to prevent voltage feedback and actuator damage.

7. 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.

8. When all the work is completed, replace the top cover and secure it using the six cover screws.

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



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 it is safe to proceed.

## Troubleshooting

PCU card is due to various reasons does not function properly if 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	Sollution
Manual override will not move	The worm wheel and mechanical 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 hand wheel		
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 mechanical 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 damaged	Replace motor or condenser
	PCU Board failure	Replace PCU Board
When 3 phase operation rotates actuator in the opposit direction than the signal that is 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 information please contact Rotork Sweden AB for consultation. For faster service, please have all of the nameplate information avalibe.

