



# **RPC(Remote Position Controller)**

## **Installation and operating manual**

Model : RPC-07-C

**(Manual Revision September 07, 2015)**



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## Many thanks for purchasing JFEW / JFEX & IQL Series electric Actuator!

For safe and proper operation, please read this manual carefully before installation, operating or maintenance it and save it for your references.

**Important Notice: The contents in this manual are subject to change due to quality improvement without individual notice.**

## 1. Checkpoints before using Actuator

- 1) Check if the specifications (Model No, Main Power, Control Power, other Options) of the delivered actuator meet your requirements.
- 2) Check the application such as the valve and Damper etc.
- 3) Check if the mounting of the actuator on your application is correct and tight enough.
- 4) Check if the setting of the actuator such as limit switches, stopper bolts and indicator are correct.
- 5) Check the electric specifications such as Main Power, In/Out Signal, Wiring State based on Electric Wiring Diagram.
- 6) Do not convert, repair or change of electric wiring to suit yourself.
- 7) Do not electric wiring work to avoid electric shock in case of rain.
- 8) Check if the power is off before your wiring work.
- 9) In case of 3Phases Main Power, recheck Reserved Phases or Open Phases.
- 10) In case of 3Phases Main Power, user must check Actuator Rotating Direction.
  - A. Places Actuator Open/Close Position at 50% by manual and supplies Close Signal to Actuator.
  - B. In case Actuator operates in Close Direction, all wires are connected well in 3Phases.
  - C. If the Actuator operates in Opposite Direction (Open Direction), some wires are connected in Reserved Phases. In case Reverse Direction Actuator Operating, disconnect any two wires and switch them each other and make connect them again with switched.
- 11) Reset if CAM is changed due to setting output according to Actuator.
- 12) Disassembly, modification without factory's consent may affect the performance of the actuator and the factory cannot guarantee the product and its performance.
- 13) Actuator appearance, electric wiring diagram and this manual can be revised without prior notice for quality and performance improvement.

## 2. Over View

RPC (Remote Position Controller) is a controller dedicated for Proportional Control System, it is possible to provide Open/Close contact for forward/backward rotation comparing current position value of the Actuator and input signal since 12-bit A/D converter and 8-bit microprocessor are used. It shows/outputs current position value within range of 4~20mA as well.

## 3. Standard Specifications

- 1) Model : RPC-07-A
- 2) Power : 1Ph, AC 85~265V, 50/60Hz, Free Voltage (Option : AC/DC 24V)
- 3) Input Signal : 4~20mADC / DC 1~5V / DC 2~10V / DC 0~5V / DC 0~10V
- 4) Input Resistance : 250 $\omega$
- 5) Feed Back Potentiometer : 1h
- 6) Output Signal : 4~20mADC (Source Type)
- 7) Load Resistance : Max. 750  $\omega$
- 8) Number of Output Contact : 2EA (Open Relay & Close Relay)
- 9) Motor Recess Time when Running Reverse Direction (Delay Time)  
: 1.0~8.5 sec. (0.5sec/1step, 0~15 step)
- 10) Tolerance (Dead Band) : 0.1~4.5% (0.3%/step, 0~15 step)
- 11) Position Conversion Accuracy :  $\rho$  0.5% ~  $\rho$  1.5% (might depend on circumstance)
- 12) Signal Fail Safe Position : Close / Open / Stop
- 13) Resolution : Min. 1/1000
- 14) Ambient Temperature : -10 $\circ$ C ~ 60 $\circ$ C (14 $\mu$  ~ 140 $\mu$ , Surface of RPC Board)
- 15) Ambient Humidity : 90% RH Max. (Non-Condensing)
- 16) Dielectric Strength Test : AC 1800V, 1 Sec. (Input to Output, Power to GND)
- 17) Insulation Resistance : DC 500V more than 100 Z
- 18) Vibration & Shock Test  
: (Axis : X, Y, Z) 10g (6g based on RMF), Frequencies : 0.2~34Hz, less than 180min.

## REVISION NOTE

Rev. Jan. 8, 2013 : Existed Main Power Selection Dip Switches

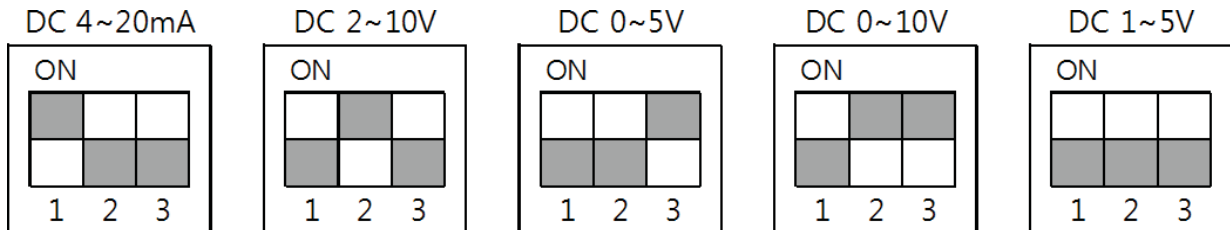
Rev. Sep. 7, 2015 : Removed Main Power Selection Dip Switches



## 4. Main Functions & Way of Use

1) Input Signal Selection : According to the Range of user's input signal, user can simply set up input signal with Dip Switch.

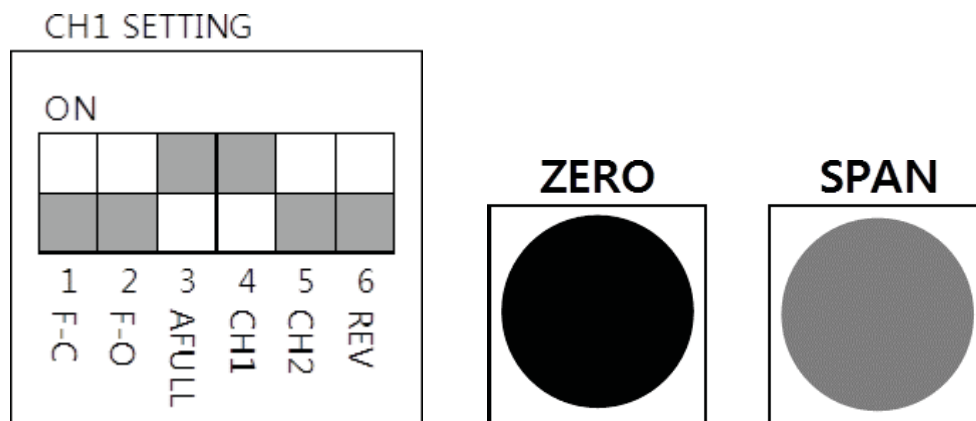
(Refer to Page No. 15 "8. RPC Lay-out", Mark "A" Input Signal Select Switches.)



Switch No.	1	2	3
DC 4~20mA	<b>ON</b>	OFF	OFF
DC 2~10V	OFF	<b>ON</b>	OFF
DC 0~5V	OFF	OFF	<b>ON</b>
DC 0~10V	OFF	<b>ON</b>	<b>ON</b>
DC 1~5V	OFF	OFF	OFF

2) Input Signal Set-up & Alteration (CH1)

(Refer to Page No. 15 "8. RPC Lay-out", Mark "B" & "C")



A. DC 4-20mA Input Signal Set-up (Standard Setting)

- Input Signal Select Switch : 1-ON, 2-OFF, 3-OFF (Refer to "4. 1) Input Signal Selection in Page No. 5")
- After placed CH1 Dip Switch "ON", please check if Power LED (White) is flickering.
- Input Close Value Signal (4mA) onto RPC PCB Board from PLC(Power Line Communication) then press "ZERO"(Black) button until two times flickering of Fault(Yellow), Close(Green) and Open(Red) LEDs. During inputs Close Value Singal onto RPC Board, the actuator does not move.

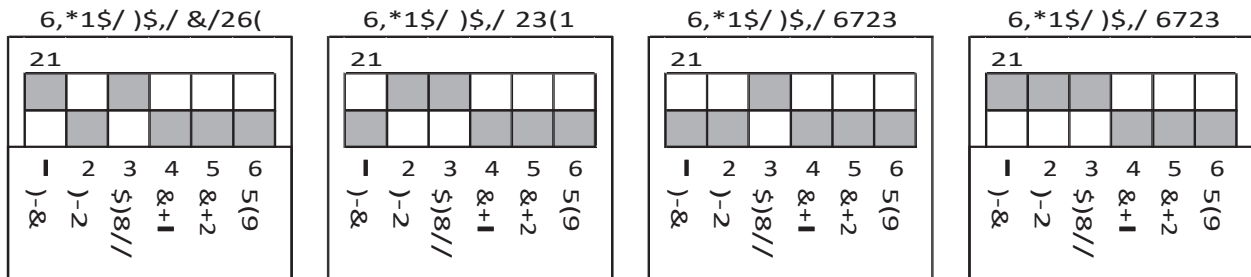
- d. Inputs Open Value Signal (20mA) onto RPC PCB Board from PLC then press "SPAN"(Grey) button until two times flickering of Fault(Yellow), Close(Green) and Open(Red) LEDs. During inputs Open Value Singal onto RPC Board, the actuator does not move.
  - e. Once completed Signal Input setup, places CH1 DIP Switch "OFF" then check if POWER(White) LED stays ON.
  - f. Check if Actuator Operating status with Input Signal 4~20mA.
- B. Input Signal Set-up with any preferable range.
- a. It shall be used, when user wants to use/setup 3~8mA as Close or 16~21mA as Open other than 4mA(Close) or 20mA(Open).  
Ex) Full Close : 5mA / Full Open : 18mA
  - b. Refer to "4. 1) Input Signal Selection" in Page No. 5, set-up Input Signal 4-20mA with Dip Switch.
  - c. Check if White LED(Power) is flickering, when CH1 Dip Switch "ON".
  - d. Input any preferable Close Signal(3~8mA) then Press "ZERO" button, until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs.
  - e. Input any preferable Open Signal(16~21mA) then Press "SPAN" button, until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs
  - f. After finished Input Signal setting, make sure CH1 Dip Switch "OFF" then check if White LED(Power) stays "ON".
  - g. Check if Actuator operates properly upon your Input Signal Setting Value.
- C. Alteration of Input Signal other than 4-20mADC
- a. Refer to "4. (1) Input Signal Selection", set-up Input Signal 0~10VDC with Dip Switches.
  - b. Check if White LED(Power) is flickering, when CH1 Dip Switch "ON".
  - c. Input Close Signal(0VDC) then Press "ZERO" button, until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs.
  - d. Input Open Signal(10VDC) then Press "SPAN" button, until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs
  - e. After finished Input Signal setting, make sure CH1 Dip Switch "OFF" then check if White LED(Power) stays "ON".
  - f. Check if Actuator operates properly upon your Input Signal Setting Value.
  - g. In case of user wants to use 2~10VDC, 1~5VDC or 0~5VDC as Input Signal, refer to "4. (1) Input Signal Selection" and choose appropriate Dip Switches according to Input Signal Range then reset as "above c to f".
  - h. When Input Signal uses 0~5VDC or 0~10VDC, A-FULL and Signal Fail Safe Position functions are not working.

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(A-FULL : Refer to Page No. 8 "4. 7) A-FULL (Function) Set-up" / Signal Fail Safe Position : Refer to Page No. 7 "4. 3) Signal Fail Safe Position")

## 3) Signal Fail Safe Position

(Refer to Page No. 15 "8. RPC Lay-out", Mark "B")

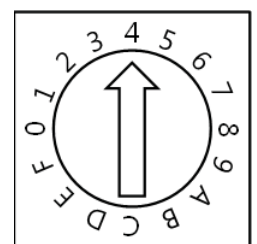


- FAIL CLOSE (F-C ON & F-O OFF) : When Signal Fail, Actuator Operates up to Full Close Position.
- FAIL OPEN (F-C OFF & F-O ON) : When Signal Fail, Actuator Operates up to Full Open Position.
- FAIL STOP (F-C OFF & F-O OFF / F-C ON & F-O ON) : When Signal Fail, Actuator Does NOT Operate and Stop.
- Set up as "FAIL STOP" when Factory Shipment. (F-C OFF & F-O OFF)
- In case, user uses 0~5VDC or 0~10VDC as Input Signal, Signal Fail Safe Position is not working.

## 4) Delay Time(Motor Recess Time set-up when running in Reverse Direction)

(Refer to Page No. 15 "8. RPC Lay-out", Mark "E")

- Set-up Motor Recess Time to avoid Spark or Surge on Board-when user needs to operate Actuators in Reverse Direction suddenly while Actuator Operating.
- Each step has 0.5 sec. Time Delay and available to set-up up to 15 steps Time Delay from 1.0 sec. to 8.5 sec..  
(0=1.0 sec., 1=1.5 sec., 2=2.0 sec. ~ E=8.0 sec., F=8.5 sec.)
- Closer to "0", Motor Recess Time shall be shorter when Motor needs to operate Reverse Direction while Actuator Running. If set-up at "0" or lower step, Motor may be overheat and/or defected.
- Set up as "4"(3.0 Sec.) when Factory Shipment.



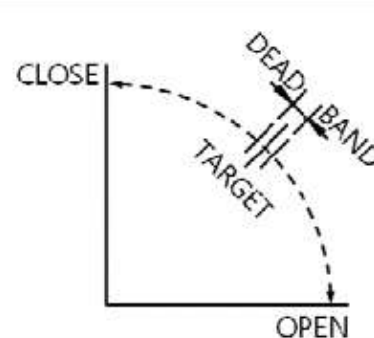
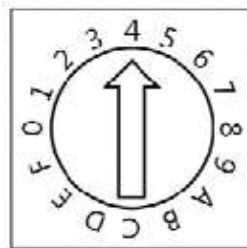
TIME  
DELAY

## 5) Dead-Band (Tolerance Set-up)

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(Refer to Page No. 15 "8. RPC Lay-out", Mark "D")

- A. Set-up Allowable Tolerance Range of Actuator Stop Position.
- B. Check if user wants to operate a current Stop Actuator again, input Higher/Lower Signal compare to Current Actuator Position Value plus Dead Band Value.



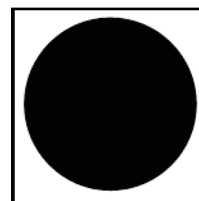
- C. From 0 to F (0.1~4.5%), each step has 0.3% Tolerance Value, user may set-up Dead-Band Value upto 15 steps.
- D. Closer to "0", Dead-Band (Tolerance Value) shall be shorter, in case Actuator can not be stopped at a Target Position and can be Hunting(Slip).
- E. If there is continuous Hunting/Slip, Motor, RPC Card, Potentiometer or/and Valve/Damper can get damaged/defective.
- F. Set up as "4"(1.3%) when Factory Shipment.

## 6) Manual Operating by ZERO & SPAN Buttons (Local Control)

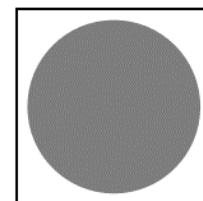
(Refer to Page No. 15 "8. RPC Lay-out", Mark "C")

- A. Press "ZERO(Black)" and "SPAN(Grey)" buttons at the same time until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs.

**ZERO**



**SPAN**



- B. While FAULT(Yellow) LED stays "ON", press "**ZERO(Black)**" button until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs. Press "**ZERO(Black)**" button, Actuator operates to **Close Direction** and "**CLOSE(Green)**" LED turns "ON".
- C. While FAULT(Yellow) LED stays "ON", press "**SPAN(Grey)**" button until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs. Press "**SPAN(Grey)**" button, Actuator operates to **Open Direction** and "**OPEN(Red)**" LED turns "ON".
- D. While press "**ZERO(Black)**" or "**SPAN(Grey)**" button, Actuator is NOT OPERATING by Input Signal.
- E. Press "**ZERO(Black)**" and "**SPAN(Grey)**" buttons at the same time until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs then returns to Stand-by Status.
- F. Nothing to do after done above "A to C" or NOT PRESS "ZERO(Black)" and/or "SPAN(Grey)" buttons longer than 15 sec. then returns to Stand-by status by itself.

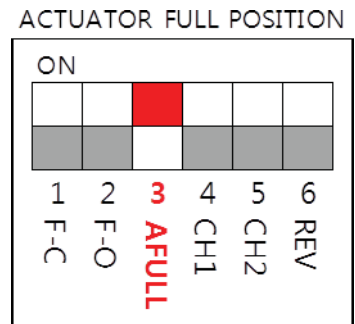


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## 7) A-Full (Function) Set-up

(Refer to Page No. 15 "8. RPC Lay-out", Mark "B")

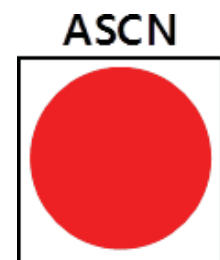
- Input Lower than 4.3mA(2%), Actuator operates until "Full Close" position and Input Higher than 19.7mA(98%), Actuator operates until "Full Open" position.
- If set-up Input Signal as 0~5VDC or 0~10VDC, this A-Full function is not working.
- Set up as "ON", when Factory Shipment.



## 8) Auto Setting (ASCN)

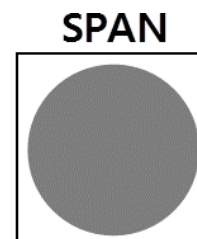
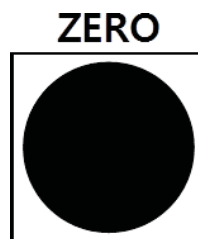
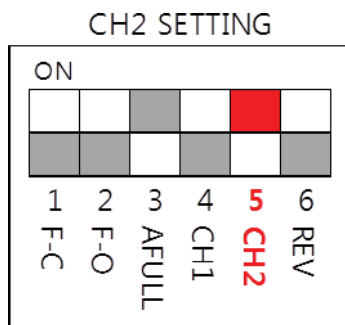
(Refer to Page No. 15 "8. RPC Lay-out", Mark "C")

- Press "ASCN" button, until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs.
- Actuator operates by itself from current position to Full Close and from Full Close to Full Open and measures/memorizes by itself about Full Close and Full Open Positions.
- When Actuator operates to Full Close direction, check if Close(Green) LED is flickering and when Actuator operates to Full Open direction, check if Open(Red) LED is flickering.
- After completed Auto Setting, 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs then returns to Stand-by status.
- Input any Operating Signal onto RPC Board, check if Actuator operates well or not.
- NOTE.** After performed Auto Setting, Delete previous Setting Value/Saved Data and Save a New Data.
- Do Auto Setting one time when First Installation after Factory Shipment, Adjust/Movement of Limit Switch CAM, Replace of Potentiometer or RPC Card.



## 9) Manual Set-up (CH2)

(Refer to Page No. 15 "8. RPC Lay-out", Mark "B")



- Without Limit Switch or CAM adjustment/movement, available to set-up Actuator

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Operating Range.(Full Close and Full Open Position).

- B. Switch "ON" of CH2 Dip Switch, check if "POWER(White)" LED is flickering.
- C. Places ideal Close Position with Handwheel.
- D. Press "ZERO(Black)" button until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs.
- E. Places ideal Open Position with Handwheel.
- F. Press "SPAN(Grey)" button until 2 times flickering on FAULT(Yellow), CLOSE(Green) and OPEN(Red) LEDs.
- G. Switch "OFF" of CH2 Dip Switch, check if "POWER(White)" LED is flickering.
- H. Input Operating Signal check if Actuator operates well or not.
- I. In Manual Set-up, A-FULL function does NOT work.
- J. If performed Auto Setting, Manual Set-up Data will be Deleted.

## 10) Adjustment of Output Signal Value

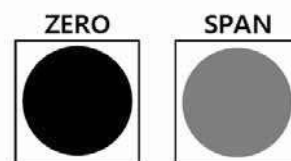
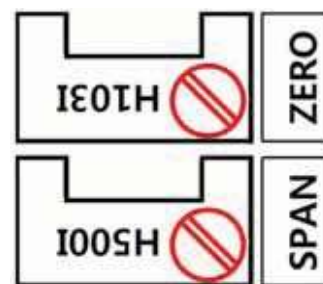
(Refer to Page No. 15 "8. RPC Lay-out", Mark "G")

- A. After completed all of Input Signal Setting, check if Output Signal comes out from RPC Card properly.
- B. Places Full Close Position of Actuator, check if Output Signal is 4mA.(In case, Output Signal Range is 4-20mA)

**NOTE. CW=Clock Wise=Increase Output Signal Value**

**CCW=Counter Clock Wise=Decrease Output Signal Value**

- C. User wants to alternate/increase/decrease "CLOSE Output Signal Value", refer to "8. RPC LAYOUT" and adjust small bolt on "ZERO(H103I)" according to his application.
- D. Places Full Close Position of Actuator, check if Output Signal is 20mA.
- E. User wants to alternate/increase/decrease "OPEN Output Signal Value", refer to "8. RPC LAYOUT" and adjust small bolt on "SPAN(H500I)" according to his application.
- F. Operating Actuator 2~3 times repeatedly in Open and Close Directions then check if the OUTPUT SIGNAL comes out from RPC Board properly.



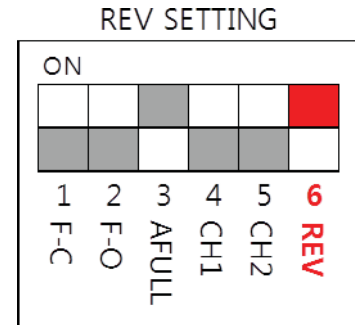
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11) Rev : CW-Close direction operating Actuator mounting on CW-OPEN direction operating Valve/Damper

(Refer to Page No. 15 "8. RPC Lay-out", Mark "B")

- A. Generally, Actuator operates CW=CLOSE and CCW=OPEN.
- B. This "Rev. Setting" uses Actuator and Valve/Damper operating directions are not matched(opposite ways).

Operating Direction	Normal Setting		Rev. Setting	
	Actuator	Valve	Actuator	Valve
CW	Close	Close	Open	Open
CCW	Open	Open	Close	Close

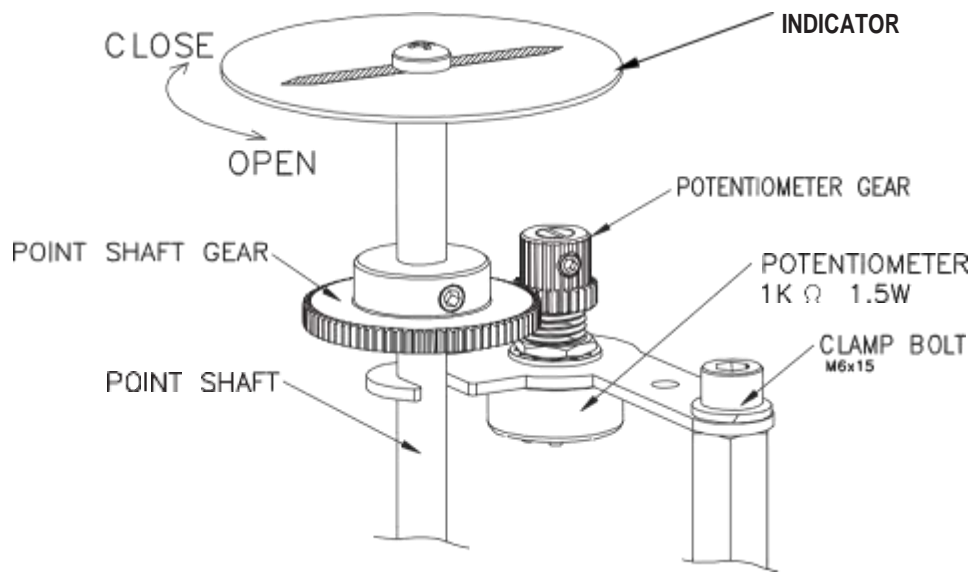


- C. In case, Valve/Damper operates CW=Open and CCW=Close, switch "ON" of "Rev" Dip Switch then Actuator operates CW=Open and CCW=Close same as Valve/Damper Operating Direction.

12) LED Indication on RPC PCB Board

	LED	STATUS
POWER (White)	ON	Power ON
	Flickering	Input Signal Set-up & Change (CH1) Or Manual Set-up (CH2)
CLOSE (Green)	ON	Operating to Close Direction Or places Full Close Position
	Flickering	Operating to Close Direction in Auto Setting(A-SCN)
OPEN (Red)	ON	Operating to Open Direction Or places Full Open Position
	Flickering	Operating to Open Direction in Auto Setting(A-SCN)
FAULT (Yellow)	ON	Auto-Setting(A-SCN) Or Manual Operating
	Flickering	No Input Signal
	Yellow+Green Flickering	Potentiometer Fault
	Yellow+Red Flickering (A-SCAN only)	Motor NOT working NOT change Potentiometer Output Value Actuator Operating Reverse Direction
	Yellow+Green+Red Flickering	Input Signal Memory Fault 4-20mA Input Signal Lose of Auto-Setting(A-SCN)Range Data

## 5. Potentiometer Set-up



### 1) Tools

- A. L-Wrench 1 set (metric)
- B. Screw Driver (-)
- C. Monkey Spanner (1 set)
- D. DC Signal Generator (0~24mADC)
- E. Digital Multi-meter (DMM)
- F. mADC meter (0~25mADC)

### 2) JFEW-0080~JFEW / JFEX-3000

**NOTE. CW = Clockwise / CCW = Counter Clockwise**

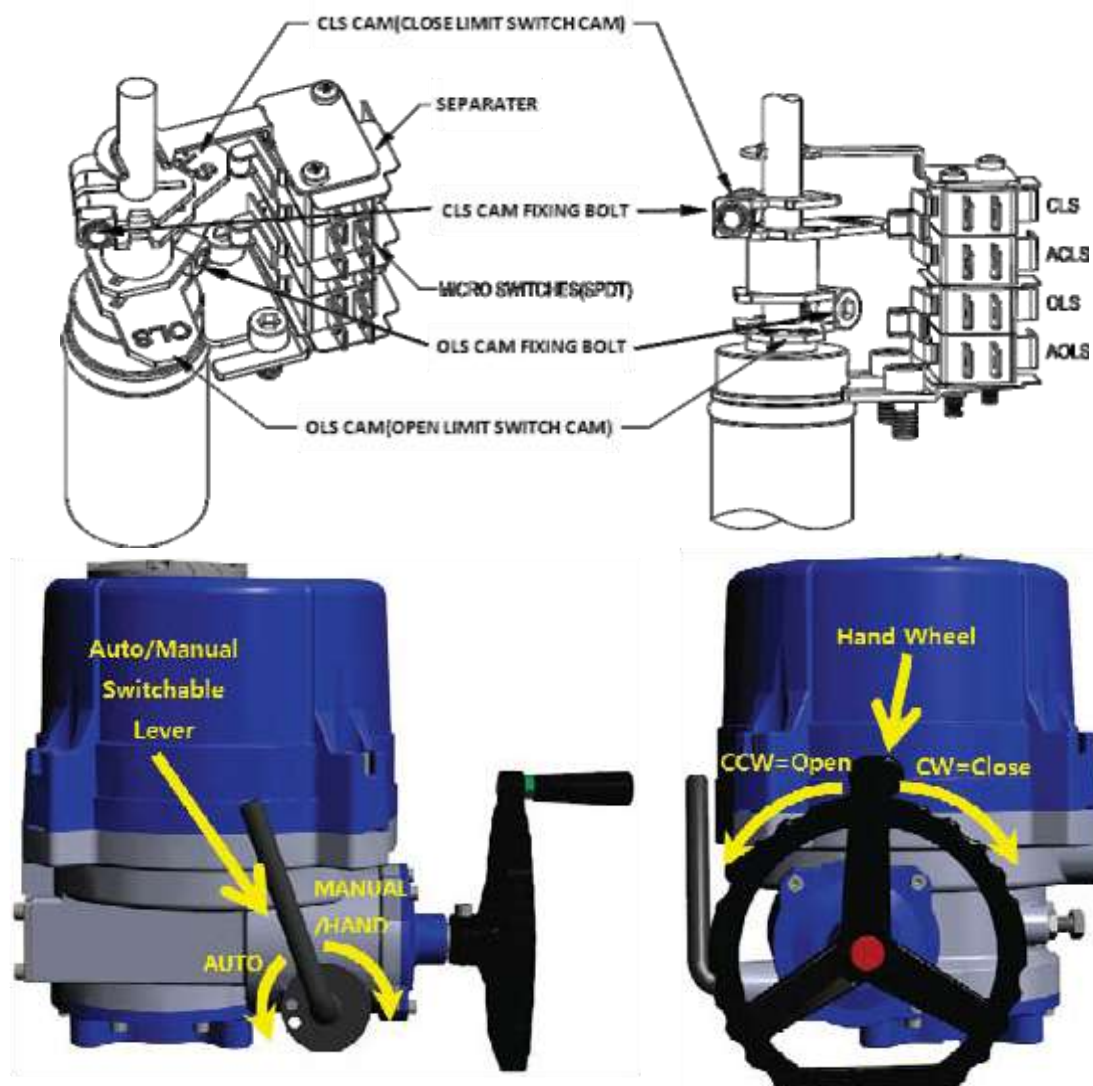
- A. Places Actuator Position at Full Close.
- B. Check if measured output Resistance Value is between 80~120ohm at P1(Orange) & P2(Purple) with measuring instrument (DMM).
- C. If the application is reverse direction operating (CCW=Close), user shall check/measure the output Resistance Value at P2(Purple) & P3(Grey).
- D. Turning PK around by moving Point Shaft Gear with L-Wrench (M4) until measured Resistance Value reaches between 80 ~ 120 ohm. (Close Position Turning)
- E. Places Actuator Position at Full Open.
- F. Check if measured output Resistance Value is within 980 ohm at P1(Orange) & P2(Purple) with measuring instrument (DMM).
- G. If measured output Resistance Value is exceeded 980 ohm at P1(Orange) & P2(Purple), user needs to adjust OLS CAM otherwise there will be expected a malfunction of equipment.

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## 3) IQL04~IQL25 & JFEX-6000~JFEX-9000 (Gear Box Type)

- A. Places Actuator Position at Full Close.
- B. Check if measured output Resistance Value is between 80~120ohm at P3(Grey) & P2(Purple) with measuring instrument (DMM).
- C. If the application is reverse direction operating (CCW=Close), user shall check/measure the output Resistance Value at P2(Purple) & P1(Orange).
- D. Turning PK around by moving Point Shaft Gear with L-Wrench (M4) until measured Resistance Value reaches between 80 ~ 120 ohm. (Close Position)
- E. Places Actuator Position at Full Open.
- F. Check if measured output Resistance Value is within 980 ohm at P3(Grey) & P2(Purple) with measuring instrument (DMM).
- G. If measured output Resistance Value is exceeded 980 ohm at P3(Grey) & P2(Purple), user needs to adjust OLS CAM otherwise there is expected a malfunction of equipment.

## 6. Limit Switch Set-up



Remote Position Controller (RPC)  
Installation and Operating manual



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- 1) Switches "Auto/Manual Switchable Lever" to CW direction (toward to "Manual/Hand") then rotate "Hand Wheel" to CW (Close) direction and make Full Close Position of Valve/Damper and Actuator.
- 2) Make loosen Close Limit Cam Fixing Bolt with Hex Wrench, adjust CLS CAM in CW or CCW direction, makes match CLS CAM Position at Limit Switch Contact then fix the bolt tighten.
- 3) Switches "Auto/Manual Switchable Lever" to CW direction (toward to "Manual/Hand") then rotate "Hand Wheel" to CCW (Open) direction and make Full Open Position of Valve/Damper and Actuator.
- 4) Make loosen Open Limit Cam Fixing Bolt with Wrench, adjust OLS CAM in CW or CCW direction, makes match OLS CAM Position at Limit Switch Contact then fix the bolt tighten.
- 5) When Actuator Operates with Main Power, the "Auto/Manual Switchable Lever returns back to "AUTO" automatically.

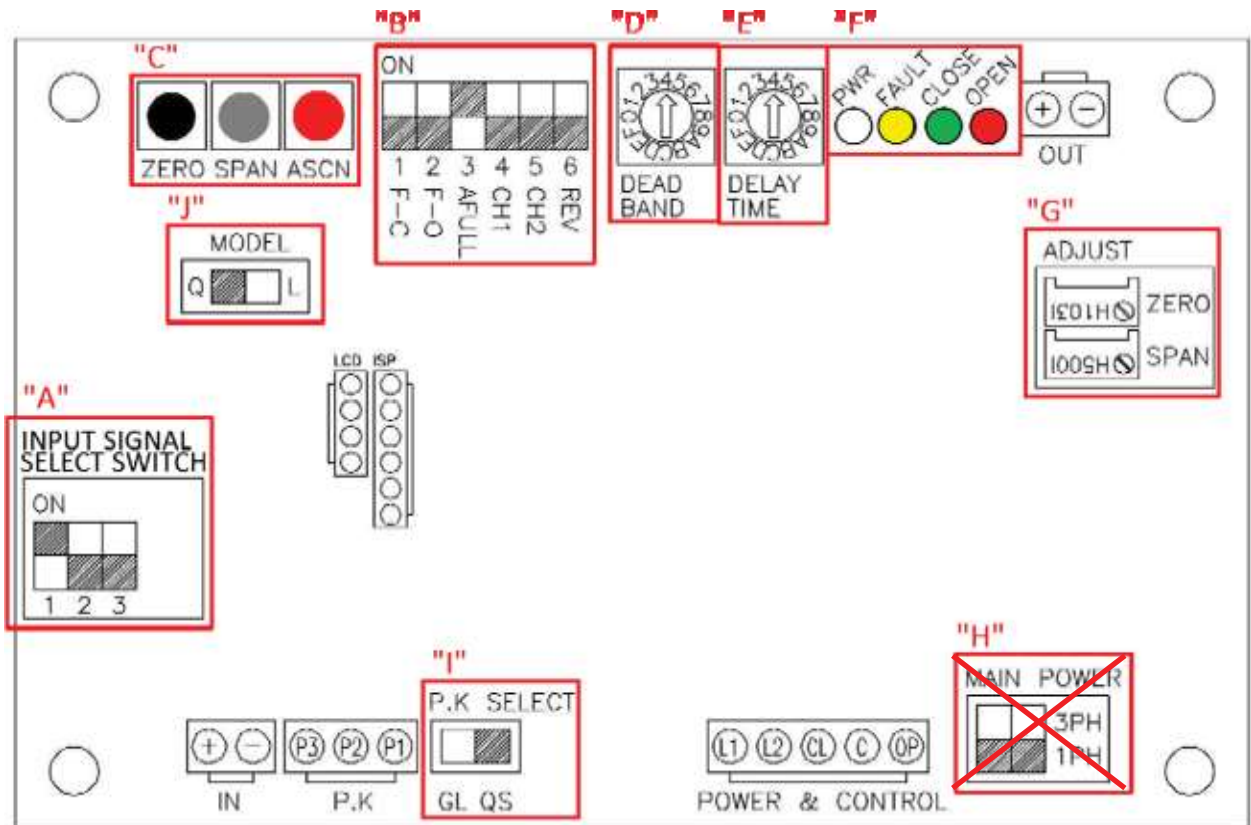
## 7. RPC Operating Status by Signal

Actuator Position		Full Close	Full Open
Input Signal	4 ~ 20mA	4mA	20mA
	2 ~ 10V	2V	10V
	0 ~ 10V	0V	10V
	0 ~ 5V	0V	5V
	1 ~ 5V	1V	5V
Output Signal	4 ~ 20mA	4mA	20mA
LED Status		Close(Green) stays "ON"	Open(Red) Stays "ON"
AUTO Setting		Close(Green) Flickering	Open(Red) Flickering
No Input Signal		Fault(Yellow) Flickering	



# JFEW / JFEX ELECTRIC QUARTER TURN ACTUATOR IQL LINEAR ACTUATOR

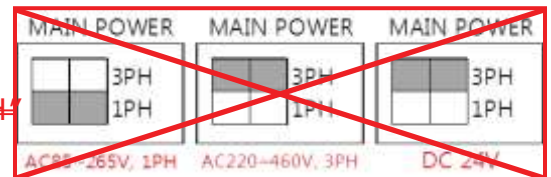
## 8. RPC Lay-out



- 1) Model Selection (Refer to "J" in "8. RPC Lay-out")
  - A. "Q" : JFEW / JFEX Series (Quarter Turn Actuator)
  - B. "L" : IQL Series (Linear Actuator)
- 2) Potentiometer Selection (Refer to "I" in "8. RPC Lay-out")
  - A. "QS" : JFEW / JFEX Series (Quarter Turn Actuator), Except JFEX-6000 ~ JFEX-9000
  - B. "GL" : IQL Series (Linear Actuator) & JFEX-6000~JFEX-9000 (Gear Box Type)

~~3) Main Power Selection (Refer to "H" in "8. RPC Lay-out")=~~

- ~~A. AC 85~265V, 1 Phase : Places Dip Switches at "1PH"~~
- ~~B. AC 220~460V, 3 Phases : Places Dip Switches at "3PH"~~
- C. DC 24V : Places Dip Switches at "3PH"



## 9. LCD Lay-out (Optional-ICM2)

- 1) Current Status
  - A. CLOSING / FULL CLOSE
  - B. OPENING / FULL OPEN
  - C. STOP
- 2) Signal Fail Safe Position Set-up Status
  - A. F-CL : FAIL CLOSE
  - B. F-OP : FAIL OPEN
  - C. NONE : FAIL STOP
- 3) Tolerance (Dead-Band) Set-up Status
- 4) Delay Time(Motor Recess Time set-up when running in Reverse Direction)
- 5) Input Signal Value given to Actuator
- 6) Actuator Current Position Value
- 7) Reverser Operating Status Confirmation
  - A. NONE (Normal) : CW=Close, CCW=Open
  - B. R(REV) : CW=Open, CCW=Close



## 10. RPC PCB Card Replacement

- 1) Power must be Turned Off before starting Replacement of RPC PCB Card.
- 2) Set-up all of Switches same as before Replacement.
- 3) Correctly and Normally connect those Cables and Connectors of Power, Potentiometer (PK), Input and Output Signal.
- 4) Places Full Close Position of Actuator then measure and confirm Potentiometer (PK) Value with measuring instrument such as DMM(Digital Multi Meter).
- 5) Power ON, check if Power(White) LED turns ON.
- 6) Press ASCN(Red) button for 2 sec. and perform Auto Scan at least one time.
- 7) Completed Auto Scan, check if Power(White) LED turns ON.
- 8) Input Operating Signal, check if Actuator operates well or not.